Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-13/1036 of 12 December 2017

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	Injection system Hilti HIT-HY 270
Product family to which the construction product belongs	Injection system for use in masonry
Manufacturer	Hilti AG Feldkircherstraße 100 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Werke
This European Technical Assessment contains	50 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	ETAG 029, April 2013, used as EAD according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.
This version replaces	ETA-13/1036 issued on 28 April 2015

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Specific part

1 Technical description of the product

The Injection system Hilti HIT-HY 270 for masonry is a bonded anchor (injection type) consisting of a mortar foil pack with injection mortar Hilti HIT-HY 270, a perforated sieve sleeve and an anchor rod with hexagon nut and washer in the range of M6 to M16 or an internal threaded sleeve 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 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)

Essential characteristic	Performance
Characteristic resistance for steel elements	See Annex C1
Characteristic resistance for anchors in masonry units	See Annex C3 – C30
Displacements under shear and tension loads	See Annex C3 – C30
Reduction Factor for job site tests (β-Factor)	See Annex C1
Edge distances and spacing	See Annex C2 – C30
Group factor for group fastenings	See Annex C2 – C30

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	No performance assessed (NPA)

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

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3.4 Safety and accessibility in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

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

In accordance with guideline for European technical approval ETAG 029, April 2013 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 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 with Deutsches Institut für Bautechnik.

Issued in Berlin on 12 December 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Baderschneider

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Installed condition

Figure A1: Hollow and solid brick with threaded rod, HIT-V-... and one sieve sleeve HIT-SC (see Table B5), or with internally threaded sleeve HIT-IC and one sieve sleeve HIT-SC (see Table B7)

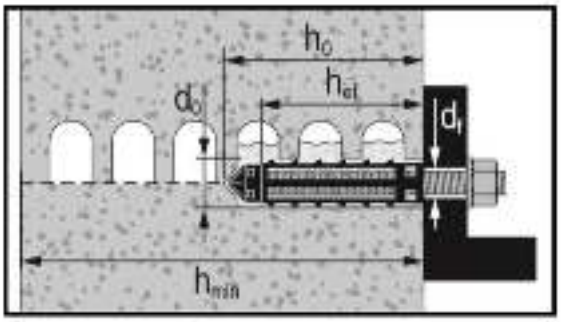


Figure A2: Hollow and solid brick with threaded rod, HIT-V-... and two sieve sleeves HIT-SC for deeper embedment depth (see Table B6)

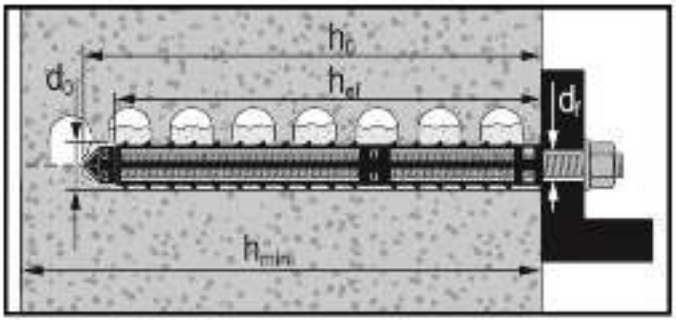
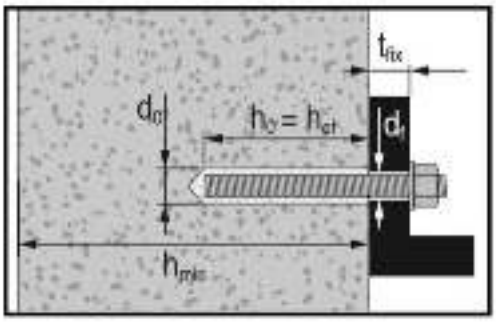


Figure A3: Solid brick with threaded rod, HIT-V-... (see Table B8)



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Hilti HIT-HY 270	
Product description Installed condition	**Annex A1**

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Figure A4: Solid brick with internally threaded sleeve HIT-IC (see Table B9)

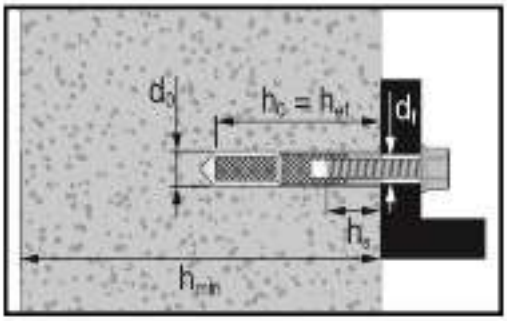
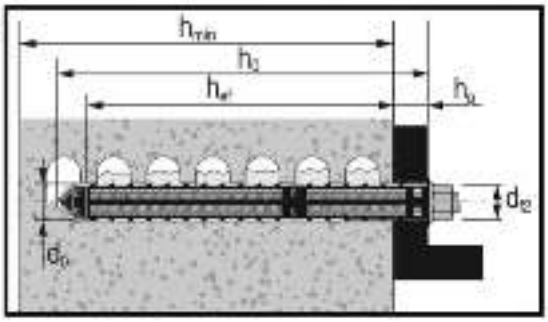
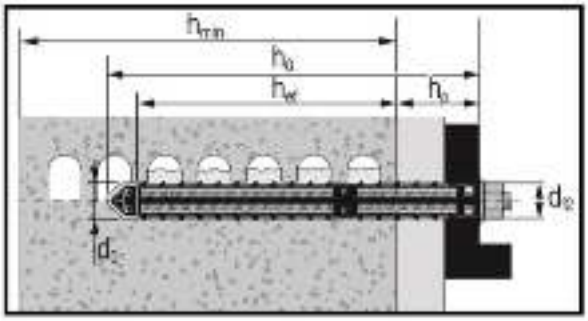


Figure A5: Hollow and solid brick with threaded rod, HIT-V-... with two sieve sleeves HIT-SC for setting through the fixture and/or through the non-loadbearing layer (see Table B10)

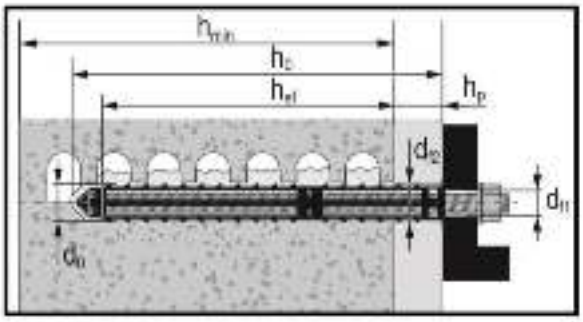
a)



b)



c)



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Hilti HIT-HY 270	
Product description Installed condition	**Annex A2**

Product description: Injection mortar and steel elements

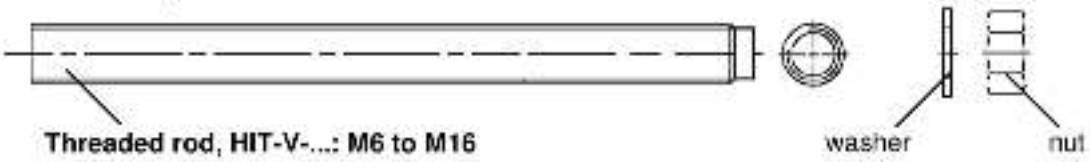
Injection mortar Hilti HIT-HY 270: hybrid system with aggregate
330 ml and 500 ml



Static mixer Hilti HIT-RE-M



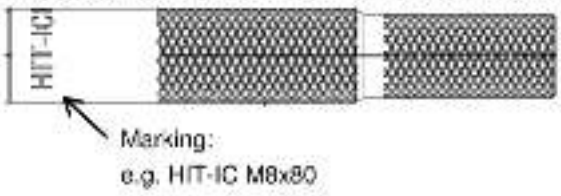
Threaded rod, HIT-V-...



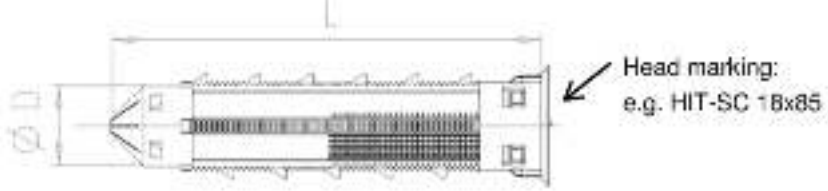
Commercial standard threaded rod with:

- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. to EN 10204:2004. The document shall be stored.
- Marking of embedment depth

Internally threaded sleeve HIT-IC M8 to M12



Sieve sleeve HIT- SC 16 to 22



Hilti HIT-HY 270	**Annex A3**
Product description Injection mortar / Static mixer / Steel elements / Sieve sleeve	

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Table A1: Materials

Designation	Material
Metal parts made of zinc coated steel	
Threaded rod, HIT-V-5.8(F)	Strength class 5.8, f_{uk} = 500 N/mm², f_{yk} = 400 N/mm², Rupture elongation (l_c = 5d) > 8% ductile Electroplated zinc coated ≥ 5 µm, (F) Hot dip galvanized ≥ 45 µm
Threaded rod, HIT-V-8.8(F)	Strength class 8.8 , f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², Rupture elongation (l_c = 5d) > 8% ductile Electroplated zinc coated ≥ 5 µm, (F) Hot dip galvanized ≥ 45 µm
Internally threaded sleeve HIT-IC	f_{uk} = 490 N/mm², f_{yk} = 390 N/mm² Rupture elongation (l_c = 5d) (l_0–5d) > 8% ductile Electroplated zinc coated ≥ 5 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
Metal parts made of stainless steel	
Threaded rod, HIT-V-R	Strength class 70 f_{uk} = 700 N/mm², f_{yk} = 450 N/mm², Rupture elongation (l_c = 5d) > 8% ductile Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1: 2014
Washer	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1: 2014
Nut	Strength class of nut adapted to strength class of threaded rod 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	
Threaded rod, HIT-V-HCR	f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², Rupture elongation (l_c = 5d) > 8% ductile High corrosion resistant steel 1.4529, 1.4565 EN 10088-1: 2014
Washer	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1: 2014
Nut	Strength class of nut adapted to strength class of threaded rod High corrosion resistant steel 1.4529, 1.4565 EN 10088-1: 2014
Plastic parts	
Sieve sleeve HIT-SC	Frame: FPP 20T Sieve: PA6.6 N500/200

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Hilti HIT-HY 270	
Product description Materials	**Annex A4**

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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 B3 and B5.
- Mortar strength class of the masonry: M2,5 at minimum according to EN 998-2: 2010.
- 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 ETAG 029, Annex B under consideration of the β-factor according to Annex C1, Table C1.

