

HRD-U 10 / - S 10 / -U 14 Frame anchor

Anchor version		Benefits
  	HRD-U 10 Carbon steel Stainless steel	- universal frame anchor for façade, steelwork, and mechanical installation - base material versatility - excellent setting behaviour
	HRD-S 10 Carbon steel Stainless steel	
	HRD-U 14 Carbon steel Stainless steel	



Concrete



Solid brick



Hollow brick



Autoclaved
aerated
concrete



Fire
resistance

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
Fire test report	IBMB, Braunschweig	UB 3613/3891-1 Nau / 2001-11-23
		UB 3613/3891-2 Nau / 2001-11-26

Basic loading data (for a single anchor)

All data in this section applies to

- Correct setting (See setting instruction)
- No edge distance and spacing influence
- Base materials as specified in the table
Minimum base material thickness
- Anchor is set in the brick, not in the joints

Recommended loads

Anchor size			HRD-U 10	HRD-S 10	HRD-U 14
Concrete	≥ C12/15	F_{rec} [kN]	1,6	1,2	1,8
Solid clay brick	Mz 12	F_{rec} [kN]	0,6	0,6	0,6
Solid clay brick	Mz 20	F_{rec} [kN]	1,2	0,8	1,25
Solid sand-lime brick	KS 12/2,0	F_{rec} [kN]	0,6	0,6	0,6
Lightweight solid block	V 2	F_{rec} [kN]	0,25	0,25	0,5
Hollow clay brick	Hlz 12 – 1,0	F_{rec} [kN]	0,3	-	0,5
Hollow sand-lime brick	KSL 6	F_{rec} [kN]	0,4	0,4	0,6
Lightweight hollow brick	Hbl 2	F_{rec} [kN]	0,25	0,25	0,3
AAC blocks	AAC 2	F_{rec} [kN]	0,2	0,2	0,3
	≥ AAC 4	F_{rec} [kN]	0,5	0,35	0,6
AAC members	P 3,3	F_{rec} [kN]	0,2	0,2	0,3
	≥ P 4,4	F_{rec} [kN]	0,5	0,35	0,6
AAC acc. TGL	Plant Laussig	F_{rec} [kN]	0,3	-	-
	Plant Parchim	F_{rec} [kN]	0,15	-	-
Thin skins of external wall panels		F_{rec} [kN]	0,6	0,6	-
hwpLb acc. TGL		F_{rec} [kN]	0,5	-	0,7

Service temperature range

Hilti HRD-U 10 / -S 10 / -U 14 frame anchor 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 of HRD-U 10 / S 10 / U 14

Anchor size		U 10	S 10	U 14
Nominal tensile strength f_{uk}	Carbon steel [N/mm ²]	600		
	Stainless steel [N/mm ²]	580		500
Yield strength f_{yk}	Carbon steel [N/mm ²]	480		
	Stainless steel [N/mm ²]	450		400
Stressed cross-section A_s	[mm ²]	31,2		56,8
Moment of resistance W	[mm ³]	24,6		60,4
Char. bending resistance $M^0_{RK,s}$	Carbon steel [Nm]	17,7		43,5
	Stainless steel [Nm]	17,1		36,2

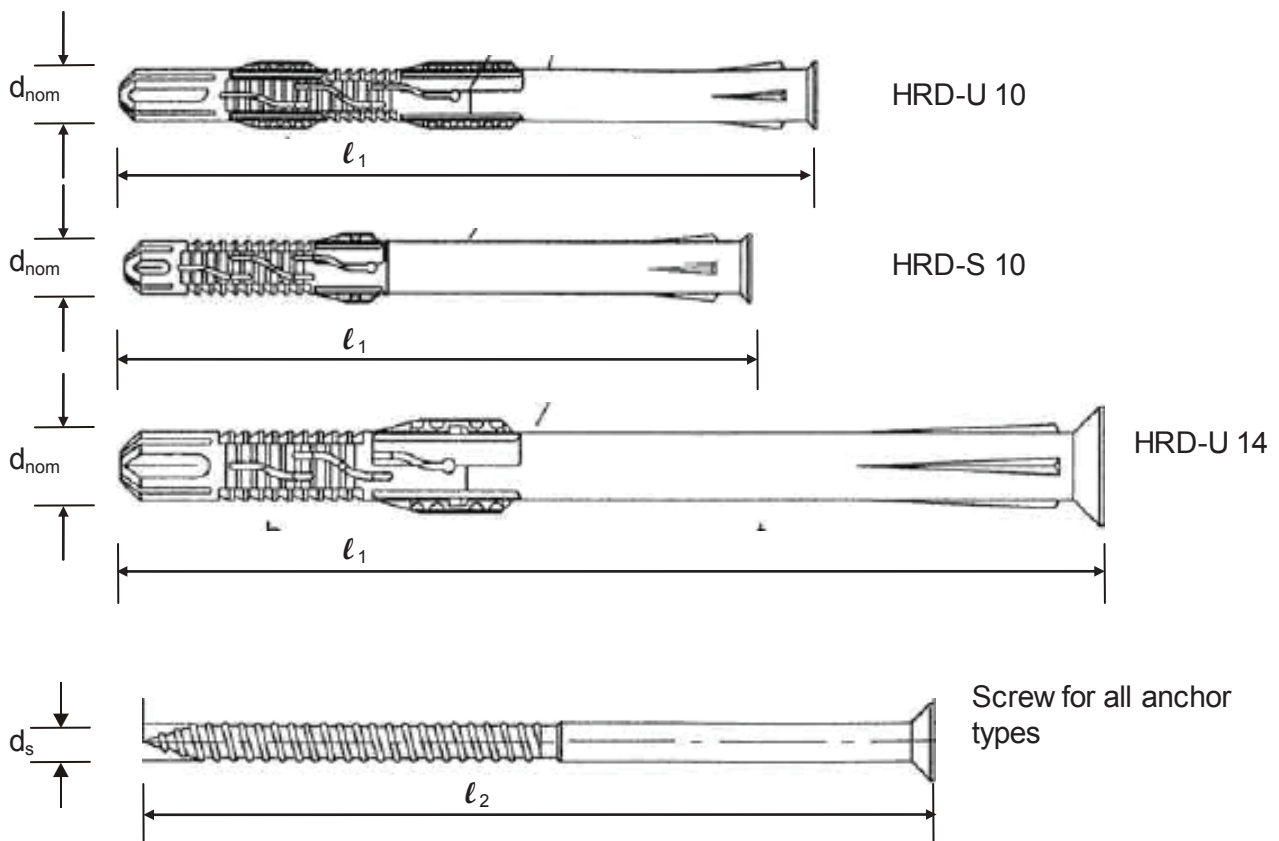
The recommended bending moment shall be calculated by dividing the characteristic bending moment by 1,4 and 1,25

