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European Technical Assessment Body
for construction products



European Technical Assessment

ETA-21/0480
of 20 October 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 metal expansion anchor HST2 V3

Product family to which the construction product belongs

Mechanical fastener for use in concrete

Manufacturer

Hilti Aktiengesellschaft
Feldkircherstrasse 100
9494 SCHAAN
FÜRSTENTUM LIECHTENSTEIN

Manufacturing plant

Hilti plants

This European Technical Assessment contains

41 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 330232-02-0601, edition 12/2024

This version replaces

ETA-21/0480 issued on 31 October 2024

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Specific part

1 Technical description of the product

The Hilti metal expansion anchor HST2 V3 is an anchor made of galvanized steel (HST2 V3), hot dip galvanized steel (HST2-F V3), stainless steel (HST2-R V3) or high-corrosion resistance stainless steel (HST2-HCR V3) which is placed into a drilled hole and anchored by torque-controlled expansion.

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 fastener 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 according to Annex B1, use conditions. 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 tension load (static and quasi-static loading) Method A	see Annex B8 – B10 and C1 – C4
Characteristic resistance to shear load (static and quasi-static loading)	see Annex C5
Displacements	see Annex C6
Stiffness	No performance assessed
Characteristic resistance and displacements for seismic performance categories C1 and C2	see Annex C7 – C11
Durability	see Annex B1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Class A1
Resistance to fire	see Annex C12 – C18

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 330232-02-0601 the applicable European legal act is: 1996/582/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 EAD

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

Issued in Berlin on 20 Oktober 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Ziegler

Installed condition

Figure A1:

Hilti metal expansion anchor HST2 V3, HST2-F V3

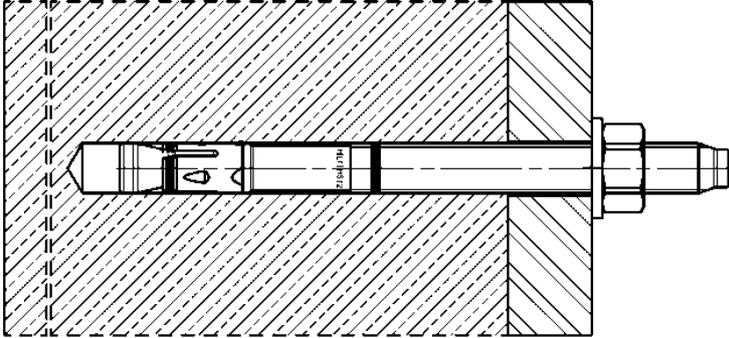
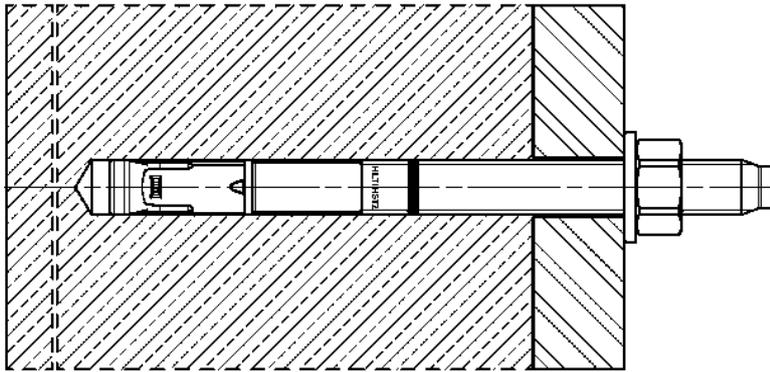


Figure A2:

Hilti metal expansion anchor HST2-R V3, HST2-HCR V3



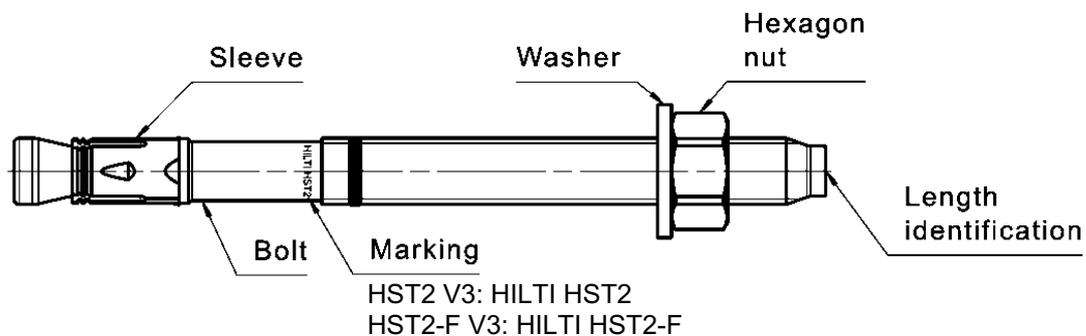
Hilti metal expansion anchor HST2 V3

Product description
Installation condition

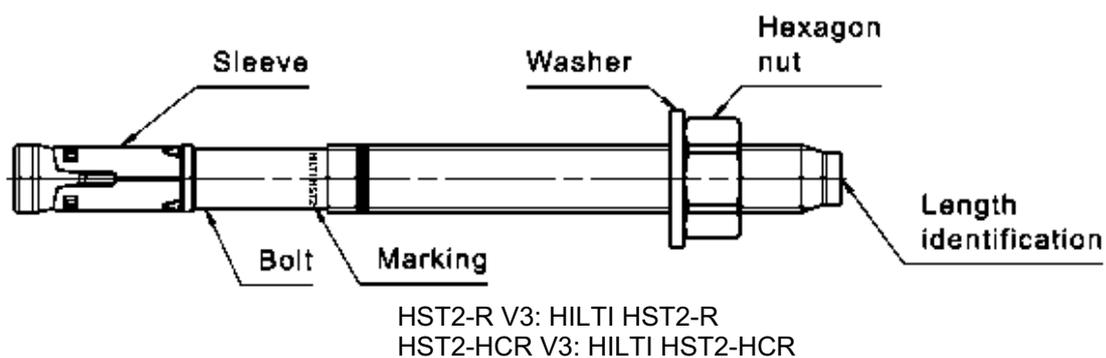
Annex A1

Product description and marking

Hilti metal expansion anchor HST2 V3, HST2-F V3: M8 to M16



Hilti metal expansion anchor HST2-R V3, HST2-HCR V3: M8 to M16



Hilti metal expansion anchor HST2 V3

Product description
Anchor types, marking and identification

Annex A2

Table A1: Length identification

Letter		A	B	C	D	E	f	II
Anchor length	≥ [mm]	38,1	50,8	63,5	76,2	88,9	100,0	100,0
	< [mm]	50,8	63,5	76,2	88,9	101,6	100,0	100,0

Letter		F	G	Δ	H	I	J	K
Anchor length	≥ [mm]	101,6	114,3	125,0	127,0	139,7	152,4	165,1
	< [mm]	114,3	127,0	125,0	139,7	152,4	165,1	177,8

Letter		L	M	N	O	P	Q	R
Anchor length	≥ [mm]	177,8	190,5	203,2	215,9	228,6	241,3	254,0
	< [mm]	190,5	203,2	215,9	228,6	241,3	254,0	279,4

Letter		r	S	T	U	V	W	X
Anchor length	≥ [mm]	260,0	279,4	304,8	330,2	355,6	381,0	406,4
	< [mm]	260,0	304,8	330,2	355,6	381,0	406,4	431,8

Letter		Y	Z	AA	BB	CC	DD	EE
Anchor length	≥ [mm]	431,8	457,2	482,6	508,0	533,4	558,8	584,2
	< [mm]	457,2	482,6	508,0	533,4	558,8	584,2	609,6

Letter		FF	GG	HH	II	JJ	KK	LL
Anchor length	≥ [mm]	609,6	635,0	660,4	685,8	711,2	736,6	762,0
	< [mm]	635,0	660,4	685,8	711,2	736,6	762,0	787,4

Letter		MM	NN	OO	PP	QQ	RR	SS
Anchor length	≥ [mm]	787,4	812,8	838,2	863,6	889,0	914,4	939,8
	< [mm]	812,8	838,2	863,6	889,0	914,4	939,8	965,2

Letter		TT	UU	VV
Anchor length	≥ [mm]	965,2	990,6	1016,0
	< [mm]	990,6	1016,0	1041,4

