Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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European Technical Assessment

ETA-13/1036 of 15 December 2014

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	40 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	Guideline for European technical approval of "Metal Injection Anchors for Use in Masonry", ETAG 029, April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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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 M8 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 C2
Characteristic resistance for anchors in masonry units	See Annex C4 – C19
Displacements under shear and tension loads	See Annex C4 – C19
Reduction Factor for job site tests (β-Factor)	See Annex C1
Edge distances and spacing	See Annex C3 – C18
Group factor for group fastenings	See Annex C3 – C18

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Not applicable.

3.4 Safety in use (BWR 4)

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

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 17 February 1997 (97/177/EC) (OJ L 073 of 14.03.97 p. 24-25), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal injection anchors for use in masonry	For fixing and/or supporting to masonry, structural elements (which contributes to the stability of the works) or heavy units	—	1

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

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

Issued in Berlin on 15 December 2014 by Deutsches Institut für Bautechnik

Uwe Bender
Head of Department

beglaubigt:
Wittstock

Deutsches Institut für Bautechnik

Installed condition

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

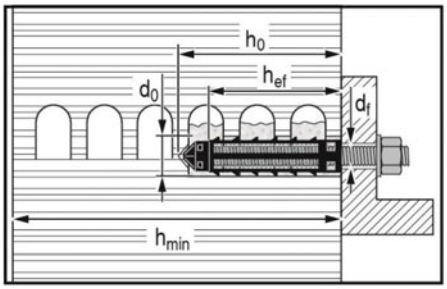


Figure A2: Hollow and solid brick with threaded rod HIT-V-... and two sieve sleeves HIT-SC for deeper embedment depth (see Table B6)

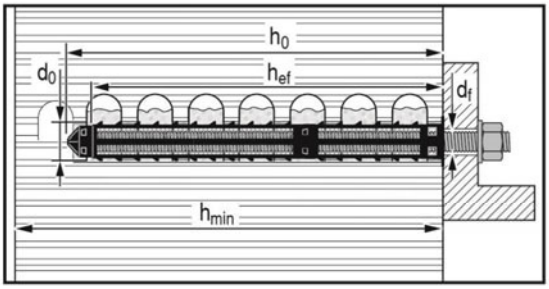
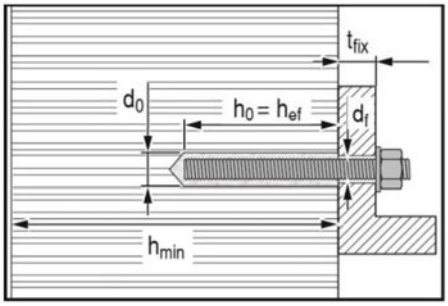


Figure A3: Solid brick with threaded rod HIT-V-...(see Table B8)



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

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

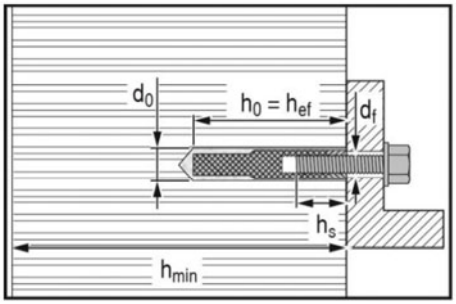
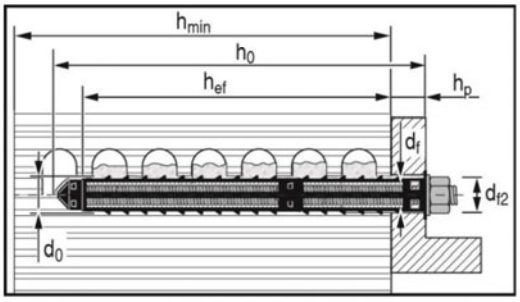
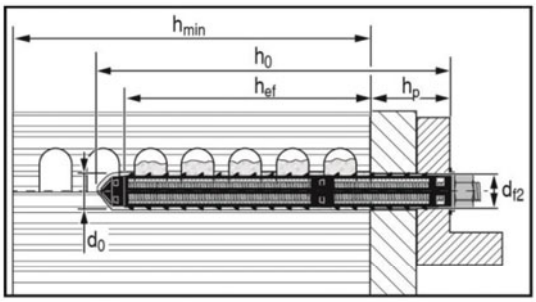


Figure A5: Hollow and solid brick with threaded rod HIT-V-... with two sieve sleeves HIT-SC for setting through the fixture and/or through the non-loadbearing layer (see Table B10)

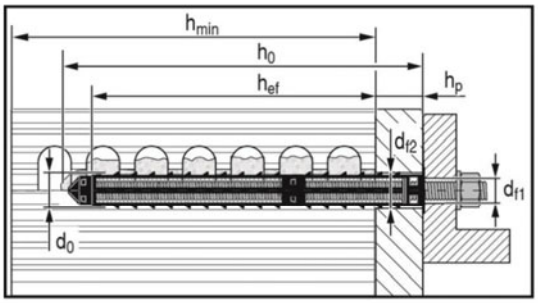
a)



b)



c)



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

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Product description: Injection mortar and steel elements

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

Marking
HILTI HY-270
Production number and production line
Expiry date mm/yyyy

Product name: "Hilti HIT-HY 270"

Dispenser

HDM 330/500

HDE 500-A

Hilti HIT-HY 270	**Annex A3**
Product description Injection mortar / Dispenser	

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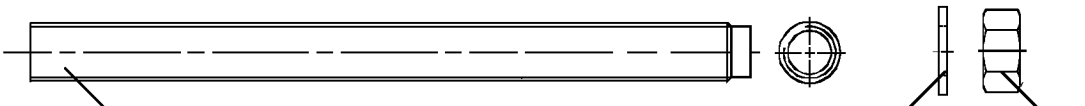
Static mixer Hilti HIT-RE-M

