



Anchor Fastening Technology Manual

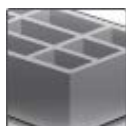
Hilti HIT-HY 270 Injection mortar

Hilti HIT-HY 270 mortar for masonry

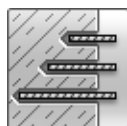
Injection mortar system	Benefits
 Hilti HIT-HY 270 330 ml foil pack (also available as 500 ml foil pack)  Mixer  HIT-V rod  HIT-IC internally threaded sleeve  HIT-SC composite sleeve	- chemical injection fastening for the most common types of base materials: - hollow and solid clay bricks, calcium silicate bricks, normal and light weight concrete blocks - two-component hybrid mortar - versatile and convenient handling with HDE dispenser - flexible setting depth and fastening thickness - small edge distance and anchor spacing - mortar filling control with HIT-SC sleeves - suitable for overhead fastenings - in-service temperatures: short term: max.80°C long term: max 50°C



Solid brick



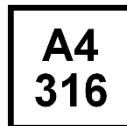
Hollow brick



Variable
embedment
depth



Fire
resistance



Corrosion
resistance



High
corrosion
resistance



European
Technical
Approval



CE
conformity



PROFIS
Anchor design
software

Approvals / certificates

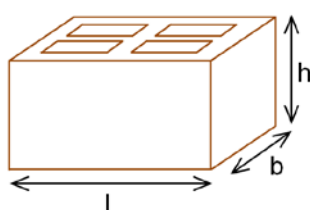
Description	Authority / Laboratory	No. / date of issue
European Technical Assessment	DIBt, Berlin	ETA-13/1036 / 2015-04-28
Fire test report	MFPA, Leipzig	PB 3.2/14-179-1 / 2014-09-05

Brick types and properties

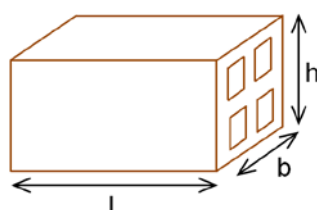
Instruction to this technical data

- Identify/choose your brick (or brick type) and its geometrical/physical properties on the following tables. Information about edge and spacing criteria for every brick is available on pages 7/8.
- The pages referred on the last column of the table below contain the design resistance loads for pull-out failure of the anchor, brick breakout failure and local brick failure for each respective brick. Notice that the data displayed on these tables is only valid for single anchors with distance to edge equal to or greater than c_{cr} – for other cases not covered, use PROFIS Anchor software, consult ETA-13/1036 or contact Hilti Engineering Team.
- The resistance loads provided by this technical data manual are valid only for the exact same masonry unit (hollow bricks) or for units made of the same base material with equal or higher size and compressive strength (solid bricks). For other cases, on-site tests must be performed – please consult page 21.

Exterior brick dimensions

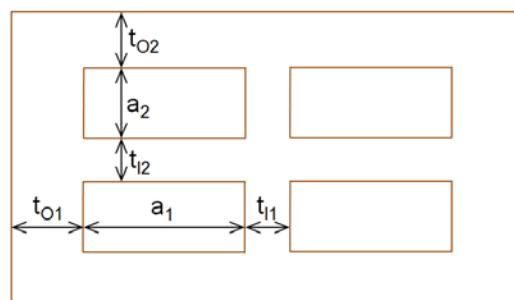


Generic bricks



Bricks HC5, CC1 and CC2

Interior dimensions of the majority of the holes



Brick code	Data	Brick name	Image	Size [mm]	t_{01} [mm]	t_{11} [mm]	a_1 [mm]	f_b [N/mm ²]	ρ [kg/dm ³]	Page
Solid Clay										
SC1	ETA	Solid clay brick Mz, 1DF		$l: \geq 240$ $b: \geq 115$ $h: \geq 52$	-	-	-	12 20 40	2,0	12
SC2	ETA	Solid clay brick Mz, 2DF		$l: \geq 240$ $b: \geq 115$ $h: \geq 113$	-	-	-	12	2,0	12
SC3	Hilti Data	UK London yellow Multi Stock		$l: 215$ $b: 100$ $h: 65$	-	-	-	16	1,5	12
Hollow Clay										
HC1	ETA	Hollow clay brick H1z, 10DF		$l: 300$ $b: 240$ $h: 238$	$t_{01}: 12$ $t_{02}: 15$	$t_{11}: 11$ $t_{12}: 15$	$a_1: 10$ $a_2: 25$	12 20	1,4	13
HC2	Hilti Data	Italy Mattone Alveolater 50		$l: 300$ $b: 245$ $h: 185$	$t_{01}: 12$ $t_{02}: 12$	$t_{11}: 9$ $t_{12}: 9$	$a_1: 22$ $a_2: 25$	16	1,0	13
HC3	Hilti Data	Spain Termoarcilla		$l: 300$ $b: 192$ $h: 190$	$t_{01}: 9$ $t_{02}: 9$	$t_{11}: 7$ $t_{12}: 7$	$a_1: 17$ $a_2: --$	22	0,9	13

Brick types and properties (cont.)

Brick code	Data	Brick name	Image	Size [mm]	t ₀ [mm]	t ₁ [mm]	a [mm]	f _b [N/mm ²]	ρ [kg/dm ³]	Page
HC4	Hilti Data	Belgium Wienerberger Thermobrick		l: 285 b: 135 h: 138	t ₀₁ : 10 t ₀₂ : 10	t ₁₁ : 7 t ₁₂ : 7	a ₁ : 14 a ₂ : 34	21	0,9	13
HC5	Hilti Data	Spain Hueco doble		l: 232 b: 115 h: 78	t ₀₁ : 9 t ₀₂ : 9	t ₁₁ : 8 t ₁₂ : 8	a ₁ : 28 a ₂ : 28	4	0,8	13
HC6	Hilti Data	Belgium Wienerberger Powerbrick		l: 285 b: 135 h: 135	t ₀₁ : 16 t ₀₂ : 12	t ₁₁ : 10 t ₁₂ : 10	a ₁ : 12 a ₂ : 31	41	1,2	13
HC7	Hilti Data	Italy Doppio uni		l: 240 b: 120 h: 120	t ₀₁ : 12 t ₀₂ : 12	t ₁₁ : 10 t ₁₂ : 12	a ₁ : 22 a ₂ : 24	27	1,1	14
HC8	Hilti Data	Spain Ladrillo cara vista		l: 240 b: 115 h: 49	t ₀₁ : 13 t ₀₂ : 16	t ₁₁ : 7 t ₁₂ : 7	a ₁ : 30 a ₂ : 33	42	1,2	14
HC9	Hilti Data	Spain Clinker mediterraneo		l: 240 b: 115 h: 49	t ₀₁ : 17 t ₀₂ : 17	t ₁₁ : 7 t ₁₂ : 7	a ₁ : 29 a ₂ : 29	78	1,3	14
HC10	Hilti Data	UK Nostell red multi		l: 215 b: 102 h: 65	t ₀₁ : 23 t ₀₂ : 21	t ₁₁ : 28 t ₁₂ : --	a ₁ : 38 a ₂ : 56	70	1,6	14
Clay Ceiling										
CC1	ETA	Clay ceiling brick Ds-1,0		l: 250 b: 510 h: 180	t ₀₁ : 12 t ₀₂ : 12	t ₁₁ : 7 t ₁₂ : 7	a ₁ : 14 a ₂ : 32	3	1,0	14
CC2	Hilti Data	Italy Mattone rosso		l: 250 b: 400 h: 180	t ₀₁ : 9 t ₀₂ : 9	t ₁₁ : 7 t ₁₂ : 7	a ₁ : 69 a ₂ : 55	26	0,6	14
Solid Calcium Silicate										
SCS1	ETA	Solid silica brick KS, 2DF		l: ≥240 b: ≥115 h: ≥113	-	-	-	12 28	2,0	15
SCS2	ETA	Solid silica brick KS, 8DF		l: ≥248 b: ≥240 h: ≥248	-	-	-	12 20 28	2,0	15
Hollow Calcium Silicate										
HCS1	ETA	Hollow silica brick KSL, 8DF		l: ≥248 b: ≥240 h: ≥238	t ₀₁ : 34 t ₀₂ : 22	t ₁₁ : 11 t ₁₂ : 20	a ₁ : 52 a ₂ : 52	12 20	1,4	16
HCS2	Hilti Data	Germany KSL 12		l: 240 b: 175 h: 113	t ₀₁ : 18 t ₀₂ : 20	t ₁₁ : -- t ₁₂ : --	a ₁ : -- a ₂ : --	12	1,6	16

Brick types and properties (cont.)