Material quality

Part		Material
Sleeve	HRD	Polyamide
Screw	HRD-UG	Carbon steel, galvanised to min. 5 µm
	HRD-UR	Stainless steel

Anchor dimensions

Anchor size			U 10	S 10	U 14	UP 14
Minimum thickness of fixture	$t_{fix,min}$	[mm]	10	10	10	10
Maximum thickness of fixture	$t_{fix,max}$	[mm]	160	130	280	250
Diameter of the sleeve	d_{nom}	[mm]	10	10	14	14
Minimum length of the sleeve	$\ell_{1,min}$	[mm]	80	60	80	110
Maximum length of the sleeve	$\ell_{1,max}$	[mm]	230	180	350	330
Diameter of the screw	d_s	[mm]	7	7	10	10
Minimum length of the screw	$\ell_{2,min}$	[mm]	85	65	85	115
Maximum length of the screw	$\ell_{2,max}$	[mm]	235	285	355	335

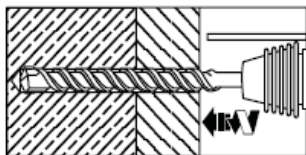


Setting

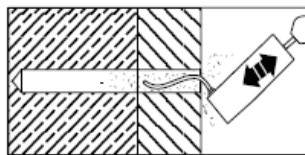
Installation equipment

Anchor size	U 10	S 10	U 14
Rotary hammer	TE2 ... TE16		TE16... TE40
Other tools	hammer, screw driver		

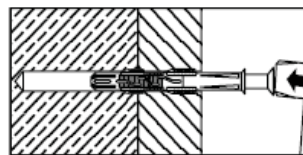
Setting instruction



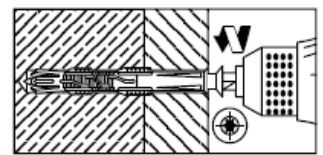
Drill hole with drill bit.



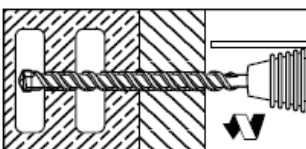
Blow out dust and fragments.



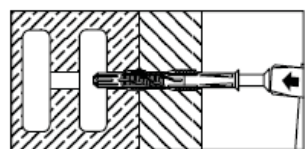
Install anchor.



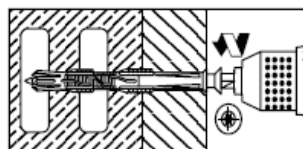
Drive screw into anchor.



Drill hole with drill bit.



Install anchor.

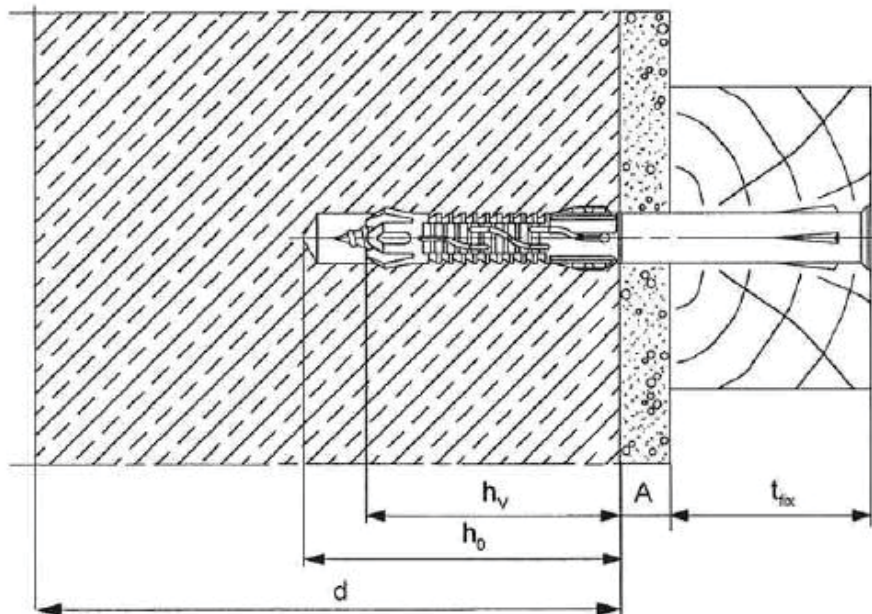


Drive screw into anchor.

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

For technical data for anchors in diamond drilled holes please contact the Hilti Technical advisory service.

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

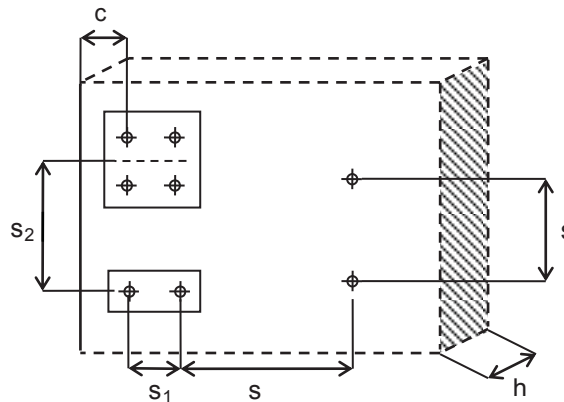


Setting details HRD-U 10 / S 10 / U 14

		U 10	S 10	U 14
Nominal diameter of drill bit	d_o [mm]	10	10	14
Cutting diameter of drill bit	$d_{cut} \leq$ [mm]	10,45	10,45	14,5
Depth of drill hole	$h_1 \geq$ [mm]	80	60	85
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	10,5	10,5	14,5
Overall embedment depth in the base material	h_{nom} [mm]	70	50	70
Installation temperature	[°C]	-10 - +40		

