

Approval body for construction products
and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and
Laender Governments



European Technical Assessment

ETA-07/0219
of 19 September 2017

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the
European Technical Assessment:

Deutsches Institut für Bautechnik

Trade name of the construction product

Hilti frame anchor HRD

Product family
to which the construction product belongs

Plastic anchor for multiple use in concrete and masonry
for non-structural applications

Manufacturer

Hilti Aktiengesellschaft
Business Unit Anchors
9494 Schaan
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

Hilti Werke

This European Technical Assessment
contains

23 pages including 3 annexes which form an integral part
of this assessment

This European Technical Assessment is
issued in accordance with Regulation (EU)
No 305/2011, on the basis of

ETAG 020, Version March 2012,
used as EAD according to Article 66 Paragraph 3 of
Regulation (EU) No 305/2011

European Technical Assessment

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Specific Part

1 Technical description of the product

The Hilti frame anchor HRD in the sizes HRD 8 and HRD 10 is a plastic anchor consisting of a plastic sleeve made of polyamide and an accompanying specific screw of electro galvanised steel, hot-dip galvanised steel or stainless steel.

The plastic sleeve is expanded by screwing in the specific screw which presses the sleeve against the wall of the drilled hole.

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 anchors 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)

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

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorage satisfy requirements for Class A 1
Resistance to fire	See Annex C 2

3.3 Safety and accessibility (BWR 4)

Essential characteristic	Performance
Characteristic resistance for tension and shear loads	See Annexes C 1 - C 8
Characteristic resistance for bending moments	See Annex C 1
Displacements under shear and tension loads	See Annex C 8
Anchor distances and dimensions of members	See Annex B 5 - B 7

3.4 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

In accordance with guideline for European technical approval ETAG 020, March 2012 used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: 97/463/EC.

The system to be applied is: 2+

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 19 September 2017 by Deutsches Institut für Bautechnik

BD Dipl.-Ing. Andreas Kummerow
Head of Department

beglaubigt:
Aksünger

Installed condition

Figure A1:
Intended use with different embedment depth in concrete [including thin skins (weather resistant skins of external wall panels)], solid brick, hollow brick and non-cracked autoclaved aerated concrete (AAC blocks)

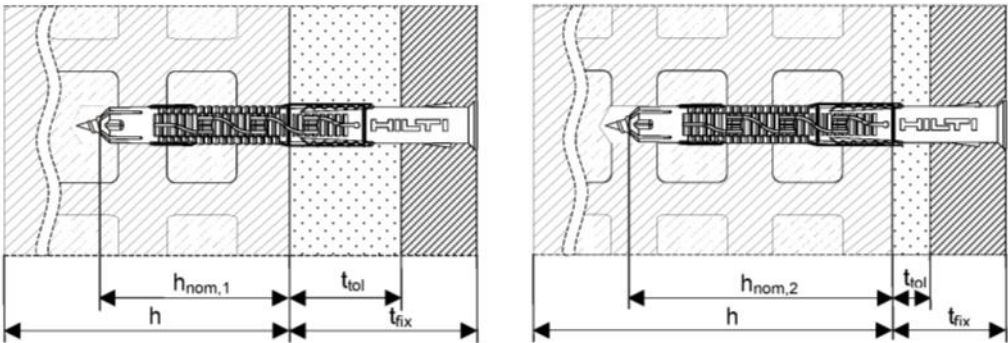
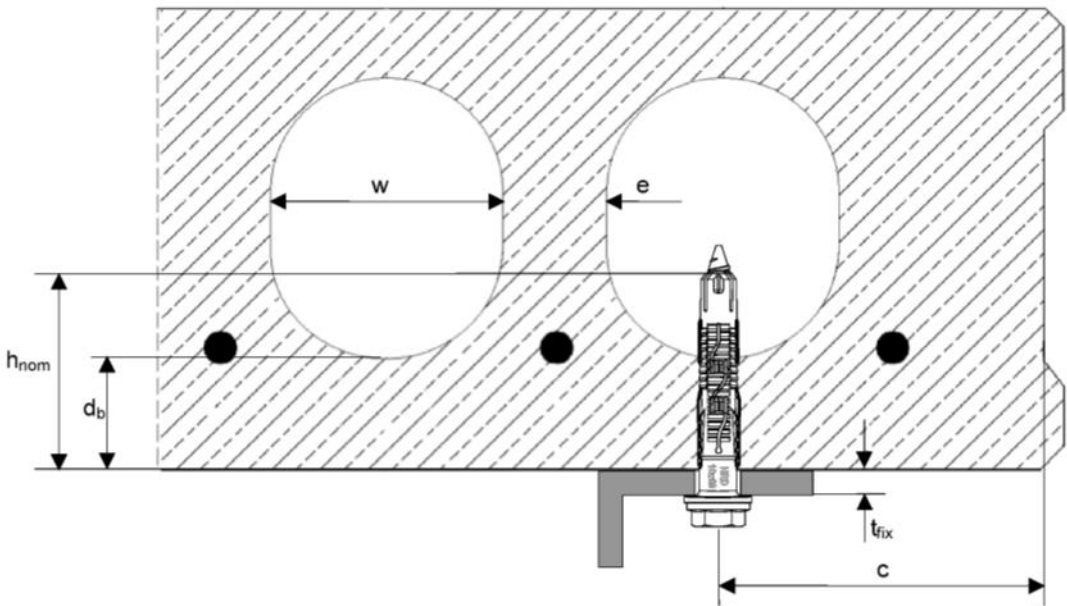


Figure A2:
Intended use in precast prestressed hollow core slabs ($w/e \leq 4,2$)



h_{nom} = overall plastic anchor embedment depth in the base material
 h = thickness of member
 t_{fix} = thickness of fixture
 t_{tol} = thickness of non-load-bearing layer

c = edge distance
 d_b = bottom flange thickness ≥ 25 mm
 w = core width
 e = web thickness

