Deutsches Institut für Bautechnik

Public-law institution jointly founded by the federal states and the Federation

European Technical Assessment Body for construction products

Member of EOTA
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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-23/0936 of 13 May 2025

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 Betonschraube HUS4
Product family to which the construction product belongs	Screw anchor for use in masonry
Manufacturer	Hilti AG Liechtenstein Feldkircherstraße 100 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Werke
This European Technical Assessment contains	33 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	EAD 330460-00-0604, edition 08/2022

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Specific Part

1 Technical description of the product

The Hilti screw anchor HUS4 is an anchor in size 8, and 10 mm made of galvanized or multilayer coating carbon steel. The anchor is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterized by mechanical interlock in the special thread.

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)

Essential characteristic	Performance
Characteristic resistance to steel failure of a single screw anchor under tension loading	$N_{Rk,s}$ see Annex C1
Characteristic resistance to steel failure of a single screw anchor under shear loading	$V_{Rk,s}$ [kN], $M^0_{Rk,s}$ see Annex C1
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading	$N_{Rk,p}$, $N_{Rk,b}$, $N_{Rk,p,c}$, $N_{Rk,b,c}$ see Annex B7, C3, C7, C11, C15 $\alpha_{j,N}$ see Annex C3, C7, C11, C15
Characteristic resistance to local brick failure and brick edge failure of a single screw anchor under shear loading	$V_{Rk,b,II}$, $V_{Rk,b,\perp}$, $V_{Rk,c,II}$, $V_{Rk,c,\perp}$ see Annex B7, C3, C7, C11, C15 $\alpha_{j,VII}$, $\alpha_{j,V\perp}$ see Annex C3, C7, C11, C15
Characteristic resistance to brick breakout failure of a screw anchor group under tension loading	N^g_{Rk} see Annex B7 $\alpha_{g,N}$ see Annex B7, C4, C8, C12, C16
Characteristic resistance to local brick failure and brick edge failure of a screw anchor group under shear loading	$V^g_{Rk,b,II}$, $V^g_{Rk,b,\perp}$, $V^g_{Rk,c,II}$, $V^g_{Rk,c,\perp}$ see Annex B7 $\alpha_{g,VII}$, $\alpha_{g,VII\perp}$ see Annex B7, C4, C8, C12, C16

Essential characteristic	Performance
Edge distances, joint distances, spacing, member thickness	c_{cr}, s_{crII}, $s_{cr\perp}$ see Annex B7, C2, C6, C10, C14 c_{min}, c_{jII}, $c_{j\perp}$, s_{minII}, $s_{min\perp}$ see Annex C2, C6, C10, C14 h_{min} see Annex C2, C6, C10, C14
Resistance to combined tension and shear loading (hollow and perforated bricks)	No performance assessed
Displacements	δ_{N0}, $\delta_{N\infty}$, δ_{V0}, $\delta_{V\infty}$ see Annex C4, C8, C12, C 16

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A 1
Resistance to fire	$N_{Rk,s,fi}$, $N_{Rk,p,fi}$, $N_{Rk,b,fi}$, $V_{Rk,s,fi}$, $M^0_{Rk,s,fi}$, $c_{min,fi}$, $c_{j,fi}$ see Annex C1, C5, C9, C13, C17 $N^g_{Rk,fi}$, $s_{min,fi}$, $c_{min,fi}$, $c_{j,fi}$ see Annex C1, C5, C9, C13, C17

3.3 Aspects of durability

Essential characteristic	Performance
Durability	see Annex B1

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

In accordance with the European Assessment Document EAD 330460-00-0604 the applicable European legal act is: 97/177/EC.

The system to be applied is: 1

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

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

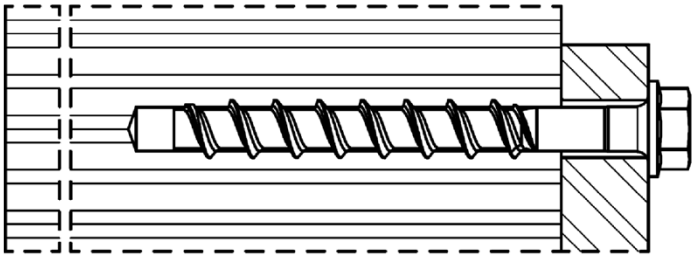
Issued in Berlin on 13 May 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

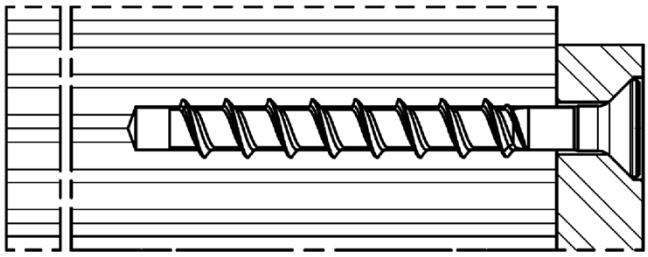
beglaubigt:
Aksünger

Deutsches Institut für Bautechnik DIBt

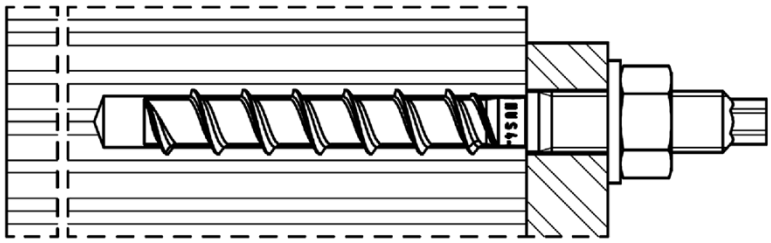
Installed condition without adjustment



HUS4-H (hexagon head configuration sizes 8 and 10)
HUS4-HF (hexagon head configuration sizes 8 and 10)

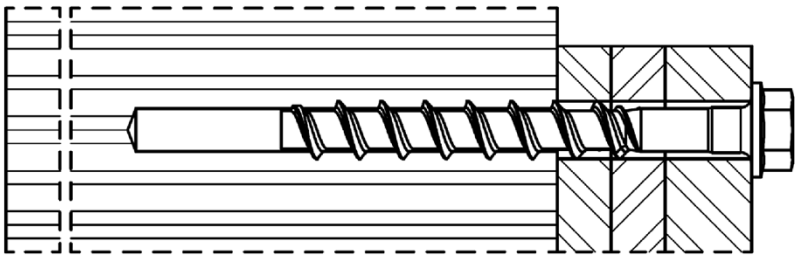


HUS4-C (countersunk head configuration sizes 8 and 10)

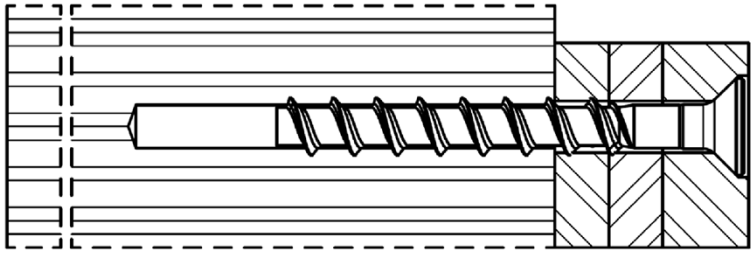


HUS4-A
(threaded rod connection size 10)
HUS4-AF
(threaded rod connection size 10)

Installed condition with adjustment



HUS4-H (hexagon head configuration sizes 8 and 10)
HUS4-HF (hexagon head configuration sizes 8 and 10)



HUS4-C (countersunk head configuration sizes 8 and 10)

Hilti screw anchor HUS4	**Annex A1**
Product description Installed condition with and without adjustment	