Base material thickness, anchor spacing and edge distance

Anchor size				U 10	S 10	U 14
Minimum base material thickness	Concrete	$h_{\min}$	[mm]	120	100	120
	Masonry	$h_{\min}$	[mm]	115	115	115
	AAC	$h_{\min}$	[mm]	115	115	115
	Wetterschale	$h_{\min}$	[mm]	40	40	-
	hwpLb	$h_{\min}$	[mm]	40	40	-
Minimum spacing of single anchors	Concrete	$s_{\min}$	[mm]	150	100	150
	Solid masonry	$s_{\min}$	[mm]	100	100	250
	Hollow masonry	$s_{\min}$	[mm]	250	250	250
	AAC	$s_{\min}$	[mm]	100 ^{a)}	-	-
	Wetterschale	$s_{\min}$	[mm]	100	100	-
	hwpLb	$s_{\min}$	[mm]	100	-	100
Minimum spacing in a group in concrete		$s_{\min 1}$	[mm]	50	50	50
Minimum spacing of groups in concrete		$s_{\min 2}$	[mm]	300	240	300
Minimum edge distance	Concrete	$c_{\min}$	[mm]	100	80	100
	Solid masonry	$c_{\min}$	[mm]	100	100	100
	Hollow masonry	$c_{\min}$	[mm]	100	100	100
	AAC	$c_{\min}$	[mm]	150	-	-
	Wetterschale	$c_{\min}$	[mm]	50	50	-
	hwpLb	$c_{\min}$	[mm]	100	100	100



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) Suitable for fastening thicknesses up to 260mm Available in 4 different materials for optimum suitability in all corrosive environments Pre-assembled for optimum handling and fastening quality
	HRD-H 10x... HRD-HR 10x... HRD-HR2 10x... HRD-HF 10x...	
	HRD-K 10x... HRD-KR 10x... HRD-KR2 10x...	
	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