Hilti metal expansion anchor HST2 V3

Product description
Length identification

Annex A3

Table A2: Materials

Designation	Material
HST2 V3 (Carbon steel, galvanized)	
Expansion sleeve	Stainless steel A2 according to ASTM A 240/A 240M: 2019
Bolt	Carbon steel, galvanized, coated, rupture elongation ($l_0 = 5d$) > 8 %
Washer	Carbon steel, galvanized
Hexagon nut	Carbon steel, galvanized, coated
HST2-F V3 (Carbon steel, hot dip galvanized $\geq 50\mu\text{m}$ according to EN ISO 10684:2004 + AC:2009)	
Expansion sleeve	Stainless steel A2 according to ASTM A 240/A 240M: 2019
Bolt	Carbon steel, hot dip galvanized, coated, rupture elongation ($l_0 = 5d$) > 8 %
Washer	Carbon steel, hot dip galvanized
Hexagon nut	Carbon steel, hot dip galvanized, coated
HST2-R V3 (Stainless steel A4 or Duplex stainless steel) Corrosion resistance class III according to EN 1993-1-4:2006+A1:2015	
Expansion sleeve	Stainless steel A4 according to EN 10088-1:2014
Bolt	Stainless steel A4 or Duplex stainless steel according to EN 10088-1:2014, cone coated, rupture elongation ($l_0 = 5d$) > 8 %
Washer	Stainless steel A4
Hexagon nut	Stainless steel A4, coated
HST2-HCR V3 (High corrosion resistance stainless steel) Corrosion resistance class V according to EN 1993-1-4:2006+A1:2015	
Expansion sleeve	Stainless steel A4 according to EN 10088-1:2014
Bolt	High corrosion resistance stainless steel according to EN 10088-1:2014, cone coated, rupture elongation ($l_0 = 5d$) > 8 %
Washer	High corrosion resistance stainless steel
Hexagon nut	High corrosion resistance stainless steel, coated

Hilti metal expansion anchor HST2 V3

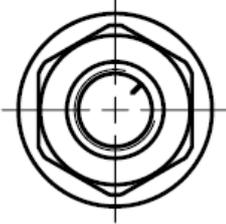
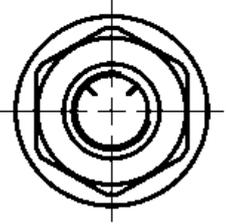
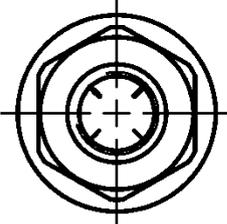
Product description
Materials

Annex A4

Table A2: Continued

Designation	Material
Filling set (Carbon steel, galvanized)	
Sealing washer and Spherical washer	Carbon steel, galvanized
Filling set (Carbon steel, mechanical zinc plating)	
Sealing washer and Spherical washer	Carbon steel, mechanical zinc plating
Filling Set (Stainless steel) Corrosion resistance class III according EN 1993-1-4:2006+A1:2015	
Sealing washer	Stainless steel A4 according to ASTM A 240/A 240M:2019
Spherical washer	Stainless steel A4 according to EN 10088-1:2014
Mortar	
Injection mortar	Injection mortar Hilti HIT-HY...

Table A3: Material code for identification of different materials

	HST2 V3, HST2-F V3	HST2-R V3	HST2-HCR V3
Material code	 <p>Letter code with one mark</p>	 <p>Letter code with two marks</p>	 <p>Letter code with four marks</p>

Hilti metal expansion anchor HST2 V3

Product description
Materials

Annex A5

Table A4: Dimensions HST2 V3, HST2-F V3

Size			M8	M10	M12	M16
Maximum length of anchor	l_{max}	[mm]	230	230	305	485
Shaft diameter at the cone	d_R	[mm]	5,7	6,9	8,2	12,0
Length of expansion sleeve	l_S	[mm]	13,6	18	19	24,6
Diameter of washer HST2 V3 and HST2-F V3	$d_w \geq$	[mm]	15,6	19,5	23,5	29,5