Threaded rod HIT-V-…



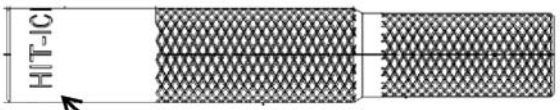
Threaded rod HIT-V- ...
thread sizes M8, M10, M12 or M16

or

Commercial standard threaded rod with:

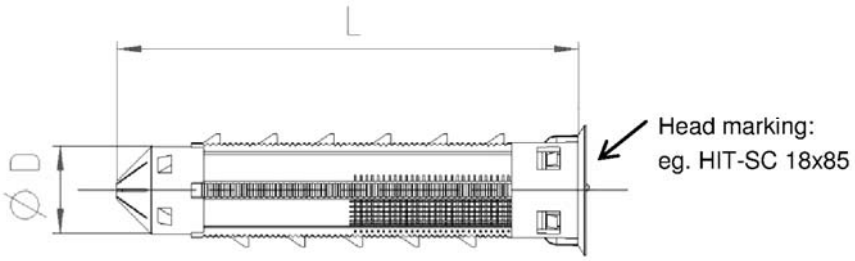
- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 acc. To EN 10204:2004
- Marking of embedment depth

Internal threaded sleeve HIT-IC M8 to M12



Marking:
eg. HIT-IC M8x80

Sieve sleeve HIT- SC 16 to 22



Hilti HIT-HY 270	**Annex A4**
Product description 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, Elongation at fracture (l_0=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, Elongation at fracture (l_0=5d) > 8% ductile Electroplated zinc coated ≥ 5 µm, (F) Hot dip galvanized ≥ 45 µm
Washer	Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
Nut	Strength class of nut adapted to strength class of threaded rod Electroplated zinc coated ≥ 5 µm, Hot dip galvanized ≥ 45 µm
Internal threaded sleeve HIT-IC	f_{uk} = 490 N/mm², f_{yk} = 390 N/mm² Elongation at fracture (l_0=5d) > 8% ductile Electroplated zinc coated ≥ 5 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, Elongation at fracture (l_0=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, Elongation at fracture (l_0=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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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 … HIT-V or HIT-IC**	
		in solid bricks	**in hollow bricks**
Hole drilling		hammer mode	rotary mode
Static and quasi static loading		Annex : C2 (steel), C5, C7, C9, C11	Annex : C2 (steel), C 13, C 15, C17, C19
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	
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

Installation:

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

Hilti HIT-HY 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 [N/mm²]	Bulk density [kg/dm³]	Annex
Solid clay brick EN 771-1		≥ 240x115x113	12	2,0	C4/C5
Solid calcium silicate brick EN 771-2		≥ 240x115x113	12 / 28	2,0	C6/C7
Solid light weight concrete brick EN 771-3		≥ 240x115x113	4 / 6	0,9	C8/C9
Solid normal weight concrete brick EN 771-3		≥ 240x115x113	6 / 16	2,0	C10/C11
Hollow clay brick EN 771-1		300x240x238	12 / 20	1,4	C12/C13
Hollow calcium silicate brick EN 771-2		248x240x248	12 / 20	1,4	C14/C15
Hollow lightweight concrete brick EN 771-3		495x240X238	2 / 6	0,7	C16/C17
Hollow normal weight concrete brick EN 771-3		500x200x200	4 / 10	0,9	C18/C19

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	Threaded rod HIT-V	HIT-IC	Threaded rod HIT-V with HIT-SC	HIT-IC with 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	C4/C5
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	C6/C7
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	C8/C9
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	C10/C11
Hollow clay brick EN 771-1		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C12/C13
Hollow calcium silicate brick EN 771-2		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C14/C15
Hollow lightweight concrete brick EN 771-3		-	-	M8 to M16 h_{ef} = 80 mm to 160 mm	M8 to M12	C16/C17
Hollow normal weight concrete brick EN 771-3		-	-	M8 to M16 h_{ef} = 50 mm to 160 mm	M8 to M12	C18/C19

Hilti HIT-HY 270

Intended Use
Fastening elements and corresponding brick types

Annex B4

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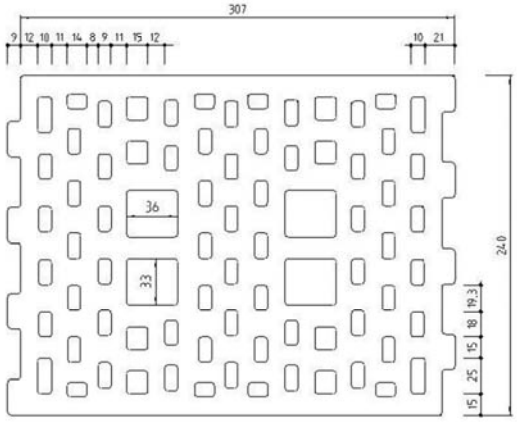
Table B4: Details of hollow bricks

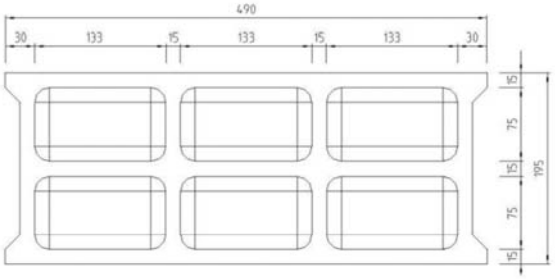
Hollow clay brick
EN 771-1

Rapis Ziegel Hlz 12-1,4-
10DF



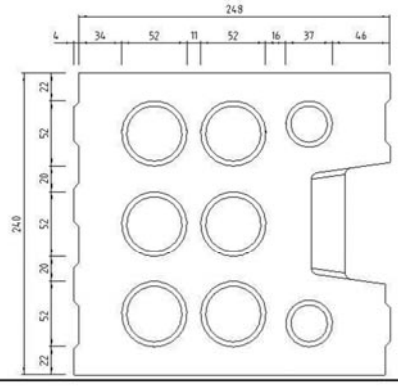
Hollow normal weight
concrete brick EN 771-3