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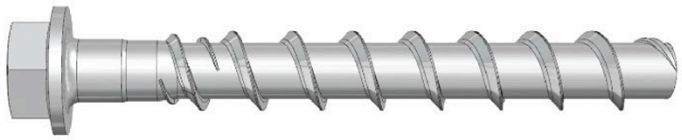
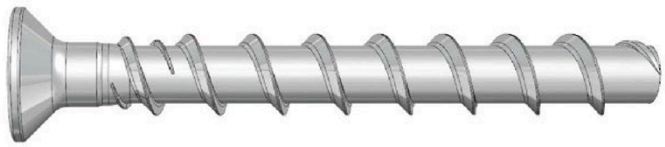
Table A1: Screw types

Hilti HUS4-H, sizes 8 and 10, hexagonal head configuration, carbon steel galvanized **Hilti HUS4-HF**, sizes 8 and 10, hexagonal head configuration, carbon steel multilayer coating

Hilti HUS4-C, sizes 8 and 10, countersunk head configuration, carbon steel galvanized

Hilti HUS4-A, size 10 with external thread M12, carbon steel galvanized **Hilti HUS4-AF,** size 10 with external thread M12, carbon steel multilayer coating


Hilti screw anchor HUS4	**Annex A2**
Product description HUS4 screw types	

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Table A2: Hilti filling set (for HUS4-H (F, R) and HUS4-A (F)) and Hilti injection mortar

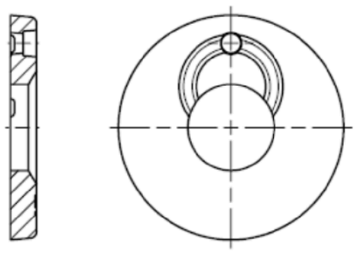
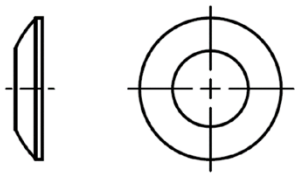
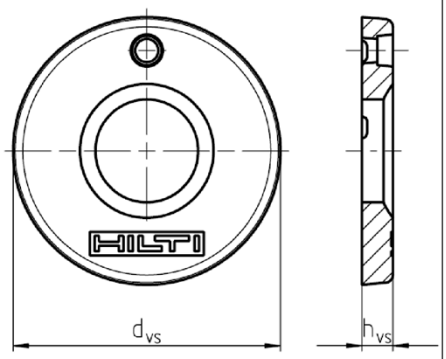
Filling washer	Spherical washer	Injection mortar
		 Hilti HIT-HY … with ETA Hilti HIT-RE … with ETA

Table A3: Materials

Part	Material
HUS4-H(F), HUS4-C and HUS4-A(F) screw anchor	Carbon steel Rupture elongation $A_5 \leq 8\%$
Hilti Filling set (carbon steel)	Filling washer: Carbon steel Spherical washer: Carbon steel

Table A4: Filling set dimensions and compatibility

Filling set size		M10	M12
Diameter of sealing washer	d_{vs} [mm]	42	44
Thickness of sealing washer	h_{vs} [mm]	5	5
Thickness of Hilti Filling Set	h_{fs} [mm]	9	10
HUS4-H (F) 		8	10
HUS4-A (F) 		-	10



Hilti screw anchor HUS4	**Annex A3**
Product description Filling set and Hilti injection mortar, Materials	

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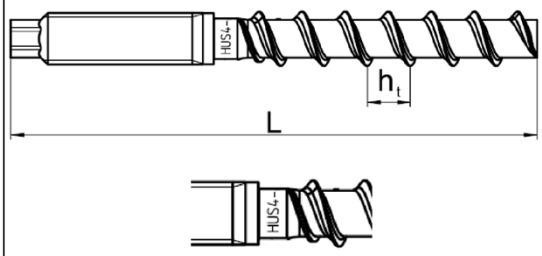
Table A5: Fastener dimensions and marking HUS4-A(F)

Fastener size HUS4-			**A(F) 10**
Nominal fastener diameter	d	[mm]	10
Metric thread connection			M12
Pitch of the thread	h_t	[mm]	10
Nominal embedment depth	h_{nom}	[mm]	75
Length of screw min / max	L	[mm]	120 / 165



E.g. HUS4-A 10x165

8K

HUS4:	Hilti Universal Screw 4th generation
A: **AF**:	Thread connection, galvanized Thread connection, multilayer coating
10:	Nominal screw diameter d [mm]
165:	Length of screw L [mm]
8:	Carbon steel
K:	Length identification HUS4-A 10x165

G	**I**	**K**
10x120	10x140	10x165

Hilti screw anchor HUS4

Production description
Fastener dimensions and head marking

Annex A4

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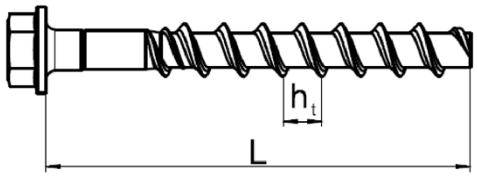
Table A6: Fastener dimensions and marking HUS4-H(F)

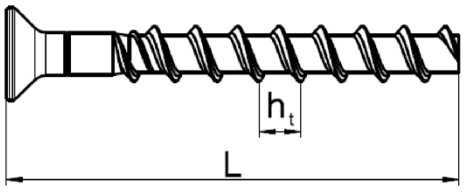
Fastener size HUS4-			**H(F) 8**	**H(F) 10**
Nominal fastener diameter	d	[mm]	8	10
Pitch of the thread	h_t	[mm]	8	10
Nominal embedment depth	h_{nom}	[mm]	60	75
Length of screw min / max	L	[mm]	65 / 150	80 / 305



HUS4:	Hilti Universal Screw 4th generation
H: **HF**:	Hexagonal head, galvanized Hexagonal head, multilayer coating
10:	Nominal screw diameter d [mm]
100:	Length of screw [mm]

Table A7: Fastener dimensions and marking HUS4-C

Fastener size HUS4-			**C 8**	**C 10**
Nominal fastener diameter	d	[mm]	8	10
Pitch of the thread	h_t	[mm]	8	10
Nominal embedment depth	h_{nom}	[mm]	60	75
Length of screw min / max	L	[mm]	65 / 160	80 / 120



HUS4:	Hilti Universal Screw 4th generation
C:	Countersunk head, galvanized
10:	Nominal screw diameter d [mm]
100:	Length of screw L [mm]

Hilti screw anchor HUS4	**Annex A5**
Production description Fastener dimensions and head marking	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loadings
- Fire exposure (for dry masonry only)

Base materials:

- Solid brick masonry, according to Annex B2
- Horizontal joints must completely be filled with mortar. Vertical Joints may, but do not have to be filled with mortar. Mortar strength class of the masonry: M2,5 at minimum according EN 998-2:2016.
- In case of fire all joints have to be filled with mortar according to EN 998-2:2016 with strength class M2.5 at minimum.
- Maximum joint width w_j see annex C3, C7, C11, C15.
- Wall execution and joint dimensions according to EN 1996-1-1:2022.
- Dry or wet masonry (during installation)

Use conditions (Environmental conditions):

- Anchorages subject to dry internal conditions: all screw types
- The covered temperature range of the masonry during the working life is within the range -40 °C to +80 °C

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and masonry.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the fastener is indicated on the design drawings (e. g. position of the fastener relative to reinforcement or to supports, etc.).
- Anchorages are designed in accordance with EOTA Technical Report TR054: Juli 2022
- For solid bricks the characteristic resistances are valid also for bricks with larger dimensions, larger compressive strength or larger bulk density.

Installation:

- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on site.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of the load application.
- After installation further turning of the fastener must not be possible.
- The head of the fastener (HUS4-H(F) and HUS4-C) must be supported on the fixture and is not damaged.
- Hilti filling set is suitable for HUS4-H(F) and HUS4-A(F).
- The minimum permitted distance from the joints is specified in the annexes C3, C6, C9 and C12.
- Drilling method: hammer drill or rotatory drilling with standard hammer drill bits with cleaned and uncleaned borehole. In case of uncleaned borehole, three times ventilation shall be applied.
- Adjustability according to annex B2.