Hilti frame anchor HRD

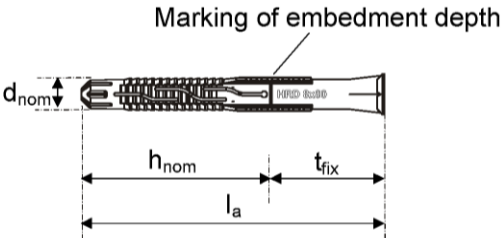
Product description
Installed condition

Annex A1

Anchor types, marking and identification after installation

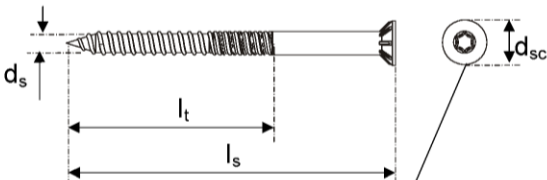
HRD 8

Anchor sleeve



Marking:
Producer, Type, size
e.g. HRD 8x80

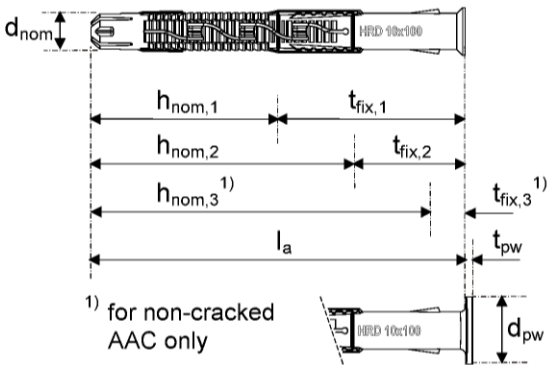
Special screw



Marking:
HDS-U

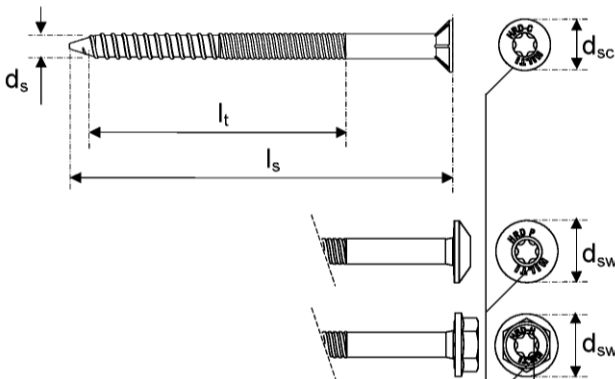
HRD 10

Anchor sleeve



Marking:
Producer, Type, Size
e.g. HRD 10x100

Special screw



Marking:
“HRD”-Type
e.g. HRD-C
Inner drive optional

Naming

Product family Hilti frame anchor	HRD-CR2	10x180	Overall length of the anchor [mm] Anchor / hole diameter [mm]
Head configuration	C: H: K: P:	Screw material _: galvanised carbon steel F: hot dip galvanized R: stainless steel: 1.4362 / 1.4401 / 1.4404 / 1.4571 / 1.4578 R2: stainless steel: 1.4301 / 1.4567	

Hilti frame anchor HRD

Product description
Anchor types, marking, naming

Annex A2

Table A1: Dimensions

			HRD 8	HRD 10
Plastic sleeve	Sleeve diameter	d_{nom} [mm]	8	10
	Length of sleeve	min l_a [mm]	60	60
		max l_a [mm]	140	310
	Diameter of plastic washer	d_{pw} [mm]	-	17,5
	Thickness of plastic washer	t_{pw} [mm]	-	2
Special screw	Screw diameter	d_s [mm]	6	7
	Length of screw	l_s [mm]	$l_a + 5$	$l_a + 5$
	Length of thread	l_t [mm]	53	70
	Head diameter	Countersunk screw d_{sc} [mm]	11	14
		Hexhead screw d_{sw} [mm]	-	17,5

Table A2: Materials

	HRD 8	HRD 10
Plastic sleeve	Polyamide, PA6, colour red	
Special screw	Steel, electro galvanised $\geq 5 \mu m$, blue passivated, coated $f_{yk} = 480 \text{ N/mm}^2$, $f_{uk} = 600 \text{ N/mm}^2$	
	-	Steel, hot-dip galvanized, $\geq 65 \mu m$, coated $f_{yk} = 480 \text{ N/mm}^2$, $f_{uk} = 600 \text{ N/mm}^2$
	Stainless steel: 1.4301 / 1.4567 (e.g. A2 acc. ISO 3506), coated $f_{yk} = 450 \text{ N/mm}^2$, $f_{uk} = 580 \text{ N/mm}^2$	
	Stainless steel: 1.4362 / 1.4401 / 1.4404 / 1.4571 / 1.4578 (e.g. A4 acc. ISO 3506), coated $f_{yk} = 450 \text{ N/mm}^2$, $f_{uk} = 580 \text{ N/mm}^2$	

Hilti frame anchor HRD

Product description
Dimensions, materials

Annex A3

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loads
- Multiple fixing of non-structural applications

Base materials:

- Reinforced or unreinforced normal weight concrete with strength classes \geq C12/15 (use category a) according to EN 206-1:2000 and according Annex C2.
- Precast prestressed hollow core slabs with strength classes \geq C35/55 (use category a) according Annex C2.
- Solid brick masonry (use category b) according to Annex C3.
Note: The characteristic resistance is also valid for larger brick sizes and higher compressive strength of the masonry unit.
- Hollow brick masonry (use category c) according to Annex C4 to C7.
- Autoclaved aerated concrete AAC (use category d) according to Annex C8.
- Mortar strength class of the masonry \geq M2,5 according to EN 998-2:2010.
- For other base materials of the use categories a, b, c or d the characteristic resistance of the anchor may be determined by job site tests according to ETAG 020, Annex B, Edition March 2012.

Temperature range:

- In-service
-40 °C to +80 °C (max. long term temperature +50 °C and max. short term temperature +80 °C)

Use conditions (Environmental conditions):

- Hilti frame anchor HRD, HRD-F, HRD-R and HRD-R2:
Structures subject to dry internal conditions
- The specific screw made of galvanized steel may also be used in structures subject to external atmospheric exposure, if the area of the head of the screw is protected against moisture and driving rain after mounting of the fixing unit in this way, that intrusion of moisture into the anchor shaft is prevented. Therefore there shall be an external cladding or a ventilated rainscreen mounted in front of the head of the screw and the head of the screw itself shall be coated with a soft plastic, permanently elastic bitumen-oil-combination coating (e. g. undercoating or body cavity protection for cars).
- Hilti frame anchor HRD-R:
Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist (stainless 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 materials are used).

Hilti frame anchor HRD

Specifications of intended use

Annex B1

Design:

- The anchorages are to be designed in accordance with the ETAG 020, Annex C under the responsibility of an engineer experienced in anchorages and masonry work.
- Verifiable calculation notes and drawings shall be prepared taking account of the loads to be anchored, the nature and strength of the base materials and the dimensions of the anchorage members as well as of the relevant tolerances. The position of the anchor is indicated on the design drawings.
- Fasteners are only to be used for multiple use for non-structural application according to ETAG 020, Edition March 2012.