Parpaing creux
B40



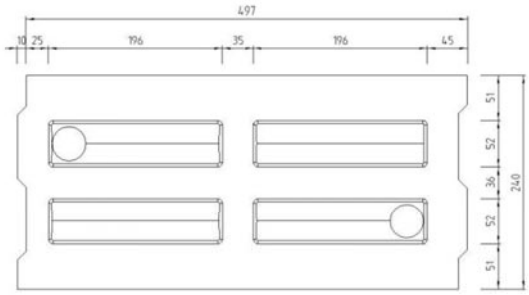
Hollow calcium silicate brick
EN 771-2

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



Hollow lightweight
concrete brick
EN 771-3

Knobel Betonwerk
Hbl 4-0,8-500x240x238



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)

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

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

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

Hilti HIT-HY 270

Intended Use
Installation parameters

Annex B6

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Table B7: Installation parameters of internal 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)

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 internal 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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Installation parameters

Annex B7

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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)

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)	$h_{p,max}$	[mm]	50	80	50	80
Max. diameter of clearance hole in the fixture (pre-setting)	d_{f1}	[mm]	9	9	12	12
Max. diameter of clearance hole in the fixture (through setting)	d_{f2}	[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

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)	$h_{p,max}$	[mm]	50	80	50	80
Max. diameter of clearance hole in the fixture (pre-setting)	d_{f1}	[mm]	14	14	18	18
Max. diameter of clearance hole in the fixture (through setting)	d_{f2}	[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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Annex B8

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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 according to tables B5 to B10 depending on bore hole diameter for MC and CAC	

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Annex B9

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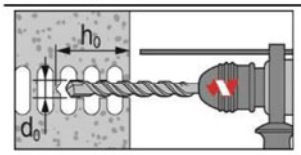
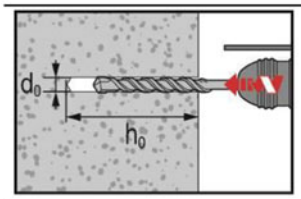
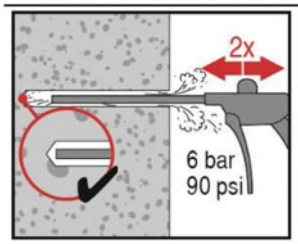
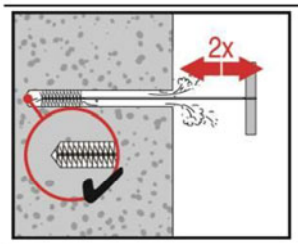
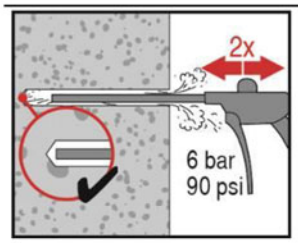
Installation

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 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 hand pump or compressed air 2 times until return air stream is free of noticeable dust.

Hilti HIT-HY 270	
Intended Use Installation instructions	**Annex B10**

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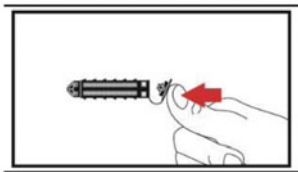
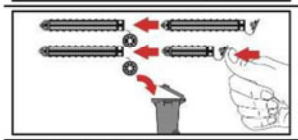
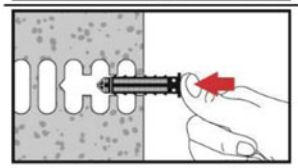
Injection preparation in masonry with holes or voids: installation with sieve sleeve HIT-SC



Single sieve sleeve HIT-SC
Close lid

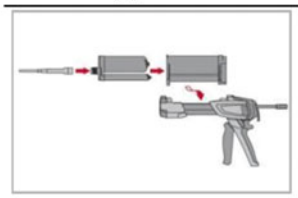


Two sieve sleeves HIT-SC
Plug sieve sleeves together. Discard superfluous lid.
Observe sieve sleeve order in case of different sieve sleeve lengths: shorter sleeve has to be plugged into longer sleeve.

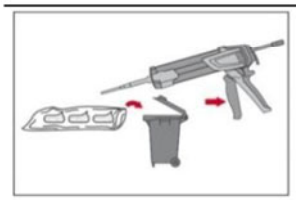


Insert sieve sleeve manually.
When using two sieve sleeves, longer sieve sleeve has to be be inserted first.

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.

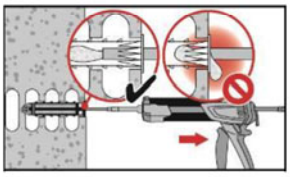


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discarded quantities are

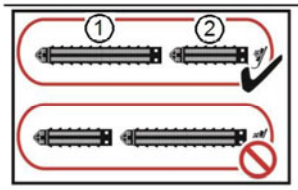
2 strokes	for 330 ml foil pack,
3 strokes	for 500 ml foil pack.

Inject adhesive without forming air voids

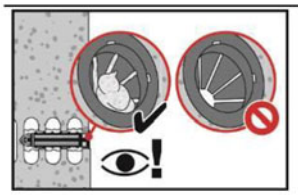
Installation with sieve sleeve HIT-SC



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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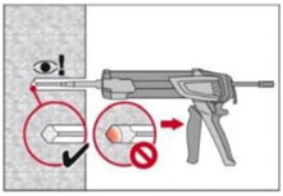
Solid bricks: installation without sieve sleeve

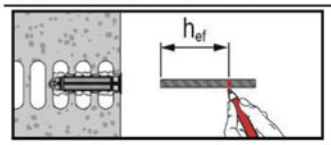


Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.
Fill holes approximately 2/3 full to ensure that the annular gap between the anchor and the base material is completely filled with adhesive along the embedment length.