Table B1: Overview use categories

Anchorages subject to:		**HIT-HY 270 with threaded rod, HIT-V or HIT-IC**	
		in solid bricks	**in hollow bricks**
Hole drilling		hammer mode	rotary mode
Static and quasi static loading		Annex : C1 (steel), C3 to C20	Annex : C1 (steel), C21 to C30
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 (except calcium silicate bricks). Category **w/w** - **Installation and use** in structures subject to **dry or wet** environmental conditions (except calcium silicate bricks).	
Installation direction Masonry		horizontal	
Installation direction Ceiling brick		overhead	
Use category		b (solid masonry)	c (hollow or perforated masonry)
Temperature in the base material at installation		+5° C to +40° C (Table B11)	-5° C to +40° C (Table B12)
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)

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Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal conditions, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal conditions, if other particular aggressive conditions exist
  (high corrosion resistant steel).
  Note: Particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e.g. in desulphurization plants or road tunnels where de-icing products are used).

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, etc.).
- Anchorages under static or quasi-static loading are designed in accordance with:
  ETAG 029, Annex C, Design method A.
- In case of a brick compressive strength f_b is smaller than the highest strength stated in the load table the load can be calculated according to the following Equation:

  $F_{Rk,act.} = F_{Rk,ETA,(fb)} * (f_{b,act}/f_{b\,ETA})^{\alpha}$

  $F_{Rk,act.}$ = Resistance of the fastener in the actual masonry unit
  $F_{Rk,ETA,(fb)}$ = Resistance of the fastener in the masonry unit stated in annex C3 to C30
  $f_{b,act.}$ = Actual normalized mean compressive strength of the masonry unit according to EN 772-1:2011
  $f_{b\,ETA.}$ = Normalized mean compressive strength stated in annexes C3 to C30
  α = 0,5 for masonry units of clay or concrete and solid unit of calcium silicate
  α = 0,75 for masonry units of perforated calcium silicate
- For hollow brick masonry. The shear load vertical to the free edge must be transferred via the vertical joint. (Completely filled joint or direct contact.)
- For hollow brick masonry shear load only without lever arm permitted.

Installation:

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

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Hilti HIT-HY 270	
Intended Use Specifications	**Annex B2**

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Table B2: Overview brick types and properties

Brick type	Picture	Brick size [mm]	Compressive strength $f_{b,ETA}$ [N/mm²]	Bulk density [kg/dm³]	Annex
Solid clay brick EN 771-1		≥ 240x115x52	12 / 20 / 40	2,0	C3/C4
Solid clay brick EN 771-1		≥ 240x115x72	10 / 20	2,0	C5/C7
Solid clay brick EN 771-1		≥ 240x115x113	12 / 20	2,0	C8/C10
Solid calcium silicate brick EN 771-2		≥ 240x115x113	12 / 28	2,0	C11/C12
Solid calcium silicate brick EN 771-2		≥ 248x240x248	12 / 20 / 28	2,0	C13/C16
Solid ligh: weight concrete brick EN 771-3		≥ 240x115x113	4 / 6	0,9	C17/C18
Solid normal weight concrete brick EN 771-3		≥ 240x115x113	6 / 16	2,0	C19/C20
Hollow clay brick EN 771-1		300x240x238	12 / 20	1,4	C21/C22
Hollow calcium silicate brick EN 771-2		248x240x248	12 / 20	1,4	C23/C24
Hollow lightweight concrete brick EN 771-3		495x240X238	2 / 6	0,7	C25/C27
Hollow normal weight concrete brick EN 771-3		500x200x200	4 / 10	0,9	C28/C29
Hollow clay brick EN 771-1 Ceiling brick		250x510x180	DIN EN 15037-3 class R2	1,0	C30

Hilti HIT-HY 270

Intended Use
Brick types and properties

Annex B3

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Table B3: Overview fastening elements (including sizes and embedment depths) and corresponding brick types

Brick type	Picture	HIT-V [1]	HIT-IC	HIT- V [1] + HIT-SC	HIT-IC + HIT-SC	Annex
Solid clay brick EN 771-1		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C3/C4
Solid clay brick EN 771-1		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C5/C7
Solid clay brick EN 771-1		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C8/C10
Solid calcium silicate brick EN 771-2		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C11/C12
Solid calcium silicate brick EN 771-2		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C13/C16
Solid light weight concrete brick EN 771-3		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C17/C18
Solid normal weight concrete brick EN 771-3		M8 to M16 h_{ef} = 50 mm to 300 mm	M8 to M12	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C19/C20
Hollow clay brick EN 771-1		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C21/C22
Hollow calcium silicate brick EN 771-2		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C23/C24
Hollow lightweight concrete brick EN 771-3		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C25/C27
Hollow normal weight concrete brick EN 771-3		-	-	M8 to M16 h_{ef} = 50 mm to 160 mm	M8 to M12	C28/C29
Hollow clay brick EN 771-1 Ceiling brick		-	-	M6 h_{ef} = 80 mm	-	C30

[1] Commercial standard threaded rods can also be used.

Hilti HIT-HY 270

Intended Use
Fastening elements and corresponding brick types

Annex B4

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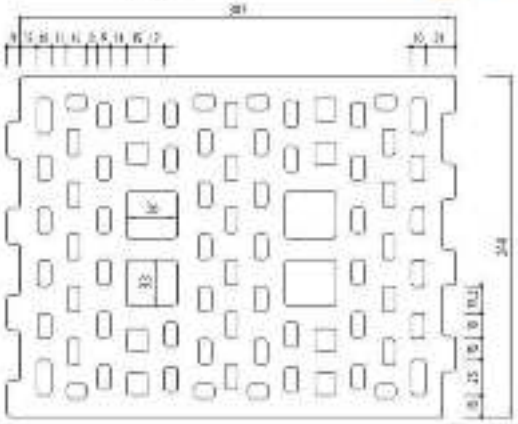
Table B4: Details of hollow bricks

Hollow clay brick
EN 771-1

Rapis Ziegel Hlz 12-1,4-10DF

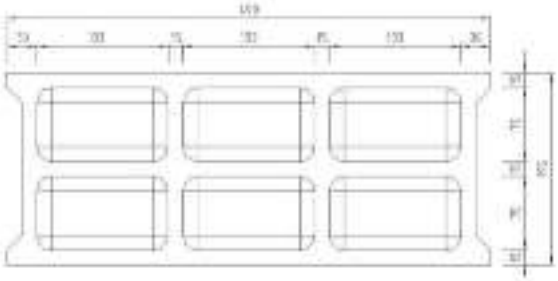




Hollow normal weight concrete brick EN 771-3

Parpaing creux
B40

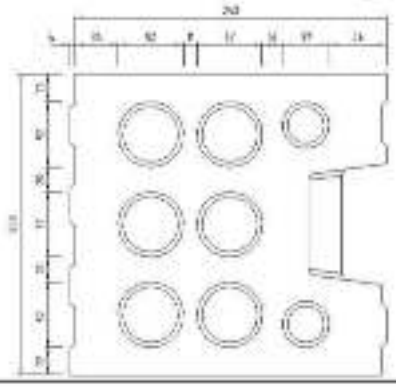




Hollow calcium silicate brick
EN 771-2

KS Wemding
KSL-R(P) 12-1,4 8DF

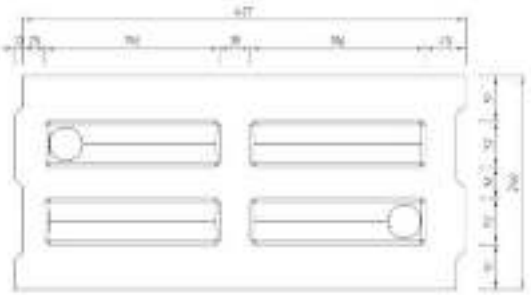




Hollow lightweight concrete brick
EN 771-3

Knobel Betonwerk
Hbl 4-0,8-500x240x238

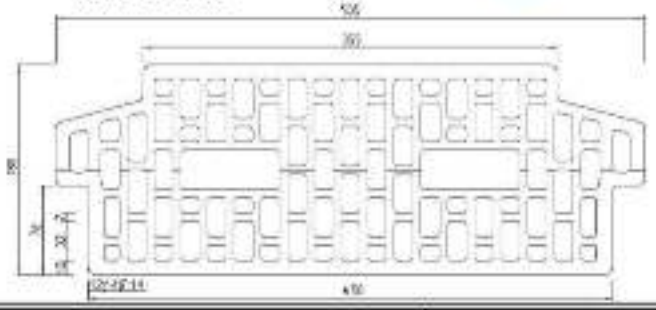




Hollow clay brick EN 771-1

Ceiling brick
Fiedler Brick Ceiling Type
18+0 or 18+3





Hilti HIT-HY 270

Intended Use
Details of hollow bricks

Annex B5

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Table B5: Installation parameters of threaded rod, HIT-V-... with one sieve sleeve HIT-SC in hollow brick and solid brick (Figure A1)

Threaded rod, HIT-V-...			M6	M8		M10		M12		M16	
with HIT-SC			12x85	16x50	16x85	16x50	16x85	18x50	18x85	22x50	22x85
Nominal diameter of drill bit	d_0	[mm]	12	16	16	16	16	18	18	22	22
Drill hole depth	h_0	[mm]	95	60	95	60	95	60	95	60	95
Effective embedment depth	h_{ef}	[mm]	80	50	80	50	80	50	80	50	80
Maximum diameter of clearance hole in the fixture	d_f	[mm]	7	9	9	12	12	14	14	18	18
Minimum wall thickness	h_{min}	[mm]	115	80	115	80	115	80	115	80	115
Brush HIT-RB	-	[-]	12	16	16	16	16	18	18	22	22
Number of strokes HDM	-	[-]	5	4	6	4	6	4	8	6	10
Number of strokes HDE 500-A	-	[-]	4	3	5	3	5	3	6	5	8
Maximum torque moment for all brick types except "parpaing creux"	T_{max}	[Nm]	0	3	3	4	4	6	6	8	8
Maximum torque moment for "parpaing creux"	T_{max}	[Nm]	-	2	2	2	2	3	3	6	6

Table B6: Installation parameters of threaded rod, HIT-V-... with two HIT-SC in hollow brick and solid brick for deeper embedment depth (Figure A2)

