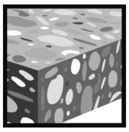
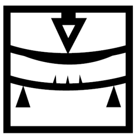
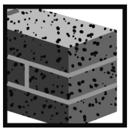
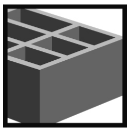
HRD Frame anchor, Redundant fastening

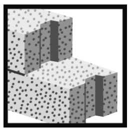
	Anchor version	Benefits
	HRD-C 8x HRD CR 8x	Innovative screw design for better hold Suitable on practically all base materials
	HRD-C 10x… HRD-CR 10x… HRD-CR2 10x…	Flexible embedment depth (approved at 50mm and 70mm)
	HRD-H 10x… HRD-HR 10x… HRD-HR2 10x… HRD-HF 10x…	Suitable for fastening thicknesses up to 260mm Available in 4 different materials for optimum suitability in all
	HRD-K 10x… HRD-KR 10x… HRD-KR2 10x…	corrosive environments Pre-assembled for optimum handling and fastening quality
	HRD-P 10x… HRD-PR 10x… HRD-PR2 10x…	

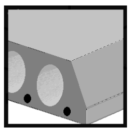

Concrete

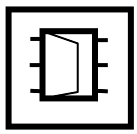

Tensile zone [a)]


Solid brick


Hollow brick


Autoclaved aerated concrete


Prestressed hollow core slabs


Window frame


Fire resistance


European Technical Approval

CE conformity

a) Redundant fastening only

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval [a)]	DIBt, Berlin	ETA-07/0219 / 2011-10-19
Allgemeine bauaufsichtliche Zulassung [c)] (national German approval)	DIBt, Berlin	Z-21.2-1952 / 2011-10-31
Fire test report	MFPA, Leipzig	GS 3.2/10-157-1/ 2010-09-02
Window frame report [b)]	Ift, Rosenheim	Ift report 105 33035 / 2007-07-09

a) All data given in this section according ETA-07/0219, issue 2011-02-01. The anchor is to be used only for redundant fastening for non-structural applications.

b) only available for HRD 8

c) only valid for HRD 10

Basic loading data according ETAG 020

All data in this section applies to

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Base material as specified in the table
  Minimum base material thickness
- *Steel* failure
- Shear without lever arm
- Anchors in redundant fastening

- The data that are highlighted in light grey are additional Hilti recommended data and not part of the approval

Characteristic resistance

Anchor size				HRD 8	HRD 10		
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm	h_{nom} =90mm
Concrete C 12/15		N_{Rk}	[kN]	2,0	3,0	6,0	-
		V_{Rk}	[kN]	6,9 / 6,6 b)	10,6 / 10,1 b) / 11,1 c)		-
Concrete C 16/20 –C 50/60		N_{Rk}	[kN]	3,0	4,5	8,5	-
		V_{Rk}	[kN]	6,9 / 6,6 b)	10,6 / 10,1 b) / 11,1 c)		-
Solid clay brick Mz 2,0 DIN V 105-100 / EN 771-1	f_b ≥ 20 N/mm²	F_{Rk}	[kN]	1,5	3,0 4,5 d)	f)	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	1,2	2,0 3,0 d)	f)	-
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	f_b ≥ 20 N/mm²	F_{Rk}	[kN]	2,5	3,0 4,5 d)	f)	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	2,0	2,0 3,0 d)	f)	-
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	f_b ≥ 20 N/mm²	F_{Rk}	[kN]	-	3,5 6,0 d)	f)	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	-	2,5 4,5 d)	f)	-
	f_b ≥ 6 N/mm²	F_{Rk}	[kN]	0,50	-	-	-
Ital. solid brick Tufo	f_b ≥ n/a	F_{Rk}	[kN]	1,4	-	-	-
Hollow clay brick Hlz B 12/1,2 brick **A** e)	f_b ≥ 12 N/mm²	F_{Rk}	[kN]	0,50	-	-	-
Vertically perforated clay brick Hlz 1,2-2DF brick **F** e)	f_b ≥ 8 N/mm²	F_{Rk}	[kN]	-	1,5	-	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	-	2,0	-	-
	f_b ≥ 12 N/mm²	F_{Rk}	[kN]	-	2,0	-	-
Vertically perforated clay brick Hlz 1,0-2DF brick **G** e)	f_b ≥ 8 N/mm²	F_{Rk}	[kN]	-	0,4	0,75	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	-	0,5	0,9	-
	f_b ≥ 12 N/mm²	F_{Rk}	[kN]	-	0,6	0,9	-
	f_b ≥ 20 N/mm²	F_{Rk}	[kN]	-	0,9	1,5	-
Vertically perforated clay brick VHlz 1,6-2DF brick **H** e)	f_b ≥ 28 N/mm²	F_{Rk}	[kN]	-	2,0	2,5	-
	f_b ≥ 50 N/mm²	F_{Rk}	[kN]	-	3,0	3,5	-
Vertically perforated clay brick Poroton T8 brick **M** e)	f_b ≥ 6 N/mm²	F_{Rk}	[kN]	-	0,75	1,5	-
Vertically perforated clay brick Hlz 1,0-9DF brick **L** e)	f_b ≥ 8 N/mm²	F_{Rk}	[kN]	-	1,2	1,5	-
	f_b ≥ 10 N/mm²	F_{Rk}	[kN]	-	1,5	1,5	-
	f_b ≥ 12 N/mm²	F_{Rk}	[kN]	-	1,5	2,0	-
	f_b ≥ 16 N/mm²	F_{Rk}	[kN]	-	2,0	3,0	-