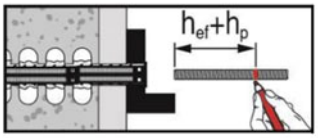
After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

Setting the element:

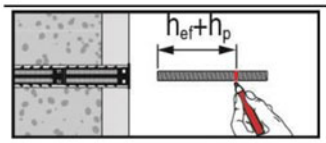
Before use, verify that the element is dry and free of oil and other contaminants.



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.

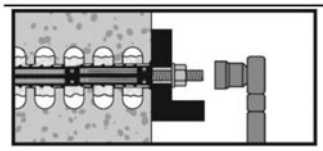


HIT-V-... in hollow and solid bricks:
setting through the fixture (Figure A5a)
or through the non-loadbearing layer and the fixture (Figure A5b)
Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B11 and Table B12.



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



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	**Annex B12**
Intended Use Installation instructions	

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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	0,81	0,81	0,81	0,81
	MC	0,71	0,71	0,71	0,71
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

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

Steel failure tension loads			**M8**	**M10**	**M12**	**M16**
HIT-V-5.8(F)	$N_{Rk,s}$	[kN]	18	29	42	79
HIT-V-8.8(F)	$N_{Rk,s}$	[kN]	29	46	67	126
HIT-V-R	$N_{Rk,s}$	[kN]	26	41	59	110
HIT-V-HCR	$N_{Rk,s}$	[kN]	29	46	67	126
Steel failure shear loads without lever arm						
HIT-V-5.8(F)	$V_{Rk,s}$	[kN]	9	15	21	39
HIT-V-8.8(F)	$V_{Rk,s}$	[kN]	15	23	34	63
HIT-V-R	$V_{Rk,s}$	[kN]	13	20	30	55
HIT-V-HCR	$V_{Rk,s}$	[kN]	15	23	34	63
Steel failure shear loads with lever arm						
HIT-V-5.8(F)	$M_{Rk,s}$	[Nm]	19	37	66	167
HIT-V-8.8(F)	$M_{Rk,s}$	[Nm]	30	60	105	266
HIT-V-R	$M_{Rk,s}$	[Nm]	26	52	92	233
HIT-V-HCR	$M_{Rk,s}$	[Nm]	30	60	105	266

Table C3: Characteristic values of steel resistance for internal 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
Steel failure shear loads without lever arm					
HIT-V 5.8	$V_{Rk,s}$	[kN]	9	15	21
screw 8.8	$V_{Rk,s}$	[kN]	15	23	34
Steel failure shear loads with lever arm					
HIT-V 5.8	$M_{Rk,s}$	[Nm]	19	37	66
screw 8.8	$M_{Rk,s}$	[Nm]	30	60	105

Hilti HIT-HY 270

Performances
Characteristic resistances under tension and shear load – steel failure

Annex C2

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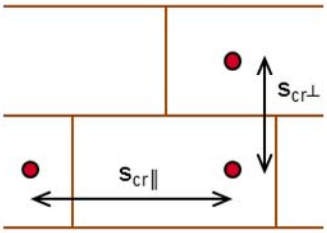
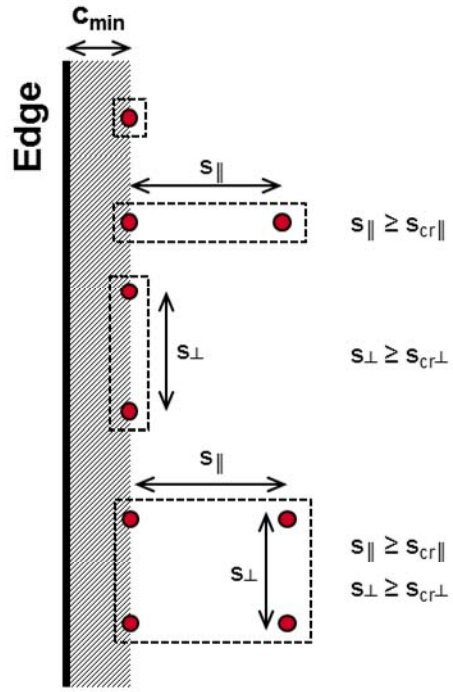
Spacing dependent on edge distances for all anchor combinations: details see Annex C4, C6, C8, C10, C12, C14, C16, C18

Spacing

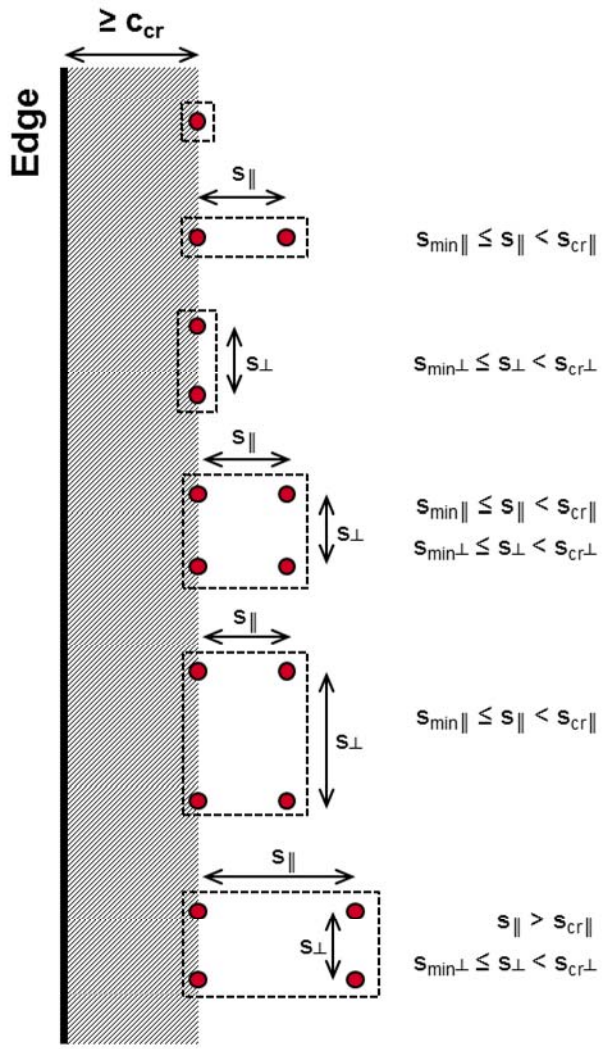
vertical and horizontal to the bed joint