Installation:

- Hole drilling by the drill modes according to Annex B 8.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Temperature at installation
-10 °C to +40 °C
- Exposure to UV due to solar radiation of the anchor not protected ≤ 6 weeks

Hilti frame anchor HRD

Specifications of intended use

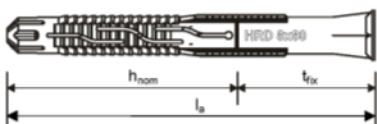
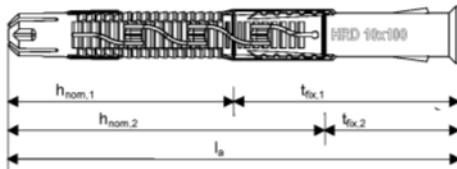
Annex B2

Table B1: Installation parameters

		HRD 8	HRD 10
Drill hole diameter	$d_0 =$ [mm]	8	10
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	8,45	10,45
Depth of drilled hole to deepest point	$h_{1,1} \geq$ [mm]	60	60
	$h_{1,2} \geq$ [mm]	-	80
	$h_{1,3} \geq$ [mm]	-	100 ¹⁾
Overall plastic anchor embedment depth in base material	$h_{nom,1} \geq$ [mm]	50	50
	$h_{nom,2} \geq$ [mm]	-	70
	$h_{nom,3} \geq$ [mm]	-	90 ¹⁾
Diameter of clearance hole in the fixture	Countersunk screw $d_f \leq$ [mm]	8,5	11
	Hexhead screw $d_f \leq$ [mm]	-	12

¹⁾ for non-cracked AAC only

Table B2: Relation of h_{nom} , l_a and t_{fix} for use in concrete and masonry

		HRD 8 x l_a	HRD 10 x l_a	
Use category "a, b, c"		$h_{nom} \geq 50$ ¹⁾	$h_{nom,1} \geq 50$ ¹⁾	$h_{nom,2} \geq 70$ ¹⁾
		l_a	$t_{fix,1}$	$t_{fix,2}$
		[mm]	[mm]	[mm]
HRD 8 	60	≤ 10	≤ 10	---
	80	≤ 30	≤ 30	≤ 10
	100	≤ 50	≤ 50	≤ 30
	120	≤ 70	≤ 70	≤ 50
	140	≤ 90	≤ 90	≤ 70
	160	-	≤ 110	≤ 90
	180	-	≤ 130	≤ 110
	200	-	≤ 150	≤ 130
	230	-	≤ 180	≤ 160
	270	-	≤ 220	≤ 200
HRD 10 	310	-	≤ 260	≤ 240

¹⁾ The influence of $h_{nom} > 50$ mm (HRD 8) or $h_{nom,1} > 50$ mm or $h_{nom,2} > 70$ mm (HRD 10) has to be checked by job-site testing according Annex B1

Hilti frame anchor HRD

Intended use

Installation parameters, Relations of h_{nom} , l_a and t_{fix}

Annex B3

Table B3: Relation of h_{nom} , l_a and t_{fix} for use in autoclaved aerated concrete (AAC)

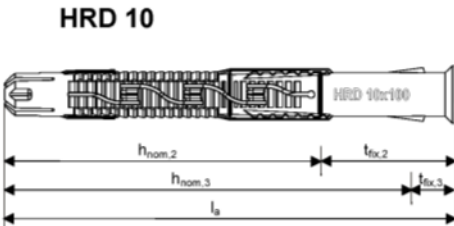
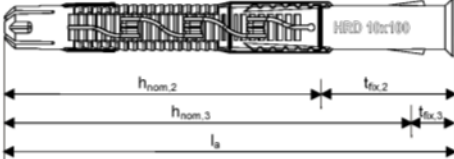
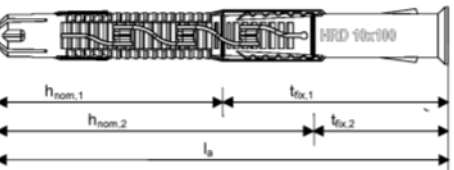
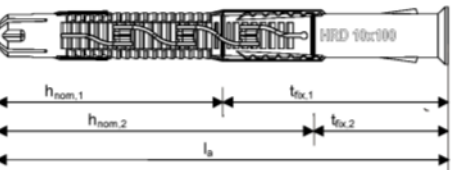
Use category "d"		HRD 8 x l_a	HRD 10 x l_a	
			$h_{nom,2} \geq 70$	$h_{nom,3} \geq 90$
		l_a	$t_{fix,2}$	$t_{fix,3}$
		[mm]	[mm]	[mm]
HRD 10		60	-	-
		80	-	-
		100	≤ 10	≤ 10
		120	≤ 30	≤ 10
		140	≤ 50	≤ 30
		160	≤ 70	≤ 50
		180	≤ 90	≤ 70
		200	≤ 110	≤ 90
		230	≤ 130	≤ 110
		270	≤ 160	≤ 140
		310	≤ 200	≤ 180
			≤ 240	≤ 220

Table B4: Relation of h_{nom} , l_a and t_{fix} for use in thin skins (weather resistant skins of external wall panels) and precast prestressed hollow core slabs

Use category "a"		HRD 8 x l_a	HRD 10 x l_a	
			$h_{nom,1} \geq 50$	
		l_a	$t_{fix,min}$	$t_{fix,max}$
		[mm]	[mm]	[mm]
HRD 10		60	-	2
		80	-	10
		100	-	22
		120	-	42
		140	-	62
		160	-	82
		180	-	102
		200	-	122
		230	-	142
		270	-	172
		310	-	212
			-	252

Hilti frame anchor HRD

Intended use
Relations of h_{nom} , l_a and t_{fix}

Annex B4

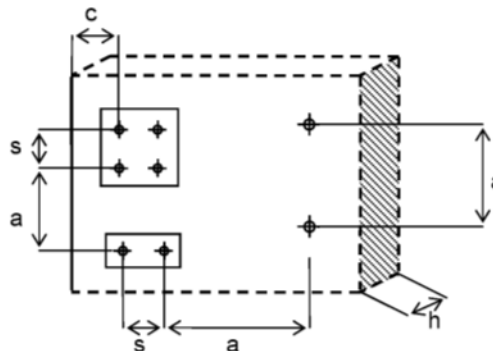
Table B5: Minimum thickness of member, edge distance and anchor spacing in concrete and thin skins (use category "a")

				HRD 8	HRD 10	
Overall plastic anchor embedment depth in the base material $h_{nom} \geq$ [mm]				50	50	70
Minimum thickness of member	concrete h_{min}	[mm]		100	100	120
	thin skin h_{min}	[mm]		-	40	-
Minimum spacing	$\geq C16/20$ s_{min}	[mm]		100	50 if $c \geq 100$ ¹⁾	
	C12/15 s_{min}	[mm]		140	70 if $c \geq 140$ ¹⁾	
Minimum edge distance	$\geq C16/20$ c_{min}	[mm]		50	50 if $s \geq 150$ ¹⁾	
	C12/15 c_{min}	[mm]		70	70 if $s \geq 210$ ¹⁾	
Characteristic edge distance	$\geq C16/20$ $c_{cr,N}$	[mm]		100	100	
	C12/15 $c_{cr,N}$	[mm]		140	140	
Characteristic spacing ²⁾	$\geq C16/20$ $s_{cr,N}$	[mm]		62	80	125
	C12/15 $s_{cr,N}$	[mm]		68	90	135

¹⁾ Linear interpolation allowed

²⁾ Spacing at which a fixing point that consists of more than 1 anchor can be calculated with the characteristic resistance $N_{Rk,p}$ of each anchor.