Threaded rod, HIT-V-...			M8		M10	
with HIT-SC			16x50+16x85	16x85+16x85	16x50+16x85	16x85+16x85
Nominal diameter of drill bit	d_0	[mm]	16	16	16	16
Drill hole depth	h_0	[mm]	145	180	145	180
Effective embedment depth	h_{ef}	[mm]	130	160	130	160
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	9	12	12
Minimum wall thickness	h_{min}	[mm]	195	230	195	230
Brush HIT-RB	-	[-]	16	16	16	16
Number of strokes HDM	-	[-]	4+6	6+6	4+6	6+6
Number of strokes HDE-500	-	[-]	3+5	5+5	3+5	5+5
Maximum torque moment	T_{max}	[Nm]	3	3	4	4

Table B6 continued

Threaded rod, HIT-V-...			M12		M16	
with HIT-SC			18x50+18x85	18x85+18x85	22x50+22x85	22x85+22x85
Nominal diameter of drill bit	d_0	[mm]	18	18	22	22
Drill hole depth	h_0	[mm]	145	180	145	180
Effective embedment depth	h_{ef}	[mm]	130	160	130	160
Maximum diameter of clearance hole in the fixture	d_f	[mm]	14	14	18	18
Minimum wall thickness	h_{min}	[mm]	195	230	195	230
Brush HIT-RB	-	[-]	18	18	22	22
Number of strokes HDM	-	[-]	4+8	8+8	6+10	10+10
Number of strokes HDE-500	-	[-]	3+6	6+6	5+8	8+8
Maximum torque moment	T_{max}	[Nm]	6	6	8	8

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Table B7: Installation parameters of internally threaded sleeve HIT-IC... with HIT-SC in hollow brick and solid brick (Figure A1)

HIT-IC...			**M8x80**	**M10x80**	**M12x80**
with HIT-SC			**16x85**	**18x85**	**22x85**
Nominal diameter of drill bit	d_0	[mm]	16	18	22
Drill hole depth	h_0	[mm]	95	95	95
Effective embedment depth	h_{ef}	[mm]	80	80	80
Thread engagement length	h_s	[mm]	8...75	10...75	12...75
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	18	22
Number of strokes HDM	-	[-]	6	8	10
Number of strokes HDE-500	-	[-]	5	6	8
Maximum torque moment	T_{max}	[Nm]	3	4	6

Table B8: Installation parameters of threaded rods, HIT-V-... in solid brick (Figure A3)

Threaded rod, HIT-V-...			**M8**	**M10**	**M12**	**M16**
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18
Drill hole depth = Effective embedment depth	h_0= h_{ef}	[mm]	50...300	50...300	50...300	50...300
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18
Minimum wall thickness	h_{min}	[mm]	h_0+30	h_0+30	h_0+30	h_0+36
Brush HIT-RB	-	[-]	10	12	14	18
Maximum torque moment	T_{max}	[Nm]	5	8	10	10

Table B9: Installation parameters of internally threaded sleeve HIT-IC... in solid brick (Figure A4)

HIT-IC...			**M8x80**	**M10x80**	**M12x80**
Nominal diameter of drill bit	d_0	[mm]	14	16	18
Drill hole depth = Effective embedment depth	h_0= h_{ef}	[mm]	80	80	80
Thread engagement length	h_s	[mm]	8...75	10...75	12...75
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	-	[-]	14	16	18
Maximum torque moment	T_{max}	[Nm]	5	8	10

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Table B10: Installation parameters of threaded rod, HIT-V-... with two sieve sleeves HIT-SC for setting through the fixture and/or through the non- loadbearing layer in hollow brick and solid brick (Figure A5)

Threaded rod, HIT-V-...			M8		M10	
with HIT-SC			16x50+16x85	16x85+16x85	16x50+16x85	16x85+16x85
Nominal diameter of drill bit	d_0	[mm]	16	16	16	16
Drill hole depth	h_0	[mm]	145	180	145	180
Min. effective embedment depth	$h_{ef,min}$	[mm]	80	80	80	80
Max. thickness of non-loadbearing layer and fixture (through setting)	$h_{b,max}$	[mm]	50	80	50	80
Max. diameter of clearance hole in the fixture (pre-setting)	d_f	[mm]	9	9	12	12
Max. diameter of clearance hole in the fixture (through setting)	d_f	[mm	17	17	17	17
Min. wall thickness	h_{min}	[mm]	h_{ef}+65	h_{ef}+70	h_{ef}+65	h_{ef}+70
Brush HIT-RB	-	[-]	16	16	16	16
Number of strokes HDM	-	[-]	4+6	6+6	4+6	6+6
Number of strokes HDE-500	-	[-]	3+5	5+5	3+5	5+5
Maximum torque moment for all brick types except "parpaing creux"	T_{max}	[Nm]	3	3	4	4
Maximum torque moment for "parpaing creux"	T_{max}	[Nm]	2	2	2	2

Table B10 continued

Threaded rod, HIT-V-...			M12		M16	
with HIT-SC			18x50+18x85	18x85+18x85	22x50+22x85	22x85+22x85
Nominal diameter of drill bit	d_0	[mm]	18	18	22	22
Drill hole depth	h_0	[mm]	145	180	145	180
Min. effective embedment depth	$h_{ef,min}$	[mm]	80	80	80	80
Max. thickness of non-loadbearing layer and fixture (for through setting)	$h_{b,max}$	[mm]	50	80	50	80
Max. diameter of clearance hole in the fixture (pre-setting)	d_f	[mm]	14	14	18	18
Max. diameter of clearance hole in the fixture (through setting)	d_f	[mm	19	19	23	23
Min. wall thickness	h_{min}	[mm]	h_{ef}+65	h_{ef}+70	h_{ef}+65	h_{ef}+70
Brush HIT-RB	-	[-]	18	18	22	22
Number of strokes HDM	-	[-]	4+8	8+8	6+10	10+10
Number of strokes HDE-500	-	[-]	5+8	8+8	5+8	8+8
Maximum torque moment for all brick types except "parpaing creux"	T_{max}	[Nm]	6	6	8	8
Maximum torque moment for "parpaing creux"	T_{max}	[Nm]	3	3	6	6

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Table B11: 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 9 °C	10 min	2,5 h
10 °C to 19 °C	7 min	1,5 h
20 °C to 29 °C	4 min	30 min
30 °C to 40 °C	1 min	20 min

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

Table B12: 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}
-5 °C to -1 °C	10 min	6 h
0 °C to 4 °C	10 min	4 h
5 °C to 9 °C	10 min	2,5 h
10 °C to 19 °C	7 min	1,5 h
20 °C to 29 °C	4 min	30 min
30 °C to 40 °C	1 min	20 min

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

Table B13: Cleaning alternatives

Manual Cleaning (MC):
Hilti hand pump for blowing out drill hole diameter $d_0 \leq 18$ mm and drill hole depth up to $h_0 = 100$ mm.



Compressed air cleaning (CAC):
Air nozzle with an orifice opening of minimum 3,5 mm in diameter for blowing out drill hole depth up to $h_0 = 300$ mm.



Steel brush HIT-RB:
According to tables B5 to B10 depending on drill hole diameter for MC and CAC.



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Annex B9

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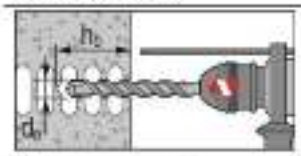
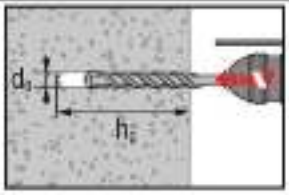
Installation

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



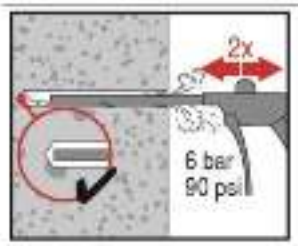
In hollow bricks (use category c): rotary mode
Drill hole to the required embedment depth with a hammer drill set in rotation mode using an appropriately sized carbide drill bit.



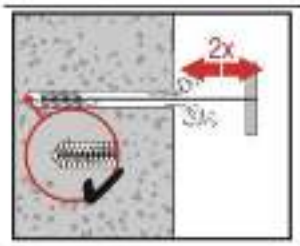
In solid bricks (use category b): hammer mode
Drill hole to the required embedment depth with a hammer drill set in hammer mode using an appropriately sized carbide drill bit.

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

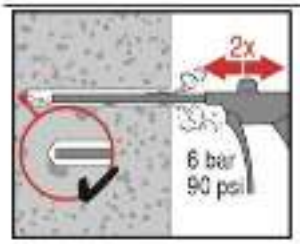
Manual Cleaning (MC) or Compressed Air Cleaning (CAC) for hollow and solid bricks



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with Hilti hand pump (drill hole diameter $d_0 \leq 18$ mm and drill hole depth up to $h_0 = 100$ mm) or oil-free compressed air (min. 6 bar at 6 m³/h; drill hole depth up to $h_0 = 300$ mm) until return air stream is free of noticeable dust.



Brush 2 times with the specified steel brush (tables B5 to B10) 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 Hilti hand pump or compressed air 2 times until return air stream is free of noticeable dust.

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Intended Use Installation instructions	**Annex B10**

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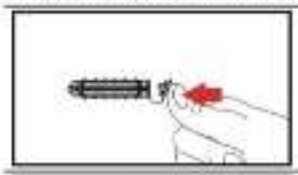
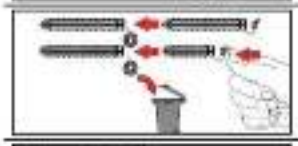
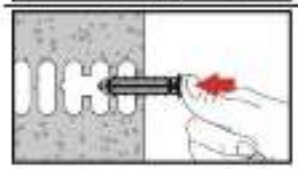
Injection preparation in masonry with holes or voids: installation with sieve sleeve HIT-SC



Single sieve sleeve HIT-SC
Close lid



Two sieve sleeves HIT-SC
Plug sieve sleeves together. Discard superfluous lid.
Observe sieve sleeve order in case of different sieve sleeve lengths: shorter sleeve has to be plugged into longer sleeve.

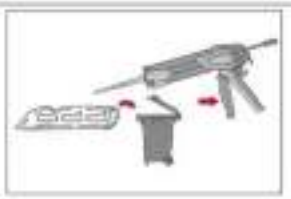


Insert sieve sleeve manually.
When using two sieve sleeves, longer sieve sleeve has to be be inserted first.

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.

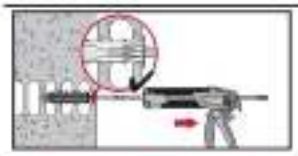


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discarded quantities are

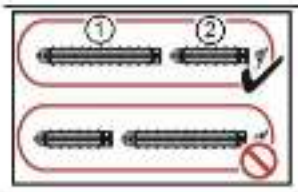
2 strokes	for 330 ml foil pack,
3 strokes	for 500 ml foil pack.