Spacing at c_{min}



Spacing at c_{cr}



The characteristic values of resistance of an anchor group are calculated by using the group-factors α_g according to Annexes C4 to C20:

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_g)

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

Hilti HIT-HY 270	
Performances Anchor spacing	**Annex C3**

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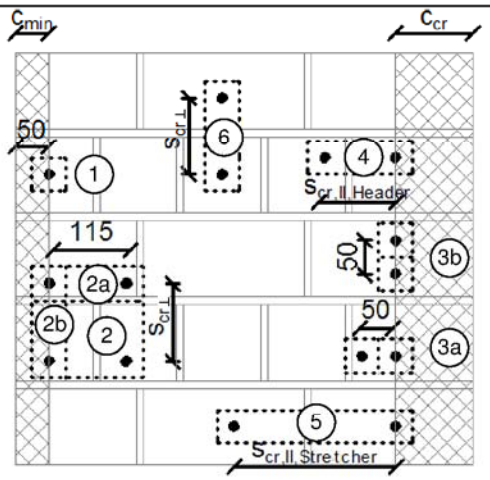
Brick type: Solid clay brick Mz, 2DF

Table C4: Description of brick

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



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing in header
5	Characteristic horizontal spacing in stretcher
6	Charact. vertical spacing in header and stretcher

Table C5: Installation parameter for all anchor combinations (Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm]	115
Spacing	$s_{min\,II}$ [mm]	50 at c_{cr} and 115 at c_{min}
	$s_{min\,\perp}$ [mm]	50 at c_{cr} and 115 at c_{min}
Header	$s_{cr\,II}$ [mm]	115
Stretcher	$s_{cr\,II}$ [mm]	240
Header and Stretcher	$s_{cr\,\perp}$ [mm]	115

Table C6: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,V\,II}$ $\alpha_{g,V\,\perp}$ [-]	0,3 for Position 2a, 3a, 3b
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,N\,\perp}$ [-]	1 for Position 2a, 3a, 3b

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Characteristic resistances for all anchor combinations (see Table B3)

Table C7: Tension resistance at edge distance c ≥ c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk,p} = N_{Rk,b}$ [kN]**			
All anchor	≥ 50	12	2,5 (3,0*)	2,5 (3,0*)	2,5 (3,0*)	2,5 (3,0*)
	≥ 80	12	3,5 (4,0*)	3,5 (4,0*)	3,5 (4,0*)	3,5 (4,0*)
	≥ 100	12	6,0 (7,0*)	6,0 (7,0*)	6,0 (7,0*)	6,0 (7,0*)

* CAC cleaning only

Table C8: Tension resistance at edge distance c_{min} ≤ c < c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk,p} = N_{Rk,b}$ [kN]**			
All anchor	all	12	1,5 (2,0*)	1,5 (2,0*)	1,5 (2,0*)	1,5 (2,0*)

* CAC cleaning only

Table C9: Shear resistance at edge distance c ≥ c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk,b}$ [kN]**			
All anchor	all	12	2,0			

Table C10: Shear resistance at edge distance c_{min} ≤ c < c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk,c}$ [kN]**			
All anchor	all	12	calculation according ETAG029 Annex C, equation C5.6			

Table C11: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
50	0,86	0,1	0,2	0,6	0,5	0,8
80	1,3	0,2	0,4	0,6	0,5	0,8
100	1,7	0,3	0,6	0,6	0,5	0,8

Hilti HIT-HY 270

Performances solid clay brick Mz, 2DF
Characteristic values of resistance under tension and shear loads
Displacements

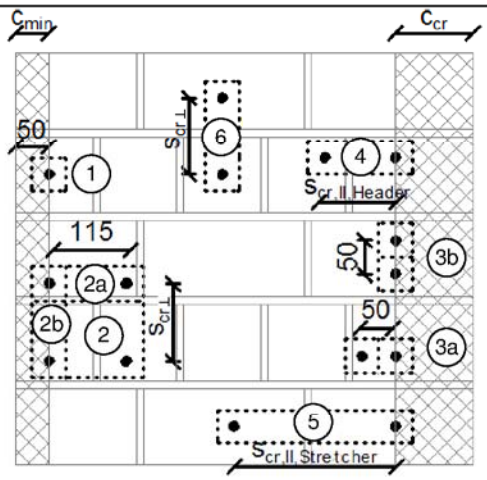
Annex C5

Deutsches Institut für Bautechnik DIBt

Brick type: Solid calcium silicate brick KS, 2DF

Table C12: Description of brick

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



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing in header
5	Characteristic horizontal spacing in stretcher
6	Charact. vertical spacing in header and stretcher

Table C13: Installation parameter for all anchor combinations (Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm]	115
Spacing	$s_{min\,\parallel}$ [mm]	50 at c_{cr} and 115 at c_{min}
	$s_{min\,\perp}$ [mm]	50 at c_{cr} and 115 at c_{min}
Header	$s_{cr\,\parallel}$ [mm]	115
Stretcher	$s_{cr\,\parallel}$ [mm]	240
Header and Stretcher	$s_{cr\,\perp}$ [mm]	115

Table C14: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,\parallel}$ $\alpha_{g,V\,\parallel}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,V\,\parallel}$ $\alpha_{g,V\,\perp}$ [-]	0,5 for Position 2a, 3a, 3b
Group factor	$\alpha_{g,N\,\parallel}$ $\alpha_{g,N\,\perp}$ [-]	1 for Position 2a, 3a, 3b

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Characteristic resistances for all anchor combinations (see Table B3)