Characteristic resistance

Anchor size				HRD 8	HRD 10		
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm	h_{nom} =90mm
Hollow sand-lime brick KSL 12/1,4 brick **O** [e)]	$f_b \geq 12$ N/mm^2	F_{Rk}	[kN]	0,75	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF brick **P** [e)]	$f_b \geq 8$ N/mm^2	F_{Rk}	[kN]	-	1,5	-	-
	$f_b \geq 10$ N/mm^2	F_{Rk}	[kN]	-	1,5	-	-
	$f_b \geq 12$ N/mm^2	F_{Rk}	[kN]	-	2,0	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF brick **Q** [e)]	$f_b \geq 8$ N/mm^2	F_{Rk}	[kN]	-	-	2,0	-
	$f_b \geq 10$ N/mm^2	F_{Rk}	[kN]	-	-	2,5	-
	$f_b \geq 12$ N/mm^2	F_{Rk}	[kN]	-	-	3,0	-
Vertically perforated sand-lime brick KSL R 1,6-16DF brick **R** [e)]	$f_b \geq 8$ N/mm^2	F_{Rk}	[kN]	-	0,9	1,2	-
	$f_b \geq 10$ N/mm^2	F_{Rk}	[kN]	-	1,2	1,5	-
	$f_b \geq 12$ N/mm^2	F_{Rk}	[kN]	-	1,5	2,0	-
	$f_b \geq 16$ N/mm^2	F_{Rk}	[kN]	-	2,0	2,5	-
Lightweight hollow brick Hbl 2/0,8 brick **S** [e)]	$f_b \geq 2$ N/mm^2	F_{Rk}	[kN]	0,30	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF brick **T** [e)]	$f_b \geq 2$ N/mm^2	F_{Rk}	[kN]	-	0,5	0,75	-
	$f_b \geq 6$ N/mm^2	F_{Rk}	[kN]	-	1,2	2,0	-
Ital. Hollow brick Mattone brick **E** [e)]	$f_b \geq 22$ N/mm^2	F_{Rk}	[kN]	1,5	-	-	-
Ital. Hollow brick Poroton P700 brick **N** [e)]	$f_b \geq 15$ N/mm^2	F_{Rk}	[kN]	-	-	0,6	-
Ital. Hollow brick Doppio Uni brick **C+I** [e)]	$f_b \geq 25$ N/mm^2	F_{Rk}	[kN]	0,9 (C)	-	1,5 (I)	-
Span. Hollow brick Rojo hydrofugano brick **D** [e)]	$f_b \geq 40$ N/mm^2	F_{Rk}	[kN]	0,60	-	-	-
Span. Hollow brick Ladrillo perforado brick **J** [e)]	$f_b \geq 26$ N/mm^2	F_{Rk}	[kN]	-	1,5	2,0	-
Span. Hollow brick Clinker mediterraneo brick **K** [e)]	$f_b \geq 75$ N/mm^2	F_{Rk}	[kN]	-	-	1,5	-
French Hollow brick Brique Creuse brick **B** [e)]	$f_b \geq 6$ N/mm^2	F_{Rk}	[kN]	0,50	-	-	-
Autoclaved aerated concrete AAC	AAC 2	F_{Rk}	[kN]	-	-	0,9	0,9
	AAC 4	F_{Rk}	[kN]	-	-	2,0	2,5
	AAC 6	F_{Rk}	[kN]	-	-	2,0	2,5
		F_{Rk}	[kN]		-	3,5 [d)]	4,5 [d)]

Design resistance

Anchor size				HRD 8	HRD 10		
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm	h_{nom} =90mm
Concrete C 12/15		N_{Rd}	[kN]	1,1	1,7	3,3	-
		V_{Rd}	[kN]	5,5 / 5,2 b)	8,5 / 8,1 b) / 8,5 c)		-
Concrete C 16/20 –C 50/60		N_{Rd}	[kN]	1,7	2,5	4,7	-
		V_{Rd}	[kN]	5,5 / 5,2 b)	8,5 / 8,1 b) / 8,5 c)		-
Solid clay brick Mz 2,0 DIN V 105-100 / EN 771-1	$f_b \geq 20$ N/mm²	F_{Rd}	[kN]	0,6	1,2 1,8 d)	f)	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	0,48	0,8 1,2 d)	f)	-
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	$f_b \geq 20$ N/mm²	F_{Rd}	[kN]	1,0	1,2 1,8 d)	f)	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	0,8	0,8 1,2 d)	f)	-
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	$f_b \geq 20$ N/mm²	F_{Rd}	[kN]	-	1,4 2,4 d)	f)	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	1,0 1,8 d)	f)	-
	$f_b \geq 6$ N/mm^2	F_{Rd}	[kN]	0,2	-	-	-
Ital. solid brick Tufo	$f_b \geq$ n/a	F_{Rd}	[kN]	0,56	-	-	-
Hollow clay brick Hlz B 12/1,2 brick **A** e)	$f_b \geq 12$ N/mm^2	F_{Rd}	[kN]	0,2	-	-	-
Vertically perforated clay brick Hlz 1,2-2DF brick **F** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	0,6	-	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	0,8	-	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	0,8	-	-
Vertically perforated clay brick Hlz 1,0-2DF brick **G** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	0,16	0,3	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	0,2	0,36	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	0,24	0,36	-
	$f_b \geq 20$ N/mm²	F_{Rd}	[kN]	-	0,36	0,6	-
Vertically perforated clay brick VHlz 1,6-2DF brick **H** e)	$f_b \geq 28$ N/mm²	F_{Rd}	[kN]	-	0,8	1,0	-
	$f_b \geq 50$ N/mm²	F_{Rd}	[kN]	-	1,2	1,4	-
Vertically perforated clay brick Poroton T8 brick **M** e)	$f_b \geq 6$ N/mm²	F_{Rd}	[kN]	-	0,3	0,6	-
Vertically perforated clay brick Hlz 1,0-9DF brick **L** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	0,48	0,6	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	0,6	0,6	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	0,6	0,8	-
	$f_b \geq 16$ N/mm²	F_{Rd}	[kN]	-	0,8	1,2	-