HST2 V3, HST2-F V3

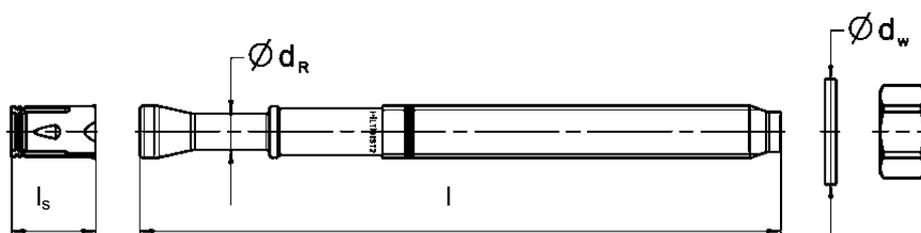
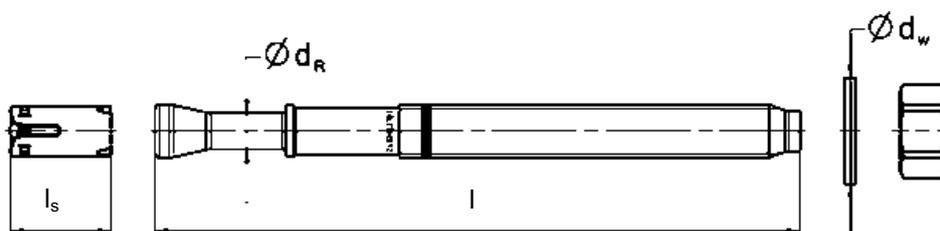


Table A5: Dimensions HST2-R V3, HST2-HCR V3

Size			M8	M10	M12	M16
Maximum length of anchor	l_{max}	[mm]	260	280	295	350
Shaft diameter at the cone	d_R	[mm]	5,6	7,3	8,6	11,6
Length of expansion sleeve	l_S	[mm]	14,8	18,3	22,6	24,4
Diameter of washer	$d_w \geq$	[mm]	15,6	19,5	23,5	29,5

HST2-R V3, HST2-HCR V3



Hilti metal expansion anchor HST2 V3

Product description
Dimensions

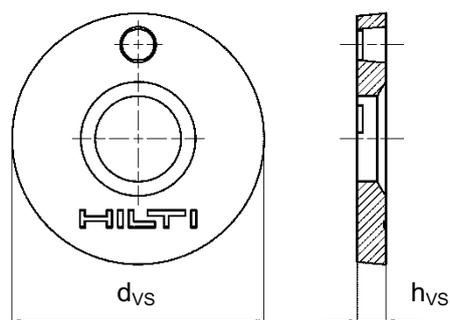
Annex A6

Filling set to fill the annular gap between the anchor and the fixture

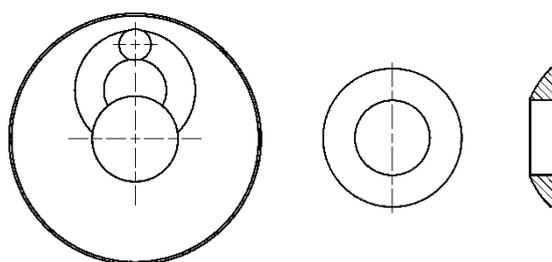
Table A6: Dimensions of the Filling Set

Size	M8	M10	M12	M16
Diameter of sealing washer d_{VS} [mm]	38	42	44	52
Thickness of sealing washer h_{VS} [mm]	5			6
Thickness of the Hilti Filling set h_{fs} [mm]	8	9	10	11

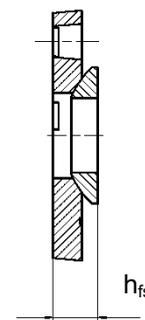
Sealing washer



Spherical washer



Filling Set



Hilti metal expansion anchor HST2 V3

Product description
Filling set

Annex A7

Specifications of intended use

Anchorage subject to:

- Static and quasi-static loading: all sizes
- Seismic performance category C1 and C2: sizes see Table C4 – C9
- Fire exposure: all sizes.

Base materials:

- Compacted reinforced or unreinforced normal weight concrete without fibers according to EN 206:2013+A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016.
- Cracked or uncracked concrete.