Inject adhesive without forming air voids

Installation with sieve sleeve HIT-SC



Single sieve sleeve HIT-SC
Insert mixer approximately 1 cm through the lid. Inject required amount of adhesive (see tables B5 to B10). Adhesive must emerge through the lid.



Two sieve sleeves HIT-SC
Use extension for installation with two sieve sleeves.
Insert mixer approximately 1 cm through the tip of sieve sleeve "2" and inject required amount of adhesive into sieve sleeve "1" (see tables B5 to B10).
Withdraw mixer to the point where it extends about 1 cm through the lid into the sleeve "2". Continue injecting in sieve sleeve "2" as described above.



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 270	
Intended Use Installation instructions	**Annex B11**

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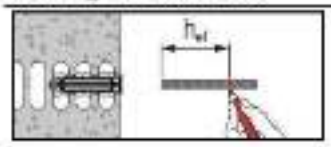
Solid bricks: installation without sieve sleeve



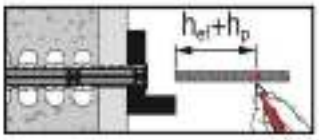
Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.
Fill holes approximately 2/3 full to ensure that the annular gap between the anchor and the base material is completely filled with adhesive along the embedment length.
After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

Setting the element:

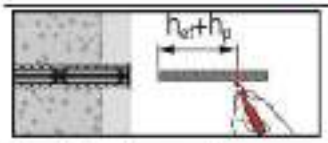
Before use, verify that the element is dry and free of oil and other contaminants.



HIT-V-...or HIT-IC in hollow and solid bricks:
Pre-setting (Figure A1 to Figure A4)
Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B11 and Table B12.

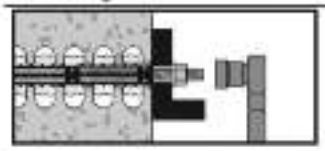


HIT-V-... in hollow and solid bricks:
setting through the fixture (Figure A5a)
or through the non-loadbearing layer and the fixture (Figure A5b)
Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B11 and Table B12.



HIT-V-... in hollow and solid bricks:
setting through the non-loadbearing (Figure A5c)
Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B11 and Table B12.

Loading the anchor



After required curing time t_{cure} (see Table B11 and Table B12) the anchor can be loaded.
The applied installation torque shall not exceed the values T_{max} given in tables B5 to B10.

Hilti HIT-HY 270	
Intended Use Installation instructions	**Annex B12**

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

Use categories		w/w and w/d		d/d	
Temperature range		**Ta***	**Tb***	**Ta***	**Tb***
Base material	**Cleaning**				
Solid clay brick EN 771-1	CAC	0,96	0,96	0,96	0,96
	MC	0,84	0,84	0,84	0,84
Solid calcium silicate brick EN 771-2	CAC/MC	-	-	0,96	0,80
Solid light weight concrete brick EN 771-3	CAC	0,82	0,68	0,96	0,80
	MC	0,81	0,67	0,90	0,75
Solid normal weight concrete brick EN 771-3	CAC/MC	0,96	0,80	0,96	0,80
Hollow clay brick EN 771-1	CAC	0,96	0,96	0,96	0,96
	MC	0,84	0,84	0,84	0,84
Hollow calcium silicate brick EN 771-2	CAC/MC	-	-	0,96	0,80
Hollow light weight concrete brick EN 771-3	CAC	0,69	0,57	0,81	0,67
	MC	0,68	0,56	0,76	0,63
Hollow normal weight concrete brick EN 771-3	CAC/MC	0,96	0,80	0,96	0,80

*Temperature range Ta / Tb see Annex B1

Table C2: Characteristic values of steel resistance for threaded rods, HIT-V under tension and shear loads in masonry

Steel failure tension loads			**M6**	**M8**	**M10**	**M12**	**M16**
Characteristic steel resistance	$N_{Rk,s}$	[kN]	$A_s \cdot f_{uk}$				
Steel failure shear loads without lever arm							
Characteristic steel resistance	$V_{Rk,s}$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$				
Steel failure shear loads with lever arm							
Characteristic bending moment	$M_{Rk,s}$	[kN]	$1,2 \cdot W_{el} \cdot f_{uk}$				

Table C3: Characteristic values of steel resistance for internally threaded sleeve HIT-IC under tension and shear loads in masonry

Steel failure tension loads			**M8**	**M10**	**M12**
HIT-IC	$N_{Rk,s}$	[kN]	5,9	7,3	13,8
Partial safety factor	$\gamma_{Ms,N}$	[-]	1,50		
Steel failure shear loads without lever arm for threaded rods or screws					
Characteristic steel resistance	$V_{Rk,s}$	[kN]	$0,5 \cdot A_s \cdot f_{uk}$		
Steel failure shear loads with lever arm for threaded rods or screws					
Characteristic bending moment	$M_{Rk,s}$	[kN]	$1,2 \cdot W_{el} \cdot f_{uk}$		

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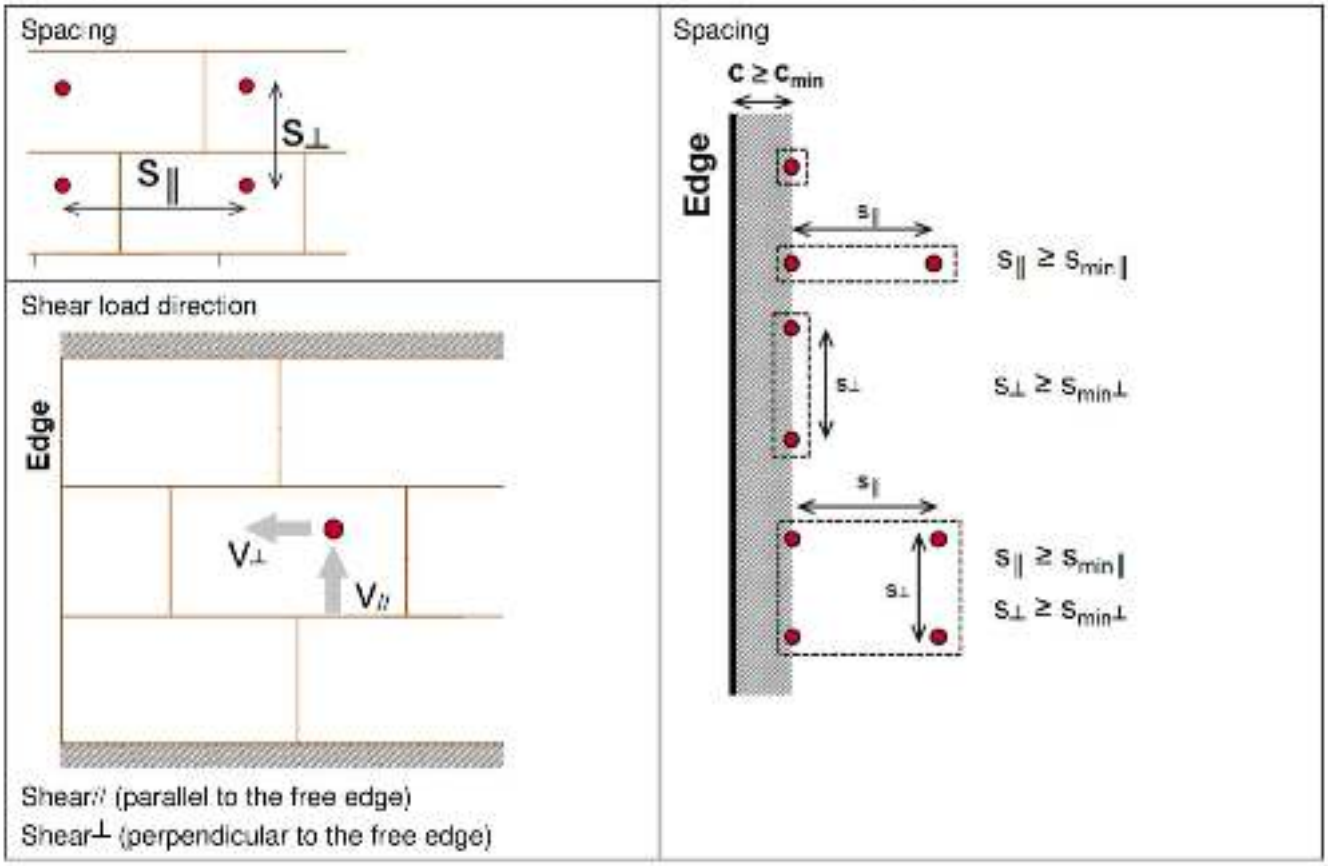
Hilti HIT-HY 270	
Performances β-factors for job-site testing under tension load Characteristic resistances under tension and shear load – steel failure	**Annex C1**

Spacing dependent on edge distances for all anchor combinations:



The characteristic values of resistance of an anchor group are calculated by using the group-factors α_g according to Annexes C3 to C30:

Group of two anchors: $N^g_{Rk} = \alpha_{g,N} \cdot N_{Rk}$ and $V^g_{Rk} = \alpha_{g,V} \cdot V_{Rk}$ (with the relevant α_c)

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

Hilti HIT-HY 270	
Performances Anchor spacing Shear load direction	**Annex C2**

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Brick type: Solid clay brick Mz, 1DF

Table C4: Description of brick

Brick type			Solid Mz, 1DF
Bulk density	ρ	[kg/dm³]	2,0
Compressive strength	f_b	[N/mm²]	≥ 12, ≥ 20 or ≥ 40
Code			EN 771 - 1
Producer			
Brick dimensions		[mm]	≥ 240 x 115 x 52
Minimum wall thickness	h_{min}	[mm]	≥ 115



Characteristic resistances for all anchor combinations (see Table B3)

Table C5: Tension resistance at edge distance c ≥115 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	12	1,5 (2,0*)			
		20	2,0 (2,5*)			
		40	3,5 (4,0*)			
	≥ 80	12	2,5 (3,0*)			
		20	3,5 (4,0*)			
		40	5,5 (6,5*)			
	≥ 100	12	3,5 (4,0*)			
		20	4,5 (5,0*)			
		40	7,0 (8,0*)			

* CAC cleaning only

Related edge and spacing distance and group factor α_c

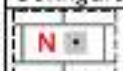
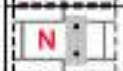
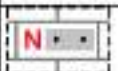
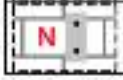
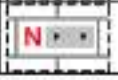
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]
	115	-	-	-	-	-	-
	115	55	1,0		115	75	1,35
	115	115	2,0		115	3 h_{ef}	2,0

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Table C6: Shear resistance at edge distance c ≥ 115 mm (for V_{II}) and c ≥ 1,5 h_{ef} (for $V_{\perp}$)