Design resistance

Anchor size				**HRD 8**	**HRD 10**		
				h_{nom} =50mm	**h_{nom} =50mm**	**h_{nom} =70mm**	**h_{nom} =90mm**
Hollow sand-lime brick KSL 12/1,4 brick **O** e)	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	0,3	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF brick **P** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	0,6	-	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	0,6	-	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	0,8	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF brick **Q** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	-	0,8	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	-	1,0	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	-	1,2	-
Vertically perforated sand-lime brick KSL R 1,6-16DF brick **R** e)	$f_b \geq 8$ N/mm²	F_{Rd}	[kN]	-	0,36	0,48	-
	$f_b \geq 10$ N/mm²	F_{Rd}	[kN]	-	0,48	0,6	-
	$f_b \geq 12$ N/mm²	F_{Rd}	[kN]	-	0,6	0,8	-
	$f_b \geq 16$ N/mm²	F_{Rd}	[kN]	-	0,8	1,0	-
Lightweight hollow brick Hbl 2/0,8 brick **S** e)	$f_b \geq 2$ N/mm²	F_{Rd}	[kN]	0,12	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF brick **T** e)	$f_b \geq 2$ N/mm²	F_{Rd}	[kN]	-	0,2	0,3	-
	$f_b \geq 6$ N/mm²	F_{Rd}	[kN]	-	0,48	0,8	-
Ital. Hollow brick Mattone brick **E** e)	$f_b \geq 22$ N/mm²	F_{Rk}	[kN]	0,6	-	-	-
Ital. Hollow brick Poroton P700 brick **N** e)	$f_b \geq 15$ N/mm²	F_{Rd}	[kN]	-	-	0,24	-
Ital. Hollow brick Doppio Uni brick **C+I** e)		F_{Rd}	[kN]	0,36 (C)	-	0,6 (I)	-
Span. Hollow brick Rojo hydrofugano brick **D** e)	$f_b \geq 40$ N/mm²	F_{Rd}	[kN]	0,24	-	-	-
Span. Hollow brick Ladrillo perforado brick **J** e)	$f_b \geq 26$ N/mm²	F_{Rd}	[kN]	-	0,6	0,8	-
Span. Hollow brick Clinker mediterraneo brick **K** e)	$f_b \geq 75$ N/mm²	F_{Rd}	[kN]	-	-	0,6	-
French Hollow brick Brique Creuse brick **B** e)	$f_b \geq 6$ N/mm²	F_{Rd}	[kN]	0,20	-	-	-
Autoclaved aerated concrete AAC EN 771-4	AAC 2	F_{Rd}	[kN]	-	-	0,45	0,45
	AAC 4	F_{Rd}	[kN]	0,21	-	1,0	1,25
	AAC 6	F_{Rd}	[kN]	0,21	-	1,0	1,25
		F_{Rd}	[kN]		-	1,75 d)	2,25 d)

Recommended loads [a)]

Anchor size				HRD 8	HRD 10		
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm	h_{nom} =90mm
Concrete C 12/15		N_{rec}	[kN]	0,8	1,2	2,4	-
		V_{rec}	[kN]	3,9 / 3,7 [b)]	6,1 / 5,8 [b)] / 6,1 [c)]		-
Concrete C 16/20 –C 50/60		N_{rec}	[kN]	1,2	1,8	3,4	-
		V_{rec}	[kN]	3,9 / 3,7 [b)]	6,1 / 5,8 [b)] / 6,1 [c)]		-
Solid clay brick Mz 2,0 DIN V 105-100 / EN 771-1	$f_b \geq 20$ N/mm²	F_{rec}	[kN]	0,42	0,85 1,28 [d)]	[f)]	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	0,34	0,57 0,85 [d)]	[f)]	-
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	$f_b \geq 20$ N/mm²	F_{rec}	[kN]	0,7	0,85 1,28 [d)]	[f)]	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	0,57	0,57 0,85 [d)]	[f)]	-
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	$f_b \geq 20$ N/mm²	F_{rec}	[kN]	-	1,0 1,71 [d)]	[f)]	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,71 1,28 [d)]	[f)]	-
	$f_b \geq 6$ N/mm^2	F_{rec}	[kN]	0,14	-	-	-
Ital. solid brick Tufo	$f_b \geq$ n/a	F_{rec}	[kN]	0,4	-	-	-
Hollow clay brick Hlz B 12/1,2 brick **A** [e)]	$f_b \geq 12$ N/mm^2	F_{rec}	[kN]	0,14	-	-	-
Vertically perforated clay brick Hlz 1,2-2DF brick **F** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	0,42	-	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,57	-	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	0,57	-	-
Vertically perforated clay brick Hlz 1,0-2DF brick **G** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	0,11	0,21	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,14	0,25	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	0,17	0,25	-
	$f_b \geq 20$ N/mm²	F_{rec}	[kN]	-	0,25	0,42	-
Vertically perforated clay brick VHlz 1,6-2DF brick **H** [e)]	$f_b \geq 28$ N/mm²	F_{rec}	[kN]	-	0,57	0,71	-
	$f_b \geq 50$ N/mm²	F_{rec}	[kN]	-	0,85	1,0	-
Vertically perforated clay brick Poroton T8 brick **M** [e)]	$f_b \geq 6$ N/mm²	F_{rec}	[kN]	-	0,21	0,42	-
Vertically perforated clay brick Hlz 1,0-9DF brick **L** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	0,34	0,42	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,42	0,42	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	0,42	0,57	-
	$f_b \geq 16$ N/mm²	F_{rec}	[kN]	-	0,57	0,85	-

Recommended loads [a)]

Anchor size				HRD 8	HRD 10		
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm	h_{nom} =90mm
Hollow sand-lime brick KSL 12/1,4 brick **O** [e)]	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	0,21	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF brick **P** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	0,42	-	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,42	-	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	0,57	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF brick **Q** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	-	0,57	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	-	0,71	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	-	0,85	-
Vertically perforated sand-lime brick KSL R 1,6-16DF brick **R** [e)]	$f_b \geq 8$ N/mm²	F_{rec}	[kN]	-	0,25	0,34	-
	$f_b \geq 10$ N/mm²	F_{rec}	[kN]	-	0,34	0,42	-
	$f_b \geq 12$ N/mm²	F_{rec}	[kN]	-	0,42	0,57	-
	$f_b \geq 16$ N/mm²	F_{rec}	[kN]	-	0,57	0,71	-
Lightweight hollow brick Hbl 2/0,8 brick **S** [e)]	$f_b \geq 2$ N/mm²	F_{rec}	[kN]	0,09	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF brick **T** [e)]	$f_b \geq 2$ N/mm²	F_{rec}	[kN]	-	0,14	0,21	-
	$f_b \geq 6$ N/mm²	F_{rec}	[kN]	-	0,34	0,57	-
Ital. Hollow brick Mattone brick **E** [e)]	$f_b \geq 22$ N/mm²	F_{rec}	[kN]	0,43	-	-	-
Ital. Hollow brick Poroton P700 brick **N** [e)]	$f_b \geq 15$ N/mm²	F_{rec}	[kN]	-	-	0,17	-
Ital. Hollow brick Doppio Uni brick **C+I** [e)]	$f_b \geq 25$ N/mm²	F_{rec}	[kN]	0,25 (C)	-	0,42 (I)	-
Span. Hollow brick Rojo hydrofugano brick **D** [e)]	$f_b \geq 40$ N/mm²	F_{rec}	[kN]	0,17	-	-	-
Span. Hollow brick Ladrillo perforado brick **J** [e)]	$f_b \geq 26$ N/mm²	F_{rec}	[kN]	-	0,42	0,57	-
Span. Hollow brick Clinker mediterraneo brick **K** [e)]	$f_b \geq 75$ N/mm²	F_{rec}	[kN]	-	-	0,42	-
French Hollow brick Brique Creuse brick **B** [e)]	$f_b \geq 6$ N/mm²	F_{rec}	[kN]	0,14	-	-	-
Autoclaved aerated concrete AAC EN 771-4	AAC 2	F_{rec}	[kN]	-	-	0,32	0,32
	AAC 4	F_{rec}	[kN]	0,15	-	0,71	0,89
	AAC 6	F_{rec}	[kN]	0,15	-	0,71	0,89
		F_{rec}	[kN]		-	1,25 [d)]	1,6 [d)]