Hilti screw anchor HUS4	**Annex B1**
Intended use Specifications	

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Table B1: Overview of brick types, properties and fastening elements

Brick type	Picture	Minimum Brick size[1] [mm]	Trade names[1], e.g.	Mean compressive strength f_{mean}[1] [N/mm²]	HUS4-H(F), C, HF 8	HUS4-A, H(F), C 10	Annex
Solid clay brick EN 771-1		≥ 240x115x52	Mz 1DF Mz NF Mz 2DF Rosso Vivo, Rosso Classico	18 / 27	h_{nom} = 60	h_{nom} = 75	C2
Solid calcium silicate brick EN 771-2		≥ 240x115x113	KS 2DF, KS 8DF	20 / 30	h_{nom} = 60	h_{nom} = 75	C6
Solid lightweigh t concrete EN 771-3		≥ 498x150x199	LECA murblock	5 / 7,5	h_{nom} = 60	h_{nom} = 75	C10
Areated concrete EN 771-4		≥ 499x240x249	Xella Ytong Therm-Combi	4 / 6	h_{nom} = 60	h_{nom}= 75	C14

[1] The characteristic resistances are valid also for bricks with larger dimensions, larger compressive strength or larger bulk density

Table B2: Specifications for the adjustment of HUS4 in Masonry

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Adjustment				
Total max. thickness of adjustment layers	t_{adj}	[mm]	10	10
Max. number of adjustments	n_a	[-]	2	2

Hilti screw anchor HUS4	**Annex B2**
Intended use Overview of brick types and fastening elements	

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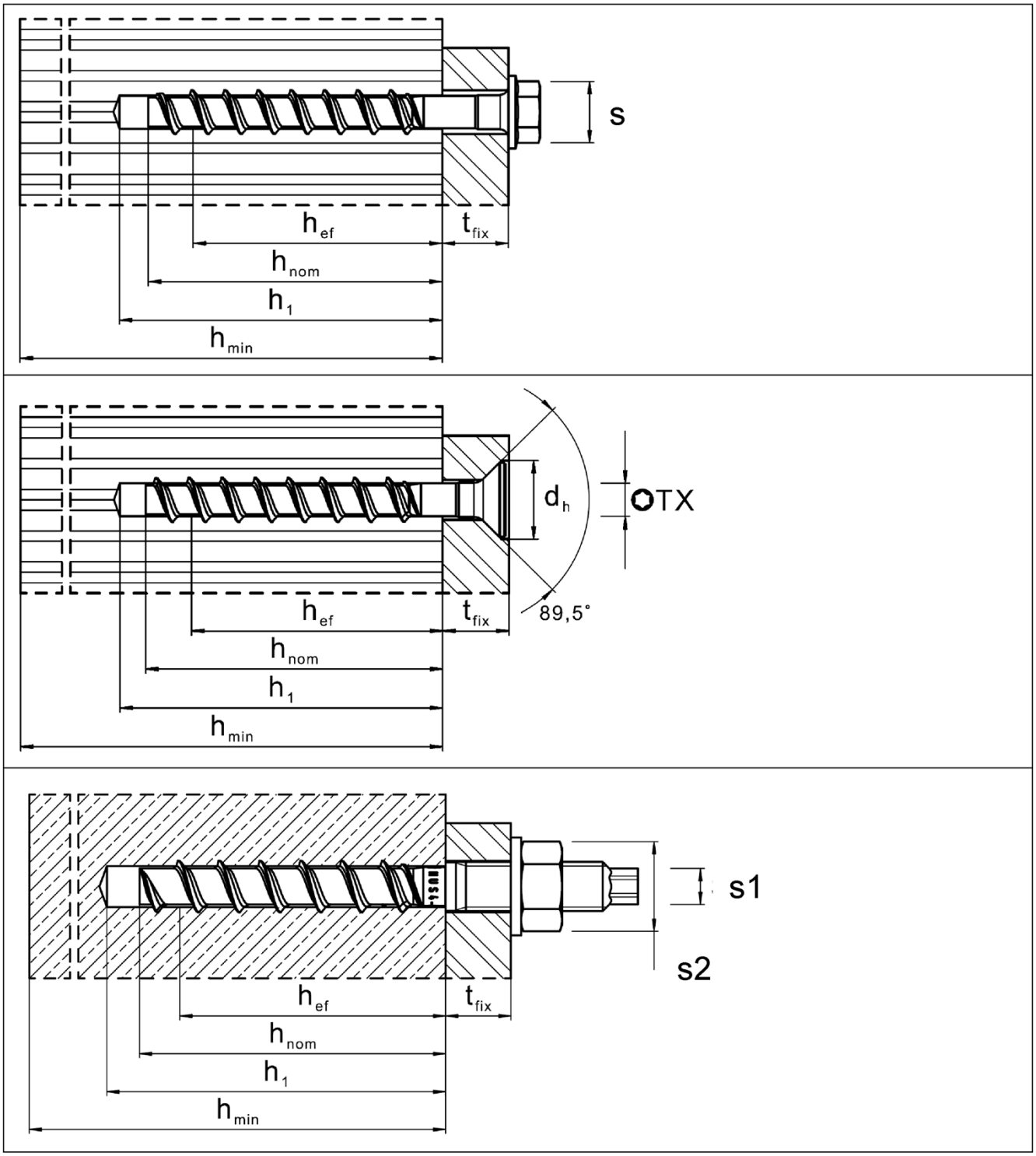
Installation parameters



Hilti screw anchor HUS4	
Intended use Installation parameters	**Annex B3**

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Table B3: Installation parameters HUS4 size 8 and 10

Fastener size HUS4			**8**	**10**
Type			**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Nominal drill hole diameter	d_0	[mm]	8	10
Cutting diameter of drill bit	$d_{cut} \leq$	[mm]	8,45	10,45
Clearance hole diameter through setting	d_f min	[mm]	11	13
	d_f max		12	14
Clearance hole diameter pre setting (A-type)	$d_f \leq$	[mm]	-	14
Wrench size (H, HF-type)	s	[mm]	13	15
Wrench size for hex head (A-type)	s1	[mm]	-	8
Wrench size for nut (A-type)	s2	[mm]	-	19
Torx size (C-type)	TX	-	45	50
Diameter of countersunk head	d_h	[mm]	18	21
Depth of drill hole for cleaned hole hammer drilling or for uncleaned hole when drilling upwards	$h_1 \geq$	[mm]	(h_{nom} + 10 mm)	
			70	85
Depth of drill hole for uncleaned hole hammer drilling in wall and floor position	$h_1 \geq$	[mm]	(h_{nom} + 10 mm) + 2 * d_0	
			86	105
Depth of drill hole (with adjustability) for cleaned hole hammer drilling, hammer drilling uncleaned hole when drilling upwards	$h_1 \geq$	[mm]	(h_{nom} + 20 mm)	
			80	95
Depth of drill hole (with adjustability) for uncleaned hole hammer drilling in wall and floor position	$h_1 \geq$	[mm]	(h_{nom} + 20 mm) + 2 * d_0	
			96	115
Minimum spacing	$s_{min} \geq$	[mm]	80	80

Hilti screw anchor HUS4	**Annex B4**
Intended use Installation parameters	

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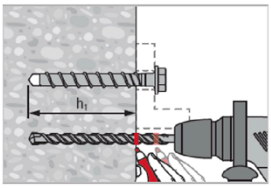
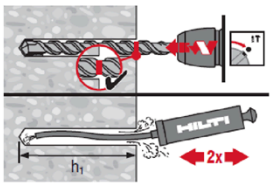
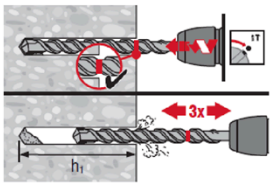
Installation instructions

Hole drilling and cleaning	
Hammer drilling (HD) all sizes for carbon steel screw types	
	Mark drilling depth h_1 for pre or through installation. Details for drilling depth h_1 see table B2.
	Cleaning needed in downward and horizontal installation direction with drill hole depth $h_1 = h_{nom} + 10$ mm
	No cleaning is allowed in downward and horizontal installation direction when 3x ventilation[1)] after drilling is executed. Drill hole depth $h_1 = h_{nom} + 10$ mm$+ 2 * d_0$ [1)] moving the drill bit in and out of the drill hole 3 times after the recommended drilling depth h_1 is achieved. This procedure shall be done with both revolution and hammer functions activated in the drilling machine. For more details read the relevant installation instruction (MPII).