Table C15: Tension resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	all	12	-	-	6,0	5,0
		28	-	-	9,0	7,5

Table C16: Tension resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	all	12	-		4,0	3,5
		28	-		6,5	5,5

Table C17: Shear resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b}$ [kN]			
All anchor	all	12	-		6,0	
		28	-		9,0	

Table C18: Shear resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,c}$ [kN]			
All anchor	all	all	-		calculation according ETAG029 Annex C, equation C5.6	

Table C19: Displacements

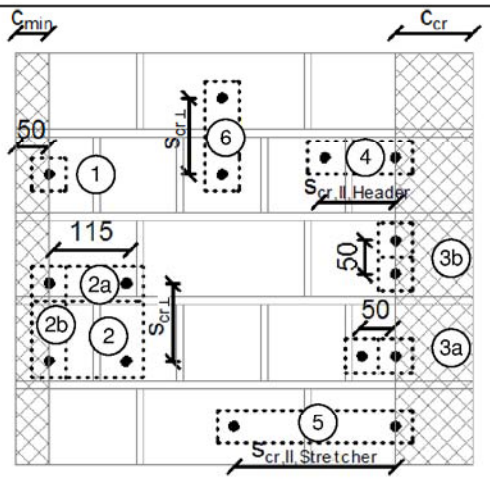
h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
all	2,5	0,3	0,6	2,5	1,0	1,5

Deutsches Institut für Bautechnik DIBt

Brick type: Solid lightweight concrete brick Vbl, 2DF

Table C20: Description of brick

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



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing in header
5	Characteristic horizontal spacing in stretcher
6	Charact. vertical spacing in header and stretcher

Table C21: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm]	115
Spacing	$s_{min\,II}$ [mm]	50 at c_{cr} and 115 at c_{min}
	$s_{min\,\perp}$ [mm]	50 at c_{cr} and 115 at c_{min}
Header	$s_{cr\,II}$ [mm]	115
Stretcher	$s_{cr\,II}$ [mm]	240
Header and Stretcher	$s_{cr\,\perp}$ [mm]	115

Table C22: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 2a, 3a, 3b

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Performances solid lightweight concrete brick Vbl, 2DF
Installation parameters and group factor

Annex C8

Deutsches Institut für Bautechnik DIBt

Characteristic resistances for all anchor combinations (see Table B3)

Table C23: Tension resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor 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

Table C24: Tension resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
All anchor	all	4	1,5	1,5	2,0	1,5
		6	2,0	1,5	2,5	2,0

Table C25: Shear resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b}$ [kN]			
M8	all	4	2,0			
		6	2,5			
M10 to M16	all	4	2,5			
		6	3,0			

Table C26: Shear resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,c}$ [kN]			
All anchor	all	all	calculation according ETAG029 Annex C, equation C5.6			

Table C27: Displacements

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

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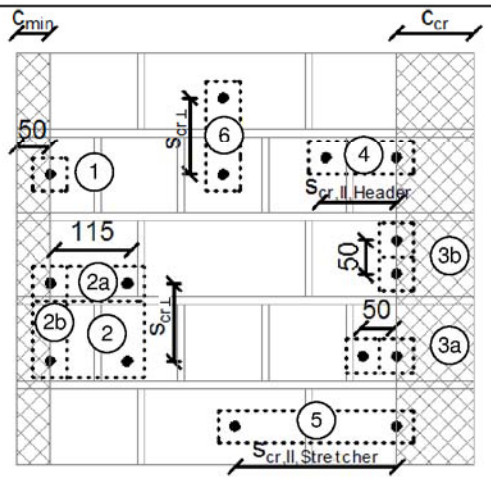
Brick type: Solid normal weight concrete brick Vbn, 2DF

Table C28: Description of brick

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



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing in header
5	Characteristic horizontal spacing in stretcher
6	Charact. vertical spacing in header and stretcher

Table C29: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm]	115
Spacing	$s_{min\,II}$ [mm]	50 at c_{cr} and 115 at c_{min}
	$s_{min\,\perp}$ [mm]	50 at c_{cr} and 115 at c_{min}
Header	$s_{cr\,II} = s_{cr\,\perp}$ [mm]	115
Stretcher	$s_{cr\,II}$ [mm]	240
Header and Stretcher	$s_{cr\,\perp}$ [mm]	115

Table C30: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 2a, 3a, 3b

Hilti HIT-HY 270

Performances solid normal weight concrete brick Vbn, 2DF
Installation parameters and group factor

Annex C10

Deutsches Institut für Bautechnik DIBt

Characteristic resistances for all anchor combinations (see Table B3)

Table C31: Tension resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk,p} = N_{Rk,b}$ [kN]**			
All anchor	all	6	3,0	2,5	3,0	2,5
		16	5,5	4,5	5,5	4,5

Table C32: Tension resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$N_{Rk,p} = N_{Rk,b}$ [kN]**			
All anchor	all	6	1,5	1,2	1,5	1,2
		16	2,5	2,0	2,5	2,0

Table C33: Shear resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk,b}$ [kN]**			
All anchor	all	6	4,0			
		16	6,5			

Table C34: Shear resistance at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	**$V_{Rk,c}$ [kN]**			
All anchor	all	all	calculation according ETAG029 Annex C, equation C5.6			

Table C35: Displacements

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

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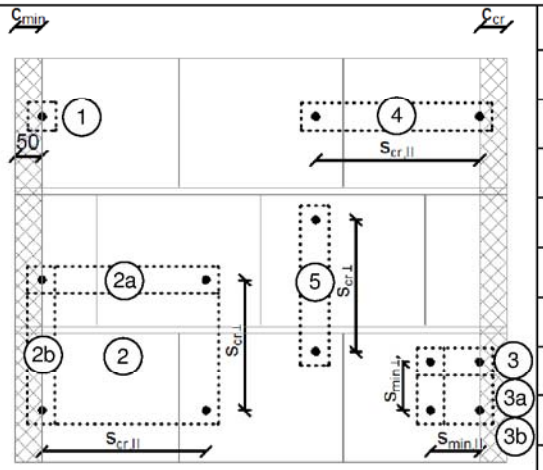
Brick type: Hollow clay brick Hlz, 10DF