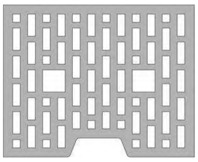
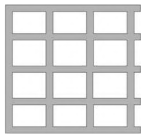
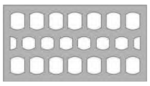
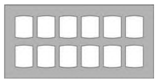
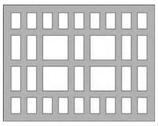
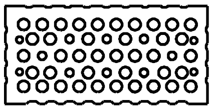
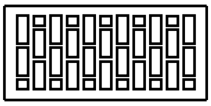
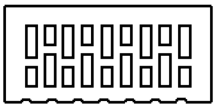
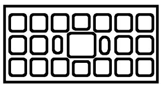
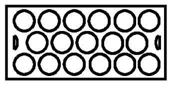
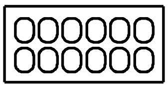
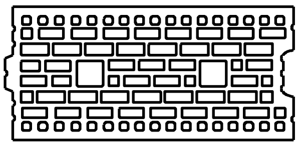
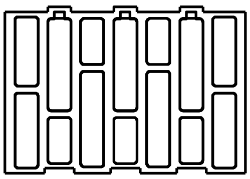
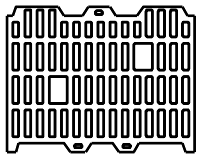
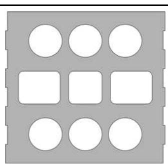
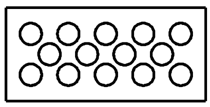
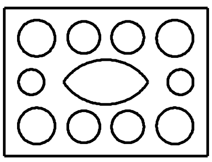
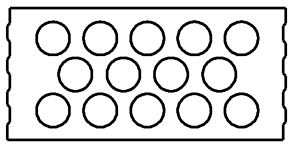
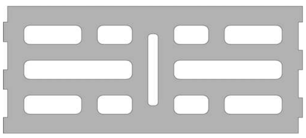
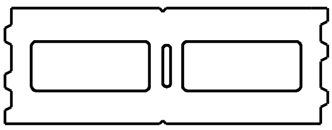
a) With overall partial safety factor for action γ = 1,4. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.
b) Values for hot-dip galanized carbon steel
c) Values for stainless steel
d) Valid for edge distance c≥150mm, intermediate values can be interpolated
e) Specification of hollow base material brick types see separate table below
f) Data can be determined by job-site testing, data for h_{nom} = 50mm can be applied.

Characteristic resistance for pull-out failure (plastic sleeve) for use in concrete

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

a) In absence of other national regulations

Specification of hollow base material brick types

Specification	Picture / drilling method	Specification	Picture / drilling method
Hollow clay bricks according EN 771-1			
brick **A** Hlz B 12/1,2 LxWxH [mm]: 300x240x248 hmin [mm]: 240	 Rotary drilling	brick **B** Brique Creuse LxWxH [mm]: 210x198x… hmin [mm]: 210	 Rotary drilling
brick **C** Doppio Uni LxWxH [mm]: 230x120x100 hmin [mm]: 120	 Rotary drilling	brick **D** Rojo hydrofugano LxWxH [mm]: 240x115x50 hmin [mm]: 115	 Rotary drilling
brick **E** Mattone LxWxH [mm]: 240x180x100 hmin [mm]: 180	 Rotary drilling	brick **F** Hlz 1,2-2DF LxWxH [mm]: 240x115x113 hmin [mm]: 115	 Hammer drilling
brick **G** Hlz 1,0-2DF LxWxH [mm]: 240x115x113 hmin [mm]: 110	 Hammer drilling	brick **H** VHlz 1,6-2DF LxWxH [mm]: 240x115x113 hmin [mm]: 115	 Hammer drilling
brick **I** Doppio Uni LxWxH [mm]: 250x120x190 h_{min} [mm]: 120	 Rotary drilling	brick **J** Ladrillo perforado LxWxH [mm]: 240x110x100 hmin [mm]: 110	 Rotary drilling
brick **K** Clinker mediterraneo LxWxH [mm]: 240x113x50 hmin [mm]: 113	 Hammer drilling	brick **L** Hlz 1,0-9DF LxWxH [mm]: 372x175x238 hmin [mm]: 175	 Rotary drilling
brick **M** Poroton T8 LxWxH [mm]: 248x365x249 hmin [mm]: 365	 Rotary drilling	brick **N** Poroton P700 LxWxH [mm]: 225x300x190 hmin [mm]: 300	 Rotary drilling
Hollow sand-lime bricks according EN 771-2			
brick **O** KSL 12/1,4 LxWxH [mm]: 240x248x248 h_{min} [mm]: 240	 Hammer drilling	brick **P** KS L 1,6-2DF LxWxH [mm]: 240x115x113 hmin [mm]: 115	 Hammer drilling
brick **Q** KS L 1,4-3DF LxWxH [mm]: 240x175x113 hmin [mm]: 175	 Hammer drilling	brick **R** KS L R 1,6-16DF LxWxH [mm]: 480x240x248 hmin [mm]: 240	 Rotary drilling
Lightweight concrete hollow block according EN 771-3			
brick **S** Hbl 2/0,8 LxWxH [mm]: 497x240x248 hmin [mm]: 240	 Hammer drilling	brick **T** Hbl 1,2-12DF LxWxH [mm]: 497x175x238 hmin [mm]: 175	 Rotary drilling

Requirements for redundant fastening

The definition of redundant fastening according to Member States is given in the ETAG 020. In Absence of a definition by a Member State the following default values may be taken

Minimum number of fixing points	Minimum number of anchors per fixing point	Maximum design load of action N_{Sd} per fixing point [a]
3	1	3 kN
4	1	4,5 kN

a) The value for maximum design load of actions per fastening point N_{Sd} is valid in general that means all fastening points are considered in the design of the redundant structural system.