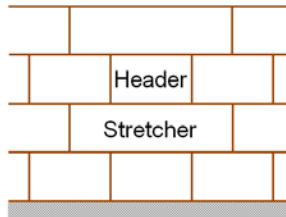
Brick code	Data	Brick name	Image	Size [mm]	t ₀ [mm]	t ₁ [mm]	a [mm]	f _b [N/mm ²]	ρ [kg/dm ³]	Page
Solid Light weight concrete										
SLWC1	ETA	Solid lightweight concrete brick Vbl, 2DF		l: ≥240 b: ≥115 h: ≥113	-	-	-	4 6	0,9	16
SLWC2	Hilti Data	Sweden Leca typ 3		l: 550 b: 190 h: 190	-	-	-	3	0,6	16
SLWC3	Hilti Data	Italy "Tufo" volcanic rock		l: 380 b: 270 h: 270	-	-	-	4	1,2	17
Hollow Light weight concrete										
HLWC1	ETA	Hollow lightweight concrete brick Hbl, 16DF		l: 495 b: 240 h: 238	t ₀₁ : 25 t ₀₂ : 51	t ₁₁ : 35 t ₁₂ : 36	a ₁ : 196 a ₂ : 52	2 6	0,7	17
HLWC2	Hilti Data	Germany Hbl 2		l: 248 b: 300 h: 248	t ₀₁ : 17 t ₀₂ : 21	t ₁₁ : 24 t ₁₂ : 22	a ₁ : 87 a ₂ : 40	2	0,6	17
HLWC3	Hilti Data	Germany Hbl 4		l: 248 b: 240 h: 248	t ₀₁ : 48 t ₀₂ : 41	t ₁₁ : -- t ₁₂ : 62	a ₁ : 140 a ₂ : 49	4	0,7	17
Solid Normal weight concrete										
SNWC1	ETA	Solid normal weight concrete brick Vbn, 2DF		l: ≥240 b: ≥115 h: ≥113	-	-	-	6 16	2,0	17
SNWC2	Hilti Data	UK Dense Concrete b=100mm		l: 440 b: 100 h: 215	-	-	-	14	2,0	18
SNWC3	Hilti Data	UK Dense concrete b=140mm		l: 440 b: 140 h: 215	-	-	-	14	2,0	18
Hollow Normal weight concrete										
HNWC1	ETA	Hollow normal weight concrete brick parpaing creux		l: 500 b: 200 h: 200	t ₀₁ : 15 t ₀₂ : 15	t ₁₁ : 15 t ₁₂ : 15	a ₁ : 133 a ₂ : 75	4 10	0,9	18
HNWC2	Hilti Data	Italy Blocchi Cem		l: 500 b: 200 h: 200	t ₀₁ : 30 t ₀₂ : 30	t ₁₁ : 30 t ₁₂ : --	a ₁ : 200 a ₂ : 135	8	1,0	18
HNWC3	Hilti Data	Germany Hbn 4		l: 365 b: 240 h: 238	t ₀₁ : 26 t ₀₂ : 35	t ₁₁ : 26 t ₁₂ : 26	a ₁ : 128 a ₂ : 62	4 10	1,4	18

Brick types and properties (cont.)

Brick code	Data	Brick name	Image	Size [mm]	t ₀ [mm]	t ₁ [mm]	a [mm]	f _b [N/mm ²]	ρ [kg/dm ³]	Page
HNWC4	Hilti Data	UK (b=215 mm)		l: 440 b: 215 h: 215	t ₀₁ : 48 t ₀₂ : 48	t ₁₁ : 40 t ₁₂ : --	a ₁ : 150 a ₂ : 120	10	1,2	19
HNWC5	Hilti Data	UK (b=138 mm)		l: 440 b: 138 h: 215	t ₀₁ : 48 t ₀₂ : 38	t ₁₁ : 48 t ₁₂ : --	a ₁ : 150 a ₂ : 60	13	1,5	19
HNWC6	Hilti Data	UK (b=112 mm)		l: 440 b: 112 h: 215	t ₀₁ : 30 t ₀₂ : 30	t ₁₁ : 30 t ₁₂ : --	a ₁ : 50 a ₂ : 50	7	1,3	19
HNWC7	Hilti Data	Finland Standard concrete brick		l: 600 b: 500 h: 92	t ₀₁ : 32 t ₀₂ : 15	t ₁₁ : 32 t ₁₂ : --	a ₁ : 62 a ₂ : 62	6	0,9	19

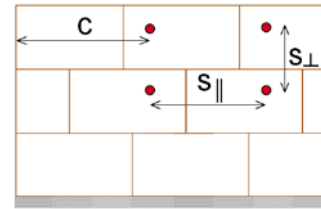
Anchor installation parameters

Brick position:



- **Header (H):** The longest dimension of the brick represents the width of the wall
- **Stretcher (S):** The longest dimension of the brick represents the length of the wall

Spacing and edge distance:

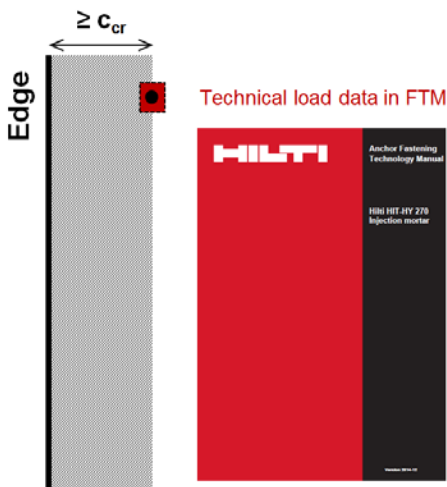


- c - Distance to the edge
- s_{||} - Spacing parallel to the bed joint
- s_⊥ - Spacing perpendicular to the bed joint

Minimum and characteristic spacing and edge distance parameters

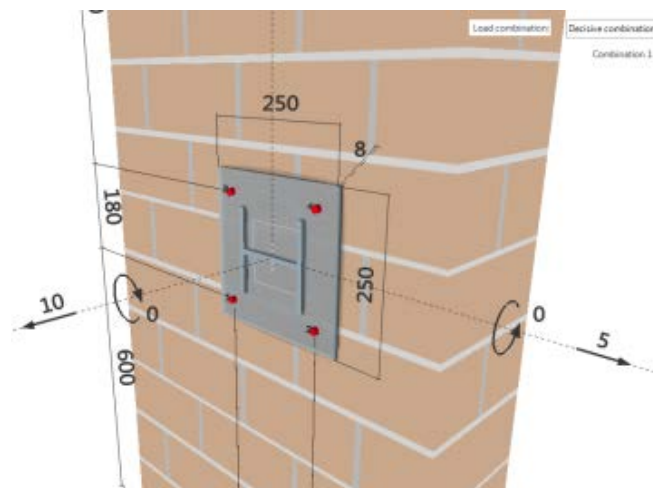
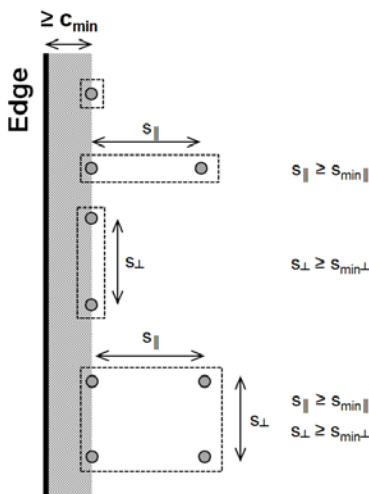
- c_{min} – Minimum edge distance
- c_{cr} – Characteristic edge distance
- s_{min||} – Min. spacing distance parallel to the bed joint
- s_{cr||} – Characteristic spacing distance parallel to the bed joint
- s_{min⊥} – Min. spacing distance perpendicular to the bed joint
- s_{cr⊥} – Characteristic spacing distance perpendicular to the bed joint

Allowed anchor positions:



- This FTM includes the load data for single anchors in masonry with a distance to edge equal to or greater than the characteristic edge distance.
- For the cases not covered in this technical data, including anchor groups, please use PROFIS Anchor software or consult ETA-13/1036.