CE
conformity



European
Technical
Approval

a) Redundant fastening only

Approvals / certificates

Description	Authority / Laboratory	No. / date of issue
European technical approval ^{a)}	DIBt, Berlin	ETA-07/0219 / 2012-09-18
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 2012-09-18. 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	$f_b \geq 20 \text{ N/mm}^2$	F_{Rk}	[kN]	1,5	3,0 4,5 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	1,2	2,0 3,0 ^{d)}	f)	-
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	$f_b \geq 20 \text{ N/mm}^2$	F_{Rk}	[kN]	2,5	3,0 4,5 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	2,0	2,0 3,0 ^{d)}	f)	-
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	$f_b \geq 20 \text{ N/mm}^2$	F_{Rk}	[kN]	-	3,5 6,0 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,5 4,5 ^{d)}	f)	-
	$f_b \geq 6 \text{ N/mm}^2$	F_{Rk}	[kN]	0,50	-	-	-
Ital. solid brick Tufo	$f_b \geq n/a$	F_{Rk}	[kN]	1,4	-	-	-
Hollow clay brick Hlz B 12/1,2 A ^{e)}	brick $f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	0,50	-	-	-
Vertically perforated clay brick Hlz 1,2-2DF F ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	-	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,0	-	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,0	-	-
Vertically perforated clay brick Hlz 1,0-2DF G ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,4	0,75	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,5	0,9	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,6	0,9	-
	$f_b \geq 20 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,9	1,5	-
Vertically perforated clay brick VHlz 1,6-2DF brick H ^{e)}	$f_b \geq 28 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,0	2,5	-
	$f_b \geq 50 \text{ N/mm}^2$	F_{Rk}	[kN]	-	3,0	3,5	-
Vertically perforated clay brick Poroton T8 M ^{e)}	brick $f_b \geq 6 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,75	1,5	-
Vertically perforated clay brick Hlz 1,0-9DF L ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,2	1,5	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	1,5	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	2,0	-
	$f_b \geq 16 \text{ N/mm}^2$	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 O^{e)}	brick	$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	0,75	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF	brick P^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	-	-
		$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	-	-
		$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,0	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF	brick Q^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	-	2,0	-
		$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	-	2,5	-
		$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	-	3,0	-
Vertically perforated sand-lime brick KSL R 1,6-16DF R^{e)}	brick	$f_b \geq 8 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,9	1,2	-
		$f_b \geq 10 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,2	1,5	-
		$f_b \geq 12 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	2,0	-
		$f_b \geq 16 \text{ N/mm}^2$	F_{Rk}	[kN]	-	2,0	2,5	-
Lightweight hollow brick Hbl 2/0,8 S^{e)}	brick	$f_b \geq 2 \text{ N/mm}^2$	F_{Rk}	[kN]	0,30	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF	brick T^{e)}	$f_b \geq 2 \text{ N/mm}^2$	F_{Rk}	[kN]	-	0,5	0,75	-
		$f_b \geq 6 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,2	2,0	-
Ital. Hollow brick Mattone E^{e)}	brick	$f_b \geq 22 \text{ N/mm}^2$	F_{Rk}	[kN]	1,5	-	-	-
Ital. Hollow brick Poroton P700	brick N^{e)}	$f_b \geq 15 \text{ N/mm}^2$	F_{Rk}	[kN]	-	-	0,6	-
Ital. Hollow brick Doppio Uni C+I^{e)}	brick	$f_b \geq 25 \text{ N/mm}^2$	F_{Rk}	[kN]	0,9 (C)	-	1,5 (I)	-
Span. Hollow brick Rojo hidrofugano D^{e)}	brick	$f_b \geq 40 \text{ N/mm}^2$	F_{Rk}	[kN]	0,60	-	-	-
Span. Hollow brick Ladrillo perforado J^{e)}	brick	$f_b \geq 26 \text{ N/mm}^2$	F_{Rk}	[kN]	-	1,5	2,0	-
Span. Hollow brick Clinker mediterraneo	brick K^{e)}	$f_b \geq 75 \text{ N/mm}^2$	F_{Rk}	[kN]	-	-	1,5	-
French Hollow brick Brique Creuse	brick B^{e)}	$f_b \geq 6 \text{ N/mm}^2$	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	$f_b \geq 20 \text{ N/mm}^2$	F_{Rd} [kN]		0,6	1,2 1,8 ^{d)}	f)	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		0,48	0,8 1,2 ^{d)}	f)	-	
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	$f_b \geq 20 \text{ N/mm}^2$	F_{Rd} [kN]		1,0	1,2 1,8 ^{d)}	f)	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		0,8	0,8 1,2 ^{d)}	f)	-	
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	$f_b \geq 20 \text{ N/mm}^2$	F_{Rd} [kN]		-	1,4 2,4 ^{d)}	f)	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		-	1,0 1,8 ^{d)}	f)	-	
	$f_b \geq 6 \text{ N/mm}^2$	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)}	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd} [kN]		0,2	-	-	-	
Vertically perforated clay brick Hlz 1,2-2DF brick F ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,6	-	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,8	-	-	
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,8	-	-	
Vertically perforated clay brick Hlz 1,0-2DF brick G ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,16	0,3	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,2	0,36	-	
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,24	0,36	-	
	$f_b \geq 20 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,36	0,6	-	
Vertically perforated clay brick VHlz 1,6-2DF brick H ^{e)}	$f_b \geq 28 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,8	1,0	-	
	$f_b \geq 50 \text{ N/mm}^2$	F_{Rd} [kN]		-	1,2	1,4	-	
Vertically perforated clay brick Poroton T8 brick M ^{e)}	$f_b \geq 6 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,3	0,6	-	
Vertically perforated clay brick Hlz 1,0-9DF brick L ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,48	0,6	-	
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,6	0,6	-	
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd} [kN]		-	0,6	0,8	-	
	$f_b \geq 16 \text{ N/mm}^2$	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)}	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd}	[kN]		0,3	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF brick P ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,6	-	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,6	-	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,8	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF brick Q ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd}	[kN]		-	-	0,8	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd}	[kN]		-	-	1,0	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd}	[kN]		-	-	1,2	-
Vertically perforated sand-lime brick KSL R 1,6-16DF brick R ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,36	0,48	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,48	0,6	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,6	0,8	-
	$f_b \geq 16 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,8	1,0	-
Lightweight hollow brick Hbl 2/0,8 brick S ^{e)}	$f_b \geq 2 \text{ N/mm}^2$	F_{Rd}	[kN]		0,12	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF brick T ^{e)}	$f_b \geq 2 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,2	0,3	-
	$f_b \geq 6 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,48	0,8	-
Ital. Hollow brick Mattone brick E ^{e)}	$f_b \geq 22 \text{ N/mm}^2$	F_{Rk}	[kN]		0,6	-	-	-
Ital. Hollow brick Poroton P700 brick N ^{e)}	$f_b \geq 15 \text{ N/mm}^2$	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 hidrofugano brick D ^{e)}	$f_b \geq 40 \text{ N/mm}^2$	F_{Rd}	[kN]		0,24	-	-	-
Span. Hollow brick Ladrillo perforado brick J ^{e)}	$f_b \geq 26 \text{ N/mm}^2$	F_{Rd}	[kN]		-	0,6	0,8	-
Span. Hollow brick Clinker mediterraneo brick K ^{e)}	$f_b \geq 75 \text{ N/mm}^2$	F_{Rd}	[kN]		-	-	0,6	-
French Hollow brick Brique Creuse brick B ^{e)}	$f_b \geq 6 \text{ N/mm}^2$	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	$f_b \geq 20 \text{ N/mm}^2$	F_{rec} [kN]		0,42	0,85 1,28 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		0,34	0,57 0,85 ^{d)}	f)	-
Solid sand-lime brick KS 2,0 DIN V 106 / EN 771-2	$f_b \geq 20 \text{ N/mm}^2$	F_{rec} [kN]		0,7	0,85 1,28 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		0,57	0,57 0,85 ^{d)}	f)	-
Lightweight solid block Vbl 0,9 DIN V 18151-100 / EN 771-3	$f_b \geq 20 \text{ N/mm}^2$	F_{rec} [kN]		-	1,0 1,71 ^{d)}	f)	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		-	0,71 1,28 ^{d)}	f)	-
	$f_b \geq 6 \text{ N/mm}^2$	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 A ^{e)}	brick $f_b \geq 12 \text{ N/mm}^2$	F_{rec} [kN]		0,14	-	-	-
Vertically perforated clay brick Hlz 1,2-2DF F ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{rec} [kN]		-	0,42	-	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		-	0,57	-	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{rec} [kN]		-	0,57	-	-
Vertically perforated clay brick Hlz 1,0-2DF G ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{rec} [kN]		-	0,11	0,21	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		-	0,14	0,25	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{rec} [kN]		-	0,17	0,25	-
	$f_b \geq 20 \text{ N/mm}^2$	F_{rec} [kN]		-	0,25	0,42	-
Vertically perforated clay brick VHlz 1,6-2DF brick H ^{e)}	$f_b \geq 28 \text{ N/mm}^2$	F_{rec} [kN]		-	0,57	0,71	-
	$f_b \geq 50 \text{ N/mm}^2$	F_{rec} [kN]		-	0,85	1,0	-
Vertically perforated clay brick Poroton T8 M ^{e)}	brick $f_b \geq 6 \text{ N/mm}^2$	F_{rec} [kN]		-	0,21	0,42	-
Vertically perforated clay brick Hlz 1,0-9DF L ^{e)}	brick $f_b \geq 8 \text{ N/mm}^2$	F_{rec} [kN]		-	0,34	0,42	-
	$f_b \geq 10 \text{ N/mm}^2$	F_{rec} [kN]		-	0,42	0,42	-
	$f_b \geq 12 \text{ N/mm}^2$	F_{rec} [kN]		-	0,42	0,57	-
	$f_b \geq 16 \text{ N/mm}^2$	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)}	$f_b \geq 12 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,21	-	-	-
Vertically perforated sand-lime brick KSL 1,6-2DF brick P ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,42	-	-
	$f_b \geq 10 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,42	-	-
	$f_b \geq 12 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,57	-	-
Vertically perforated sand-lime brick KSL 1,4-3DF brick Q ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	-	0,57	-
	$f_b \geq 10 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	-	0,71	-
	$f_b \geq 12 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	-	0,85	-
Vertically perforated sand-lime brick KSL R 1,6-16DF brick R ^{e)}	$f_b \geq 8 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,25	0,34	-
	$f_b \geq 10 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,34	0,42	-
	$f_b \geq 12 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,42	0,57	-
	$f_b \geq 16 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,57	0,71	-
Lightweight hollow brick Hbl 2/0,8 brick S ^{e)}	$f_b \geq 2 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,09	-	-	-
Lightweight concrete hollow block Hbl 1,2-12DF brick T ^{e)}	$f_b \geq 2 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,14	0,21	-
	$f_b \geq 6 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,34	0,57	-
Ital. Hollow brick Mattone brick E ^{e)}	$f_b \geq 22 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,43	-	-	-
Ital. Hollow brick Poroton P700 brick N ^{e)}	$f_b \geq 15 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	-	0,17	-
Ital. Hollow brick Doppio Uni brick C+I ^{e)}	$f_b \geq 25 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,25 (C)	-	0,42 (I)	-
Span. Hollow brick Rojo hidrofugano brick D ^{e)}	$f_b \geq 40 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,17	-	-	-
Span. Hollow brick Ladrillo perforado brick J ^{e)}	$f_b \geq 26 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	0,42	0,57	-
Span. Hollow brick Clinker mediterraneo brick K ^{e)}	$f_b \geq 75 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	-	-	0,42	-
French Hollow brick Brique Creuse brick B ^{e)}	$f_b \geq 6 \text{ N/mm}^2$	$F_{rec} \text{ [kN]}$	0,14	-	-	-
Autoclaved aerated concrete AAC EN 771-4	AAC 2	$F_{rec} \text{ [kN]}$	-	-	0,32	0,32
	AAC 4	$F_{rec} \text{ [kN]}$	0,15	-	0,71	0,89
	AAC 6	$F_{rec} \text{ [kN]}$	0,15	-	0,71	0,89
		$F_{rec} \text{ [kN]}$		-	1,25 ^{d)}	1,6 ^{d)}