Service temperature range

Hilti HRD frame anchors may be applied in the temperature range given below.

Temperature range	Base material temperature	Maximum long term base material temperature	Maximum short term base material temperature
Temperature range	-40 °C to +80 °C	+50 °C	+80 °C

Max short term base material temperature
Short-term elevated base material temperatures are those that occur over brief intervals, e.g. as a result of diurnal cycling.

Max long term base material temperature
Long-term elevated base material temperatures are roughly constant over significant periods of time.

Materials

Mechanical properties

Anchor size		HRD 8		HRD 10		
		Galv. steel	Stainless steel	Galv. steel	Hot-dip galvanised	Stainless steel
Nominal tensile strength f_{uk}	[N/mm²]	600	580	600	600	630
Yield strength f_{yk}	[N/mm²]	480	450	480	480	480
Stressed cross-section A_s	[mm²]	22,9	22,9	35,3	33,7	35,3
Moment of resistance W	[mm³]	15,5	15,5	29,5	27,6	29,5
Char. bending resistance $M^0_{Rk,s}$	[Nm]	11,1	10,8	21,3	19,9	22,3

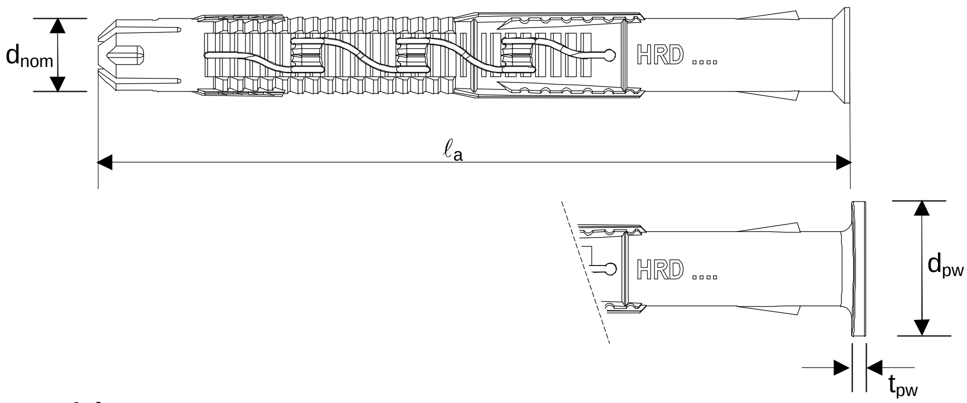
Material quality

Part		Material
Sleeve		Polyamide, colour red
Screw	HRD-C, -H, -K, -P	Carbon steel, galvanised to min. 5 µm
	HRD-HF	Carbon steel, hot-dip galvanized to min. 65 µm
	HRD-CR2, -HR2, -KR2, -PR2	Stainless steel, corrosion class II: 1.4301 / 1.4567
	HRD-CR, -HR, -KR, -PR	Stainless steel, corrosion class III: 1.4362 / 1.4401 / 1.4404 / 1.4571

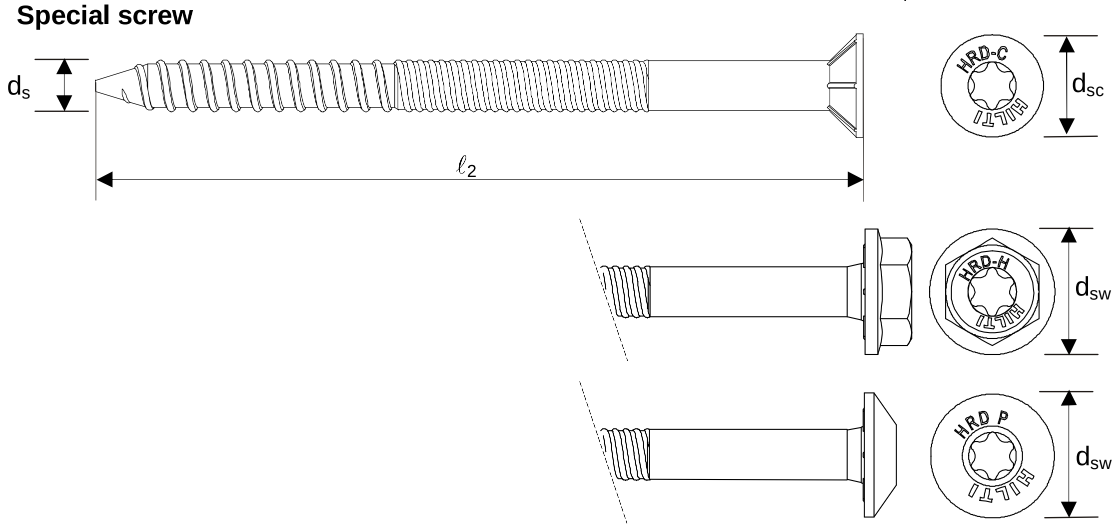
Anchor dimensions

Anchor size			HRD 8	HRD 10
Minimum thickness of fixture	$t_{fix,min}$	[mm]	0	0
Maximum thickness of fixture	$t_{fix,max}$	[mm]	90	260
Diameter of the sleeve	d_{nom}	[mm]	8	10
Minimum length of the sleeve	$\ell_{1,min}$	[mm]	60	60
Maximum length of the sleeve	$\ell_{1,max}$	[mm]	140	310
Diameter of plastic washer	d_{pw}	[mm]	-	17,5
Thickness of plastic washer	t_{pw}	[mm]	-	2
Diameter of the screw	d_S	[mm]	6	7
Minimum length of the screw	$\ell_{2,min}$	[mm]	65	65
Maximum length of the screw	$\ell_{2,max}$	[mm]	145	315
Head diameter of countersunk screw	d_{sc}	[mm]	11	14
Head diameter of hexhead screw	d_{sw}	[mm]	-	17,5