Hilti screw anchor HUS4	**Annex B5**
Intended use Installation instructions	

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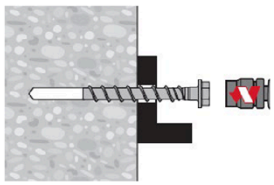
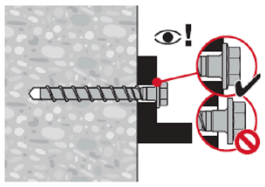
Fastener setting without adjustment

Setting by screw driver or impact screw driver



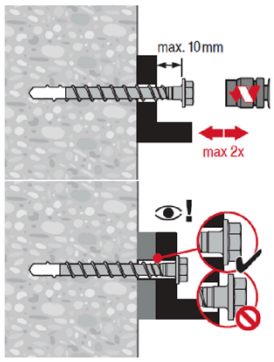
Installation of the screw with tools and setting parameters listed in Table B2.

Setting check



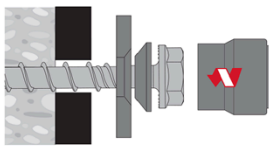
Fastener setting with adjustment for carbon steel screw types

Adjusting process

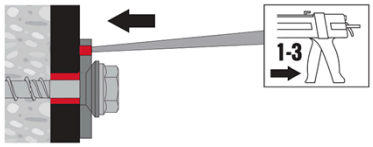


A screw can be adjusted maximum two times. The total allowed thickness of shims added during the adjustment process is 10 mm. The final embedment depth after adjustment process must be larger or equal than h_{nom}.

Fastener setting with Hilti filling set



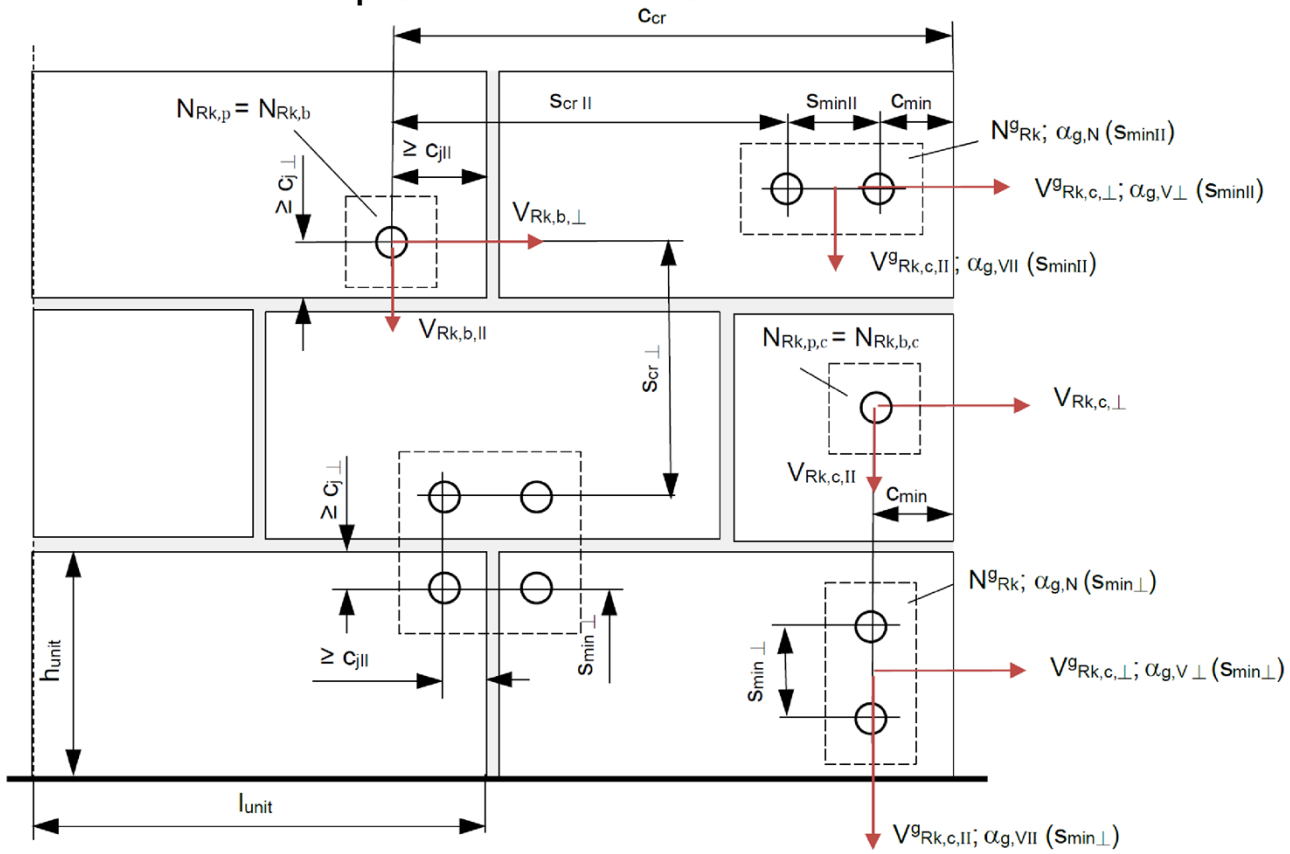
Injection of Hilti HIT mortar and curing time



Fill the annular gap between screw and fixture with 1-3 strokes of a Hilti injection mortar HIT-HY … or HIT-RE … .
Follow the installation instructions supplied with the respective Hilti injection mortar.
After required curing time t_{cure} the fastening can be loaded.

Hilti screw anchor HUS4	**Annex B6**
Intended use Installation instructions	

Definition of installation position and distances



c_{min} = minimum edge distance to the free edge of the wall
$c_{j\parallel}$ = distance to vertical joints without influence on resistance of the screw anchor
$c_{j\perp}$ = distance to horizontal joints without influence on resistance of the screw anchor
c_{cr} = edge distance for ensuring the transmission of the characteristic resistance of a single screw anchor
$s_{min\parallel}$ = minimum spacing parallel to the horizontal joint
$s_{min\perp}$ = minimum spacing perpendicular to the horizontal joint
$s_{cr\parallel}$ = characteristic spacing parallel to the horizontal joint
$s_{cr\perp}$ = characteristic spacing perpendicular to the horizontal joint
l_{unit} = length of the masonry unit
h_{unit} = height of the masonry unit
w_j = maximum width of joints
$\alpha_{g,N}$ = group factor under tension load ($\alpha_{g,N} = \alpha_{g,N}(s_{min\parallel}) = \alpha_{g,N}(s_{min\perp})$)
$\alpha_{g,V\parallel}$ = group factor under shear load parallel to the edge
$\alpha_{g,V\perp}$ = group factor under shear load perpendicular to the edge

$N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$
$V_{Rk,\parallel} = V_{Rk,b,\parallel} = V_{Rk,c,\parallel}$; $V_{Rk,\perp} = V_{Rk,b,\perp} = V_{Rk,c,\perp}$
For $s \geq s_{cr}$: $\alpha_{g,N} = \alpha_{g,V,\parallel} = \alpha_{g,V,\perp} = 2$
For $s_{min} \leq s \leq s_{cr}$: $\alpha_{g,N}$; $\alpha_{g,V,\parallel}$; $\alpha_{g,V,\perp}$ according to group factors of brick in Annex C
$N^g_{Rk} = \alpha_{g,N} * N_{Rk}$ (group of 2 anchors)
$V^g_{Rk,\parallel(sminII)} = \alpha_{g,V\parallel(sminII)} * V_{Rk,\parallel}$; $V^g_{Rk,\parallel(smin\perp)} = \alpha_{g,V\parallel(smin\perp)} * V_{Rk,\parallel}$ (group of 2 anchors)
$V^g_{Rk\perp,(sminII)} = \alpha_{g,V\perp(sminII)} * V_{Rk,\perp}$; $V^g_{Rk,\perp(smin\perp)} = \alpha_{g,V\perp(smin\perp)} * V_{Rk,\perp}$ (group of 2 anchors)
$N^g_{Rk} = \alpha_{g,N}{}^2 * N_{Rk}$ (group of 4 anchors)
$V^g_{Rk,\parallel} = \alpha_{g,V\parallel(sminII)} * \alpha_{g,V\parallel(smin\perp)} * V_{Rk,\parallel}$; $V^g_{Rk,\perp} = \alpha_{g,V\perp(sminII)} * \alpha_{g,V\perp(smin\perp)} * V_{Rk,\perp}$ (group of 4 anchors)