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II}$ [kN]	$V_{Rk,c\perp}$
HIT-V M8; M10 HIT-IC M8	≥ 50	12	2,5	Calculate according to ETAG029 Annex C, equation C5.6
		20	3,0	
		40	4,0	
HIT-V M12; M16 HIT-IC M10; M12	≥ 50	12	3,5	
		20	4,5	
		40	5,5	
HIT-V M8; M10 HIT-IC M8	≥ 80	12	5,0	
		20	6,0	
		40	7,5	
HIT-V M12; M16 HIT-IC M10; M12	≥ 80	12	6,5	
		20	8,5	
		40	10,5	

Related edge and spacing distance and group factor α_c

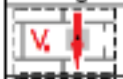
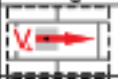
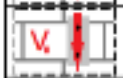
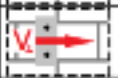
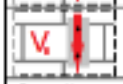
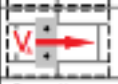
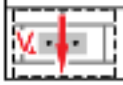
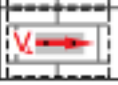
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]
	115	-	-		1,5 h_{ef}	-	-
	115	55	1,0		1,5 h_{ef}	55	1,0
	115	115	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_g [-]	Configuration	c ≥ [mm]	s_{II} [mm]	α_g [-]
-	-	-	-		1,5 h_{ef}	115	1,0
	115	75	2,0		1,5 h_{ef}	3 h_{ef}	2,0

Table C7: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
50	1,2	0,1	0,2	1,4	0,5	0,75
80	2,1	0,1	0,2	2,1	1,1	1,65
100	3,9	0,2	0,4	3,0	1,3	1,95

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Hilti HIT-HY 270

Performances solid clay brick Mz, 1DF
Characteristic values of resistance under shear load and group factor
Displacements

Annex C4

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Brick type: Solid clay brick Mz, NF

Table C8: Description of brick

Brick type			Solid Mz, NF	
Bulk density	ρ	[kg/dm³]	2,0	
Compressive strength	f_b	[N/mm²]	≥ 10 / 20	
Code			EN 771 - 1	
Producer				
Brick dimensions		[mm]	≥ 240 x 115 x 71	
Minimum wall thickness	h_{min}	[mm]	≥ 115	

Characteristic resistances for all anchor combinations (see Table B3)

Table C9: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	10	1,5 (1,5*)			
		20	2,0 (2,0*)			
	≥ 80	10	2,5 (3,0*)			
		20	3,5 (4,0*)			

* CAC cleaning only

Related edge and spacing distance and group factor α_c

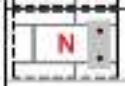
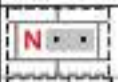
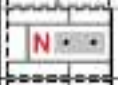
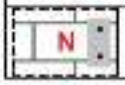
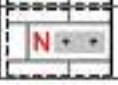
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_2 [-]
	50	-	-	-	-	-	-
	50	75	1,0		115	50	1,0
-	-	-	-		50	115	1,15
	50	150	2,0		50	3 h_{ef}	2,0

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Table C10: Tension resistance at edge distance for $h_{ef} \geq 100$ mm at $c \geq 150$ mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 100	10	4,0 (4,5*)			
		20	5,5 (6,0*)			

* CAC cleaning only

Related edge and spacing distance and group factor α_c

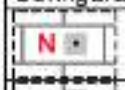
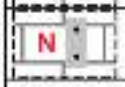
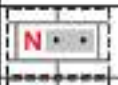
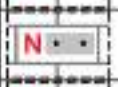
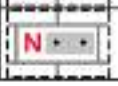
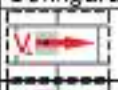
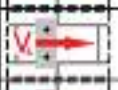
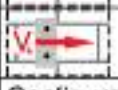
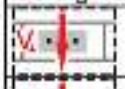
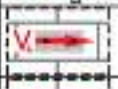
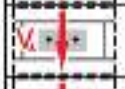
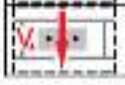
Configuration	c ≥ [mm]	$s_\perp \geq$ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\perp \geq$ [mm]	
	150	-	-	-	-	-	-
	150	75	1,40		150	50	0,75
-	-	-	-		150	115	1,35
	150	150	2,0		150	3 h_{ef}	2,0

Table C11: Shear resistance at edge distance $c \geq 1{,}5\ h_{ef}$

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II}$ [kN]	$V_{Rk,c\perp}$
All anchor	≥ 50	10	3,0	Calculate according to ETAG029 Annex C, equation C5.6
		20	4,5	
HIT-V M8; M10 HIT-IC M8	≥ 80	10	5,0	
		20	7,0	
HIT-V M8; M10	≥ 100	10	8,0	
		20	11,0	
HIT-V M12; M16 HIT-IC M10; M12	≥ 80	10	9,0	
		20	12,0	

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp \geq$ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\perp \geq$ [mm]	α_c [-]
	1,5 h_{ef}	-	-		1,5 h_{ef}	-	-
	1,5 h_{ef}	75	1,55		1,5 h_{ef}	75	1,0
	1,5 h_{ef}	150	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_c [-]
	1,5 h_{ef}	50	1,2		1,5 h_{ef}	50	1,60
	1,5 h_{ef}	75	1,5		1,5 h_{ef}	3 h_{ef}	2,0
	1,5 h_{ef}	115	2,0	-	-	-	-

Hilti HIT-HY 270

Performances solid clay brick Mz, NF
Characteristic values of resistance under tension load and group factor

Annex C6

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Table C12: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II}$ [kN]
All anchor	≥ 50	10	3,0
		20	4,5
	≥ 80	10	4,0
		20	5,5

Related edge and spacing distance and group factor α_c

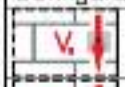
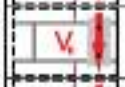
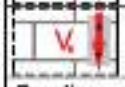
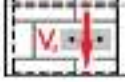
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_3 [-]
	50	-	-
	50	75	1,55
	50	150	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_3 [-]
	50	50	1,2
	50	115	2,0

Table C13: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
50	0,8	0,1	0,2	1,6	0,8	1,2
80	1,5	0,1	0,2	2,1	0,8	1,2
100	2,3	0,1	0,2	2,1	0,8	1,2

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Brick type: Solid clay brick Mz, 2DF

Table C14: Description of brick

Brick type			Solid Mz, 2DF	
Bulk density	ρ	[kg/dm³]	≥ 2,0	
Compressive strength	f_b	[N/mm²]	≥ 12 / 20	
Code			EN 771 - 1	
Producer				
Brick dimensions		[mm]	≥ 240 x 115 x 113	
Minimum wall thickness	h_{min}	[mm]	≥ 115	

Characteristic resistances for all anchor combinations (see Table B3)

Table C15: Tension resistance at edge distance c ≥ 115 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	12	2,5 (3,0*)			
		20	2,5 (3,0*)			
	≥ 80	12	3,5 (4,0*)			
		20	4,5 (5,5*)			
	≥ 100	12	6,0 (7,0*)			
		20	7,0 (8,0*)			

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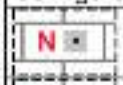
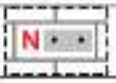
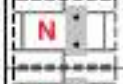
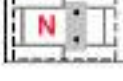
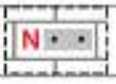
Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	$\alpha_{c,0}$ [-]	Configuration	c ≥ [mm]	$s_{\parallel}$ ≥ [mm]	$\alpha_{c,0}$ [-]
	115	-	-	-	-	-	-
	115	75	1,0		115	75	1,50
	115	115	1,60	-	-	-	-
	115	3 h_{ef}	2,0		115	3 h_{ef}	2,0

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Hilti HIT-HY 270

Performances solid clay brick Mz, 2DF
Characteristic values of resistance under tension load and group factor

Annex C8

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Table C16: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	12	1,5 (1,5*)			
		20	2,0 (2,0*)			
	≥ 80	12	3,0 (3,5*)			
		20	3,5 (4,0*)			

* CAC cleaning only

Related edge and spacing distance and group factor α_c

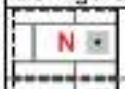
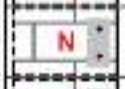
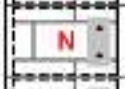
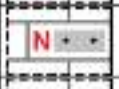
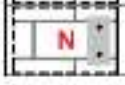
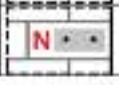
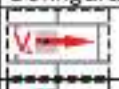
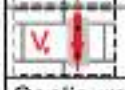
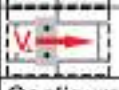
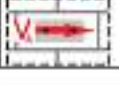
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	75	1,10		115	50	1,0
	50	115	1,45		50	115	1,15
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

Table C17: Shear resistance at edge distance c ≥ 1,5 h_{ef}

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel}$ [kN]	$V_{Rk,c\perp}$
All anchor	≥ 50	12	5,5	Calculate according to ETAG029 Annex C, equation C5.6 (for h_{ef} >80 mm calculate with h_{ef} = 80 mm)
		20	7,0	
HIT-V M8; M10 HIT-IC M8	≥ 80	12	8,0	
		20	10,0	
HIT-V M12 HIT-IC M10	≥ 80	12	10,5	
		20	12,0	
HIT-V M16 HIT-IC M12	≥ 80	12	12,0	
		20	12,0	

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ c [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	1,5 h_{ef}	-	-		1,5 h_{ef}	-	-
	1,5 h_{ef}	75	0,85		1,5 h_{ef}	115	0,75
	1,5 h_{ef}	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]
	1,5 h_{ef}	115	1,60		1,5 h_{ef}	115	0,8
	1,5 h_{ef}	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0

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Hilti HIT-HY 270

Performances solid clay brick Mz, 2DF
Characteristic values of resistance under tension and shear load and group factor

Annex C9

Deutsches Institut für Bautechnik DIBt

Table C18: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II}$ [kN]
All anchor	≥ 50	12	3,0
		20	4,0
All anchor	≥ 80	12	4,5
		20	5,5

Related edge and spacing distance and group factor α_c

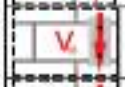
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]
	50	-	-
	50	75	0,70
	50	115	1,5
	50	3 h_{ef}	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_c [-]
	50	115	2,0

Table C19: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
50	0,9	0,1	0,2	1,9	0,6	0,9
80	1,3	0,2	0,4	2,8	1,0	1,5
100	1,7	0,3	0,6	2,8	1,0	1,5

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Brick type: Solid calcium silicate brick KS, 2DF

Table C20: Description of brick

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

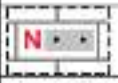
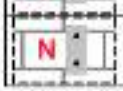
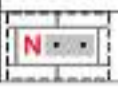


Characteristic resistances for all anchor combinations (see Table B3)