Anchor sleeve



Special screw

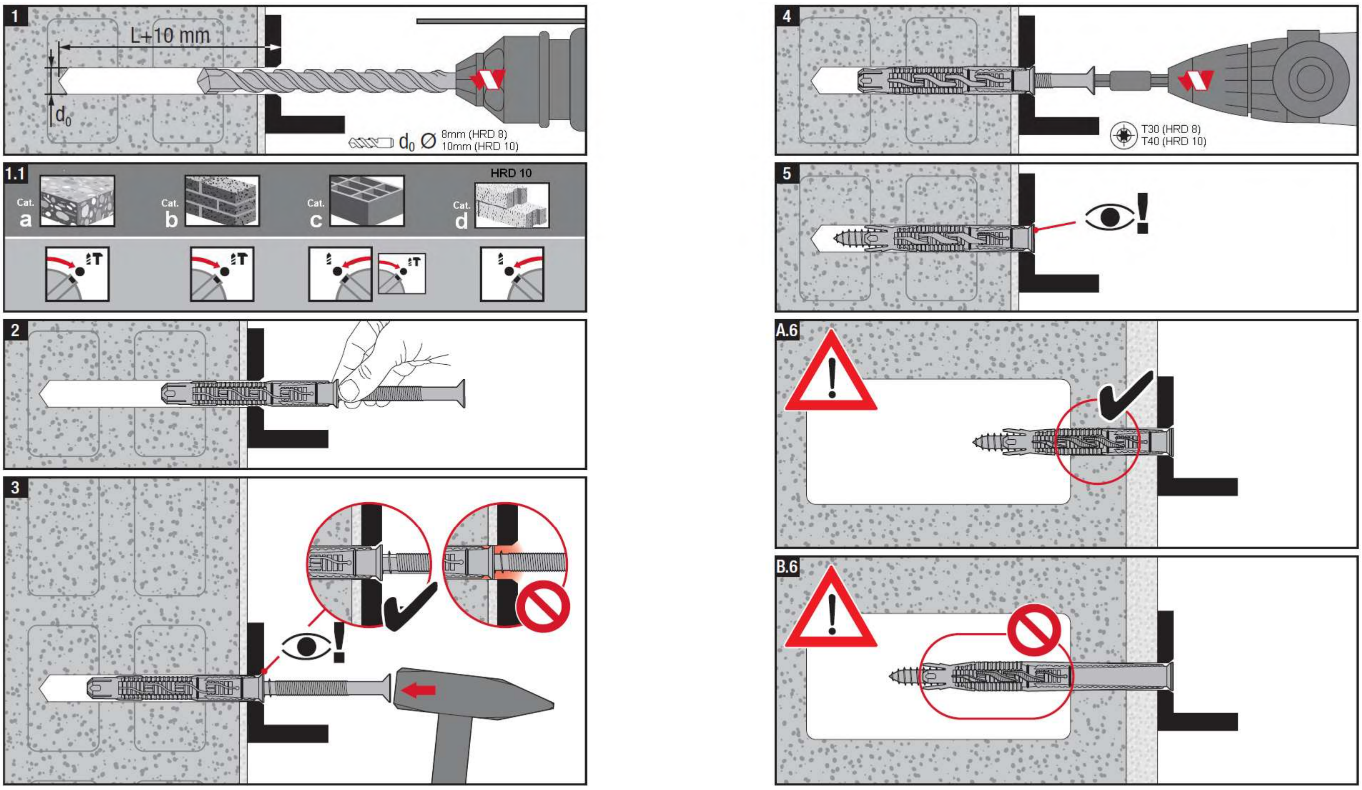


Setting

Installation equipment

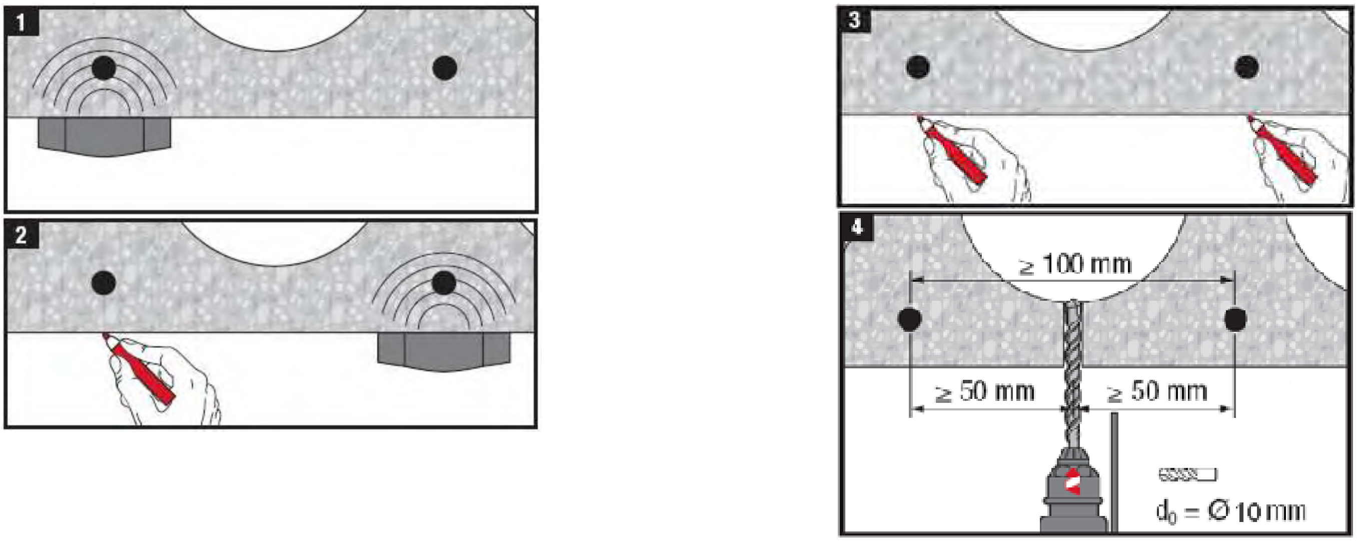
Anchor size	
Rotary hammer	TE2 … TE16
Other tools	hammer, screw driver

Setting instruction



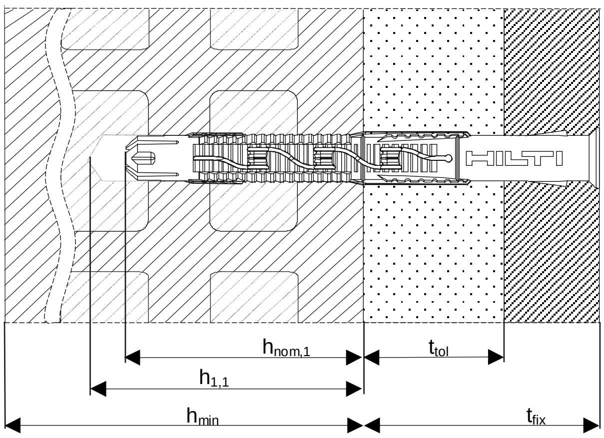
Additional preparation in case of application in precast prestressed hollow core slabs

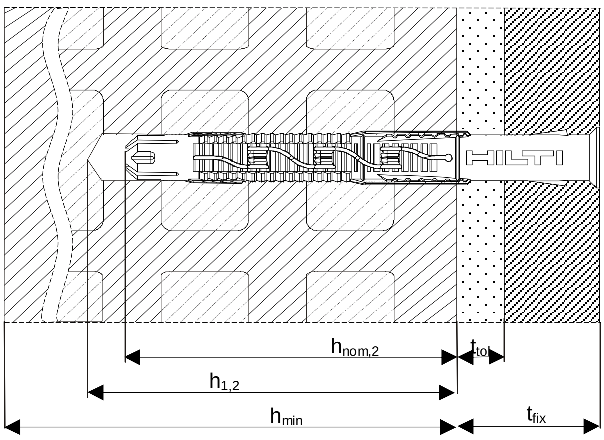
After drilling follow the main instruction above



For detailed information on installation see instruction for use given with the package of the product.