Hilti screw anchor HUS4	**Annex B7**
Intended use Definition of installation position and distances	

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Table C1: Characteristic resistance to steel failure of a single screw anchor under tension and shear loading

Fastener size HUS4 / **Type**			**8** / **H(F), C**	**10** / **H(F), C, A(F)**
Steel failure for tension load				
Characteristic resistance	$N_{Rk,s}$	[kN]	36,0	55,0
Partial factor	$\gamma_{Ms,N}$ [1)]	[-]	1,5	1,5
Steel failure for shear load				
Characteristic resistance	$V_{Rk,s}$	[kN]	18,8	28,8
Partial factor	$\gamma_{Ms,V}$ [1)]	[-]	1,25	
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	32	64

[1)] In absence of other national regulations

Table C2: Resistance to fire

Fastener size HUS4 / **Type**				**8** / **H(F), C**	**10** / **H(F), C, A(F)**
Nominal embedment depth		h_{nom}	[mm]	60	75
Steel failure for tension and shear load under fire exposure					
Characteristic resistance	R30	$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	0,47	1,03
	R60	$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	0,42	0,89
	R90	$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	0,33	0,68
	R120	$N_{Rk,s,fi} = V_{Rk,s,fi}$	[kN]	0,23	0,55
	R30	$M^0_{Rk,s,fi}$	[Nm]	0,42	1,20
	R60	$M^0_{Rk,s,fi}$	[Nm]	0,37	1,04
	R90	$M^0_{Rk,s,fi}$	[Nm]	0,29	0,80
	R120	$M^0_{Rk,s,fi}$	[Nm]	0,21	0,64

Hilti screw anchor HUS4

Performances
Essential characteristics under static and quasi-static load and fire exposure

Annex C1

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Brick type: Solid clay brick

Table C3: Description of brick

Brick type	[-]	Solid	
Bulk density	ρ [kg/dm³]	1,5	
Mean compressive strength	f_{mean} [N/mm²]	≥ 18	
Code	[-]	EN 771-1:2011	
Brick dimensions	l x b x h [mm]	≥ 240 x 115 x 52	
Minimum wall thickness	h_{min} [mm]	≥ 115	

Table C4: Installation parameters

Fastener size HUS4 **Type**				**8** **H(F), C**	**10** **H(F), C, A(F)**
Setting parameters					
Nominal embedment depth		h_{nom}	[mm]	60	75
Setting tool: screwdriver and power limitation			[-]	Must not be used	
Setting tool: impact screw wrench[1)]	Type and power limitation		[-]	SIW 4AT-22 Gear 1	SIW 4AT-22 Gear 1
	Maximum torque according manufacturer specification		[Nm]	90	90
Edge distance and spacing					
Minimum edge distance from free edge		c_{min}	[mm]	1,5 h_{nom}	
Minimum spacing		$s_{min\parallel} = s_{min\perp}$	[mm]	80	
Characteristic distance from free edge		c_{cr}	[mm]	1,5 h_{nom}	
Characteristic spacing		s_{cr}	[mm]	3,0 h_{nom}	

[1)] Installation with other impact screwdriver of equivalent or lower power output is possible.

Hilti screw anchor HUS4	**Annex C2**
Performances Essential characteristics under static and quasi-static load in solid clay bricks	

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Table C5: Characteristic resistance under tension and shear load

Fastener size HUS4			**8**		**10**	
Type			**H(F), C**		**H(F), C, A(F)**	
Use category			dry	wet	dry	wet
Nominal embedment depth	h_{nom}	[mm]	60		75	
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading						
Mean compressive brick strength f_{mean} [MPa]			$N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ [kN]			
≥ 18			5,5		7,0	
≥ 27			6,7		8,5	
Characteristic resistance to local brick breakout failure of a screw anchor under shear loading						
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\parallel} = V_{Rk,b,\parallel} = V_{Rk,c,\parallel}$ [kN]			
≥ 18			7,9		11,4	
≥ 27			9,7		14,0	
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\perp} = V_{Rk,b,\perp} = V_{Rk,c,\perp}$ [kN]			
≥ 18			4,4		4,4	
≥ 27			5,3		5,3	

Table C6: Reduction factors depending on the distance from the joints

Fastener size HUS4			**8**	**10**
Type			**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Maximum joint width	w_j	[mm]	≤ 10	≤ 10
Distance from the joints	$c_{j\perp}$	[mm]	≥ 26	≥ 26
	$c_{j\parallel}$		≥ 1,5 h_{nom}	≥ 1,5 h_{nom}
Joint factor	$\alpha_{j,N}$	[-]	1,0	1,0
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	≥ 20	≥ 20
	$c_{j\parallel}$		≥ 20	≥ 20
Joint factor	$\alpha_{j,N}$	[-]	0,88	0,83
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	< 20	< 20
	$c_{j\parallel}$		< 20	< 20
Joint factor	$\alpha_{j,N}$	[-]	Screw must not be used	
	$\alpha_{j,V\parallel} = \alpha_{j,V\perp}$			

Hilti screw anchor HUS4	**Annex C3**
Performances Essential characteristics under static and quasi-static load in solid clay bricks	

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Table C7: Group factors for double groups

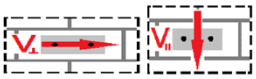
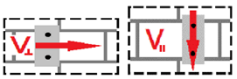
Fastener size HUS4 **Type**			**Use case**	**8** **H(F), C**	**10** **H(F), C, A(F)**
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	-	80	80
Group factor for tension	$\alpha_{g,N}(s_{min\parallel}) = \alpha_{g,N}(s_{min\perp})$	[-]		1,70	1,25
Group factor for shear with minimum spacing in direction parallel to the horizontal joint	$\alpha_{g,V\perp}(s_{min\parallel}) = \alpha_{g,V\parallel}(s_{min\parallel})$	[-]		2,00	2,00
Group factor for shear with minimum spacing in direction perpendicular to the horizontal joint	$\alpha_{g,V\perp}(s_{min\perp}) = \alpha_{g,V\parallel}(s_{min\perp})$	[-]		1,70	1,70

Table C8: Displacements

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Tension load	F_N	[kN]	1,9	2,4
Displacements under tension load	δ_{N0}	[mm]	1,3	0,9
	$\delta_{N\infty}$		2,6	1,8
Shear load parallel to the vertical joint	$F_{V\parallel}$	[kN]	2,8	4,0
Displacements under shear load[1)]	$\delta_{V\parallel 0}$	[mm]	1,7	2,3
	$\delta_{V\parallel\infty}$		2,6	3,5
Shear load perpendicular to the vertical joint	$F_{V\perp}$	[kN]	1,5	1,5
Displacements under shear load[1)]	$\delta_{V\perp 0}$	[mm]	1,2	1,2
	$\delta_{V\perp\infty}$		1,8	1,8

[1)] Shear displacements do not consider the fixture hole clearance and the respective screw position. Clearance hole displacements can be avoided with the use of the Hilti filling set.