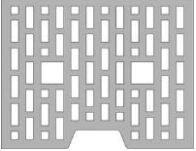
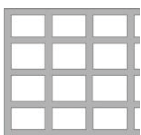
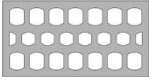
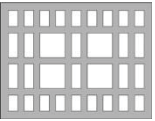
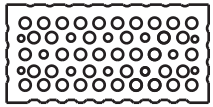
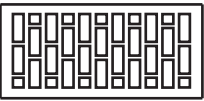
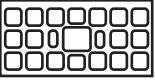
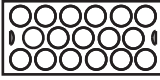
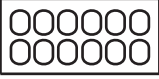
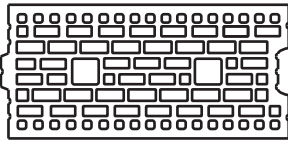
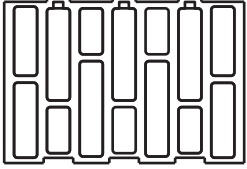
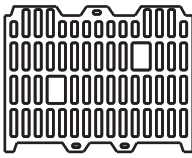
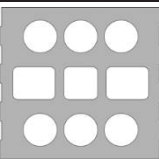
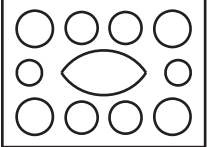
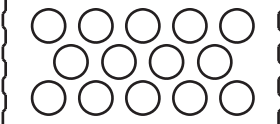
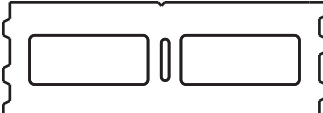
- a) With overall partial safety factor for action $\gamma = 1,4$. The partial safety factors for action depend on the type of loading and shall be taken from national regulations.
- b) Values for hot-dip galvanized carbon steel
- c) Values for stainless steel
- d) Valid for edge distance $c \geq 150\text{mm}$, 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 $h_{nom} = 50\text{mm}$ 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 <u>standard concrete slabs</u>					
Embedment depth		$h_{nom} \geq$ [mm]	50	50	70
Characteristic resistance	$\geq$ 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		$\gamma_{Mc}^{a)}$	1,8		
Pull-out failure in <u>thin skins (weather resistant skins of external wall panels)</u>					
Embedment depth		$h_{nom} \geq$ [mm]	-	50	-
Characteristic resistance	$h = 40\text{mm}$	$\geq$ C16/20 $N_{Rk,p}$ [kN]	-	3,5	-
	to 100mm	C12/15 $N_{Rk,p}$ [kN]	-	2,5	-
Partial safety factor		$\gamma_{Mc}^{a)}$	1,8		
Pull-out failure in <u>precast prestressed hollow core slabs</u>					
Embedment depth		$h_{nom} \geq$ [mm]	-	50	-
Characteristic resistance	$d_b \geq 25\text{mm}$	$\geq$ C35/45 $N_{Rk,p}$ [kN]	-	0,6	-
	$d_b \geq 30\text{mm}$	$\geq$ C35/45 $N_{Rk,p}$ [kN]	-	1,5	-
	$d_b \geq 35\text{mm}$	$\geq$ C35/45 $N_{Rk,p}$ [kN]	-	2,5	-
	$d_b \geq 40\text{mm}$	$\geq$ C35/45 $N_{Rk,p}$ [kN]	-	3,5	-
Partial safety factor		$\gamma_{Mc}^{a)}$	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 h _{min} [mm]: 240	 Rotary drilling	brick B Brique Creuse LxWxH [mm]: 210x198x... h _{min} [mm]: 210	 Rotary drilling
brick C Doppio Uni LxWxH [mm]: 230x120x100 h _{min} [mm]: 120	 Rotary drilling	brick D Rojo hydrofugano LxWxH [mm]: 240x115x50 h _{min} [mm]: 115	 Rotary drilling
brick E Mattone LxWxH [mm]: 240x180x100 h _{min} [mm]: 180	 Rotary drilling	brick F Hlz 1,2-2DF LxWxH [mm]: 240x115x113 h _{min} [mm]: 115	 Hammer drilling
brick G Hlz 1,0-2DF LxWxH [mm]: 240x115x113 h _{min} [mm]: 110	 Hammer drilling	brick H VHlz 1,6-2DF LxWxH [mm]: 240x115x113 h _{min} [mm]: 115	 Hammer drilling
brick I Doppio Uni LxWxH [mm]: 250x120x190 h _{min} [mm]: 120	 Rotary drilling	brick J Ladrillo perforado LxWxH [mm]: 240x110x100 h _{min} [mm]: 110	 Rotary drilling
brick K Clinker mediterraneo LxWxH [mm]: 240x113x50 h _{min} [mm]: 113	 Hammer drilling	brick L Hlz 1,0-9DF LxWxH [mm]: 372x175x238 h _{min} [mm]: 175	 Rotary drilling
brick M Poroton T8 LxWxH [mm]: 248x365x249 h _{min} [mm]: 365	 Rotary drilling	brick N Poroton P700 LxWxH [mm]: 225x300x190 h _{min} [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 h _{min} [mm]: 115	 Hammer drilling
brick Q KS L 1,4-3DF LxWxH [mm]: 240x175x113 h _{min} [mm]: 175	 Hammer drilling	brick R KS L R 1,6-16DF LxWxH [mm]: 480x240x248 h _{min} [mm]: 240	 Rotary drilling
Lightweight concrete hollow block according EN 771-3			
brick S Hbl 2/0,8 LxWxH [mm]: 497x240x248 h _{min} [mm]: 240	 Hammer drilling	brick T Hbl 1,2-12DF LxWxH [mm]: 497x175x238 h _{min} [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/mm ²]	600	580	600	600	630
Yield strength f_{yk}	[N/mm ²]	480	450	480	480	480
Stressed cross-section A_s	[mm ²]	22,9	22,9	35,3	33,7	35,3
Moment of resistance W	[mm ³]	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