Table C21: Tension resistance at edge distance c ≥ 115 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	12	-	-	6,0	5,0
		28	-	-	9,0	7,5

Related edge and spacing distance and group factor α_c

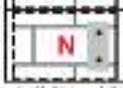
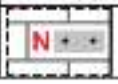
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	s_{II} ≥ [mm]	α_c [-]
	115	-	-	-	-	-	-
	115	50	1,0		115	50	1,0
	115	115	1,45	-	-	-	-
	115	150	2,0		115	115 (H)* 240 (S)*	2,0

* (H) = Header, (S) = Stretcher

Table C22: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	12	-		4,0	3,5
		28	-		6,5	5,5

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	s_{II} ≥ [mm]	α_c [-]
	50	-	-	-	-	-	-
	50	115	2,0		50	115 (H)* 240 (S)*	2,0

* (H) = Header, (S) = Stretcher

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Performances solid silica brick KS, 2DF
Characteristic values of resistance under tension load and group factor

Annex C11

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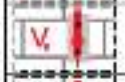
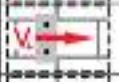
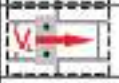
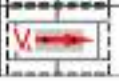
Table C23: Shear resistance at edge distance c ≥ 115 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel}$ [kN]	$V_{Rk,c\perp}$
All anchor	≥ 50	12	6,0	Calculate according to ETAG029 Annex C, equation C5.6
		28	9,0	

Related edge and spacing distance and group factor α_c

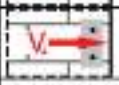
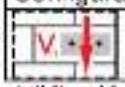
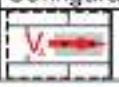
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	115	-	-		115	-	-
	115	50	0,45		115	50	0,45
	115	115	2,0		115	115	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]
	115	50	0,45		115	50	0,45
	115	115 (H)* 240 (S)*	2,0		115	115 (H)* 240 (S)*	2,0

* (H) = Header, (S) = Stretcher

Table C24: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel} = V_{Rk,c\perp}$ [kN]
All anchor	≥ 50	12	3,0
		28	4,5

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	50	-	-		50	-	-
	50	115	2,0		50	115	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]
	50	115 (H)* 240 (S)*	2,0		50	115 (H)* 240 (S)*	2,0

* (H) = Header, (S) = Stretcher

Table C25: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
≥ 50	2,5	0,3	0,6	2,5	1,0	1,5

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Brick type: Solid calcium silicate brick KS, 8DF

Table C26: Description of brick

Brick type			Solid KS, 8DF
Bulk density	ρ	[kg/dm³]	≥ 2,0
Compressive strength	f_b	[N/mm²]	≥ 12 / 20 / 28
Code			EN 771 - 2
Producer			
Brick dimensions		[mm]	≥ 248 x 240 x 248
Minimum wall thickness	h_{min}	[mm]	≥ 240



Characteristic resistances for all anchor combinations (see Table B3)

Table C27: Tension resistance at edge distance c ≥ 120 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor		≥ 50	12	-	-	7,0	5,5
			20	-	-	9,0	7,5
			28	-	-	10,5	8,5
HIT-V	M8, M10	≥ 80	12	-	-	8,5	7,0
			20	-	-	11,0	9,0
			28	-	-	12,0	10,5
HIT-V HIT-IC	M12 M8, M10		12	-	-	11,5	9,5
HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10 M8		20	-	-	12,0	12,0
			28	-	-	12,0	12,0
HIT-V HIT-IC	M16 M12		12	-	-	12,0	12,0
HIT-V + HIT-SC HIT-IC + HIT-SC	M12, M16 M10, M12		20	-	-	12,0	12,0
			28	-	-	12,0	12,0
HIT-V	M8, M10	≥ 100	12	-	-	12,0	11,0
			20	-	-	12,0	12,0
			28	-	-	12,0	12,0

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Table C27 continued

HIT-V	M12, M16	≥ 100	12	-	-	12,0	12,0
HIT-V + HIT-SC	M8 to M16		20	-	-	12,0	12,0
			28	-	-	12,0	12,0

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	$\alpha_{c,2}$ [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	$\alpha_{c,2}$ [-]
N	120	-	-	-	-	-	-
N	120	3 h_{ef}	2,0	N	120	3 h_{ef}	2,0

Table C28: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor		≥ 50	12	-	-	4,0	3,5
			20	-	-	5,5	4,5
			28	-	-	6,5	5,0
HIT-V	M8, M10	≥ 80	12	-	-	5,0	4,0
			20	-	-	6,5	5,5
			28	-	-	7,5	6,5
HIT-V HIT-IC HIT-V + HIT-SC HIT-IC + HIT-SC	M12 M8, M10 M8, M10 M8		12	-	-	7,0	5,5
			20	-	-	9,0	7,5
			28	-	-	10,5	8,5
HIT-V HIT-IC HIT-V + HIT-SC HIT-IC + HIT-SC	M16 M12 M12, M16 M10, M12		12	-	-	10,0	8,0
			20	-	-	12,0	10,5
			28	-	-	12,0	12,0
HIT-V	M8, M10	≥ 100	12	-	-	8,0	6,5
			20	-	-	10,5	8,5
			28	-	-	12,0	10,0

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Table C28 continued

HIT-V	M12	≥ 100	12	-	-	9,5	8,0
HIT-V + HIT-SC	M8, M10		20	-	-	12,0	10,0
			28	-	-	12,0	12,0
HIT-V	M16		12	-	-	12,0	10,5
HIT-V + HIT-SC	M12, M16		20	-	-	12,0	12,0
			28	-	-	12,0	12,0

Related edge and spacing distance and group factor α_c

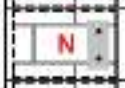
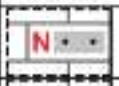
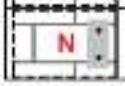
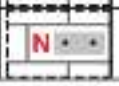
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	50	1,0		50	50	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

Table C29: Shear resistance at edge distance c ≥ 120 mm (for $V_\parallel$) and c ≥ 1,5 h_{ef} (for $V_\perp$)

Anchor type and size		h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel}$ [kN]	$V_{Rk,c\perp}$
HIT-V	M8, M10	≥ 50	12	9,0	Calculate according to ETAG029 Annex C, equation C5.6
			20	12,0	
			28	12,0	
HIT-V	M12, M16		12	12,0	
HIT-IC	M8 to M12		20	12,0	
HIT-V + HIT-SC	M12, M16				
HIT-IC + HIT-SC	M8 to M12		28	12,0	

Related edge and spacing distance and group factor α_c

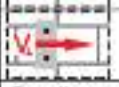
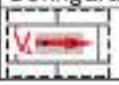
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	120	-	-		1,5 h_{ef}	-	-
	120	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]
	120	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0

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Table C30: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II} = V_{Rk,c}\perp$ [kN]
All anchor	≥ 50	12	3,0
		20	4,0
		28	4,5

Related edge and spacing distance and group factor α_c

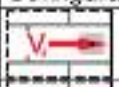
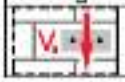
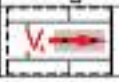
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	50	-	-		50	-	-
	50	250	2,0		50	250	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_g [-]	Configuration	c ≥ [mm]	s_{II} [mm]	α_g [-]
	50	250	2,0		50	250	2,0

Table C31: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
50	2,3	0,10	0,20	3,4	2,8	4,2
80	3,4	0,15	0,30	3,4	2,8	4,2
100	3,4	0,15	0,30	3,4	2,8	4,2

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Hilti HIT-HY 270

Performances solid silica brick KS, 8DF
Characteristic values of resistance under shear load and group factor
Displacements

Annex C16

Deutsches Institut für Bautechnik DIBt

Brick type: Solid lightweight concrete brick Vbl, 2DF

Table C32: Description of brick

Brick type			Solid Vbl, 2DF
Bulk density	ρ	[kg/dm³]	≥ 0,9
Compressive strength	f_b	[N/mm²]	≥ 4 / 6
Code			EN 771-3
Producer			
Brick dimensions		[mm]	≥ 240 x 115 x 113
Minimum wall thickness	h_{min}	[mm]	≥ 115



Characteristic resistances for all anchor combinations (see Table B3)

Table C33: Tension resistance at edge distance c ≥ 115 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	4	3,0	2,0	3,0 (3,5*)	2,5
		6	3,5	3,0	4,0	3,0 (3,5*)
	≥ 80	4	4,5	3,5	5,0	4,0 (4,5*)
		6	5,5	4,5	6,0 (6,5*)	5,0 (5,5*)
	≥ 100	4	6,0	5,0	6,5 (7,0*)	5,5 (6,0*)
		6	7,5	6,0	8,0 (8,5*)	6,5 (7,0*)

* Compressed air cleaning only

Related edge and spacing distance and group factor α_c

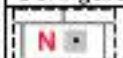
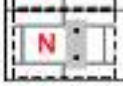
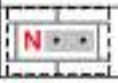
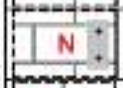
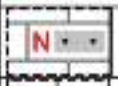
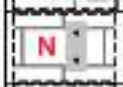
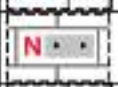
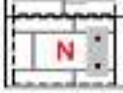
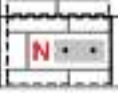
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_c [-]
	115	-	-	-	-	-	-
	115	3 h_{ef}	2,0		115	3 h_{ef}	2,0

Table C34: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	4	1,5	1,2	1,5	1,5
		6	2,0	1,5	2,0	1,5

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_c [-]
	50	-	-	-	-	-	-
	50	115	1,0		50	115	1,0
	115	50	1,0		115	50	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

Hilti HIT-HY 270

Performances solid lightweight concrete brick Vbl, 2DF
Characteristic values of resistance under tension load and group factor

Annex C17

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Table C35: Shear resistance at edge distance c ≥ 115 mm (for $V_{||}$) and c ≥ 1,5 h_{ef} (for $V_{\perp}$)

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,||}$ [kN]	$V_{Rk,c\perp}$
HIT-V M8	≥ 50	4	2,0	Calculate according to ETAG029 Annex C, equation C5.6
		6	2,5	
HIT-V M10 to M16 HIT-IC M8 to M12		4	2,5	
		6	3,0	

Related edge and spacing distance and group factor α_c

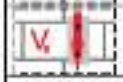
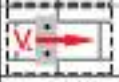
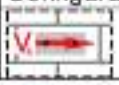
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]
	115	-	-		1,5 h_{ef}	-	-
	115	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	**c ≥ [mm]**	**$s_{||}$ [mm]**	**α_g [-]**	**Configuration**	**c ≥ [mm]**	**$s_{||}$ [mm]**	**α_g [-]**
	115	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0