Use conditions (Environmental conditions):

For working life for at least 50 years

- Structures subject to dry internal conditions (all materials).
- For all other conditions according to EN 1993-1-4:2006 + A1:2015 corresponding to corrosion resistance class CRC:
 - Stainless steel A4 or Duplex stainless steel according to Annex A4, Table A2: CRC III
 - High corrosion resistance stainless steel according to Annex A4, Table A2: CRC V

For variable working life

- Structures subject to internal and external conditions: classification of atmospheric corrosivity, determination and estimation C1-CX according to EN ISO 9223:2012-02, Table C.1 for a variable working life according to Annex B2, Table B1:
 - carbon steel, hot dip galvanized with mean thickness $\geq 50 \mu\text{m}$

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages are designed in accordance with: EN 1992-4:2018
- Under seismic loading anchorages shall be positioned outside of critical regions (e.g. plastic hinges) of the concrete structure. Fastenings where shear loads act on anchors with a lever arm, such as e.g. in stand-off installation or with a grout layer, are not covered in this European Technical Assessment.
- In case of requirements to resistance to fire local spalling of the concrete cover must be avoided.
- For effective embedment depth $h_{ef} < 40 \text{ mm}$ only statically indeterminate fixings (e.g. light weight suspended ceilings) are covered by the ETA. For anchor type HST2-F V3 the use is additionally restricted to dry internal conditions. These fixings are designed in accordance with EN 1992-4:2018, Clause 7.3 and Annex G.

Installation:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Hole drilling and cleaning with the methods given on Annex B2
- The anchor may only be set once.
- Overhead applications are permitted.

Hilti metal expansion anchor HST2 V3

Intended use
Specifications

Annex B1

Table B1: Durability of hot dip galvanized coating (HST2-F V3)²⁾ according to EN ISO 10684:2004+AC:2009 for coatings with mean thickness of minimum 50µm

Corrosivity Category ¹⁾	Corrosivity	Working life [years]
C1	Very low	50
C2	Low	50
C3	Medium	25
C4	High	12,5
C5	Very High	5
CX	Extreme	2

¹⁾ Corrosivity category according to EN ISO 9223:2012-02, Table C.1

²⁾ Only for anchor version HST2-F V3 in uncracked concrete (static and quasi-static, and fire exposure)

Table B2: Specifications of intended use

Anchorage subject to:	M8	M10	M12	M16
Static and quasi static loading in cracked and uncracked concrete - hammer drilling and diamond coring	✓	✓	✓	✓
Seismic performance category C1 - hammer drilling	-	✓	✓	✓
Seismic performance category C2 - hammer drilling	-	✓	✓	✓
Fire exposure - hammer drilling and diamond coring	✓	✓	✓	✓

Table B3: Drilling technique

Anchorage subject to:	M8	M10	M12	M16
Hammer drilling (HD) 	✓	✓	✓	✓
Diamond coring (DD) with <ul style="list-style-type: none"> DD EC-1 coring tool and DD-C ... TS/TL core bits or DD-C ... T2/T4 core bits DD 30-W coring tool and C+ ... SPX-T (abrasive) core bits  DD 150-U coring tool and SPX-L, SPX-L Abrasive or SPX-L Hand Held core bits 	✓	✓	✓	✓

Hilti metal expansion anchor HST2 V3

Intended use
Specifications, Drilling technique

Annex B2

Table B4: Drill hole cleaning

Manual cleaning (MC): Hilti hand pump for blowing out drill holes	
Compressed air cleaning (CAC): Air nozzle with an orifice opening of 3,5 mm in diameter	
Non-cleaning (NC): Non-cleaning by 3 x venting	-

Table B5: Methods for application of torque moment

HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3	M8	M10	M12	M16
Torque wrench 	✓	✓	✓	✓
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3	M8	M10	M12	M16
Machine torqueing with Hilti SIW impact wrench and SI-AT adaptive torque module 				
• SIW 4AT-22 with SI-AT-22 ¹⁾	✓	✓	✓	-
• SIW 6AT-22 with SI-AT-22 ¹⁾	-	✓	✓	✓

¹⁾ Equivalent combination of Hilti SIW + SI-AT tool, compatible to this anchor type, may be used