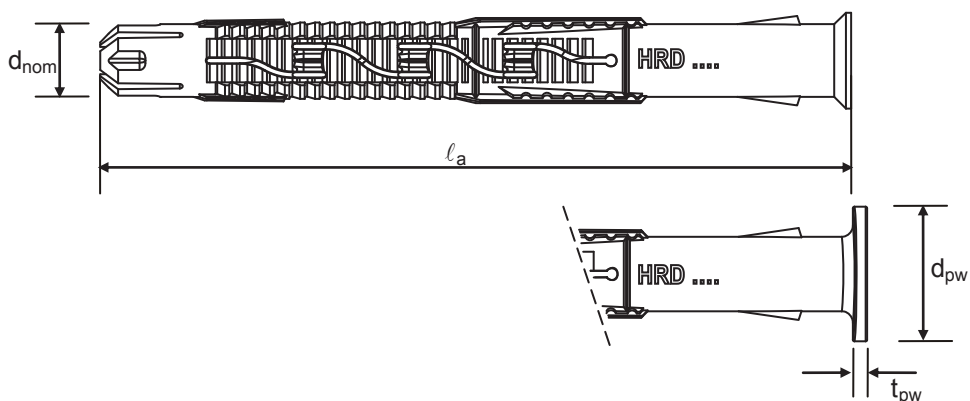
Material quality

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
Screw	HRD-CR2, -HR2, -KR2, -PR2
	Stainless steel, corrosion class II: 1.4301 / 1.4567
Screw	HRD-CR, -HR, -KR, -PR
	Stainless steel, corrosion class III: 1.4362 / 1.4401 / 1.4404 / 1.4571

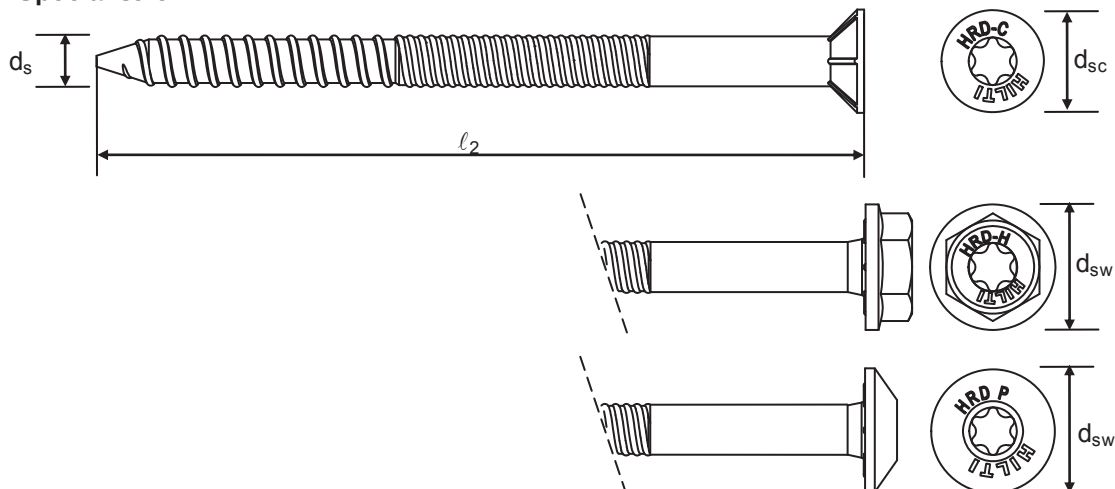
Anchor dimensions

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

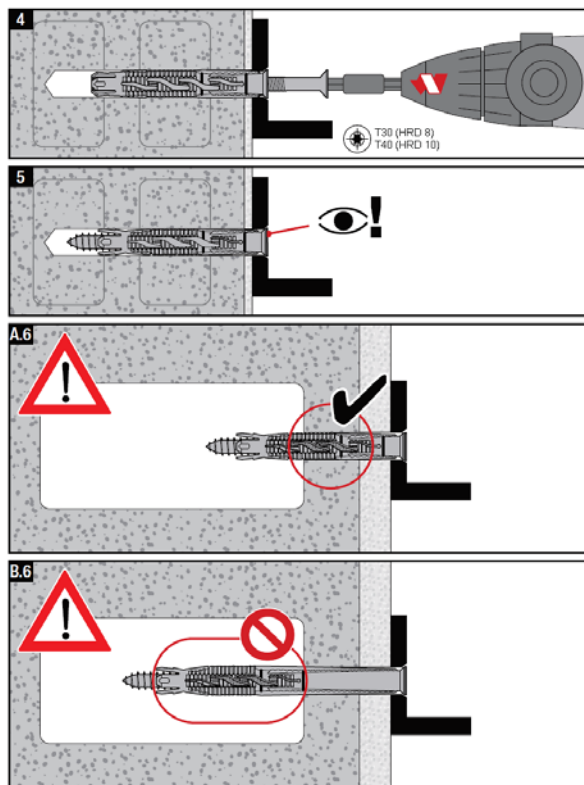
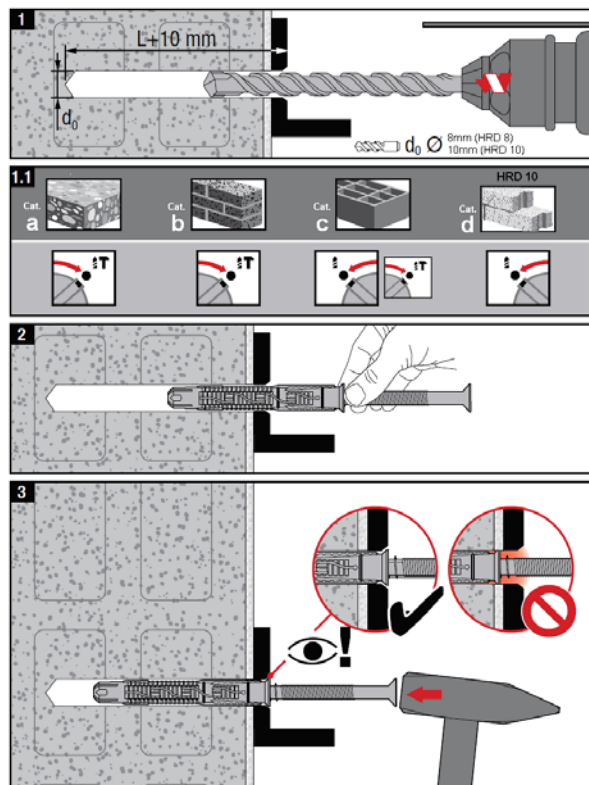