PROFIS Anchor software interface:



Edge and spacing distances per brick

ETA bricks (criteria valid also for on-site tested bricks)						
Brick code	c _{min} [mm]	c _{cr} [mm]	s _{min} [mm]	s _{min} ⊥ [mm]	s _{cr} [mm]	s _{cr} ⊥ [mm]
SC1	b	b	b	h	b for h _{ef} < 80 at header l for h _{ef} ≥ 80 at header l at stretcher	2*h+10
SC2, SCS1, SCS2, SLWC1, SNWC1	50	115	115 at c _{min} 50 at c _{cr}	115 at c _{min} 50 at c _{cr}	b at header l at stretcher	h
HC1	50	l/2	5 x d ₀	5 x d ₀	l	h
HCS1	50	Tension: 50 Shear: l/2	50	50	l	h
HLWC1, HNWC1	50	Tension: 50 Shear: h	50	50	h	h
CC1	100	100	l	b	-	b

Hilti Data bricks						
Brick code	c _{min} [mm]	c _{cr} [mm]	s _{min} [mm]	s _{min} ⊥ [mm]	s _{cr} [mm]	s _{cr} ⊥ [mm]
SC3	100	100	65	100 at h _{ef} = 50 215 at h _{ef} ≥ 80	215	140
HC2	50	Tension: 50 Shear: 150	5 x d ₀	5 x d ₀	245 at header 300 at stretcher	185
HC3	50	Tension: 50 Shear: 150	5 x d ₀	5 x d ₀	300	190
HC4	50	Tension: 50 Shear: 150	5 x d ₀	5 x d ₀	135 at header 285 at stretcher	140
HC5	120	120	5 x d ₀	5 x d ₀	232	80
HC6	50	Tension: 50 Shear: 150	5 x d ₀	5 x d ₀	135 at header 285 at stretcher	135
HC7	50	Tension: 50 Shear: 150	5 x d ₀	5 x d ₀	120 at header 240 at stretcher	120
HC8, HC9	115	115	115	50	115 at header 240 at stretcher	110
HC10	105	105	105	65	105 at header 215 at stretcher	140
CC2	100	100	400	250	400	250
HCS2	50	Tension: 50 Shear: 120	50	50	175 at header 240 at stretcher	115
SLWC2	50	115	50 at c _{cr} 115 at c _{min}	50 at c _{cr} 115 at c _{min}	190 at header 550 at stretcher	190
SLWC3	50	115	50 at c _{cr} 115 at c _{min}	50 at c _{cr} 115 at c _{min}	270 at header 380 at stretcher	270
HLWC2, HLWC3	50	Tension: 50 Shear: 250	50	50	250	250
SNWC2, SNWC3	50	115	50 at c _{cr} 115 at c _{min}	50 at c _{cr} 115 at c _{min}	440	215
HNWC2	50	Tension: 50 Shear: 200	50	50	250	200
HNWC3	50	Tension: 50 Shear: 240	50	50	240	240
HNWC4, HNWC5	50	Tension: 50 Shear: 220	50	50	215	215
HNWC6, HNWC7	50	Tension: 50 Shear: 100	50	50	200	200

Anchor dimensions

Anchor size Threaded rod HIT-V, HIT-V-R, HIT-V-HCR	M6	M8	M10	M12	M16
Embedment depth h_{ef} [mm]	Variable length from 50 to 300 without HIT-SC sieve sleeve Variable length from 50 to 160 with HIT-SC sieve sleeve				

Anchor size Internally threaded sleeve HIT-IC	M8x80	M10x80	M12x80
Embedment depth h_{ef} [mm]	80	80	80

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

Basic loading data (for a single anchor)

The load tables provide the design resistance values for a single loaded anchor.

All data in this section applies to

- Edge distance $c \geq c_{cr}$. For other applications, use Hilti PROFIS Anchor software.
- Correct anchor setting (see instruction for use, setting details)

Anchorages subject to:		Hilti HIT-HY 270 with HIT-V or HIT-IC	
		in solid bricks	in hollow bricks
Hole drilling 		hammer mode	rotary mode
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	
Temperature in the base material at installation		+5° C to +40° C	-5° C to +40° C
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)

Design – Failure modes

The design tensile resistance is the lower value of:

Failure due to tension loads		Condition	Page
Failure of the metal part		$N_{Sd}^h \leq N_{Rd,s} = N_{Rk,s} / \gamma_{Ms}$	11
Pull-out failure of the anchor		$N_{Sd}^h \leq N_{Rd,p} = N_{Rk,p} / \gamma_{Mm}$	12 to 19
Brick breakout failure		$N_{Sd} \leq N_{Rd,b} = N_{Rk,b} / \gamma_{Mm}$ $N_{Sd}^g \leq N_{Rd}^g = N_{Rk}^g / \gamma_{Mm}$	12 to 19
Pull out of one brick		$N_{Sd} \leq N_{Rd,pb} = N_{Rk,pb} / \gamma_{Mm}$	20

The design shear resistance is the lower value of:

Failure due to shear loads		Condition	Page
Failure of the metal part		$V_{Sd}^h \leq V_{Rd,s} = V_{Rk,s} / \gamma_{Ms}$	11
Local brick failure		$V_{Sd} \leq V_{Rd,b} = V_{Rk,b} / \gamma_{Mm}$ $V_{Sd}^g \leq V_{Rd}^g = V_{Rk}^g / \gamma_{Mm}$	12 to 19
Brick edge failure		$V_{Sd} \leq V_{Rd,c} = V_{Rk,c} / \gamma_{Mm}$ $V_{Sd}^g \leq V_{Rd}^g = V_{Rk}^g / \gamma_{Mm}$	12 to 19
Pushing out of one brick		$V_{Sd} \leq V_{Rd,pb} = V_{Rk,pb} / \gamma_{Mm}$	20

- Notice that loads are affected by a series of factors such as visibility/filling of joints, factors for anchor groups, spacing and edge distance.
- For other applications not covered in this FTM, use Hilti PROFIS Anchor software.

Partial safety factors

Base material	Failure (rupture) mode - Injection Anchor (γ_{Mm})	
Masonry	2,5	

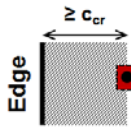
Failure (rupture) mode - Metal part (γ_{Ms})		
Tension loading	Shear loading	
	if $f_{uk} \leq 800 \text{ N/mm}^2$ and $f_{yk}/f_{uk} \leq 0,8$	if $f_{uk} > 800 \text{ N/mm}^2$ or $f_{yk}/f_{uk} > 0,8$
$1,2 / (f_{yk} / f_{uk}) \geq 1,4$	$1,0 / (f_{yk} / f_{uk}) \geq 1,25$	1,5

Design tension and shear resistances – Steel failure for threaded rods HIT-V

Anchor size			M6	M8	M10	M12	M16
$N_{Rd,s}$	HIT-V 5.8(F)	[kN]	6,7	12,0	19,3	28,0	52,7
	HIT-V 8.8(F)	[kN]	10,7	19,3	30,7	44,7	84,0
	HIT-V-R	[kN]	7,5	13,9	21,9	31,6	58,8
	HIT-V-HCR	[kN]	10,7	19,3	30,7	44,7	84,0
$V_{Rd,s}$	HIT-V 5.8(F)	[kN]	4,0	7,2	12,0	16,8	31,2
	HIT-V 8.8(F)	[kN]	6,4	12,0	18,4	27,2	50,4
	HIT-V-R	[kN]	4,5	8,3	12,8	19,2	35,3
	HIT-V-HCR	[kN]	6,4	12,0	18,4	27,2	50,4
$M^0_{Rd,s}$	HIT-V 5.8(F)	[Nm]	6,4	15,2	29,6	52,8	133,6
	HIT-V 8.8(F)	[Nm]	9,6	24,0	48,0	84,0	212,8
	HIT-V-R	[Nm]	7,1	16,7	33,4	59,1	149,7
	HIT-V-HCR	[Nm]	9,6	24,0	48,0	84,0	212,8

Design tension and shear resistances – Steel failure for internally threaded rods HIT-IC