Hilti screw anchor HUS4	**Annex C4**
Performances Essential characteristics under static and quasi-static load in solid clay bricks	

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Table C9: Resistance to fire

Fastener size HUS4					**8**	**10**
Type					**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth		h_{nom}		[mm]	60	75
Characteristic resistance to pullout and brick breakout failure $N_{Rk,fi} = N_{Rk,p,fi} = N_{Rk,b,fi}$ of a single anchor						
Mean compressive brick strength $f_{mean} \geq 18$ MPa	R30, R60, R90	$N_{Rk,fi}$		[kN]	0,9	1,2
	R120	$N_{Rk,fi}$		[kN]	0,7	0,9
Mean compressive brick strength $f_{mean} \geq 27$ MPa	R30, R60, R90	$N_{Rk,fi}$		[kN]	1,1	1,4
	R120	$N_{Rk,fi}$		[kN]	0,9	1,1
Characteristic resistance to brick breakout failure $N^{g}_{Rk,b,fi}$ for double screw anchor groups						
Mean compressive brick strength $f_{mean} \geq 18$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$		[kN]	2,0	2,3
	R120	$N^{g}_{Rk,b,fi}$		[kN]	1,6	1,8
Mean compressive brick strength $f_{mean} \geq 27$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$		[kN]	2,4	2,7
	R120	$N^{g}_{Rk,b,fi}$		[kN]	1,9	2,2
Edge distance and spacing						
Minimum edge distance		$c_{min,fi} = c_{j,fi}$		[mm]	120	150
Minimum spacing		$s_{min,fi}$		[mm]	106	106

Hilti screw anchor HUS4	**Annex C5**
Performances Essential characteristics under fire exposure in solid clay bricks	

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Brick type: Solid calcium silicate brick

Table C10: Description of brick

Brick type		[-]	Solid
Bulk density	ρ	[kg/dm³]	≥ 1,7
Mean compressive strength	f_{mean}	[N/mm²]	≥ 20
Code		[-]	EN 771-2:2011
Brick dimensions	l x b x h	[mm]	≥ 240 x 115 x 113
Minimum wall thickness	h_{min}	[mm]	≥ 115

Table C11: Installation parameters

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Setting parameters				
Nominal embedment depth	h_{nom}	[mm]	60	75
Setting tool: screwdriver and power limitation		[-]	Must not be used	
Setting tool: impact screw wrench[1)]	Type and power limitation	[-]	SIW 4AT-22 Gear 1	SIW 4AT-22 Gear 1
	Maximum torque according manufacturer specification	[Nm]	90	90
Edge distance and spacing				
Minimum edge distance from free edge	c_{min}	[mm]	1,5 h_{nom}	
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	80	
Characteristic distance from free edge	c_{cr}	[mm]	1,5 h_{nom}	
Characteristic spacing	s_{cr}	[mm]	3,0 h_{nom}	

[1)] Installation with other impact screwdriver of equivalent or lower power output is possible.

Hilti screw anchor HUS4	**Annex C6**
Performances Essential characteristics under static and quasi-static load in solid calcium silicate bricks	

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Table C12: Characteristic resistance under tension and shear load

Fastener size HUS4 / **Type**			**8** **H(F), C**		**10** **H(F), C, A(F)**	
Use category			dry	wet	dry	wet
Nominal embedment depth	h_{nom}	[mm]	60		75	
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading						
Mean compressive brick strength f_{mean} [MPa]			$N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ [kN]			
≥ 20			9,4		9,9	9,4
≥ 30			11,3		12,0	11,3
Characteristic resistance to local brick breakout failure of a screw anchor under shear loading						
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\parallel} = V_{Rk,b,\parallel} = V_{Rk,c,\parallel}$ [kN]			
≥ 20			13,6		15,6	
≥ 30			16,4		18,8	
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\perp} = V_{Rk,b,\perp} = V_{Rk,c,\perp}$ [kN]			
≥ 20			3,5		3,5	
≥ 30			4,3		4,3	

Table C13: Reduction factors depending on the distance from the joints

Fastener size HUS4 / **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Maximum joint width	w_j	[mm]	≤ 10	≤ 10
Distance from the joints	$c_{j\perp}$	[mm]	≥ 41,5	≥ 41,5
	$c_{j\parallel}$		≥ 1,5 h_{mon}	≥ 1,5 h_{mon}
Joint factor	$\alpha_{j,N}$	[-]	1,0	1,0
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	≥ 20	≥ 20
	$c_{j\parallel}$		≥ 40	≥ 40
Joint factor	$\alpha_{j,N}$	[-]	0,78	0,87
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	< 20	< 20
	$c_{j\parallel}$		< 40	< 40
Joint factor	$\alpha_{j,N}$	[-]	Screw must not be used	
	$\alpha_{j,V\parallel}$			
	$\alpha_{j,V\perp}$			

Hilti screw anchor HUS4	**Annex C7**
Performances Essential characteristics under static and quasi-static load in solid calcium silicate bricks	

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Table C14: Group factors for double groups

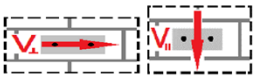
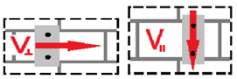
Fastener size HUS4 **Type**			**Use case**	**8** **H(F), C**	**10** **H(F), C, A(F)**
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	-	80	80
Group factor for tension	$\alpha_{g,N}(s_{min\parallel}) = \alpha_{g,N}(s_{min\perp})$	[-]		1,45	1,80
Group factor for shear with minimum spacing in direction parallel to the horizontal joint	$\alpha_{g,V\perp}(s_{min\parallel}) = \alpha_{g,V\parallel}(s_{min\parallel})$	[-]		1,70	1,70
Group factor for shear with minimum spacing in direction perpendicular to the horizontal joint	$\alpha_{g,V\perp}(s_{min\perp}) = \alpha_{g,V\parallel}(s_{min\perp})$	[-]		1,45	1,45

Table C15: Displacements

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Tension load	F_N	[kN]	3,2	3,4
Displacements under tension load	δ_{N0}	[mm]	0,4	0,4
	$\delta_{N\infty}$		0,8	0,8
Shear load parallel to the vertical joint	$F_{V\parallel}$	[kN]	4,7	5,4
Displacements under shear load[1)]	$\delta_{V\parallel 0}$	[mm]	1,7	1,7
	$\delta_{V\parallel\infty}$		2,6	2,6
Shear load perpendicular to the vertical joint	$F_{V\perp}$	[kN]	1,2	1,2
Displacements under shear load[1)]	$\delta_{V\perp 0}$	[mm]	0,7	0,7
	$\delta_{V\perp\infty}$		1,1	1,1

[1)] Shear displacements do not consider the fixture hole clearance and the respective screw position. Clearance hole displacements can be avoided with the use of the Hilti filling set.

Hilti screw anchor HUS4	**Annex C8**
Performances Essential characteristics under static and quasi-static load in solid calcium silicate bricks	

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Table C16: Resistance to fire

Fastener size HUS4				**8**	**10**
Type				**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth		h_{nom}	[mm]	60	75
Characteristic resistance to pullout and brick failure $N_{Rk,fi} = N_{Rk,p,fi} = N_{Rk,b,fi}$					
Mean compressive brick strength $f_{mean} \geq 20$ MPa	R30, R60, R90	$N_{Rk,fi}$	[kN]	1,6	1,7
	R120	$N_{Rk,fi}$	[kN]	1,3	1,3
Mean compressive brick strength $f_{mean} \geq 30$ MPa	R30, R60, R90	$N_{Rk,fi}$	[kN]	1,9	2,1
	R120	$N_{Rk,fi}$	[kN]	1,5	1,6
Characteristic resistance to brick breakout failure $N^{g}_{Rk,b,fi}$ for double screw anchor groups					
Mean compressive brick strength $f_{mean} \geq 20$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$	[kN]	2,8	4,6
	R120	$N^{g}_{Rk,b,fi}$	[kN]	2,2	3,7
Mean compressive brick strength $f_{mean} \geq 30$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$	[kN]	3,4	5,6
	R120	$N^{g}_{Rk,b,fi}$	[kN]	2,7	4,5
Edge distance and spacing					
Minimum edge distance		$c_{min,fi} = c_{j,fi}$	[mm]	120	150
Minimum spacing		$s_{min,fi}$	[mm]	106	106