Hilti metal expansion anchor HST2 V3

Intended use
Drilling, torque moment

Annex B3

Table B6: Installation parameters for HST2 V3, HST2-F V3

HST2 V3, HST2-F V3			M8	M10	M12	M16
Nominal diameter of drill bit	d_0	[mm]	8	10	12	16
Maximum cutting diameter of drill bit	d_{cut}	[mm]	8,45	10,45	12,50	16,50
Maximum diameter of clearance hole in the fixture ¹⁾	d_f	[mm]	9	12	14	18
Effective anchorage depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Nominal embedment depth	h_{nom}	[mm]	$h_{ef} + 10$	$h_{ef} + 10$	$h_{ef} + 13$	$h_{ef} + 13$
Minimum depth of drill hole (hammer drilled, not cleaned)	$h_1 \geq$	[mm]	$h_{ef} + 30$	$h_{ef} + 30$	$h_{ef} + 33$	$h_{ef} + 33$
Minimum depth of drill hole (hammer drilled, cleaned)	$h_1 \geq$	[mm]	$h_{ef} + 15$	$h_{ef} + 15$	$h_{ef} + 21$	$h_{ef} + 21$
Minimum depth of drill hole (diamond cored boreholes)	$h_1 \geq$	[mm]	$h_{ef} + 20$	$h_{ef} + 20$	$h_{ef} + 23$	$h_{ef} + 23$
Minimum thickness of concrete member ²⁾	$h_{min} \geq$	[mm]	max (100; $1,5 \cdot h_{ef}$)	max (120; $1,5 \cdot h_{ef}$)	max (140; $1,5 \cdot h_{ef}$)	max (160; $1,5 \cdot h_{ef}$)
Minimum concrete thickness below borehole bottom ²⁾	$h_b \geq$	[mm]	21	27	32	34
Width across flats	SW	[mm]	13	17	19	24
Installation torque HST2 V3	T_{inst}	[Nm]	15	25	40	80
Installation torque HST2-F V3	T_{inst}	[Nm]	25	40	50	110

¹⁾ For the design of bigger clearance holes in the fixture see EN 1992-4:2018.

²⁾ Under consideration of minimum concrete thickness below borehole bottom: $h_{min} \geq h_1 + h_b$