Scheme of distances and spacing



Hilti frame anchor HRD

Intended Use

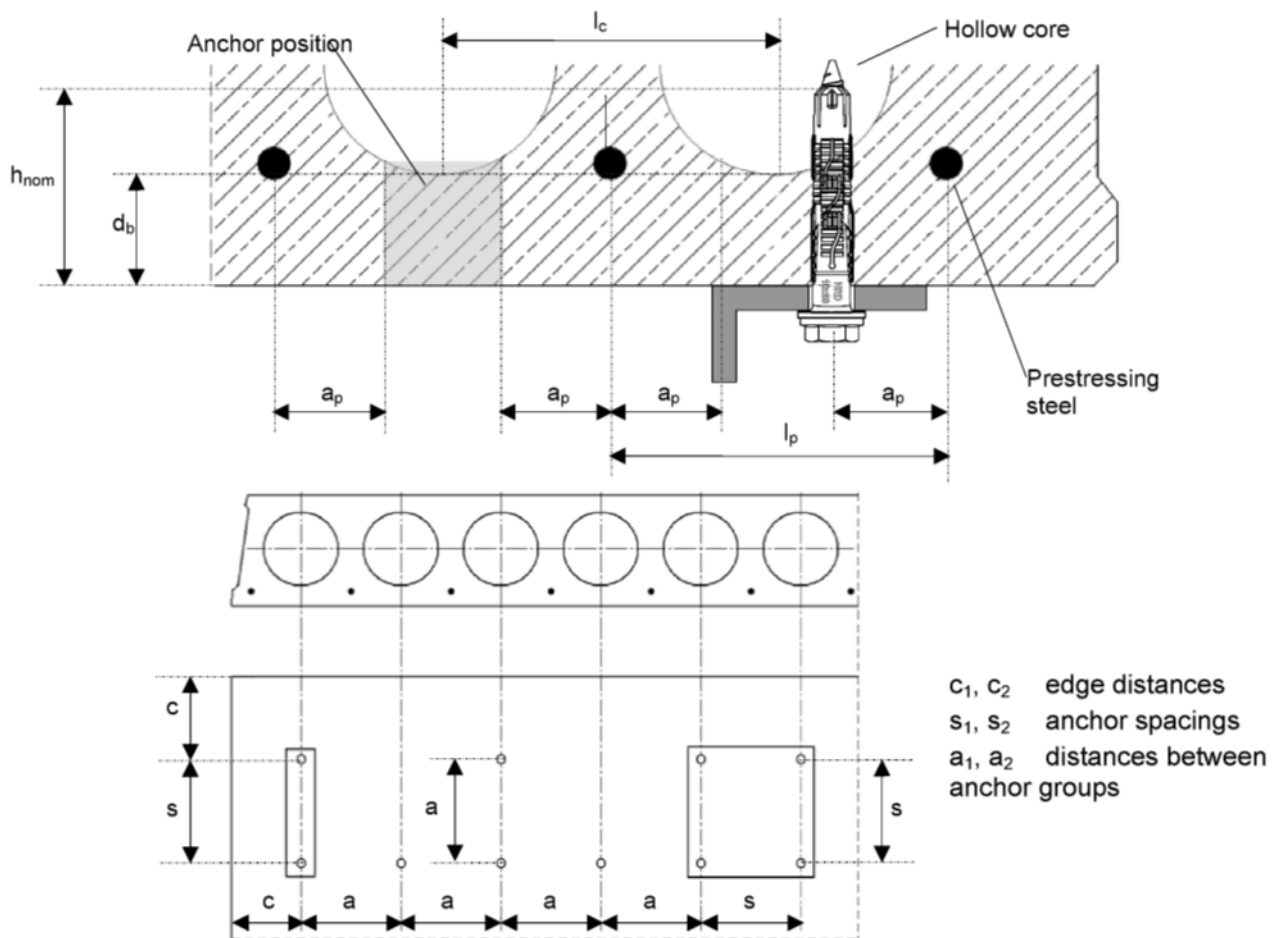
Minimum spacing and minimum edge distance in concrete

Annex B5

Table B6: Anchor positions, minimum spacing and edge distance of anchors and distance between anchor groups in precast prestressed hollow core slabs

		HRD 8	HRD 10
Overall plastic anchor embedment depth in the base material	$h_{nom} \geq$ [mm]	-	50
Bottom flange thickness	$d_b \geq$ [mm]	-	25
Core distance	$l_c \geq$ [mm]	-	100
Prestressing steel distance	$l_p \geq$ [mm]	-	100
Distance between anchor position and prestressing steel	$a_p \geq$ [mm]	-	50
Minimum edge distance	$c_{min} \geq$ [mm]	-	100
Minimum anchor spacing	$s_{min} \geq$ [mm]	-	100
Minimum distance between anchor groups	$a_{min} \geq$ [mm]	-	100

Schemes of distances and spacing



Hilti frame anchor HRD

Intended Use

Minimum spacing and minimum edge distance in precast prestressed hollow core slabs

Annex B6

Table B7: Minimum thickness of member, edge distance and anchor spacing in solid and hollow masonry (use category “b, c”)

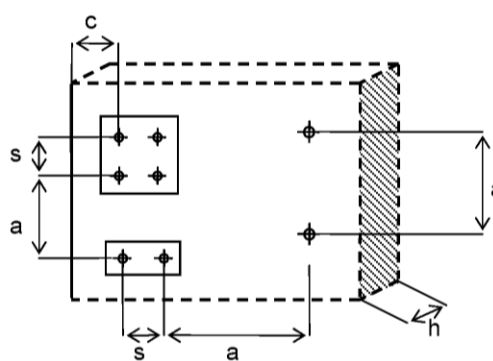
			HRD 8	HRD 10
Minimum thickness of member	h_{\min}	[mm]	see Table C4, Table C5	see Table C4- Table C6
Minimum edge distance	c_{\min}	[mm]	100 (60) ¹⁾	100
Minimum spacing (single anchor)	a_{\min}	[mm]	250	250
Minimum spacing (anchor group)	perpendicular to free edge $s_{\min1}$	[mm]	200 (120 ¹⁾)	100
	parallel to free edge $s_{\min2}$	[mm]	400 (240 ¹⁾)	100

¹⁾ only for brick “Doppio Uni” and “Mattone”

Table B8: Minimum thickness of member, edge distance and anchor spacing in non-cracked autoclaved aerated concrete (AAC blocks, use category “d”)