Table C36: Description of brick

Brick type			Hlz12-1,4-10 DF
Bulk density	ρ	[kg/dm³]	≥ 1,4
Compressive strength	f_b	[N/mm²]	≥ 12 or ≥ 20
Code			EN 771 - 1
Producer			Rapis
Brick dimensions		[mm]	300 x 240 x 238
Minimum wall thickness	h_{min}	[mm]	≥ 240

Drawing of the brick see Table B4



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3	4 anchors at characteristic edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing
5	Characteristic vertical spacing

Table C37: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3		
Edge distance	c_{min} [mm]	50		
	c_{cr} [mm]	50 for tension and 150 for shear		
Spacing	$s_{min\,II} = s_{min\,\perp}$ [mm]	80 (HIT-SC 16x85)	90 (HIT-SC 18x85)	110 (HIT-SC 22x85)
	s_{min} [mm]	$s_{min\,II} = s_{cr\,II}$; $s_{min\,\perp} = s_{cr\,\perp}$ for $h_{ef} > 80$		
	$s_{cr\,II}$ [mm]	300		
	$s_{cr\,\perp}$ [mm]	240		

Table C38: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 3, 3a, 3b

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Characteristic resistances for all anchor combinations (see Table B3)

Table C39: Tension resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
Threaded rod HIT-V M8 to M16	≥ 80	12	1,5	1,5	1,5	1,5
	≥ 80	20	2,0	2,0	2,0	2,0
	≥ 130	12	2,5 (3,0*)	2,5 (3,0*)	2,5 (3,0*)	2,5 (3,0*)
	≥ 130	20	3,5 (4,0*)	3,5 (4,0*)	3,5 (4,0*)	3,5 (4,0*)
Internal threaded sleeve HIT-IC M8, M10, M12	80	12	1,5	1,5	1,5	1,5
		20	2,0	2,0	2,0	2,0

* Compressed air cleaning only

Table C40: Shear resistance at edge distance $c \geq c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b}$ [kN]			
HIT-V M8, M10, M12 HIT-IC M8	≥ 80	12	2,0			
		20	3,0			
HIT-V M16 HIT-IC M10, M12	≥ 80	12	3,5			
		20	4,5			

Table C41: Shear resistance vertical to the free edge at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\perp}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 250	see table C40			

Table C42: Shear resistance parallel to the free edge at edge distance $c_{min} \leq c < c_{cr}$

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\parallel}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 100	see table C40; ≤ 2,5 kN			

Table C43: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
80	0,7	0,1	0,2	1,7	1,0	1,5
130	1,4	0,3	0,6	1,7	1,0	1,5

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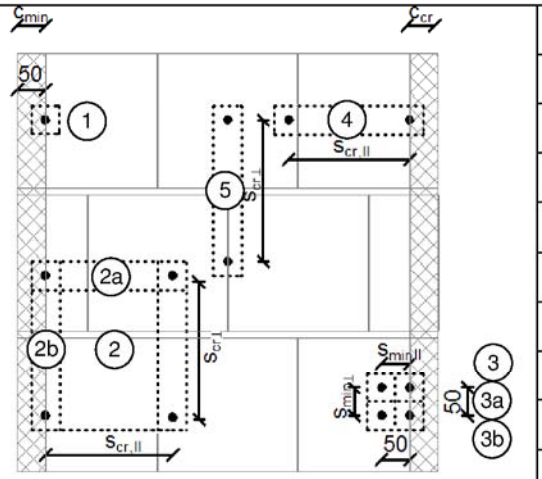
Brick type: Hollow calcium silicate brick KSL, 8DF

Table C44: Description of brick

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

Drawing of the brick see Table B4



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3	4 anchors at characteristic edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing
5	Characteristic vertical spacing

Table C45: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm	50 for tension and 125 for shear
Spacing	$s_{min\,II}$ [mm]	50
	$s_{min\,\perp}$ [mm]	50
	$s_{cr\,II}$ [mm]	250
	$s_{cr\,\perp}$ [mm]	240

Table C46: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 3, 3a, 3b

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Performances hollow silica brick KSL, 8DF
Installation parameters and group factor

Annex C14

Deutsches Institut für Bautechnik DIBt

Characteristic resistances for all anchor combinations (see Table B3)

Table C47: Tension resistance at edge distance c ≥ c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
Threaded rod HIT-V M8 to M16	≥ 80	12	-	-	4,0	3,0
	≥ 80	20	-	-	5,5	4,5
	≥ 130	12	-	-	5,0	4,0
	≥ 130	20	-	-	7,5	6,0
HIT-IC M8, M10, M12	80	12	-	-	4,0	3,0
		20	-	-	5,5	4,5

Table C48: Shear resistance at edge distance c ≥ c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b}$ [kN]			
HIT-V M8	≥ 80	12	-		6,0	
		20	-		9,0	
HIT-V M10	≥ 80	12	-		9,0	
		20	-		12,0	
HIT-V M12, M16 HIT-IC M8, M10, M12	≥ 80	12	-		10,0	
		20	-		12,0	

Table C49: Shear resistance vertical to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\perp}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 250	see Table C48			

Table C50: Shear resistance parallel to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,II}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 100	see Table C48; ≤ 2,5 kN			