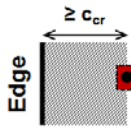
Anchor size			M8	M10	M12
$N_{Rd,s}$	HIT-IC	[Nm]	3,9	4,8	9,1
$V_{Rd,s}$	HIT-V 5.8	[Nm]	7,2	12,0	16,8
	Screw 8.8	[Nm]	12,0	18,4	27,2
$M^0_{Rd,s}$	HIT-V 5.8	[Nm]	15,2	29,6	52,8
	Screw 8.8	[Nm]	24,0	48,0	84,0



Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h_{ef} [mm]	f_b [N/mm ²]	w/w and w/d		d/d	
				Ta	Tb	Ta	Tb
				Loads [kN]			
	SC1 – Solid clay brick Mz, 1DF (ETA data)						
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V M8, M10, M12, M16 HIT-V + HIT-SC M8, M10, M12, M16 HIT-IC M8, M10, M12 HIT-IC + HIT-SC M8, M10, M12	≥ 50	12	0,8	0,8	0,8	0,8
			20	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)
			40	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
		≥ 80	12	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
			20	1,8 (2,2*)	1,8 (2,2*)	1,8 (2,2*)	1,8 (2,2*)
			40	2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)
		≥ 100	12	2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)
			20	3,6 (4,2*)	3,6 (4,2*)	3,6 (4,2*)	3,6 (4,2*)
			40	4,8	4,8	4,8	4,8
$V_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V M8, M10, M12, M16 HIT-V + HIT-SC M8, M10, M12, M16 HIT-IC M8, M10, M12 HIT-IC + HIT-SC M8, M10, M12	≥ 50	12	0,5			
			20	0,6			
			40	0,8			
	SC2 - Solid clay brick Mz, 2DF (ETA data)						
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V M8, M10, M12, M16 HIT-V + HIT-SC M8, M10, M12, M16 HIT-IC M8,M10, M12 HIT-IC + HIT-SC M8,M10, M12	≥ 50	12	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)
		≥ 80		1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
		≥ 100		2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)
		$V_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V M8, M10, M12, M16 HIT-V + HIT-SC M8, M10, M12, M16 HIT-IC M8,M10, M12 HIT-IC + HIT-SC M8,M10, M12	≥ 50	12	1,6	
	SC3 - Solid clay brick UK London yellow Multi Stock (Hilti data)						
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 100$ mm)	HIT-V + HIT-SC M8, M10, M12, M16 HIT-V + HIT-SC M8, M10 HIT-V + HIT-SC M12, M16 HIT-IC + HIT-SC M8, M10, M12	≥ 50	16	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
		≥ 80		2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)
				2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)
		$V_{Rd,b}$ ($c_{cr} = 100$ mm)	HIT-V + HIT-SC M8, M10 HIT-V + HIT-SC M12, M16	≥ 50	16	2,6	
	3,2						
HIT-V + HIT-SC M8, M10 HIT-V + HIT-SC M12, M16 HIT-IC + HIT-SC M8, M10, M12	≥ 80		3,2				
			4,8				

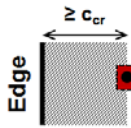
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Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h_{ef} [mm]	f_b [N/mm ²]	w/w and w/d		d/d		
				Ta	Tb	Ta	Tb	
				Loads [kN]				
	HC1 - Hollow clay brick Hz, 10DF (ETA data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	12	2,2 (2,4*)	2,2 (2,4*)	2,2 (2,4*)	2,2 (2,4*)
	HIT-IC + HIT-SC	M8, M10, M12		20	2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)
$V_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10, M12	≥ 80	12	0,8			
	HIT-IC + HIT-SC	M8		20	1,2			
	HIT-V + HIT-SC	M16		12	1,4			
	HIT-IC + HIT-SC	M10, M12		20	1,8			
	HC2 - Hollow clay brick Italy Mattone Alveolater 50 (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	16	1,8 (2,0*)	1,8 (2,0*)	1,8 (2,0*)	1,8 (2,0*)
	HIT-IC + HIT-SC	M8, M10, M12	≥ 130		2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)	2,6 (3,0*)
	$V_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	16	1,4		
HIT-IC + HIT-SC		M8, M10, M12	≥ 130	2,6				
HIT-V + HIT-SC		M8, M10, M12, M16	≥ 130					
	HC3 - Hollow clay brick Spain Termoarcilla (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	22	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	22	1,8			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC4 - Hollow clay brick Belgium Wienerberger Thermobrick (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	21	0,5 (0,6 *)	0,5 (0,6 *)	0,5 (0,6 *)	0,5 (0,6 *)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10	≥ 50	21	2,4			
	HIT-V + HIT-SC	M12, M16			2,8			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC5 - Hollow clay brick Spain Hueco doble (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 120$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	4	0,4	0,4	0,4	0,4
	HIT-V + HIT-SC	M8	80		0,8 (1,0*)	0,8 (1,0*)	0,8 (1,0*)	0,8 (1,0*)
	HIT-V + HIT-SC	M10			1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)
	HIT-IC + HIT-SC	M8, M10, M12			1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
	HIT-V + HIT-SC	M12, M16			1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)	1,4 (1,6*)
$V_{Rd,b}$ ($c_{cr} = 120$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	4	1,2			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC6 - Hollow clay brick Belgium Wienerberger Powerbrick (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	41	1,6 (1,8 *)	1,6 (1,8 *)	1,6 (1,8 *)	1,6 (1,8 *)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		2,6 (2,8*)	2,6 (2,8*)	2,6 (2,8*)	2,6 (2,8*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 150$ mm)	HIT-V + HIT-SC	M8, M10	≥ 50	41	2,6			
	HIT-V + HIT-SC	M12, M16			4,8			
	HIT-IC + HIT-SC	M8, M10, M12						

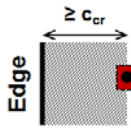
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Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h_{ef} [mm]	f_b [N/mm ²]	w/w and w/d		d/d		
				Ta	Tb	Ta	Tb	
				Loads [kN]				
	HC7 - Hollow clay brick Italy Doppio uni (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	27	0,6	0,6	0,6	0,6
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)	1,0 (1,2*)
	HIT-IC + HIT-SC	M8, M10, M12						
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 130		2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)
$V_{Rd,b}$ ($c_{cr} = 150$ m)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	27	1,6			
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		3,6			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC8 - Hollow clay brick Spain Ladrillo cara vista (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	42	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)	2,2 (2,6*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 115$ m)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	42	1,8			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC9 - Hollow clay brick Spain Clinker mediterraneo (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	78	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)	0,6 (0,8*)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		2,0 (2,2*)	2,0 (2,2*)	2,0 (2,2*)	2,0 (2,2*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	78	2,0			
	HIT-IC + HIT-SC	M8, M10, M12						
	HC10 Hollow clay brick UK Nostell Red Multi (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 105$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	70	2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)	2,4 (2,8*)
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)	2,8 (3,2*)
	HIT-IC + HIT-SC	M8, M10, M12						
$V_{Rd,b}$ ($c_{cr} = 105$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 50	70	4,6			
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80		4,8			
	HIT-IC + HIT-SC	M8, M10, M12						
	CC1 - Ceiling Hollow clay brick “Ds-1,0” (ETA data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 100$ mm)	HIT-V + HIT-SC	M6	80	3	0,6	0,6	0,6	0,6
	CC2 - Ceiling Hollow clay brick Italy “Mattone rosso” (Hilti data)							
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 100$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	50	26	0,4 (0,5*)	0,4 (0,5*)	0,4 (0,5*)	0,4 (0,5*)
	HIT-V + HIT-SC	M8, M10, M12, M16	80	26	0,5 (0,6*)	0,5 (0,6*)	0,5 (0,6*)	0,5 (0,6*)
	HIT-IC + HIT-SC	M8, M10, M12						