Setting

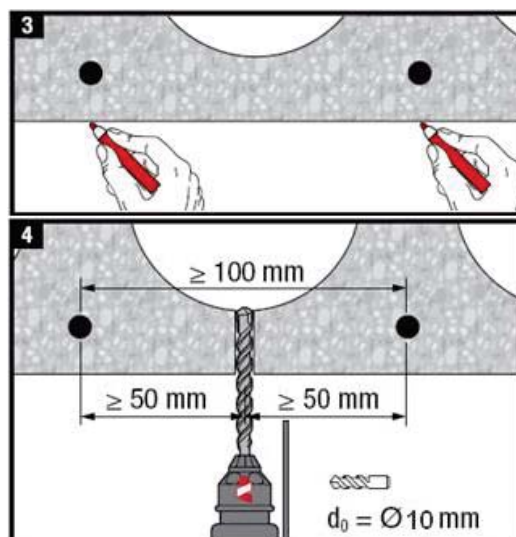
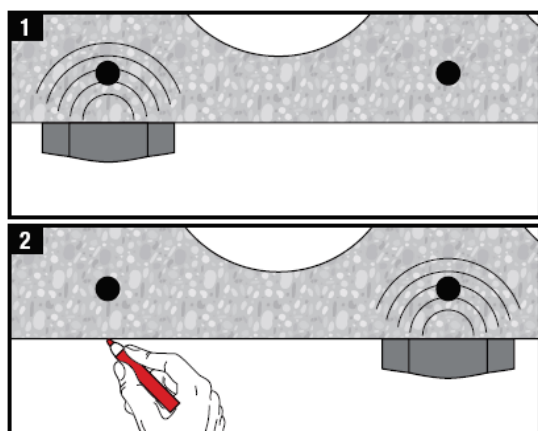
Installation equipment

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

Setting instruction

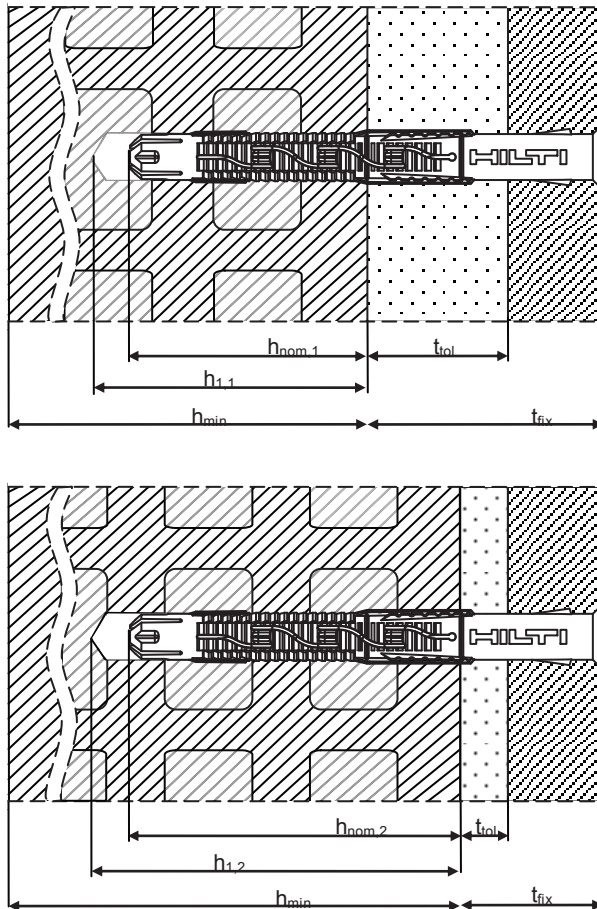


Additional preparation in case of application in precast prestressed hollow core slabs
After drilling follow the main instruction above



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 $h_{nom,3} = 90\text{mm}$ analogue

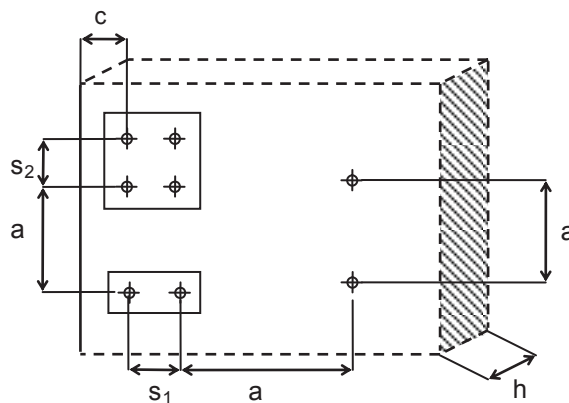
Setting details HRD

			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	$d_f \leq$	8,5	11
	Hexhead screw	$d_f \leq$	-	12
Installation temperature			-10 - +40	

^{a)} for use in AAC

Setting parameters

Anchor size				HRD 8	HRD 10	
				$h_{nom} = 50\text{mm}$	$h_{nom} = 50\text{mm}$	$h_{nom} = 70\text{mm}$
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 $\geq \text{C16/20}$	s_{min}	[mm]	100	50	
		for $c \geq$	[mm]	50	100 ^{c)}	
	Concrete C12/15	s_{min}	[mm]	140	70	
		for $c \geq$	[mm]	70	140 ^{c)}	
	Masonry and AAC	a_{min}	[mm]	250	250	
		s_{min1}	[mm]	200 (120 ^{d)})	100	
Minimum edge distance	Concrete $\geq \text{C16/20}$	s_{min2}	[mm]	400 (240 ^{d)})	100	
		c_{min}	[mm]	50	50	
	Concrete C12/15	for $s \geq$	[mm]	100	150 ^{c)}	
		c_{min}	[mm]	70	70	
	Masonry and AAC	for $s \geq$	[mm]	140	210 ^{c)}	
		c_{min}	[mm]	100 (60 ^{d)})	100	
Critical spacing in concrete ^{a)}	Concrete $\geq \text{C16/20}$	$s_{cr,N}$	[mm]	62	80	125
	Concrete C12/15	$s_{cr,N}$	[mm]	68	90	135
Critical edge distance in concrete ^{b)}	Concrete $\geq \text{C16/20}$	$c_{cr,N}$	[mm]	100	100	
	Concrete C12/15	$c_{cr,N}$	[mm]	140	140	