Setting details: depth of drill hole h_1 and nominal anchorage depth h_{nom}





Application with $h_{nom,3}$ = 90mm analogue

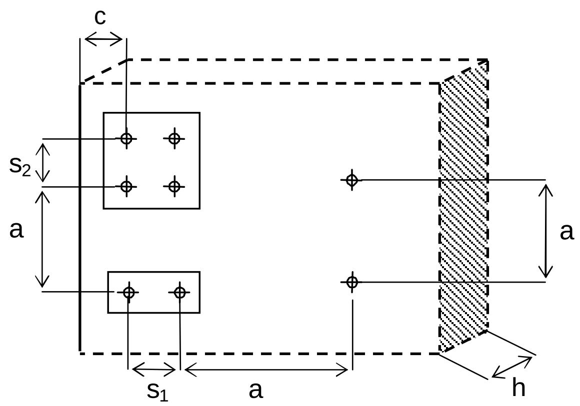
Setting details HRD

				HRD 8	HRD 10
Drill hole diameter		d_o	[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 a)
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 a)
Diameter of clearance hole in the fixture	Countersunk screw	$d_f \leq$	[mm]	8,5	11
	Hexhead screw	$d_f \leq$	[mm]	-	12
Installation temperature			[°C]	-10 - +40	

a) for use in AAC

Setting parameters

Anchor size				HRD 8	HRD 10	
				h_{nom} =50mm	h_{nom} =50mm	h_{nom} =70mm
Minimum base material thickness	Concrete	h_{min}	[mm]	100	100	120
	Concrete thin skin	h_{min}	[mm]	-	40	-
	Masonry (depending on brick type, see specification of brick types above)	h_{min}	[mm]	115 - 300		
Minimum spacing	Concrete ≥ C16/20	s_{min}	[mm]	100	50	
		for c ≥	[mm]	50	100 [c]	
	Concrete C12/15	s_{min}	[mm]	140	70	
		for c ≥	[mm]	70	140 [c]	
	Masonry and AAC	a_{min}	[mm]	250	250	
	Masonry and AAC	s_{min1}	[mm]	200 (120 [d])	100	
		s_{min2}	[mm]	400 (240 [d])	100	
Minimum edge distance	Concrete ≥ C16/20	c_{min}	[mm]	50	50	
		for s ≥	[mm]	100	150 [c]	
	Concrete C12/15	c_{min}	[mm]	70	70	
		for s ≥	[mm]	140	210 [c]	
	Masonry and AAC	c_{min}	[mm]	100 (60 [d])	100	
Critical spacing in concrete[a]	Concrete ≥ C16/20	$s_{cr,N}$	[mm]	62	80	125
	Concrete C12/15	$s_{cr,N}$	[mm]	68	90	135
Critical edge distance in concrete[b]	Concrete ≥ C16/20	$c_{cr,N}$	[mm]	100	100	
	Concrete C12/15	$c_{cr,N}$	[mm]	140	140	

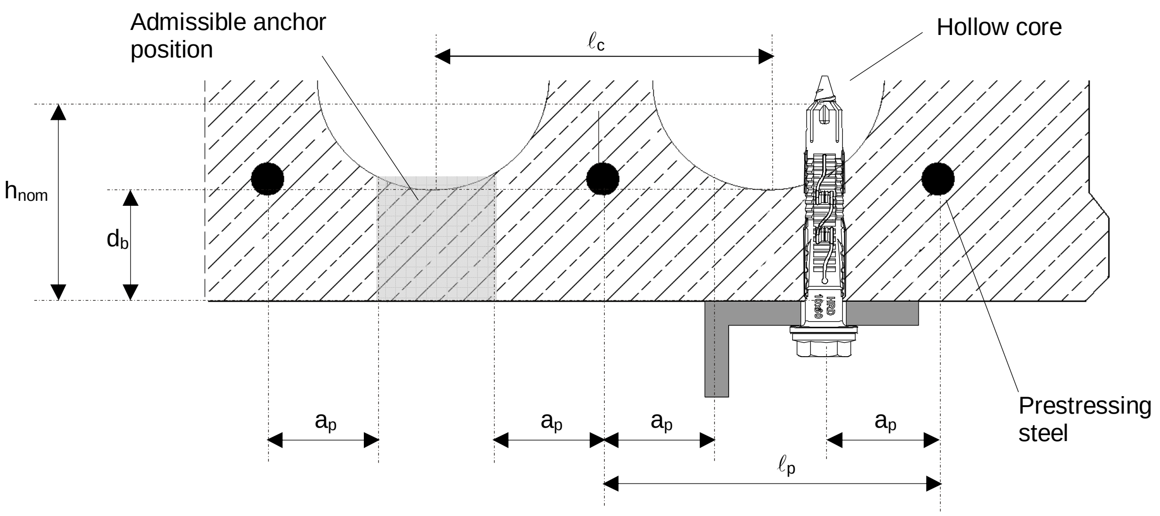


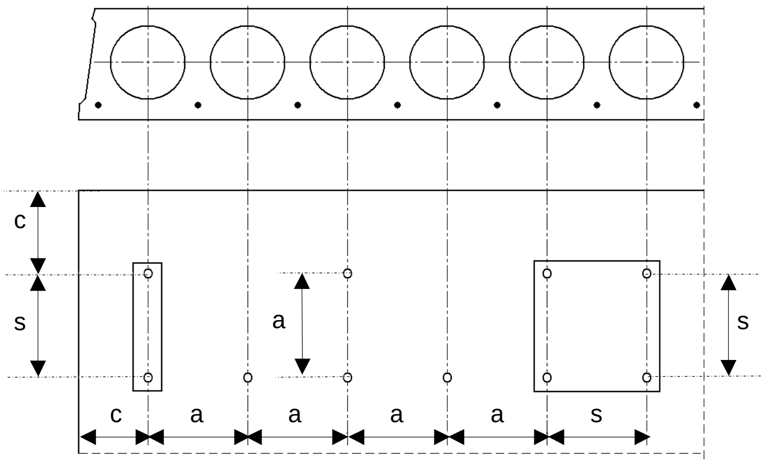
a) For spacing larger than the critical spacing each anchor in a group can be considered in design.
b) For edge distance smaller than critical edge distance the design loads have to be reduced.
c) Linear interpolation allowed
d) only for brick “Doppio Uni” and “Mattone”