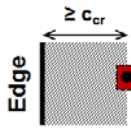
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Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size		h _{ef} [mm]	f _b [N/mm ²]	w/w and w/d		d/d			
					Ta	Tb	Ta	Tb		
					Loads [kN]					
	SCS1- Solid silica brick KS, 2DF (ETA data)									
N _{Rd,p} = N _{Rd,b} (C _{cr} = 115 mm)	HIT-V	M8, M10, M12, M16	≥ 50	12	-	-	2,4	2,0		
	HIT-V + HIT-SC	M8, M10, M12, M16								
	HIT-IC	M8, M10, M12								
	HIT-IC + HIT-SC	M8, M10, M12								
V _{Rd,b} (C _{cr} = 115 mm)	HIT-V	M8, M10, M12, M16	≥ 50	12	-		2,4			
	HIT-V + HIT-SC	M8, M10, M12, M16								
	HIT-IC	M8, M10, M12								
	HIT-IC + HIT-SC	M8, M10, M12								
	SCS2- Solid silica brick KS, 8DF (ETA data)									
N _{Rd,p} = N _{Rd,b} (C _{cr} = 115 mm)	HIT-V	M8, M10, M12, M16	≥ 50	12	-	-	2,8	2,2		
	HIT-V + HIT-SC	M8, M10, M12, M16		20	-	-	3,6	3,0		
	HIT-IC	M8, M10, M12		28	-	-	4,2	3,4		
	HIT-IC + HIT-SC	M8, M10, M12								
	HIT-V	M8, M10	≥ 80	12	-	-	3,4	2,8		
				20	-	-	4,4	3,6		
				28	-	-	4,8	4,2		
				12	-	-	4,6	3,8		
	HIT-V	M12		20	-	-	4,8	4,8		
		HIT-V + HIT-SC		M8, M10	28	-	-	4,8	4,8	
		HIT-IC		M8, M10	12	-	-	4,8	4,8	
		HIT-IC + HIT-SC		M8	20	-	-	4,8	4,8	
	HIT-V	M16		≥ 100	28	-	-	4,8	4,8	
		HIT-V + HIT-SC			M12, M16	12	-	-	4,8	4,8
		HIT-IC			M12	20	-	-	4,8	4,8
		HIT-IC + HIT-SC	M10, M12		28	-	-	4,8	4,8	
	HIT-V	M8, M10	12		-	-	4,8	4,4		
			20		-	-	4,8	4,8		
			28	-	-	4,8	4,8			
			12	-	-	4,8	4,8			
	V _{Rd,b} (C _{cr} = 115 mm)	HIT-V	M8, M10	≥ 50	20	-	-	4,8	4,8	
					28	-	-	4,8	4,8	
					12	-	-	4,8	4,8	
HIT-V		M12, M16	20		-	-	4,8	4,8		
		HIT-V + HIT-SC	M8, M10, M12, M16		28	-	-	4,8	4,8	
		HIT-IC	M8, M10, M12							
		HIT-IC + HIT-SC	M8, M10, M12							

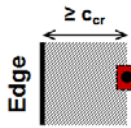
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Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h_{ef} [mm]	f_b [N/mm ²]	w/w and w/d		d/d					
				Ta	Tb	Ta	Tb				
				Loads [kN]							
	HCS1 - Hollow silica brick KSL, 8DF (ETA data)										
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	12	-	-	1,6	1,2			
	HIT-IC + HIT-SC	M8, M10, M12		20	-	-	2,2	1,8			
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 130	12	-	-	2,0	1,6			
				20	-	-	3,0	2,4			
$V_{Rd,b}$ ($c_{cr} = 125$ mm)	HIT-V + HIT-SC	M8	≥ 80	12	-		2,4				
				20	-		3,6				
	HIT-V + HIT-SC	M10		12	-		3,6				
				20	-		4,8				
	HIT-V + HIT-SC	M12, M16		12	-		4,0				
				HIT-IC + HIT-SC	M8, M10, M12	20	-		4,8		
	HSC2 - Hollow silica brick Germany KSL, 3DF (Hilti data)										
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 50$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	12	-	-	2,0	1,6			
	HIT-IC + HIT-SC	M8, M10, M12									
$V_{Rk,b}$ ($c_{cr} = 120$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	12	-		2,0				
	HIT-IC + HIT-SC	M8, M10, M12									
	SLWC1 - Solid lightweight concrete brick Vbl, 2DF (ETA data)										
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V HIT-V + HIT-SC HIT-IC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12, M16 M8,M10, M12 M8,M10, M12	≥ 50	4	1,2	0,8	1,2 (1,4*)	1,0			
				6	1,4	1,2	1,6	1,2 (1,4*)			
			≥ 80	4	1,8	1,4	2,0	1,6 (1,8*)			
				6	2,2	1,8	2,4 (2,6*)	2,0 (2,2*)			
			≥ 100	4	2,4	2,0	2,6 (2,8*)	2,2 (2,4*)			
				6	3,0	2,4	3,2 (3,4*)	2,6 (2,8*)			
			$V_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V	M8	≥ 50	4	0,8			
							6	1,0			
HIT-V HIT-V + HIT-SC HIT-IC HIT-IC + HIT-SC	M10, M12, M16 M8, M10, M12, M16 M8,M10, M12 M8,M10, M12	4		1,0							
		6		1,2							
											
		SLWC2 - Solid lightweight concrete brick Sweden Leca typ 3 (Hilti data)									
$N_{Rd,p} = N_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	3	2,2	1,8	2,4 (2,6*)	2,0 (2,2*)			
	HIT-IC + HIT-SC	M8,M10, M12									
$V_{Rd,b}$ ($c_{cr} = 115$ mm)	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 80	3	1,6						
	HIT-IC + HIT-SC	M8,M10, M12			1,0						

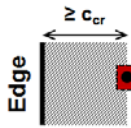
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Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h _{ef} [mm]	f _b [N/mm ²]	w/w and w/d		d/d		
				Ta	Tb	Ta	Tb	
				Loads [kN]				
	SLWC3 - Solid light weight concrete brick Italy “Tufo” volcanic rock (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 115 mm)	HIT-V M8	≥ 80	4	1,2	1,0	1,4	1,2	
	HIT-V M10			1,6	1,2	1,8	1,4 (1,6*)	
	HIT-V M12			1,8	1,6	2,0	1,8	
	HIT-V M16			2,2	1,8	2,4 (2,6*)	2,0 (2,2*)	
V _{Rd,b} (c _{cr} = 115 mm)	HIT-V M8	≥ 80	4	0,8				
	HIT-V M10, M12, M16			1,8				
	HLWC1 - Hollow light weight concrete brick Hbl, 16DF (ETA data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10, M12, M16	≥ 80	2	0,5	0,36	0,6	0,5	
	HIT-IC + HIT-SC M8, M10, M12		6	0,8	0,6	1,0	0,8	
	HIT-V + HIT-SC M8, M10, M12, M16	160	2	0,6	0,5	0,6 (0,8*)	0,6	
			6	1,0 (1,2*)	0,8	1,2 (1,6*)	1,0	
V _{Rd,b} (c _{cr} = 250 mm)	HIT-V + HIT-SC M8, M10	≥ 80	2	1,4				
	HIT-V + HIT-SC M12, M16 HIT-IC + HIT-SC M8, M10, M12		6	2,4				
			2	1,8				
			6	3,2				
	HLWC2 - Hollow light weight concrete brick Germany - Hbl 2, 10DF (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10, M12, M16	≥ 80	2	0,6	0,5	0,6	0,5 (0,6*)	
	HIT-IC + HIT-SC M8, M10, M12							
V _{Rd,b} (c _{cr} = 250 mm)	HIT-V + HIT-SC M8, M10, M12, M16	≥ 80	2	0,6				
	HIT-IC + HIT-SC M8, M10, M12							
	HLWC3 - Hollow light weight concrete brick Germany - Hbl 4, 8DF (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10, M12, M16	≥ 80	4	0,6	0,6	0,8	0,6	
	HIT-IC + HIT-SC M8, M10, M12							
V _{Rd,b} (c _{cr} = 250 mm)	HIT-V + HIT-SC M8, M10, M12, M16	≥ 80	4	1,4				
	HIT-IC + HIT-SC M8, M10, M12							
	SNWC1 - Solid normal weight concrete brick Vbn, 2DF (ETA data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 115 mm)	HIT-V M8, M10, M12, M16	≥ 50	6	1,2	1,0	1,2	1,0	
	HIT-V + HIT-SC M8, M10, M12, M16							
	HIT-IC M8,M10, M12		16	2,2	1,8	2,2	1,8	
	HIT-IC + HIT-SC M8,M10, M12							
V _{Rd,b} (c _{cr} = 115 mm)	HIT-V M8, M10, M12, M16	≥ 50	6	1,6				
	HIT-V + HIT-SC M8, M10, M12, M16							
	HIT-IC M8,M10, M12		16	2,6				
	HIT-IC + HIT-SC M8,M10, M12							