Hilti screw anchor HUS4

Performances
Essential characteristics under fire exposure load in solid calcium silicate bricks

Annex C9

Deutsches Institut für Bautechnik DIBt

Brick type: Lightweight concrete brick

Table C17: Description of brick

Brick type		[-]	Solid
Bulk density	ρ	[kg/dm³]	≥ 0,9
Mean compressive strength	f_{mean}	[N/mm²]	≥ 5
Code		[-]	EN 771-3:2011
Brick dimensions	l x b x h	[mm]	≥ 498 x 150 x 199
Minimum wall thickness	h_{min}	[mm]	≥ 150

Table C18: Installation parameters

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Setting parameters				
Nominal embedment depth	h_{nom}	[mm]	60	75
Setting tool: screwdriver and power limitation		[-]	SF 6H-A22 Gear 2 / 10	SF 6H-A22 Gear 2 / 15
Setting tool: impact screw wrench	Type and power limitation	[-]	Must not be used	
	Maximum torque according manufacturer specification	[Nm]		
Edge distance and spacing				
Minimum edge distance from free edge	c_{min}	[mm]	1,5 h_{nom}	
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	80	
Characteristic distance from free edge	c_{cr}	[mm]	1,5 h_{nom}	
Characteristic spacing	s_{cr}	[mm]	3,0 h_{nom}	

Hilti screw anchor HUS4

Performances
Essential characteristics under static and quasi-static load in solid lightweight concrete bricks

Annex C10

Deutsches Institut für Bautechnik DIBt

Table C19: Characteristic resistance under tension and shear load

Fastener size HUS4			**8**		**10**	
Type			**H(F), C**		**H(F), C, A(F)**	
Use category			dry	wet	dry	wet
Nominal embedment depth	h_{nom}	[mm]	60		75	
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading						
Mean compressive brick strength f_{mean} [MPa]			$N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ [kN]			
≥ 5,0			2,8		3,5	
≥ 7,5			3,5		4,5	
Characteristic resistance to local brick breakout failure of a screw anchor under shear loading						
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\parallel} = V_{Rk,b,\parallel} = V_{Rk,c,\parallel}$ [kN]			
≥ 5,0			1,8		4,2	
≥ 7,5			2,1		5,2	
Mean compressive brick strength f_{mean} [MPa]			$V_{Rk,\perp} = V_{Rk,b,\perp} = V_{Rk,c,\perp}$ [kN]			
≥ 5,0			1,3		1,6	
≥ 7,5			1,6		1,9	

Table C20: Reduction factors depending on the distance from the joints

Fastener size HUS4			**8**	**10**
Type			**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Maximum joint width	w_j	[mm]	≤ 10	≤ 10
Distance from the joints	$c_{j\perp}$	[mm]	≥ 1,5 h_{nom}	≥ 99
	$c_{j\parallel}$		≥ 1,5 h_{nom}	≥ 1,5 h_{nom}
Joint factor	$\alpha_{j,N}$	[-]	1,0	1,0
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	≥ 20	≥ 20
	$c_{j\parallel}$		≥ 40	≥ 40
Joint factor	$\alpha_{j,N}$	[-]	0,76	0,59
	$\alpha_{j,V\parallel}$		1,00	0,59
	$\alpha_{j,V\perp}$		0,60	0,59
Distance from the joints	$c_{j\perp}$	[mm]	< 20	< 20
	$c_{j\parallel}$		< 40	< 40
Joint factor	$\alpha_{j,N}$	[-]	Screw must not be used	
	$\alpha_{j,V\parallel}$			
	$\alpha_{j,V\perp}$			

Hilti screw anchor HUS4

Performances
Essential characteristics under static and quasi-static load in solid lightweight concrete bricks

Annex C11

Deutsches Institut für Bautechnik DIBt

Table C21: Group factors for double groups

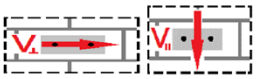
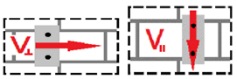
Fastener size HUS4 **Type**			**Use case**	**8** **H(F), C**	**10** **H(F), C, A(F)**
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	-	80	80
Group factor for tension	$\alpha_{g,N}(s_{min\parallel}) = \alpha_{g,N}(s_{min\perp})$	[-]		2,00	1,60
Group factor for shear with minimum spacing in direction parallel to the horizontal joint	$\alpha_{g,V\perp}(s_{min\parallel}) = \alpha_{g,V\parallel}(s_{min\parallel})$	[-]		1,60	1,60
Group factor for shear with minimum spacing in direction perpendicular to the horizontal joint	$\alpha_{g,V\perp}(s_{min\perp}) = \alpha_{g,V\parallel}(s_{min\perp})$	[-]		2,00	2,00

Table C22: Displacements

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Tension load	F_N	[kN]	0,8	1,0
Displacements under tension load	δ_{N0}	[mm]	0,05	0,10
	$\delta_{N\infty}$		0,10	0,20
Shear load parallel to the vertical joint	$F_{V\parallel}$	[kN]	0,6	1,5
Displacements under shear load[1)]	$\delta_{V\parallel 0}$	[mm]	0,50	0,70
	$\delta_{V\parallel\infty}$		0,75	1,10
Shear load perpendicular to the vertical joint	$F_{V\perp}$	[kN]	0,5	0,5
Displacements under shear load[1)]	$\delta_{V\perp 0}$	[mm]	0,70	0,60
	$\delta_{V\perp\infty}$		1,10	0,90

[1)] Shear displacements do not consider the fixture hole clearance and the respective screw position. Clearance hole displacements can be avoided with the use of the Hilti filling set.

Hilti screw anchor HUS4	**Annex C12**
Performances Essential characteristics under static and quasi-static load in solid lightweight concrete bricks	

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Table C23: Resistance to fire

Fastener size HUS4				**8**	**10**
Type				**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth		h_{nom}	[mm]	60	75
Characteristic resistance to pullout and brick failure $N_{Rk,fi} = N_{Rk,p,fi} = N_{Rk,b,fi}$					
Mean compressive brick strength $f_{mean} \geq 5$ MPa	R30, R60, R90	$N_{Rk,fi}$	[kN]	0,4	0,4
	R120	$N_{Rk,fi}$	[kN]	0,3	0,3
Mean compressive brick strength $f_{mean} \geq 7{,}5$ MPa	R30, R60, R90	$N_{Rk,fi}$	[kN]	0,4	0,6
	R120	$N_{Rk,fi}$	[kN]	0,3	0,4
Characteristic resistance to brick breakout failure $N^{g}_{Rk,b,fi}$ for double screw anchor groups					
Mean compressive brick strength $f_{mean} \geq 5$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$	[kN]	0,9	1,1
	R120	$N^{g}_{Rk,b,fi}$	[kN]	0,7	0,9
Mean compressive brick strength $f_{mean} \geq 7{,}5$ MPa	R30, R60, R90	$N^{g}_{Rk,b,fi}$	[kN]	1,1	1,4
	R120	$N^{g}_{Rk,b,fi}$	[kN]	0,9	1,1
Edge distance and spacing					
Minimum edge distance		$c_{min,fi} = c_{j,fi}$	[mm]	120	150
Minimum spacing		$s_{min,fi}$	[mm]	106	106

Hilti screw anchor HUS4

Performances
Essential characteristics under fire exposure in solid lightweight concrete bricks

Annex C13

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Brick type: Autoclaved aerated concrete

Table C24: Description of brick

Brick type		[-]	Solid
Bulk density	ρ	[kg/dm³]	≥ 0,55
Mean compressive strength	f_{mean}	[N/mm²]	≥ 4
Code		[-]	EN 771-4:2011
Brick dimensions	l x b x h	[mm]	≥ 499 x 240 x 249
Minimum wall thickness	h_{min}	[mm]	≥ 240