			HRD 8	HRD 10
Minimum thickness of member	AAC 2 h_{\min}	[mm]	-	200
	AAC 4 h_{\min}	[mm]	-	240
	AAC 6 h_{\min}	[mm]	-	240
Minimum edge distance	c_{\min}	[mm]	-	100
Minimum spacing (single anchor)	a_{\min}	[mm]	-	250
Minimum spacing (anchor group)	perpendicular to free edge $s_{\min1}$	[mm]	-	100
	parallel to free edge $s_{\min2}$	[mm]	-	100

Scheme of distances and spacing



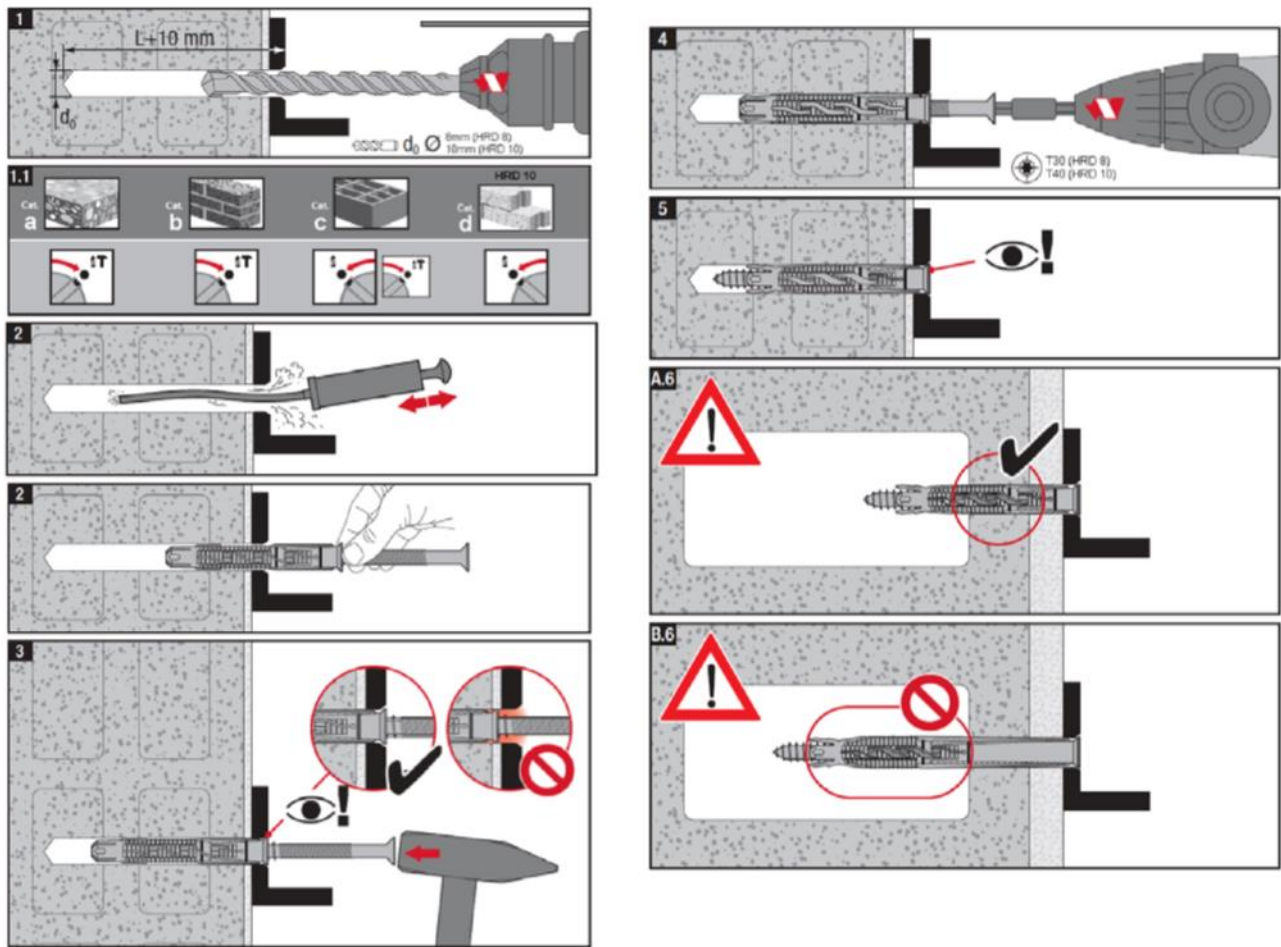
Hilti frame anchor HRD

Intended Use

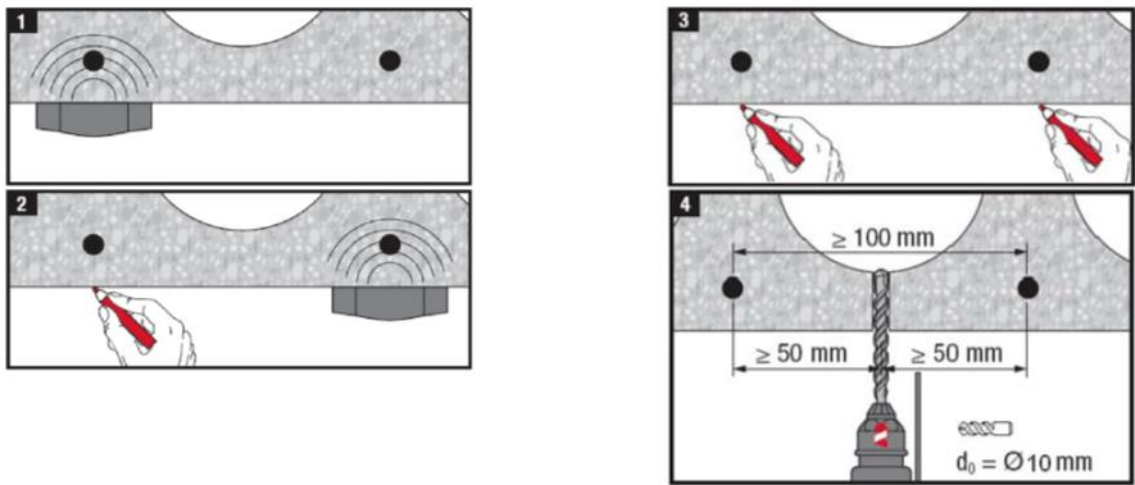
Minimum spacing and minimum edge distance in masonry and AAC

Annex B7

Installation instruction



Additional preparation in case of application in precast prestressed hollow core slabs
After drilling follow the main instruction above