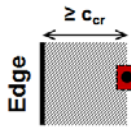
* Compressed Air Cleaning only



Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size		h _{ef} [mm]	f _b [N/mm ²]	w/w and w/d		d/d	
					Ta	Tb	Ta	Tb
					Loads [kN]			
	SNWC2 - Solid normal weight concrete brick UK Dense concrete b=100 mm (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 115 mm)	HIT-V HIT-V + HIT-SC	M8, M10, M12, M16 M8, M10, M12, M16	50	14	2,2	1,8	2,2	1,8
V _{Rd,b} (c _{cr} = 115 mm)	HIT-V HIT-V + HIT-SC	M8, M10, M12, M16 M8, M10, M12, M16	50	14	4,2			
	SNWC3 - Solid normal weight concrete brick UK Dense concrete b=140 mm (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 115 mm)	HIT-V HIT-V + HIT-SC HIT-IC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12, M16 M8,M10, M12 M8,M10, M12	≥ 50	14	2,2	1,8	2,2	1,8
V _{Rd,b} (c _{cr} = 115 mm)	HIT-V HIT-V + HIT-SC	M8, M10, M12, M16 M8, M10, M12, M16	50	14	4,2			
	HIT-V HIT-V + HIT-SC	M8, M10 M8, M10	80		4,2			
	HIT-V HIT-V + HIT-SC HIT-IC HIT-IC + HIT-SC	M12, M16 M12, M16 M8,M10, M12 M8,M10, M12			4,8			
	HNWC1 - Hollow normal weight concrete brick Parpaing creux (ETA data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12	≥ 50	4 10	0,36 0,8	0,36 0,6	0,36 0,8	0,36 0,6
	HIT-V + HIT-SC	M8, M10, M12, M16	≥ 130	4 10	0,6 1,0	0,5 0,8	0,6 1,0	0,5 0,8
	V _{Rd,b} (c _{cr} = 200 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12	≥ 50	4 10	1,4 2,4		
	HNWC2 - Hollow normal weight concrete brick Italy Blocchi Cem (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12	≥ 50	8	1,0	0,8	1,0	0,8
V _{Rd,b} (c _{cr} = 200 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10 M8	≥ 50	8	4,0			
	HIT-V + HIT-SC HIT-IC + HIT-SC	M12, M16 M10, M12			4,4			
	HNWC3 - Hollow normal weight concrete brick Germany Hbn 4, 12DF (Hilti data)							
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12	≥ 80	4 10	0,6 1,0	0,5 0,8	0,6 1,0	0,5 0,8
	V _{Rd,b} (c _{cr} = 240 mm)	HIT-V + HIT-SC HIT-IC + HIT-SC	M8, M10, M12, M16 M8, M10, M12	≥ 80	4 10	2,2 3,6		

* Compressed Air Cleaning only



Design tension and shear resistances – Pull-out failure of the anchor, brick breakout failure and local brick failure at characteristic edge distance ($c \geq c_{cr}$) for single anchor applications

Load type	Anchor size	h _{ef} [mm]	f _b [N/mm ²]	w/w and w/d		d/d	
				Ta	Tb	Ta	Tb
				Loads [kN]			
	HNWC4 - Hollow normal weight concrete brick UK (b=215 mm) (Hilti data)						
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10	80	10	0,4	0,4	0,4	0,4
	HIT-V + HIT-SC M12, M16			1,0	0,8	1,0	0,8
V _{Rd,b} (c _{cr} = 220 mm)	HIT-V + HIT-SC M8	80	10	1,4			
	HIT-V + HIT-SC M10			2,0			
	HIT-V + HIT-SC M12, M16			2,8			
	HNWC5 - Hollow normal weight concrete brick UK (b=138 mm) (Hilti data)						
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10	80	13	0,6	0,6	0,6	0,6
	HIT-V + HIT-SC M12, M16			1,0	0,8	1,0	0,8
V _{Rd,b} (c _{cr} = 220 mm)	HIT-V + HIT-SC M8	80	13	1,4			
	HIT-V + HIT-SC M10			2,0			
	HIT-V + HIT-SC M12, M16			2,8			
	HNWC6 - Hollow normal weight concrete brick UK (b=112 mm) (Hilti data)						
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10	50	7	0,6	0,6	0,6	0,6
	HIT-V + HIT-SC M12, M16			1,0	0,8	1,0	0,8
V _{Rd,b} (c _{cr} = 100 mm)	HIT-V + HIT-SC M8	50	7	1,4			
	HIT-V + HIT-SC M10			2,0			
	HIT-V + HIT-SC M12, M16			2,8			
	HNWC7 - Hollow normal weight concrete brick Finland “Standard Concrete Brick” (Hilti data)						
N _{Rd,p} = N _{Rd,b} (c _{cr} = 50 mm)	HIT-V + HIT-SC M8, M10	50	6	0,6	0,4	0,6	0,4
	HIT-V + HIT-SC M12, M16			0,8	0,6	0,8	0,6
V _{Rd,b} (c _{cr} = 100 mm)	HIT-V + HIT-SC M8	50	6	1,0			
	HIT-V + HIT-SC M10			1,4			
	HIT-V + HIT-SC M12, M16			1,6			

* Compressed Air Cleaning only

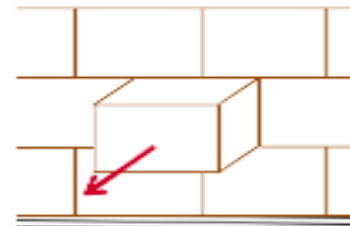
Design tension and shear resistance – Pull out / Pushing out of one brick failure modes

Pull out of one brick (tension):

$$N_{Rd,pb} = 2 \cdot l \cdot b \cdot (0,5 \cdot f_{vko} + 0,4 \cdot \sigma_d) / (2,5 \cdot 1000) \quad [\text{kN}]$$

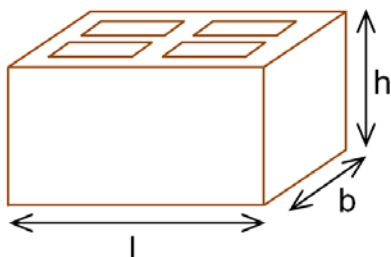
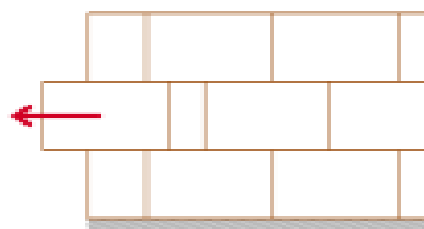
$$N_{Rd,pb} = (2 \cdot l \cdot b \cdot (0,5 \cdot f_{vko} + 0,4 \cdot \sigma_d) + b \cdot h \cdot f_{vko}) / (2,5 \cdot 1000) \quad [\text{kN}]$$

* this equation is applicable if the vertical joints are filled



Pushing out of one brick (shear):

$$V_{Rd,pb} = 2 \cdot l \cdot b \cdot (0,5 \cdot f_{vko} + 0,4 \cdot \sigma_d) / (2,5 \cdot 1000) \quad [\text{kN}]$$



σ_d = design compressive stress perpendicular to the shear (N/mm^2)
 f_{vko} = initial shear strength according to EN 1996-1-1, Table 3.4

Brick type	Mortar strength	$f_{vko} [\text{N/mm}^2]$
Clay brick	M2,5 to M9	0,20
	M10 to M20	0,30
All other types	M2,5 to M9	0,15
	M10 to M20	0,20

On-site tests



For other bricks in solid or hollow masonry, not covered by the Hilti HIT-HY 270 ETA or this technical data manual, the characteristic resistance may be determined by on-site tension tests (pull-out tests or proof-load tests), according to ETAG029, Annex B.

For the evaluation of test results, the characteristic resistance may be obtained taking into account the β factor, which considers the different influences of the product.

The β factor for the brick types covered by the Hilti HIT-HY 270 ETA is provided on the following table:

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

*Ta / Tb, w/w and d/d anchorage parameters, as defined on Table page 9

Applying the β factor from the table above, the characteristic tension resistance N_{Rk} can be obtained. Characteristic shear resistance V_{Rk} can also be directly derived from N_{Rk} . For detailed procedure consult ETAG 029, Annex B.