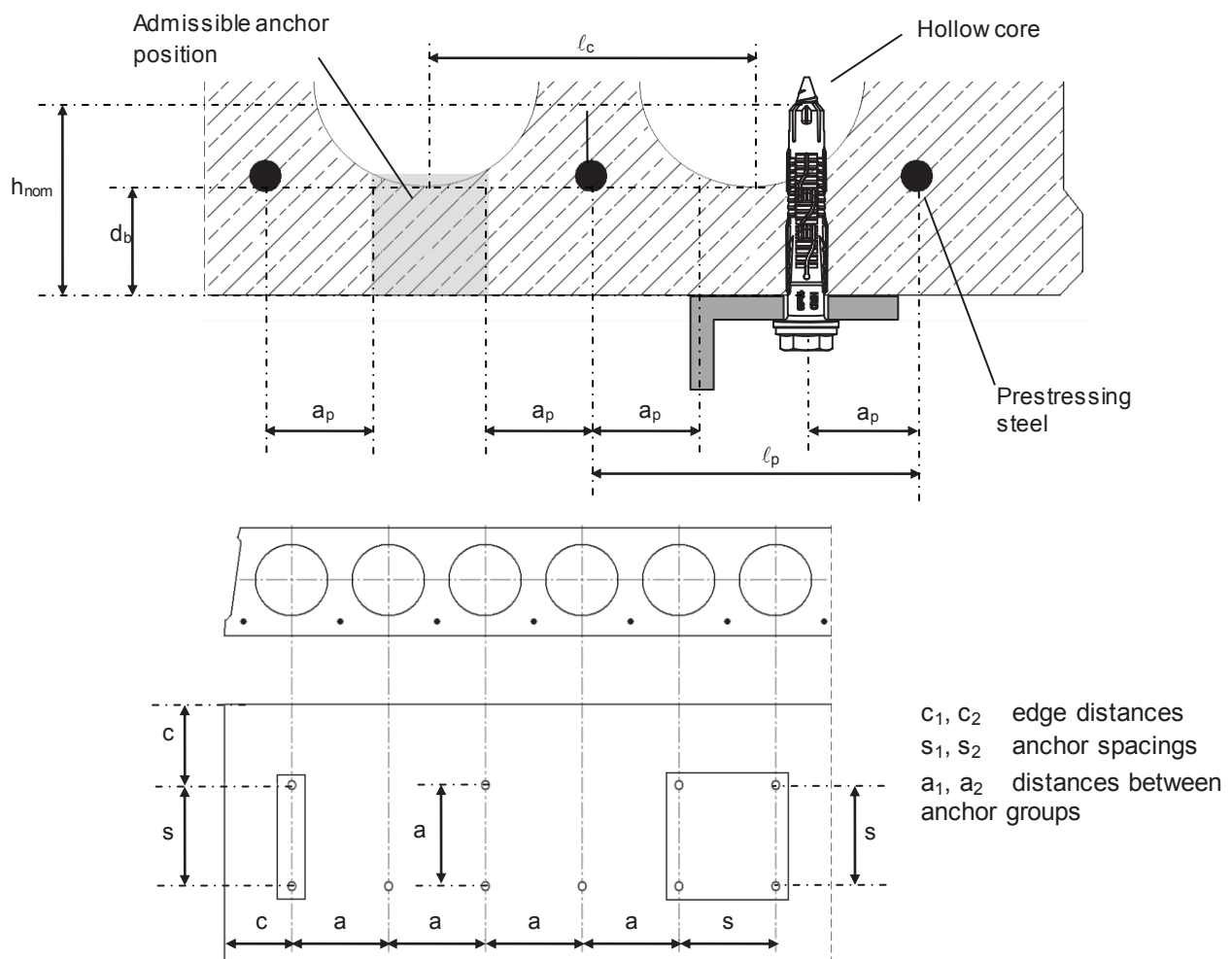


- a) For spacing larger than the critical spacing each anchor in a group can be considered in design.
b) For edge distance smaller than critical edge distance the design loads have to be reduced.
c) Linear interpolation allowed
d) only for brick "Doppio Uni" and "Mattone"

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 plastic 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



Design method

Design method according ETAG 020, Annex C. Design resistance according data given in ETA-07/0219, issue 2012-09-18.

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

The design method is based on the following simplifications:

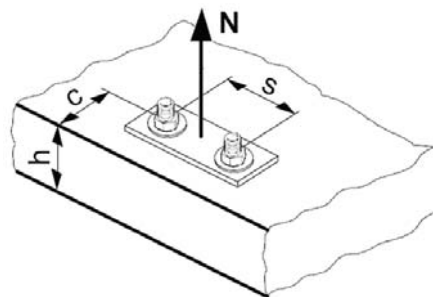
- Minimum base material thickness h_{min}
- All data for concrete C16/20 – C50/60
- No different loads are acting on individual anchors (no eccentricity)
- Shear without lever arm

The values are valid for a single anchor or a anchor group with spacing $< s_{cr,N}$ (for anchor groups with spacing $\geq s_{cr,N}$ 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	
		$h_{nom} = 50mm$	$h_{nom} = 50mm$	$h_{nom} \geq 70mm$
$N_{Rd,s}$	Carbon steel [kN]	7,3	11,7	11,7
	Stainless steel [kN]	6,8	11,6	11,6

Design pull-out resistance $N_{Rd,p}$

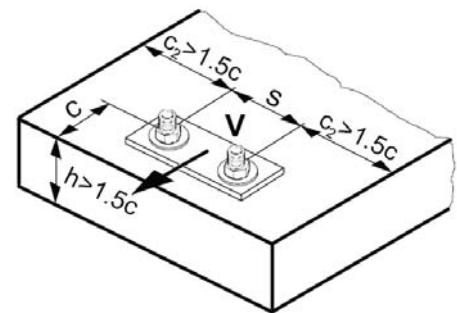
Design concrete cone $N_{Rd,c} = N_{Rd,p} \cdot (c/c_{cr,N})$

Anchor size		HRD 8	HRD 10	
		$h_{nom} = 50mm$	$h_{nom} = 50mm$	$h_{nom} \geq 70mm$
$N_{Rd,p}$	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: $V_{Rd,c} = V_{Rd,c}^0 \cdot f_B \cdot f_c$



Basic design shear resistance

Design steel resistance $V_{Rd,s}$

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

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

Anchor type		HRD 8	HRD 10	
		$h_{nom} = 50mm$	$h_{nom} = 50mm$	$h_{nom} \geq 70mm$
$V_{Rd,c}^0$	[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
$f_c =$	h = 100 mm	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.