Table C36: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,||} = V_{Rk,c\perp}$ [kN]
All anchor	≥ 50	4	1,20
		6	1,50

Related edge and spacing distance and group factor α_c

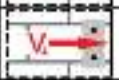
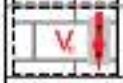
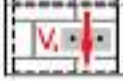
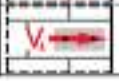
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_g [-]
	50	-	-		50	-	-
	115	50	1,0		115	50	1,0
	50	115	1,0		50	115	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0
Configuration	**c ≥ [mm]**	**$s_{||}$ [mm]**	**α_g [-]**	**Configuration**	**c ≥ [mm]**	**$s_{||}$ [mm]**	**α_g [-]**
	115	50	1,0		115	50	1,0
	50	115	1,0		50	115	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

Table C37: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
≥ 50	2,5	0,3	0,6	1,8	2,0	3,0

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Brick type: Solid normal weight concrete brick Vbn, 2DF

Table C38: Description of brick

Brick type			Solid Vbn, 2DF	
Bulk density	ρ	[kg/dm³]	≥ 2,0	
Compressive strength	f_b	[N/mm²]	≥ 6 / 16	
Code			EN 771-3	
Producer				
Brick dimensions		[mm]	≥ 240 x 115 x 113	
Minimum wall thickness	h_{min}	[mm]	≥ 115	

Characteristic resistances for all anchor combinations (see Table B3)

Table C39: Tension resistance at edge distance c ≥ 115 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	6	3,0	2,5	3,0	2,5
		16	5,5	4,5	5,5	4,5

Related edge and spacing distance and group factor α_c

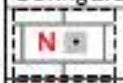
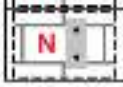
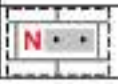
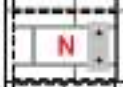
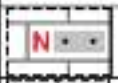
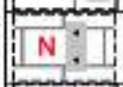
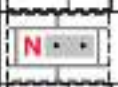
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	115	-	-	-	-	-	-
	115	3 h_{ef}	2,0		115	3 h_{ef}	2,0

Table C40: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 50	6	1,5	1,2	1,5	1,2
		16	2,5	2,0	2,5	2,0

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	115	1,0		50	115	1,0
	115	50	1,0		115	50	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

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Hilti HIT-HY 270

Performances solid normal weight concrete brick Vbn, 2DF
Characteristic values of resistance under tension load and group factor

Annex C19

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Table C41: Shear resistance at edge distance c ≥ 115 mm (for V_{II}) and c ≥ 1,5 hef (for $V_{\perp}$)

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II}$ [kN]	$V_{Rk,c\perp}$
All anchor	≥ 50	6	4,0	Calculate according to ETAG029 Annex C, equation C5.6
		16	6,5	

Related edge and spacing distance and group factor α_c

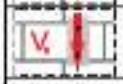
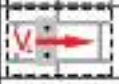
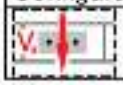
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]
	115	-	-		1,5 h_{ef}	-	-
	115	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_c [-]	Configuration	c ≥ [mm]	s_{II} [mm]	α_c [-]
	115	3 h_{ef}	2,0		1,5 h_{ef}	3 h_{ef}	2,0

Table C42: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II} = V_{Rk,c\perp}$
All anchor	≥ 50	4	1,5
		6	3,0

Related edge and spacing distance and group factor α_c

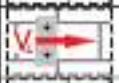
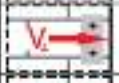
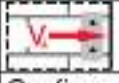
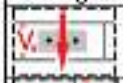
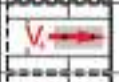
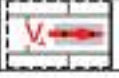
Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_{\perp}$ ≥ [mm]	α_c [-]
	50	-	-		50	-	-
	115	50	1,0		115	50	1,0
	50	115	1,0		50	115	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0
Configuration	c ≥ [mm]	s_{II} [mm]	α_c [-]	Configuration	c ≥ [mm]	s_{II} [mm]	α_c [-]
	115	50	1,0		115	50	1,0
	50	115	1,0		50	115	1,0
	50	3 h_{ef}	2,0		50	3 h_{ef}	2,0

Table C43: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
≥ 50	1,5	0,3	0,6	1,8	2,0	3,0

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Brick type: Hollow clay brick Hlz, 10DF

Table C44: Description of brick

Brick type			Hlz12-1,4-10 DF	 Drawing of the brick see **Table B4**
Bulk density	ρ	[kg/dm³]	≥ 1,4	
Compressive strength	f_b	[N/mm²]	≥ 12 / 20	
Code			EN 771 - 1	
Producer			Rapis (D)	
Brick dimensions		[mm]	300 x 240 x 238	
Minimum wall thickness	h_{min}	[mm]	≥ 240	

Characteristic resistances for all anchor combinations (see Table B3)

Table C45: Tension resistance at edge distance c ≥ 150 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 80	12	5,5 (6,0*)			
		20	7,0 (8,0*)			

* Compressed air cleaning only

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]
	150	-	-	-	-	-	-
	150	240	2,0		150	300	2,0

Table C46: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 80	12	1,5 (2,0*)			
		20	2,0 (2,5*)			

* Compressed air cleaning only

Related edge and spacing distance and group factor α_c

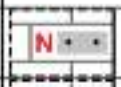
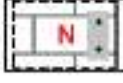
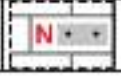
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]
	50	-	-	-	-	-	-
	50	5 d_0	1,0		50	5 d_0	1,0
	50	240	2,0		50	300	2,0

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Table C47: Shear resistance at edge distance c ≥ 300 mm

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\,II} = V_{Rk,c\perp}$ [1] [kN]
HIT-V M8, M10 HIT-IC M8	≥ 80	12	4,5
		20	5,5
HIT-V M12, M16 HIT-IC M10, M12		12	9,5
		20	10

[1] $V_{Rk,b}$ may be used as $V_{Rk,c\perp}$ if
- Horizontal joints are completely filled with mortar and
- Vertical joints are completely filled with mortar or the bricks have completely direct contact to each other.

Related edge and spacing distance and group factor α_c

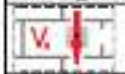
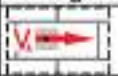
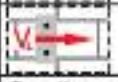
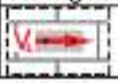
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]
	300	-	-		300	-	-
	300	240	2,0		300	240	1,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]
	300	300	2,0		300	300	2,0

Table C48: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	c [mm]	$V_{Rk,c_\perp -}$ [kN]
All anchor	≥ 80	≥ 50	1,25
		≥ 250	2,5
		c [mm]	$V_{Rk,b} = V_{Rk,c,II}$ [kN]
		≥ 50	1,25
		≥ 100 and ≥ 6*d_0	2,5

Related edge and spacing distance and group factor α_c

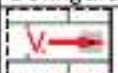
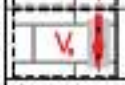
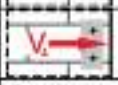
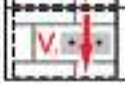
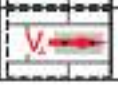
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]
	see table C48	-	-		see table C48	-	-
	see table C48	5 d_0	1,0		see table C48	5 d_0	1,0
	see table C48	240	2,0		see table C48	240	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]
	see table C48	5 d_0	1,0		see table C48	5 d_0	1,0
	see table C48	300	2,0		see table C48	300	2,0

Table C49: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
≥ 80	2,5	0,4	0,8	1,7	1,0	1,5

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Hilti HIT-HY 270

Performances hollow clay brick Hlz, 10DF
Characteristic values of resistance under shear load and group factor
Displacements

Annex C22

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Brick type: Hollow calcium silicate brick KSL, 8DF

Table C50: 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 / 20
Code			EN 771 – 2
Producer			KS Wemding (D)
Brick dimensions		[mm]	248 x 240 x 238
Minimum wall thickness	h_{min}	[mm]	≥ 240



Drawing of the brick see **Table B4**

Characteristic resistances for all anchor combinations (see Table B3)

Table C51: Tension resistance at edge distance c ≥ 50 mm

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]	**$N_{Rk,p} = N_{Rk,b}$ [kN]**			
HIT-V M8 to M16	≥ 80	12	-	-	4,0	3,0
		20	-	-	5,5	4,5
	≥ 130	12	-	-	5,0	4,0
		20	-	-	7,5	6,0
HIT-IC M8 to M12	80	12	-	-	4,0	3,0
		20	-	-	5,5	4,5

Related edge and spacing distance and group factor α_c

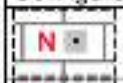
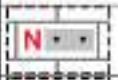
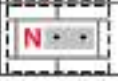
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	50	1,0		50	50	1,0
	50	240	2,0		50	250	2,0

Table C52: Shear resistance at edge distance c ≥ 125 mm (for $V_\parallel$) and c ≥ 250 mm (for $V_\perp$)

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel} = V_{Rk,c\perp}$ [1] [kN]
HIT-V M8	≥ 80	12	6,0
		20	9,0
HIT-V M10 HIT-IC M8		12	9,0
		20	12,0
HIT-V M12 to M16 HIT-IC M10, M12		12	12,0
		20	12,0

[1] $V_{Rk,b}$ may be used as $V_{Rk,c\perp}$ if
- Horizontal joints are completely filled with mortar and
- Vertical joints are completely filled with mortar or the bricks have completely direct contact to each other and
- max $V_{Rk,c\perp}$ = 9 kN

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Related edge and spacing distance and group factor α_c

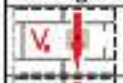
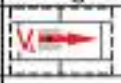
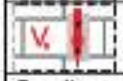
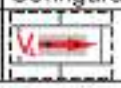
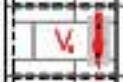
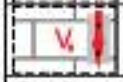
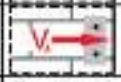
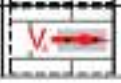
Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_g [-]
	125	-	-		250	-	-
	125	240	2,0	-	-	-	-
Configuration	c ≥ [mm]	s∥ [mm]	α_g [-]	Configuration	c ≥ [mm]	s∥ [mm]	α_g [-]
	125	250	2,0		250	250	2,0

Table C53: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	c [mm]	f_b [N/mm²]	$V_{Rk,c,\perp}$[1] [kN]
All anchor	≥ 80	≥ 50	12	4,0
			20	6,0
		c [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c,\parallel}$ [kN]
		≥ 50	12	4,0
			20	6,0

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_g [-]
	50	-	-		50	-	-
	50	50	1,0		50	50	1,0
	50	240	2,0		50	240	2,0
Configuration	c ≥ [mm]	s∥ [mm]	α_g [-]	Configuration	c ≥ [mm]	s∥ [mm]	α_g [-]
	50	50	1,0		50	50	1,0
	50	250	2,0		50	250	2,0