Materials

Material quality HIT-V

Part	Material
Threaded rod HIT-V-5.8(F)	Strength class 5.8, A ₅ > 8% ductile Electroplated zinc coated ≥ 5 µm; (F) Hot dip galvanized ≥ 45 µm
Threaded rod HIT-V-8.8(F)	Strength class 8.8, A ₅ > 8% ductile Electroplated zinc coated ≥ 5 µm; (F) Hot dip galvanized ≥ 45 µm
Threaded rod HIT-V-R	Stainless steel grade A4 A ₅ > 8% ductile strength class 70, 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
Threaded rod HIT-V-HCR	High corrosion resistant steel, A ₅ > 8% ductile 1.4529, 1.4565
Washer	Electroplated zinc coated, hot dip galvanized
	Stainless steel 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
	High corrosion resistant steel 1.4529, 1.4565
Hexagon nut	Strength class 8 Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
	Strength class 70 Stainless steel grade A4 1.4401; 1.4404; 1.4578; 1.4571; 1.4439; 1.4362
	Strength class 70 High corrosion resistant steel 1.4529, 1.4565

Material quality HIT-IC

Part	Material
Internally threaded sleeve HIT-IC	A ₅ > 8% ductile Electroplated zinc coated ≥ 5 µm

Material quality HIT-SC

Part	Material
Sieve sleeve HIT-SC	Frame: Polyfort FPP 20T Sieve: PA6.6 N500/200

Base materials:

- Solid brick masonry. The resistances are also valid for larger brick sizes and larger compressive strengths of the masonry unit.
- Hollow brick masonry
- Mortar strength class of the masonry: M2,5 at minimum according to EN 998-2: 2010.
- For other bricks in solid masonry and in hollow or perforated masonry, the characteristic resistance of the anchor may be determined by on-site tests according to ETAG 029, Annex B under consideration of the β-factor according to the table on page 21.

Setting

Installation equipment

Anchor size	M6	M8	M10	M12	M16
Rotary hammer	TE2(A) – TE30(A)				
Other tools	compressed air gun or Hilti hand pump, set of cleaning brushes, HDE/HDM dispenser				

Maximum working time and minimum curing time

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 39 °C	1 min	20 min

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

* For hollow bricks only.

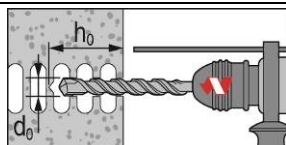
Installation instructions

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

Hole drilling

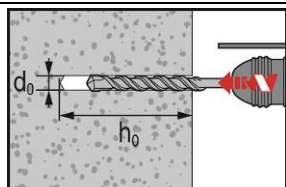
If no significant resistance is felt over the entire depth of the hole when drilling (e.g. in unfilled butt joints), the anchor should not be set at this position.

Drilling mode



In hollow bricks: rotary mode

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



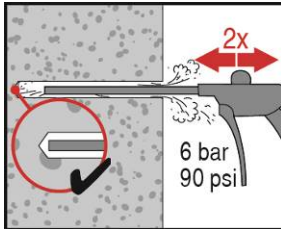
In solid bricks: hammer mode

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

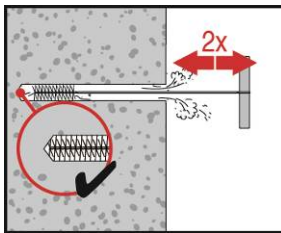
Drill hole cleaning

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

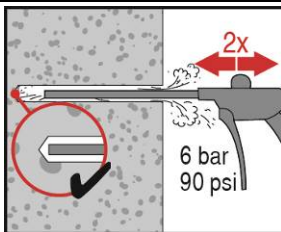
Manual Cleaning (MC) or Compressed Air Cleaning (CAC) for hollow and solid bricks



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.

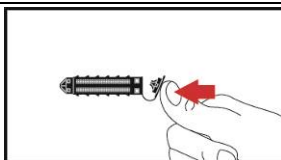


Brush 2 times with the specified steel brush (tables B5 to B10) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the drill hole (brush $\varnothing \geq$ drill hole $\varnothing$) - if not the brush is too small and must be replaced with the proper brush diameter.

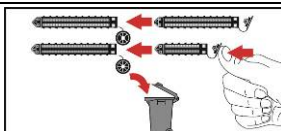


Blow again with Hilti hand pump or compressed air 2 times until return air stream is free of noticeable dust.

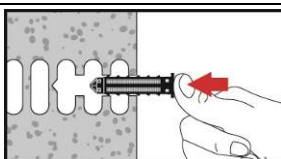
Injection preparation in masonry with holes or voids: installation with sieve sleeve HIT-SC



Single sieve sleeve HIT-SC
Close lid

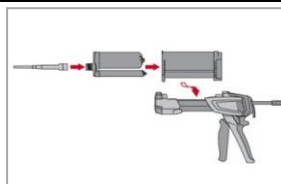


Two sieve sleeves HIT-SC
Plug sieve sleeves together. Discard superfluous lid.
Observe sieve sleeve order in case of different sieve sleeve lengths: shorter sleeve has to be plugged into longer sleeve.

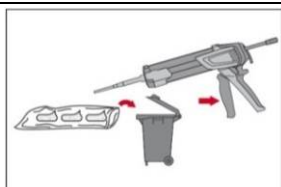


Insert sieve sleeve manually.
When using two sieve sleeves, longer sieve sleeve has to be inserted first.

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.

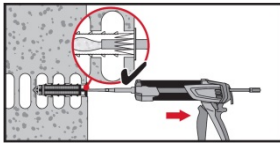


Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discarded quantities are

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

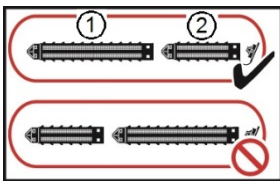
Inject adhesive without forming air voids

Installation with sieve sleeve HIT-SC



Single sieve sleeve HIT-SC

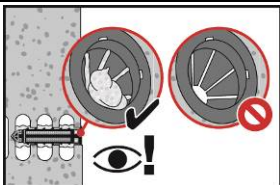
Insert mixer approximately 1 cm through the lid. Inject required amount of adhesive. Adhesive must emerge through the lid.



Two sieve sleeves HIT-SC

Use extension for installation with two sieve sleeves.

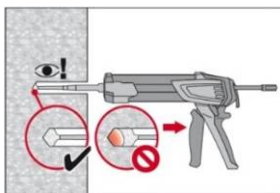
Insert mixer approximately 1 cm through the tip of sieve sleeve "2" and inject required amount of adhesive into sieve sleeve "1". Withdraw mixer to the point where it extends about 1 cm through the lid into the sleeve "2". Continue injecting in sieve sleeve "2" as described above.



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.

Solid bricks: installation without sieve sleeve



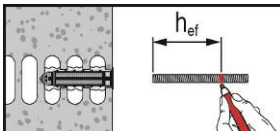
Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.

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:

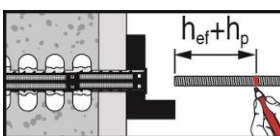
Before use, verify that the element is dry and free of oil and other contaminants.



HIT-V-... or HIT-IC in hollow and solid bricks:

Pre-setting

Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in page 23.

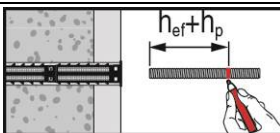


HIT-V-... in hollow and solid bricks:

setting through the fixture

or through the non-loadbearing layer and the fixture

Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in page 23.

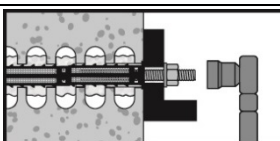


HIT-V-... in hollow and solid bricks:

setting through the non-loadbearing

Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in page 23.

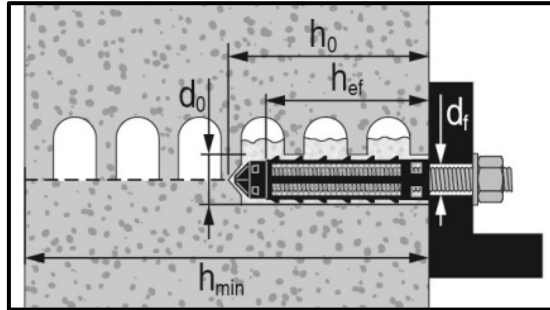
Loading the anchor



Loading the anchor: After required curing time t_{cure} the anchor can be loaded. The applied installation torque shall not exceed the values T_{max} .

Applications for hollow and solid bricks with sieve sleeves

For installing HIT-V and HIT-IC with embedments of 50 and 80 mm, a single sieve sleeve is used.