Table C51: 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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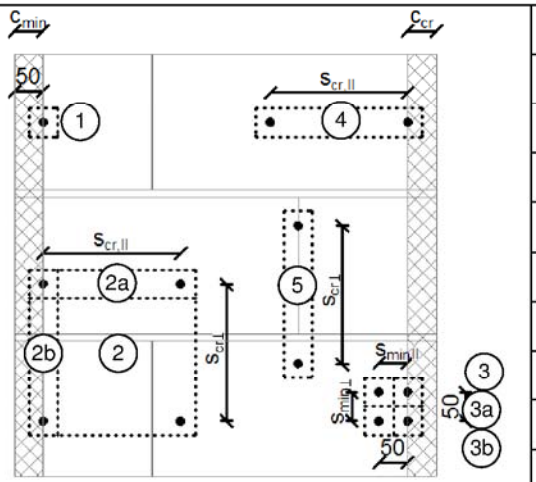
Brick type: Hollow lightweight concrete brick Hbl, 16DF

Table C52: Description of brick

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

Drawing of the brick see Table B4



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3	4 anchors at characteristic edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing
5	Characteristic vertical spacing

Table C53: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm	50 for tension and 250 for shear
Spacing	$s_{min\,II}$ [mm]	50
	$s_{min\,\perp}$ [mm]	50
	$s_{cr\,II}$ [mm]	240
	$s_{cr\,\perp}$ [mm]	240

Table C54: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 3, 3a, 3b

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Characteristic resistances for all anchor combinations (see Table B3)

Table C55: Tension resistance at edge distance c ≥ c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$N_{Rk,p} = N_{Rk,b}$ [kN]			
Threaded rod HIT-V M8 to M16	≥ 80	2	1,2	0,9	1,5	1,2
	≥ 80	6	2,0	1,5	2,5	2,0
	≥ 160	2	1,5	1,2	1,5 (2,0*)	1,5
	≥ 160	6	2,5 (3,0*)	2,0	3,0 (4,0*)	2,5
HIT-IC M8, M10, M12	80	2	1,2	0,9	1,5	1,2
		6	2,0	1,5	2,5	2,0

* Compressed air cleaning only

Table C56: Shear resistance at edge distance c ≥ c_{cr}

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

Table C57: Shear resistance vertical to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\perp}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 250	see Table C56			

Table C58: Shear resistance parallel to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			**w/w = w/d**		**d/d**	
Service temperature range			**Ta**	**Tb**	**Ta**	**Tb**
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\parallel}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 100	see Table C56; ≤ 2,5 kN			

Table C59: Displacements

h_{ef}	N	δ_{N0}	$\delta_{N\infty}$	V	δ_{V0}	$\delta_{V\infty}$
[mm]	[kN]	[mm]	[mm]	[kN]	[mm]	[mm]
80	0,86	0,2	0,4	2,3	1,0	1,5
160	1,14	0,25	0,5	2,3	1,0	1,5

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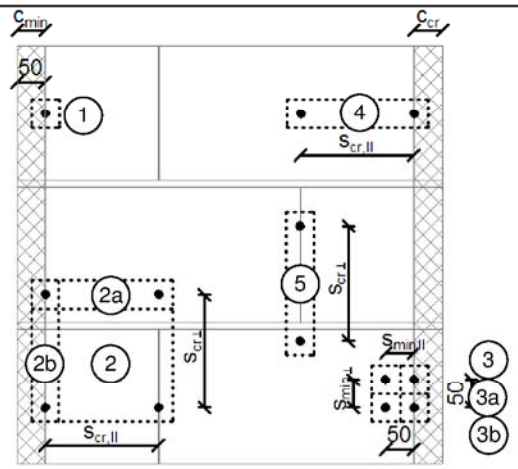
Brick type: Hollow normal weight concrete brick - parpaing creux

Table C60: Description of brick

Brick type			B40
Bulk density	ρ	[kg/dm³]	≥ 0,9
Compressive strength	f_b	[N/mm²]	≥ 4 or ≥ 10
Code			EN 771-3
Producer			Fabemi (F)
Brick dimensions		[mm]	500 x 200 x 200
Minimum wall thickness	h_{min}	[mm]	≥ 200

Drawing of the brick see Table B4



1	Single fastening
2	4 anchors at min. edge distance
2a	2 anchors horizontal at min. edge distance
2b	2 anchors vertical at min. edge distance
3	4 anchors at characteristic edge distance
3a	2 anchors horizontal at characteristic edge distance
3b	2 anchors vertical at characteristic edge distance
4	Characteristic horizontal spacing
5	Characteristic vertical spacing

Table C61: Installation parameter for all anchor combinations (see Table B3)

Anchor type		see Table B3
Edge distance	c_{min} [mm]	50
	c_{cr} [mm	50 for tension and 200 for shear
Spacing	$s_{min\,II}$ [mm]	50
	$s_{min\,\perp}$ [mm]	50
	$s_{cr\,II}$ [mm]	200
	$s_{cr\,\perp}$ [mm]	200

Table C62: Group factor for group fastenings ($\alpha_g \leq 2$ per group fastenings)

Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	2 at c_{cr} and s_{cr}
Group factor	$\alpha_{g,N\,II}$ $\alpha_{g,V\,II}$ $\alpha_{g,N\,\perp}$ $\alpha_{g,V\,\perp}$ [-]	1 for Position 3, 3a, 3b

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Performances hollow normal weight concrete brick - parpaing creux
Installation parameters and group factor

Annex C18

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Characteristic resistances for all anchor combinations (see Table B3)

Table C63: Tension resistance at edge distance c ≥ c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor 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

Table C64: Shear resistance at edge distance c ≥ c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	f_b [N/mm²]	$V_{Rk,b}$ [kN]			
All anchors	all	4	3,5			
		10	6,0			

Table C65: Shear resistance vertical to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,\perp}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 250	see Table C64			

Table C66: Shear resistance parallel to the free edge at edge distance c_{min} ≤ c < c_{cr}

Use category			w/w = w/d		d/d	
Service temperature range			Ta	Tb	Ta	Tb
Anchor size	h_{ef} [mm]	c [mm]	$V_{Rk,c,II}$ [kN]			
All anchor	all	≥ 50	1,25			
		≥ 100	see Table C64; ≤ 2,5 kN			

Table C67: Displacements

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