Hilti frame anchor HRD

Intended Use
Installation instruction

Annex B8

Table C1: Characteristic resistance of the screw

			HRD 8	HRD 10
galvanised steel				
Characteristic tension resistance	$N_{Rk,s}$	[kN]	10,9	17,5
Partial safety factor for tension	$\gamma_{Ms}^{1)}$	[-]	1,50	1,50
Characteristic shear resistance	$V_{Rk,s}$	[kN]	6,9	10,6
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	11,1	21,3
Partial safety factor for shear and bending	$\gamma_{Ms}^{1)}$	[-]	1,25	1,25
Hot-dip galvanized steel				
Characteristic tension resistance	$N_{Rk,s}$	[kN]	-	16,7
Partial safety factor for tension	$\gamma_{Ms}^{1)}$	[-]	-	1,50
Characteristic shear resistance	$V_{Rk,s}$	[kN]	-	10,1
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	-	19,9
Partial safety factor for shear and bending	$\gamma_{Ms}^{1)}$	[-]	-	1,25
Stainless steel				
Characteristic tension resistance	$N_{Rk,s}$	[kN]	10,5	18,4
Partial safety factor for tension	$\gamma_{Ms}^{1)}$	[-]	1,54	1,58
Characteristic shear resistance	$V_{Rk,s}$	[kN]	6,6	11,1
Characteristic bending resistance	$M_{Rk,s}$	[Nm]	10,8	22,3
Partial safety factor for shear and bending	$\gamma_{Ms}^{1)}$	[-]	1,28	1,31

¹⁾ In absence of other national regulations

Hilti frame anchor HRD

Performances
Characteristic resistance of the screw

Annex C1

Table C2: Characteristic resistance for pull-out failure (plastic sleeve) for use in concrete (use category “a”)

				HRD 8	HRD 10	
Embedment depth	$h_{\text{nom}} \geq$	[mm]		50	50	70
<u>Pull-out failure in standard concrete slabs</u>						
Characteristic resistance	$\geq \text{C16/20}$	$N_{Rk,p}$	[kN]	3,0	4,5	8,5
	C12/15	$N_{Rk,p}$	[kN]	2,0	3,0	6,0
Partial safety factor	γ_{Mc}	¹⁾	[-]	1,8		
<u>Pull-out failure in thin skins (weather resistant skins of external wall panels), with h = 40mm to 100mm</u>						
Characteristic resistance	$\geq \text{C16/20}$	$N_{Rk,p}$	[kN]	-	3,5	-
	C12/15	$N_{Rk,p}$	[kN]	-	2,5	-
Partial safety factor	γ_{Mc}	¹⁾	[-]	1,8		
<u>Pull-out failure in precast prestressed hollow core slabs, with concrete strength $\geq \text{C35/45}$</u>						
Characteristic resistance	$d_b \geq 25\text{mm}$	$N_{Rk,p}$	[kN]	-	0,6	-
	$d_b \geq 30\text{mm}$	$N_{Rk,p}$	[kN]	-	1,5	-
	$d_b \geq 35\text{mm}$	$N_{Rk,p}$	[kN]	-	2,5	-
	$d_b \geq 40\text{mm}$	$N_{Rk,p}$	[kN]	-	3,5	-
Partial safety factor	γ_{Mc}	¹⁾	[-]	1,8		

¹⁾ In absence of other national regulations

Table C3: Values under fire exposure in concrete C20/25 to C50/60 in any load direction, no permanent centric tension load and without lever arm

		HRD 8	HRD 10
Fire resistance class: R 90	$F^{1)}$ [kN]	-	0,8

¹⁾ $F = F_{Rk} / (\gamma_M \cdot \gamma_F)$

Hilti frame anchor HRD

Performances

Characteristic resistance for pull-out in concrete, values under fire exposure

Annex C2

Table C4: Characteristic resistance for use in solid masonry (use category "b")¹⁾

		Characteristic resistance F_{Rk} [kN]		
		HRD 8	HRD 10	
		$h_{nom} \geq 50$	$h_{nom} \geq 50$	$h_{nom} \geq 70$
Clay brick Mz 2,0-2DF DIN V 105-100:2012-01 / EN 771-1:2011 Manufacturer: Augsburger Ziegel LxWxH [mm]: 240x115x113 h_{min} [mm]: 115	$f_b \geq 20^{5)}$	1,5	3,0	4)
			4,5 ³⁾	
	$f_b \geq 10^{5)}$	1,2	2,0	4)
			3,0 ³⁾	
Sand-lime solid brick KS 2,0-2DF Manufacturer: Werk Derching DIN V 106:2005-10 / EN 771-2:2011 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115	$f_b \geq 20^{5)}$	2,5	3,0	4)
			4,5 ³⁾	
	$f_b \geq 10^{5)}$	2,0	2,0	4)
			3,0 ³⁾	
Lightweight concrete solid block Vbl / V Manufacturer: KLB DIN V 18152-100:2005-10 / EN 771-3:2011 LxWxH [mm]: 240x300x115 h_{min} [mm]: 240	$f_b \geq 20^{5)}$	-	3,5	4)
			6,0 ³⁾	
	$f_b \geq 10^{5)}$	-	2,5	4)
			4,5 ³⁾	
	$f_b \geq 2^{5)}$	0,5	-	-
Partial safety factor $\gamma_{Mm}^{2)}$ [-]		2,5		

1) Drilling method: hammer drill

2) In absence of other national regulations

3) Valid for edge distance $c \geq 150$ mm, intermediate values can be interpolated

4) Data can be determined by job-site testing, data for $h_{nom} = 50$ mm can be applied

5) Mean compressive strength [N/mm²]

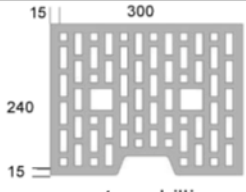
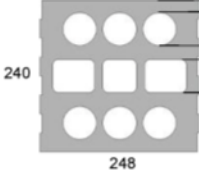
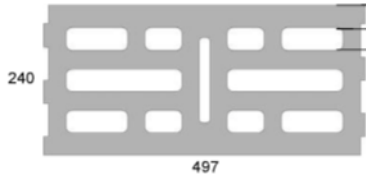
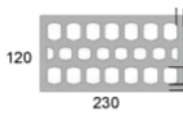
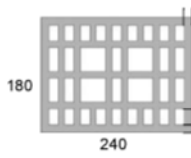
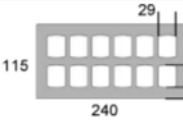
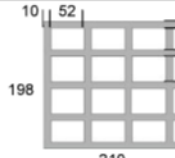
Hilti frame anchor HRD

Performances

Characteristic resistance in solid masonry

Annex C3

Table C5: Characteristic resistance for use in hollow masonry (use cat. "c") for HRD 8