Hollow brick with threaded rod HIT-V or internally threaded sleeve HIT-IC and single sieve sleeve HIT-SC

Installation parameters of threaded rod HIT-V with sieve sleeve HIT-SC in hollow and solid brick

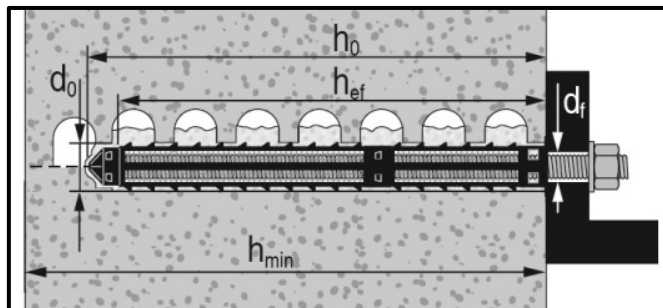
HIT-V		M6	M8		M10		M12		M16	
with HIT-SC		12x85	16x50	16x85	16x50	16x85	18x50	18x85	22x50	22x85
Nominal diameter of drill bit	d_0 [mm]	12	16	16	16	16	18	18	22	22
Drill hole depth	h_0 [mm]	95	60	95	60	95	60	95	60	95
Effective embedment depth	h_{ef} [mm]	80	50	80	50	80	50	80	50	80
Maximum diameter of clearance 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
Nr. 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

Installation parameters of internally threaded sleeve HIT-IC with HIT-SC in hollow and solid brick

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

Applications for hollow and solid bricks with sieve sleeves (cont.)

For installing HIT-V with embedments of 130 and 160 mm, two attached sleeves are used.



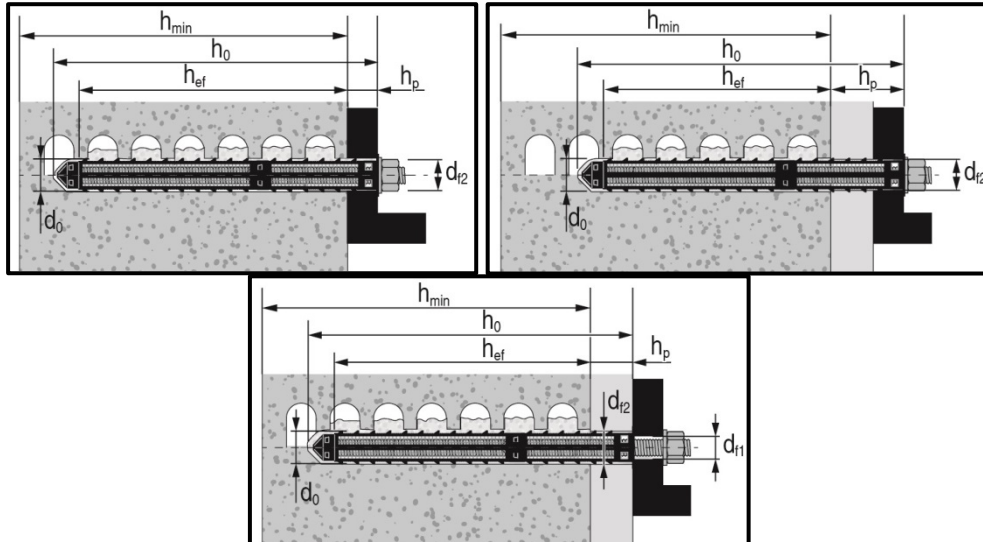
Hollow brick with threaded rod HIT-V and two sieve sleeves HIT-SC for deeper embedment depth

Installation parameters of threaded rod HIT-V with two HIT-SC in hollow and solid brick for deeper embedment depth

HIT-V			M8		M10		M12		M16	
with HIT-SC			16x50 + 16x85	16x85 + 16x85	16x50 + 16x85	16x85 + 16x85	18x50 + 18x85	18x85 + 18x85	22x50 + 22x85	22x85 + 22x85
Nominal diameter of drill bit	d_0	[mm]	16	16	16	16	18	18	22	22
Drill hole depth	h_0	[mm]	145	180	145	180	145	180	145	180
Effective embedment depth	h_{ef}	[mm]	130	160	130	160	130	160	130	160
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]	195	230	195	230	195	230	195	230
Brush HIT-RB	-	[-]	16	16	16	16	18	18	22	22
Number of strokes HDM	-	[-]	4+6	6+6	4+6	6+6	4+8	8+8	6+10	10+10
Number of strokes HDE-500	-	[-]	3+5	5+5	3+5	5+5	3+6	6+6	5+8	8+8
Maximum torque moment	T_{max}	[Nm]	3	3	4	4	6	6	8	8

Applications for hollow and solid bricks with sieve sleeves (cont.)

For through fastenings with HIT-V, two attached sleeves HIT-SC are used.



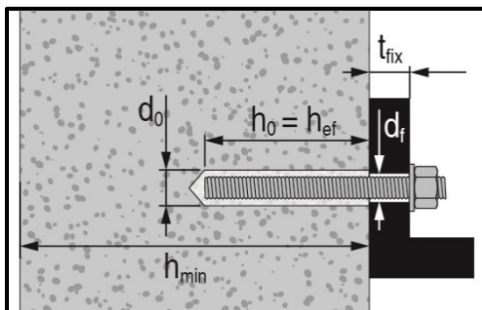
Hollow and solid brick with threaded rod HIT-V with two sieve sleeves HIT-SC for setting through the fixture and/or through the non-loadbearing layer

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 and solid brick)

HIT-V			M8		M10		M12		M16	
with HIT-SC			16x50 + 16x85	16x85 + 16x85	16x50 + 16x85	16x85 + 16x85	18x50 + 18x85	18x85 + 18x85	22x50 + 22x85	22x85 + 22x85
Nominal diameter of drill bit	d_0	[mm]	16	16	16	16	18	18	22	22
Drill hole depth	h_0	[mm]	145	180	145	180	145	180	145	180
Effective embedment depth	$h_{ef,min}$	[mm]	80	80	80	80	80	80	80	80
Max. thickness of non-loadbearing layer and fixture (through setting)	$h_{p,max}$	[mm]	50	80	50	80	50	80	50	80
Max. diameter of clearance hole in the fixture (pre-setting)	d_{f1}	[mm]	9	9	12	12	14	14	18	18
Max. diameter of clearance hole in the fixture (through setting)	d_{f2}	[mm]	17	17	17	17	19	19	23	23
Minimum wall thickness	h_{min}	[mm]	$h_{ef}+65$	$h_{ef}+70$	$h_{ef}+65$	$h_{ef}+70$	$h_{ef}+65$	$h_{ef}+70$	$h_{ef}+65$	$h_{ef}+70$
Brush HIT-RB	-	[-]	16	16	16	16	18	18	22	22
Number of strokes HDM	-	[-]	4+6	6+6	4+6	6+6	4+8	8+8	6+10	10+10
Number of strokes HDE-500	-	[-]	3+5	5+5	3+5	5+5	5+8	8+8	5+8	8+8
Max. torque moment for all brick types except "parpaing creux"	T_{max}	[Nm]	3	3	4	4	6	6	8	8
Max. torque moment for "parpaing creux"	T_{max}	[Nm]	2	2	2	2	3	3	6	6

Applications for solid bricks without sieve sleeves

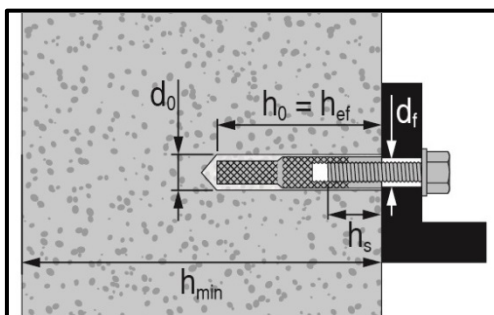
Hilti recommends the anchoring in masonry always with sieve sleeve. Anchors can only be installed without sieve sleeves in solid bricks when it is guaranteed that it has not any hole or void.



Solid brick with threaded rod HIT-V

Installation parameters of threaded rods and HIT-V-... in solid brick

Threaded rods and 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



Solid brick with internal threaded sleeve HIT-IC

Installation parameters of internal threaded sleeve HIT-IC... in solid brick

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