[1] max $V_{Rk,c,\perp}$ = 9 kN

Table C54: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
80	1,0	0,3	0,6	4,3	2,0	3,0
130	2,1	0,3	0,6	4,3	2,0	3,0

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Hilti HIT-HY 270

Performances hollow silica brick KSL, 8DF
Characteristic values of resistance under shear load and group factor
Displacements

Annex C24

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Brick type: Hollow lightweight concrete brick Hbl, 16DF

Table C55: Description of brick

Brick type			Hbl-4-0,7	 Drawing of the brick see **Table B4**
Bulk density	ρ	[kg/dm³]	≥ 0,7	
Compressive strength	f_b	[N/mm²]	≥ 2 / 6	
Code			EN 771-3	
Producer			Knobel (D)	
Brick dimensions		[mm]	495 x 240 x 238	
Minimum wall thickness	h_{min}	[mm]	≥ 240	

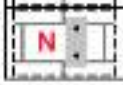
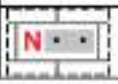
Characteristic resistances for all anchor combinations (see Table B3)

Table C56: Tension resistance at edge distance c ≥ 125 mm

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor type and size	h_{cl} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
HIT-V M8 and M10, HIT IC M8	≥ 80	2	3,5	3,0	4,0	3,0 (3,5*)
		6	6,0	5,0	6,5 (7,0*)	5,5 (6,0*)
HIT-V M12 and M16 HIT-IC M10 and M12	≥ 80	2	4,0	3,5	4,5	3,5 (4,0*)
		6	7,0	6,0	8,0	6,5 (7,0*)

* Compressed air cleaning only

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_c [-]
	125	-	-	-	-	-	-
	125	240	2,0		125	240	2,0

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Hilti HIT-HY 270

Performances hollow lightweight concrete brick Hbl, 16DF
Characteristic values of resistance under tension load and group factor

Annex C25

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Table C57: Tension resistance at edge distance c ≥ 50 mm

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor type and size	h_{ef} [mm]	i_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
HIT-V M8 to M16	≥ 80	2	1,5	1,2	1,5	1,5
		6	2,5	2,0	3,0	2,5
	160	2	2,0	1,5	2,0	1,5 (2,0*)
		6	3,5	2,5	3,5 (4,0*)	3,0
HIT-IC M8 to M12	80	2	1,5	1,2	1,5	1,5
		6	2,5	2,0	3,0	2,5

* Compressed air cleaning only

Related edge and spacing distance and group factor α_c

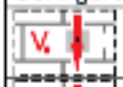
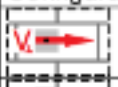
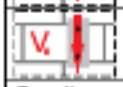
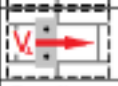
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	50	1,0		50	50	1,0
	50	240	2,0		50	240	2,0

Table C58: Shear resistance at edge distance c ≥ 250 mm (for $V_\parallel$) and c ≥ 500 mm (for $V_\perp$)

Anchor type and size	h_{ef} [mm]	i_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel} = V_{Rk,c\perp}$ [1] [kN]
HIT-V M8, M10 HIT-IC M8,	≥ 80	2	4,0
		6	6,5
HIT-V M12 HIT-IC M10	≥ 80	2	5,5
		6	9,5
HIT-V M16 HIT-IC M12	≥ 80	2	6,0
		6	10,0

[1] $V_{Rk,b}$ may be used as $V_{Rk,c\perp}$ if
- Horizontal joints are completely filled with mortar and
- Vertical joints are completely filled with mortar or the bricks have completely direct contact to each other.

Related edge and spacing distance and group factor α_c

Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]
	250	-	-		500	-	-
	250	240	2,0		500	240	1,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_g [-]
	250	250	2,0		500	500	2,0

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Hilti HIT-HY 270

Performances hollow lightweight concrete brick Hbl, 16DF
Characteristic values of resistance under tension and shear load and group factor

Annex C26

Deutsches Institut für Bautechnik DIBt

Table C59: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	c [mm]	f_b [N/mm²]	$V_{Rk,c-}$ [kN]
All anchor	≥ 80	≥ 50	2	1,5
			6	3,0
		≥ 250	2	2,5
		c [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c,II}$ [kN]
		≥ 50	2	1,5
			6	3,0
		≥ 100 ≥ 6 d_b	2	2,5

Related edge and spacing distance and group factor α_c

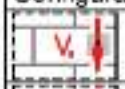
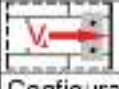
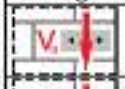
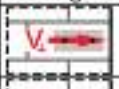
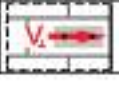
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_2 [-]
	see table C59	-	-		see table C59	-	-
	see table C59	50	1,0		see table C59	50	1,0
	see table C59	240	2,0		see table C59	240	2,0
Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]	Configuration	c ≥ [mm]	$s_\parallel$ [mm]	α_2 [-]
	see table C59	50	1,0		see table C59	50	1,0
	see table C59	250	2,0		see table C59	250	2,0

Table C60: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
80	0,8	0,20	0,4	2,3	1,0	1,5
160	1,1	0,25	0,5	2,3	1,0	1,5

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Brick type: Hollow normal weight concrete brick - parpaing creux

Table C61: Description of brick

Brick type			B40
Bulk density	ρ	[kg/dm³]	≥ 0,9
Compressive strength	f_b	[N/mm²]	≥ 4 / 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 B4**

Characteristic resistances for all anchor combinations (see Table B3)

Table C62: Tension resistance at edge distance c ≥ 50 mm

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]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchors	≥ 50	4	0,9	0,9	0,9	0,9
		10	2,0	1,5	2,0	1,5
All anchors	≥ 130	4	1,5	1,2	1,5	1,2
		10	2,5	2,0	2,5	2,0

Related edge and spacing distance and group factor α_c

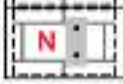
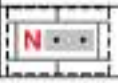
Configuration	c ≥ [mm]	$s_\perp$ ≥ [mm]	α_g [-]	Configuration	c ≥ [mm]	$s_\parallel$ ≥ [mm]	α_g [-]
	50	-	-	-	-	-	-
	50	200	2,0		50	200	2,0

Table C63: Shear resistance at edge distance c ≥ 200 mm (for $V_\parallel$) and c ≥ 500 mm (for $V_\perp$)

Anchor type and size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c\parallel} = V_{Rk,c\perp}$ [1] [kN]
All anchors	≥50	4	4
		10	6,5
	≥80	4	5
		10	7,5

[1] $V_{Rk,b}$ may be used as $V_{Rk,c\perp}$ if

- Horizontal joints are completely filled with mortar and
- Vertical joints are completely filled with mortar or the bricks have completely direct contact to each other.

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Related edge and spacing distance and group factor α_c

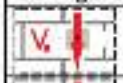
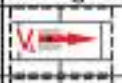
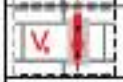
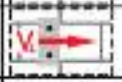
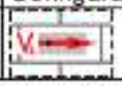
Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_2 [-]
	200	-	-		500	-	-
	200	200	2,0		500	200	1,0
Configuration	c ≥ [mm]	s∥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	s∥ [mm]	α_2 [-]
	200	200	2,0		500	500	2,0

Table C64: Shear resistance at edge distance c ≥ 50 mm

Anchor type and size	h_{ef} [mm]	c [mm]	f_b [N/mm²]	$V_{Rk,c,\perp}$ [kN]
All anchor	≥ 50	≥ 50	4	1,2
			10	1,5
		≥ 250	4/10	2,5
		c [mm]	f_b [N/mm²]	$V_{Rk,b} = V_{Rk,c,\parallel}$ [kN]
		≥ 50	4	2,0
			10	3,0

Related edge and spacing distance and group factor α_c

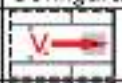
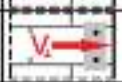
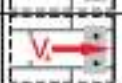
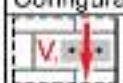
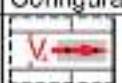
Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	s⊥ ≥ [mm]	α_2 [-]
	50	-	-		see table C64	-	-
	50	50	1,0		see table C64	50	1,0
	50	200	2,0		see table C64	200	2,0
Configuration	c ≥ [mm]	s∥ [mm]	α_2 [-]	Configuration	c ≥ [mm]	s∥ [mm]	α_2 [-]
	50	50	1,0		see table C64	50	1,0
	50	200	2,0		see table C64	200	2,0

Table C65: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
≥ 50	0,7	0,5	1,0	1,7	1,0	1,5

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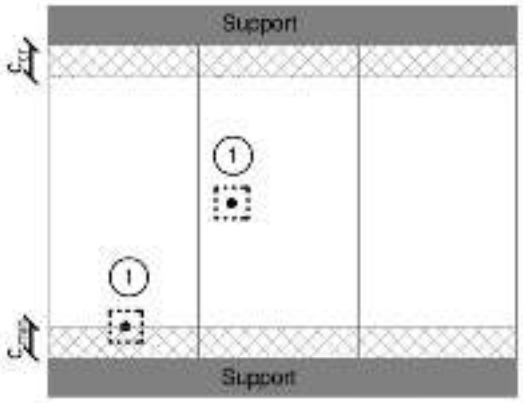
Brick type: Hollow clay brick for ceiling

Table C66: Description of brick

Brick type		Ds-1,0
Bulk density	ρ ≥ [kg/dm³]	1,0
Strenght		DIN EN 15037-3, class R2
Code		DIN 4160
Producer		Fiedler Marktredwitz (D)
Brick dimensions	[mm]	510 x 250 x 180
Min. ceiling thickness	h_{min} ≥ [mm]	≥ 180



Drawing of the brick see **Table B4**



① Single fastening

Maximum one anchor per ceiling brick

Table C67: Installation parameter for all anchor combinations (see Table B3)

Anchor type		HIT-V M6 with HIT-SC 12x85
Edge distance	$c_{min} = c_{cr}$ [mm]	100 from support
Spacing Ac	$s_{min,II}$ [mm]	510
	$s_{min,\perp} = s_{cr}$ [mm]	250

Table C68: Group factor

Group factor	$\alpha_{g,N} \mid \alpha_{g,V\parallel} \alpha_{g,N} \perp \alpha_{g,V} \perp$ [-]	1

Table C69: Characteristic tension resistance for all anchor combinations (see Table B3)

Use category			**w/w**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor type and size	h_{ef} [mm]	Console load capacity [kN]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	≥ 80	3	1,5	1,5	1,5	1,5

Table C70: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$
[mm]	[kN]	[mm]	[mm]
≥ 80	0,4	0,15	0,30

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