Admissible anchor positions, minimum spacing and edge distance of anchors and distance between anchor groups in precast prestressed hollow core slabs

Anchor type			HRD 8	HRD 10
Overall plasic anchor embedment depth in the base material	$h_{nom} \geq$	[mm]	-	50
Bottom flange thickness	$d_b \geq$	[mm]	-	25
Core distance	$\ell_c \geq$	[mm]	-	100
Prestressing steel distance	$\ell_p \geq$	[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





c_1, c_2 edge distances
s_1, s_2 anchor spacings
a_1, a_2 distances between anchor groups

Design method

Design method according ETAG 020, Annex C. Design resistance according data given in ETA-07/0219, issue 2011-02-01.

- Valid for a group of two anchors
- Influence of edge distance

The design method is based on the following simplifications:

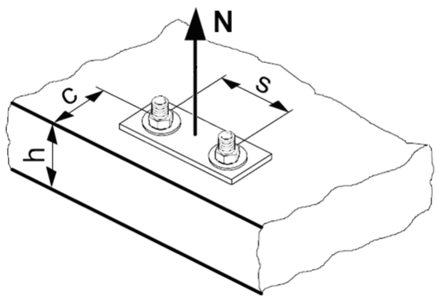
- Minimum base material thickness h_{min}
- All data for concrete C16/20 – C50/60
- No different loads are acting on individual anchors (no eccentricity)
- Shear without lever arm

The values are valid for a single anchor or a anchor group with spacing < $s_{cr,N}$ (for anchor groups with spacing ≥ $s_{cr,N}$ each anchor can be considered as acting like a single anchor).

Tension loading in concrete

The design tensile resistance is the lower value of

- Steel resistance: $N_{Rd,s}$
- Concrete pull-out resistance: $N_{Rd,p}$
- Concrete cone resistance: $N_{Rd,c} = N_{Rd,p} \cdot (c/c_{cr,N})$



Basic design tensile resistance

Design steel resistance $N_{Rd,s}$

Anchor size		HRD 8	HRD 10	
		h_{nom} =50mm	h_{nom} =50mm	h_{nom} ≥70mm
$N_{Rd,s}$	Carbon steel [kN]	7,3	11,7	11,7
	Stainless steel [kN]	6,8	11,6	11,6

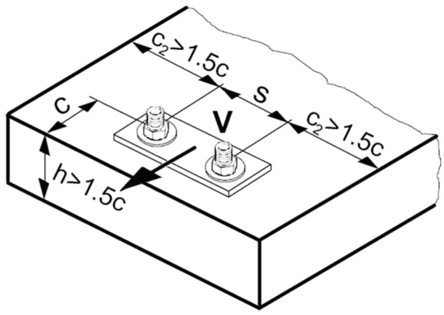
Design pull-out resistance $N_{Rd,p}$
Design concrete cone $N_{Rd,c} = N_{Rd,p} \cdot (c/c_{cr,N})$

Anchor size		HRD 8	HRD 10	
		h_{nom} =50mm	h_{nom} =50mm	h_{nom} ≥70mm
$N_{Rd,p}$	Carbon steel [kN]	1,7	2,5	4,7
	Stainless steel [kN]	1,7	2,5	4,7

Shear loading in concrete

The design shear resistance is the lower value of

- Steel resistance: $V_{Rd,s}$
- Concrete edge resistance: $V_{Rd,c} = V^{0}_{Rd,c} \cdot f_B \cdot f_c$



Basic design shear resistance

Design steel resistance $V_{Rd,s}$

Anchor size		HRD 8	HRD 10	
		h_{nom} =50mm	h_{nom} =50mm	h_{nom} ≥70mm
$V_{Rd,s}$	Carbon steel [kN]	5,5	8,5	8,5
	Stainless steel [kN]	5,2	8,5	8,5

Design concrete edge resistance[a)] $V_{Rd,c} = V^{0}_{Rd,c} \cdot f_B \cdot f_c$

Anchor type		HRD 8	HRD 10	
		h_{nom} =50mm	h_{nom} =50mm	h_{nom} ≥70mm
$V^{0}_{Rd,c}$	[kN]	5,1	5,5	5,8

a) For anchor groups only the anchors close to the edge must be considered

Influencing factors

Influence of concrete strength

Concrete strength designation (ENV 206)	C 16/20	C 20/25	C 25/30	C 30/37	C 35/45	C 40/50	C 45/55	C 50/60
$f_B = (f_{ck,cube}/25N/mm^2)^{1/2}$ a)	0,89	1	1,1	1,22	1,34	1,41	1,48	1,55

a) $f_{ck,cube}$ = concrete compressive strength, measured on cubes with 150 mm side length

Influence of edge distance for different base material thickness a)

	c [mm]	50	60	70	80	90	100	120	140	160	180	200	220
h = 100 mm	f_c =	0,35	0,46	0,57	0,65	0,73	0,82	0,98	1,14	1,31	1,47	1,63	1,80
h = 120 mm		0,35	0,46	0,59	0,72	0,80	0,89	1,07	1,25	1,43	1,61	1,79	1,97
h = 150 mm		0,35	0,46	0,59	0,72	0,85	1,00	1,20	1,40	1,60	1,80	2,00	2,20
h = 180 mm		0,35	0,46	0,59	0,72	0,85	1,00	1,31	1,53	1,75	1,97	2,19	2,41

a) The edge distance shall not be smaller than the minimum edge distance c_{min}.
The base material thickness shall not be smaller than the minimum base material thickness h_{min}.

Combined TENSION and SHEAR loading in masonry

The design resistance in masonry and AAC F_{Rd} (see basic loading data) shall be used in each load direction for single anchors and anchor groups.