Table C25: Installation parameters

Fastener size HUS4 **Type**				**8** **H(F), C**	**10** **H(F), C, A(F)**
Setting parameters					
Nominal embedment depth		h_{nom}	[mm]	60	75
Setting tool: screwdriver and power limitation			[-]	SF 6H-A22 Gear 2 / 10	SF 6H-A22 Gear 2 / 15
Setting tool: impact screw wrench	Type and power limitation		[-]	Must not be used	
	Maximum torque according manufacturer specification		[Nm]		
Edge distance and spacing					
Minimum edge distance from free edge		c_{min}	[mm]	1,5 h_{nom}	
Minimum spacing		$s_{min\parallel} = s_{min\perp}$	[mm]	80	
Characteristic distance from free edge		c_{cr}	[mm]	1,5 h_{nom}	
Characteristic spacing		s_{cr}	[mm]	3,0 h_{nom}	

Hilti screw anchor HUS4

Performances
Essential characteristics under static and quasi-static load in autoclaved aerated concrete bricks

Annex C14

Deutsches Institut für Bautechnik DIBt

Table C26: Characteristic resistance under tension and shear load

Fastener size HUS4 **Type**			**8** **H(F), C**		**10** **H(F), C, A(F)**	
Use category			dry	wet	dry	wet
Nominal embedment depth	h_{nom}	[mm]	60		75	
Characteristic resistance to pull-out failure or brick breakout failure of a single screw anchor under tension loading						
Mean compressive brick strength f_{mean} [MPa] / bulk density [kg/m³]			$N_{Rk} = N_{Rk,b} = N_{Rk,p} = N_{Rk,b,c} = N_{Rk,p,c}$ [kN]			
≥ 4 / 550			0,5		0,8	
≥ 6 / 650			0,9		1,4	
Characteristic resistance to local brick breakout failure of a screw anchor under shear loading						
Mean compressive brick strength f_{mean} [MPa] / bulk density [kg/m³]			$V_{Rk,\parallel} = V_{Rk,b,\parallel} = V_{Rk,c,\parallel}$ [kN]			
≥ 4 / 550			1		1,6	
≥ 6 / 650			1,8		2,8	
Mean compressive brick strength f_{mean} [MPa] / bulk density [kg/m³]			$V_{Rk,\perp} = V_{Rk,b,\perp} = V_{Rk,c,\perp}$ [kN]			
≥ 4 / 550			0,3		0,4	
≥ 6 / 650			0,5		0,7	

Table C27: Reduction factors depending on the distance from the joints

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Maximum joint width	w_j	[mm]	≤ 3	≤ 3
Distance from the joints	$c_{j\perp}$	[mm]	≥ 1,5 h_{nom}	≥ 1,5 h_{nom}
	$c_{j\parallel}$		≥ 1,5 h_{nom}	≥ 1,5 h_{nom}
Joint factor	$\alpha_{j,N}$	[-]	1,0	1,0
	$\alpha_{j,V\parallel}$		1,0	1,0
	$\alpha_{j,V\perp}$		1,0	1,0
Distance from the joints	$c_{j\perp}$	[mm]	≥ 20	≥ 20
	$c_{j\parallel}$		≥ 40	≥ 40
Joint factor	$\alpha_{j,N}$	[-]	0,73	0,96
	$\alpha_{j,V}$		1,0	1,0
	$\alpha_{j,V\perp}$		0,55	0,45
Distance from the joints	$c_{j\perp}$	[mm]	< 20	< 20
	$c_{j\parallel}$		< 40	< 40
Joint factor	$\alpha_{j,N}$	[-]	Screw must not be used	
	$\alpha_{j,V\parallel}$			
	$\alpha_{j,V\perp}$			

Hilti screw anchor HUS4

Performances
Essential characteristics under static and quasi-static load in autoclaved aerated concrete bricks

Annex C15

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Table C28: Group factors for double groups

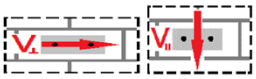
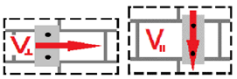
Fastener size HUS4 **Type**			**Use case**	**8** **H(F), C**	**10** **H(F), C, A(F)**
Minimum spacing	$s_{min\parallel} = s_{min\perp}$	[mm]	-	80	80
Group factor for tension	$\alpha_{g,N}(s_{min\parallel}) = \alpha_{g,N}(s_{min\perp})$	[-]		1,85	2,00
Group factor for shear with minimum spacing in direction parallel to the horizontal joint	$\alpha_{g,V\perp}(s_{min\parallel}) = \alpha_{g,V\parallel}(s_{min\parallel})$	[-]		2,00	2,00
Group factor for shear with minimum spacing in direction perpendicular to the horizontal joint	$\alpha_{g,V\perp}(s_{min\perp}) = \alpha_{g,V\parallel}(s_{min\perp})$	[-]		1,25	1,00

Table C29: Displacements

Fastener size HUS4 **Type**			**8** **H(F), C**	**10** **H(F), C, A(F)**
Nominal embedment depth	h_{nom}	[mm]	60	75
Tension load	F_N	[kN]	0,3	0,5
Displacements under tension load	δ_{N0}	[mm]	0,02	0,03
	$\delta_{N\infty}$		0,04	0,06
Shear load parallel to the vertical joint	$F_{V\parallel}$	[kN]	0,6	1,0
Displacements under shear load[1)]	$\delta_{V\parallel 0}$	[mm]	1,20	1,20
	$\delta_{V\parallel\infty}$		1,80	1,80
Shear load perpendicular to the vertical joint	$F_{V\perp}$	[kN]	0,2	0,3
Displacements under shear load[1)]	$\delta_{V\perp 0}$	[mm]	0,30	0,80
	$\delta_{V\perp\infty}$		0,45	1,20

[1)] Shear displacements do not consider the fixture hole clearance and the respective screw position. Clearance hole displacements can be avoided with the use of the Hilti filling set.

Hilti screw anchor HUS4	**Annex C16**
Performances Essential characteristics under static and quasi-static load in autoclaved aerated concrete bricks	

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Table C30: Resistance to fire

Fastener size HUS4				**8**	**10**
Type				**H(F), C**	**H(F), C, A(F)**
Nominal embedment depth		h_{nom}	[mm]	60	75
Characteristic resistance to pullout and brick failure $N_{Rk,fi} = N_{Rk,p,fi} = N_{Rk,b,fi}$					
Mean compressive brick strength $f_{mean} \geq 4$ MPa ($\rho \geq 0{,}55$kg/dm^3)	R30, R60, R90	$N_{Rk,fi}$	[kN]	No performance assessed	0,1
	R120	$N_{Rk,fi}$	[kN]		0,1
Mean compressive brick strength $f_{mean} \geq 6$ MPa ($\rho \geq 0{,}65$kg/dm^3)	R30, R60, R90	$N_{Rk,fi}$	[kN]	0,1	0,2
	R120	$N_{Rk,fi}$	[kN]	0,1	0,2
Characteristic resistance to brick breakout failure $N^g_{Rk,b,fi}$ for double screw anchor groups					
Mean compressive brick strength $f_{mean} \geq 4$ MPa ($\rho \geq 0{,}55$kg/dm^3)	R30, R60, R90	$N^g_{Rk,b,fi}$	[kN]	No performance assessed	0,4
	R120	$N^g_{Rk,b,fi}$	[kN]		0,3
Mean compressive brick strength $f_{mean} \geq 6$ MPa ($\rho \geq 0{,}65$kg/dm^3)	R30, R60, R90	$N^g_{Rk,b,fi}$	[kN]	0,3	0,7
	R120	$N^g_{Rk,b,fi}$	[kN]	0,2	0,5
Edge distance and spacing					
Minimum edge distance		$c_{min,fi} = c_{j,fi}$	[mm]	120	150
Minimum spacing		$s_{min,fi}$	[mm]	106	106

Hilti screw anchor HUS4	**Annex C17**
Performances Essential characteristics under fire exposure in autoclaved aerated concrete bricks	