Base material			Compressive strength-class	Characteristic resistance F_{Rk} [kN]
Specifications	Brick dimensions	Drilling methods	[N/mm ²]	$h_{nom} \geq 50$ ¹⁾
Vertically perforated clay brick HLz B 12/1,2 DIN V 105-100:2012-01 / EN 771-1:2011 LxWxH [mm]: 300x240x248 h_{min} [mm]: 240		rotary drilling only	≥ 12	0,5
Vertically perforated sand-lime brick KSL 12/1,4 DIN V 106:2005-10 / EN 771-2:2011 LxWxH [mm]: 240x248x248 h_{min} [mm]: 240		hammer drilling	≥ 12	0,75
Lightweight concrete hollow block Hbl 2/0,8 DIN V 18151-100 / EN 771-3 LxWxH [mm]: 497x240x248 h_{min} [mm]: 240		hammer drilling	≥ 2	0,3
Ital. Hollow brick Doppio Uni EN 771-1:2011 LxWxH [mm]: 230x120x100 h_{min} [mm]: 120		rotary drilling only	$f_b \geq 25$ ⁴⁾	0,9
Ital. Hollow brick Mattone EN 771-1:2011 LxWxH [mm]: 240x180x100 h_{min} [mm]: 180		rotary drilling only	$f_b \geq 22$ ⁴⁾	1,5
Span. Ladrillo cara vista Rojo hidrofugano EN 771-1:2011 LxWxH [mm]: 240x115x50 h_{min} [mm]: 115		rotary drilling only	$f_b \geq 40$ ⁴⁾	0,6
French Hollow brick Brique Creuse C EN 771-1:2011 LxWxH [mm]: 210x198x... h_{min} [mm]: 210		rotary drilling only	$f_b \geq 6$ ⁴⁾	0,5
Partial safety factor γ_{Mm} ²⁾			[-]	2,5

Footnotes see Table C6

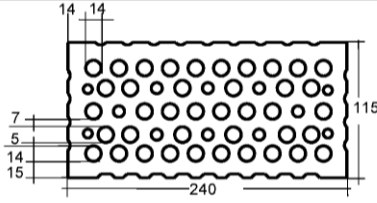
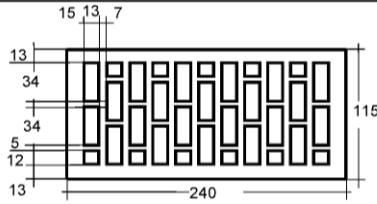
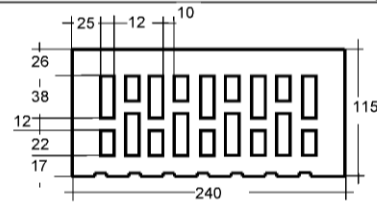
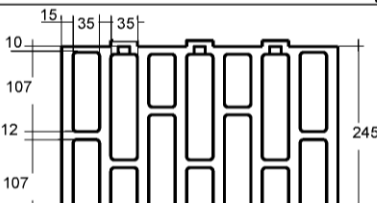
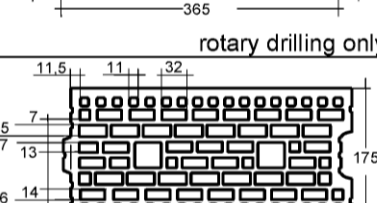
Hilti frame anchor HRD

Performances

Characteristic resistance in hollow masonry for HRD 8

Annex C4

Table C6: Characteristic resistance for use in hollow masonry (use cat. "c") for HRD 10

Base material			Compressive strength-class [N/mm ²]	Characteristic resistance F_{Rk} [kN]	
Specifications	Brick dimensions	Drilling methods		$h_{nom} \geq 50$ ¹⁾	$h_{nom} \geq 70$ ¹⁾
Vertically perforated clay brick HIz 1,2-2DF Manufacturer: Schlagmann DIN V 105-100:2012-01 / EN 771-1:2011 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115		hammer drilling	≥ 8	1,5	-
			≥ 10	2,0	-
			≥ 12	2,0	-
Vertically perforated clay brick HIz 1,0-2DF Manufacturer: Ott Ziegel DIN V 105-100:2012-01 / EN 771-1:2011 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115		hammer drilling	≥ 8	0,4	0,75
			≥ 10	0,5	0,9
			≥ 12	0,6	0,9
			≥ 20	0,9	1,5
Vertically perforated clay brick VHIz 1,6-2DF Manufacturer: Wienerberger DIN V 105-100:2012-01 / EN 771-1:2011 LxWxH [mm]: 240x115x113 h_{min} [mm]: 115		hammer drilling	≥ 28	2,0	2,5
			$f_b \geq 50$ ⁴⁾	3,0	3,5
Vertically perforated clay brick Poroton T8 Manufacturer: Wienerberger Z-17.1-982 of 14.10.2016 LxWxH [mm]: 248x365x249 h_{min} [mm]: 365		rotary drilling only	≥ 6	0,75	1,5
Vertically perforated clay brick HIz 1,0-9DF Manufacturer: Bergmann DIN V 105-100:2012-01 / EN 771-1:2011 LxWxH [mm]: 372x175x238 h_{min} [mm]: 175		rotary drilling only	≥ 8	1,2	1,5
			≥ 10	1,5	1,5
			≥ 12	1,5	2,0
			≥ 16	2,0	2,5
Partial safety factor γ_{Mm} ²⁾			[-]		
			2,5		

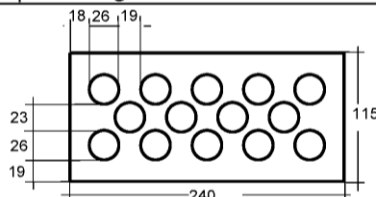
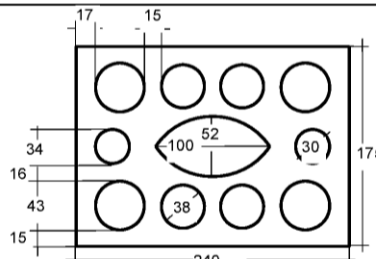
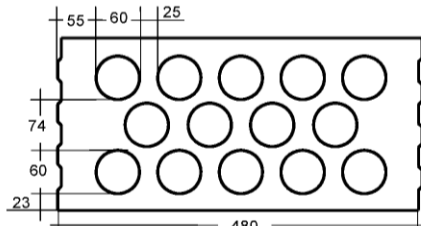
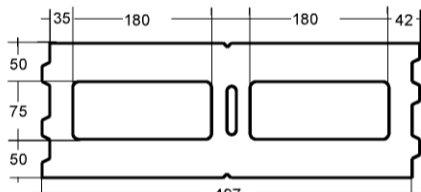
Hilti frame anchor HRD

Performances

Characteristic resistance in hollow masonry for HRD 10

Annex C5

Table C6: continued

Base material			Compressive strength-class [N/mm ²]	Characteristic resistance F _{Rk} [kN]	
Specifications	Brick dimensions	Drilling methods		h _{nom} ≥ 50 ¹⁾	h _{nom} ≥ 70 ¹⁾
Vertically perforated sand-lime brick		hammer drilling	≥ 8	1,5	-
KS L 1,6-2DF Manufacturer: Werk B'güssbach DIN V 106:2005-10 / EN 771-2:2011 LxWxH [mm]: 240x115x113 h _{min} [mm]: 115	≥ 10		1,5	-	
	≥ 12		2,0	-	
Vertically perforated sand-lime brick		hammer drilling	≥ 8	-	2,0
KS L 1,4-3DF Manufacturer: Werk B'güssbach DIN V 106:2005-10 / EN 771-2:2011 LxWxH [mm]: 240x175x113 h _{min} [mm]: 175	≥ 10		-	2,5	
	≥ 12		-	3,0	
Vertically perforated sand-lime brick		rotary drilling only	≥ 8	0,9	1,2
KS L R 1,6-16DF Manufacturer: Werk Derching DIN V 106:2005-10 / EN 771-2:2011 LxWxH [mm]: 480x240x248 h _{min} [mm]: 240	≥ 10		1,2	1,5	
	≥ 12		1,5	2,0	
	≥ 16		2,0	2,5	
Lightweight concrete hollow block		rotary drilling only	≥ 2	0,5	0,75
Hbl 1,2-9DF Manufacturer: KBL DIN V 18151-100:2005-10 / EN 771-3:2011 LxWxH [mm]: 497x175x238 h _{min} [mm]: 175	≥ 6		1,2	2,0	
Partial safety factor			γ _{Mm} ²⁾	2,5	

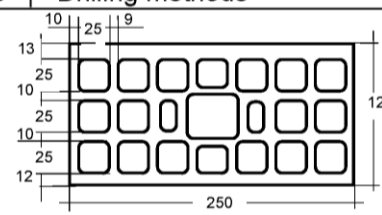
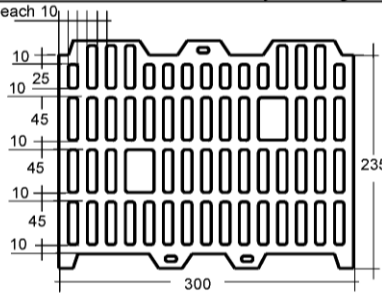
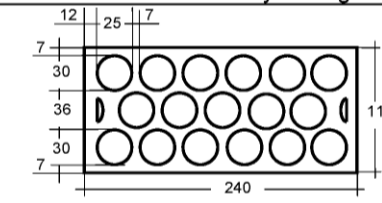
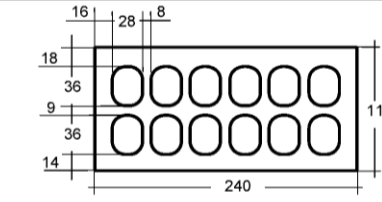
Hilti frame anchor HRD

Performances

Characteristic resistance in hollow masonry for HRD 10

Annex C6

Table C6: continued

Base material			Compressive strength-class [N/mm ²]	Characteristic resistance F_{Rk} [kN]	
Specifications	Brick dimensions	Drilling methods		$h_{nom} \geq 50$ ¹⁾	$h_{nom} \geq 70$ ¹⁾
Ital. Hollow brick Doppio Uni Manufacturer: Danesi EN 771-1:2011 LxWxH [mm]: 250x120x190 h _{min} [mm]: 120		rotary drilling only	$f_b \geq 25$ ⁴⁾	³⁾	1,5
Ital. Hollow brick Poroton P700 Manufacturer: Danesi EN 771-1:2011 LxWxH [mm]: 225x300x190 h _{min} [mm]: 300		rotary drilling only	$f_b \geq 15$ ⁴⁾	³⁾	0,6
Span. Hollow brick Ladrillo perforado Manufacturer: La Oliva EN 771-1:2011 LxWxH [mm]: 240x110x100 h _{min} [mm]: 110		rotary drilling only	$f_b \geq 26$ ⁴⁾	1,5	2,0
Span. Hollow brick Clinker mediterraneo Manufacturer: - EN 771-1:2011 LxWxH [mm]: 240x113x50 h _{min} [mm]: 113		hammer drilling	$f_b \geq 75$ ⁴⁾	³⁾	1,5
Partial safety factor γ_{Mm} ²⁾			2,5		

- ¹⁾ The influence of $h_{nom} > 50$ mm (HRD 8) or $h_{nom,1} > 50$ mm or $h_{nom,2} > 70$ mm (HRD 10) has to be checked by job-site testing according Annex B1
- ²⁾ In absence of other national regulations
- ³⁾ Data can be determined by job site tests
- ⁴⁾ Mean compressive strength [N/mm²]

Hilti frame anchor HRD

Performances

Characteristic resistance in hollow masonry for HRD 10

Annex C7

Table C7: Characteristic resistance for use in non-cracked autoclaved aerated concrete (AAC blocks, use category “d”) ¹⁾

				HRD 8	HRD 10	
				$h_{nom} \geq 50$	$h_{nom,2} \geq 70$	$h_{nom,3} \geq 90$
Characteristic resistance in non-cracked autoclaved aerated concrete (AAC blocks), EN 771-4:2011	AAC 2	F_{Rk}	[kN]	-	0,9	0,9
	AAC 4	F_{Rk}	[kN]	-	2,0	2,0
		F_{Rk}	[kN]	-	2,0 ³⁾	2,5 ³⁾
	AAC 6	F_{Rk}	[kN]	-	2,0	2,5
		F_{Rk}	[kN]	-	3,5 ³⁾	4,5 ³⁾
	Partial safety factor γ_{MAAC} ²⁾			2,0		

¹⁾ Drilling method: rotary drilling only

²⁾ In absence of other national regulations

³⁾ Valid for edge distance $c \geq 150\text{mm}$, intermediate values can be interpolated

Table C8: Displacements under tension and shear loading in concrete, solid and hollow masonry and non-cracked ACC (use category “a, b, c, d”)

			HRD 8	HRD 10		
Embedment depth	$h_{nom} \geq$	[mm]	50	50	70	90 ¹⁾
Displacement under tension load	F	[kN]	1,2	1,8	3,3	1,6
	δ_{NO}	[mm]	0,3	0,5	0,9	1,0
	$\delta_{N\infty}$	[mm]	0,6	1,0	1,8	2,0
Displacement under shear load	F	[kN]	1,2	1,8	3,3	1,6
	δ_{VO}	[mm]	1,0	1,5	2,8	3,2
	$\delta_{V\infty}$	[mm]	1,5	2,3	4,2	4,8

¹⁾ for use in non-cracked AAC

Hilti frame anchor HRD

Performances

Characteristic resistance in AAC, Displacements for all base materials

Annex C8