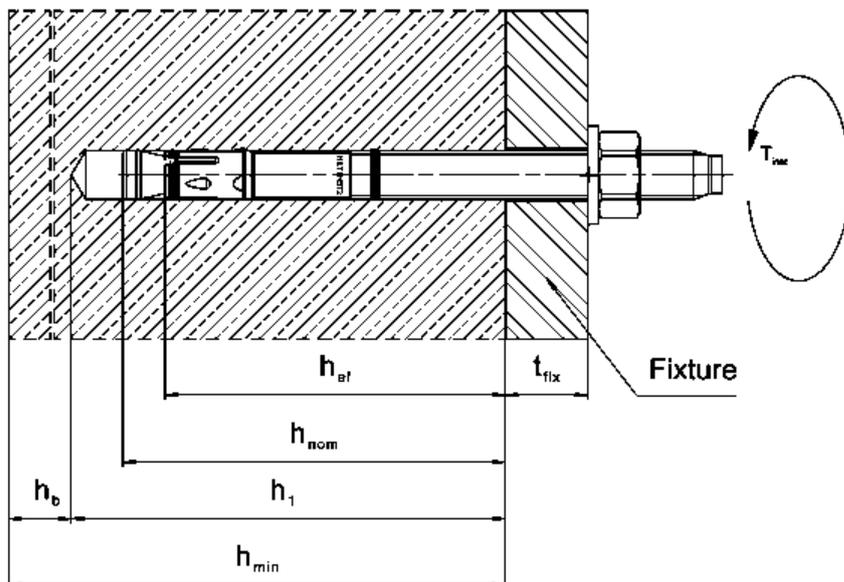
Hilti metal expansion anchor HST2 V3

Intended use
Installation parameters

Annex B4

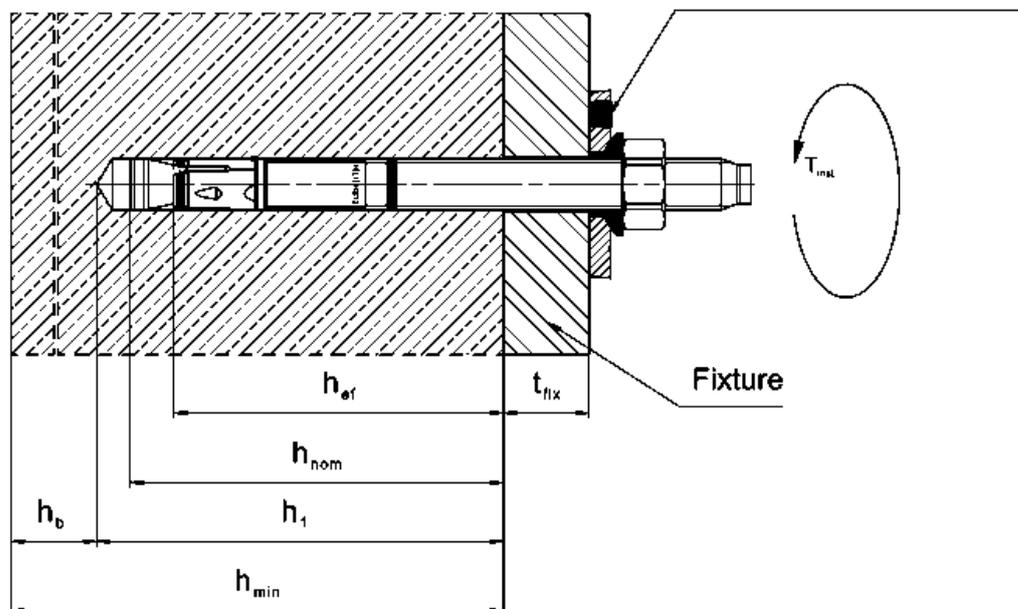
Setting positions for HST2 V3, HST2-F V3

Without the Filling Set to fill the annular gap between the anchor and the fixture



With the Filling Set to fill the annular gap between the anchor and the fixture

Injection mortar HIT-HY ...



Hilti metal expansion anchor HST2 V3

Intended use
Installation parameters

Annex B5

Table B7: Installation parameters for HST2-R V3, HST2-HCR V3

HST2-R V3, HST2-HCR V3		M8	M10	M12	M16
Nominal diameter of drill bit	d_0 [mm]	8	10	12	16
Maximum cutting diameter of drill bit	d_{cut} [mm]	8,45	10,45	12,50	16,50
Maximum diameter of clearance hole in the fixture ¹⁾	d_f [mm]	9	12	14	18
Effective anchorage depth	h_{ef} [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Nominal embedment depth	h_{nom} [mm]	$h_{ef} + 8$	$h_{ef} + 9$	$h_{ef} + 10$	$h_{ef} + 13$
Minimum depth of drill hole (hammer drilled, not cleaned)	$h_1 \geq$ [mm]	$h_{ef} + 28$	$h_{ef} + 29$	$h_{ef} + 30$	$h_{ef} + 33$
Minimum depth of drill hole (hammer drilled, cleaned)	$h_1 \geq$ [mm]	$h_{ef} + 13$	$h_{ef} + 14$	$h_{ef} + 18$	$h_{ef} + 21$
Minimum depth of drill hole (diamond cored boreholes)	$h_1 \geq$ [mm]	$h_{ef} + 18$	$h_{ef} + 19$	$h_{ef} + 20$	$h_{ef} + 23$
Minimum thickness of concrete member ²⁾	$h_{min} \geq$ [mm]	max (100; $1,5 \cdot h_{ef}$)	max (120; $1,5 \cdot h_{ef}$)	max (140; $1,5 \cdot h_{ef}$)	max (160; $1,5 \cdot h_{ef}$)
Minimum concrete thickness below borehole bottom ²⁾	$h_b \geq$ [mm]	21	27	32	34
Width across flats	SW [mm]	13	17	19	24
Installation torque	T_{inst} [Nm]	20	45	60	110

¹⁾ For the design of bigger clearance holes in the fixture see EN 1992-4:2018.

²⁾ Under consideration of minimum concrete thickness below borehole bottom: $h_{min} \geq h_1 + h_b$

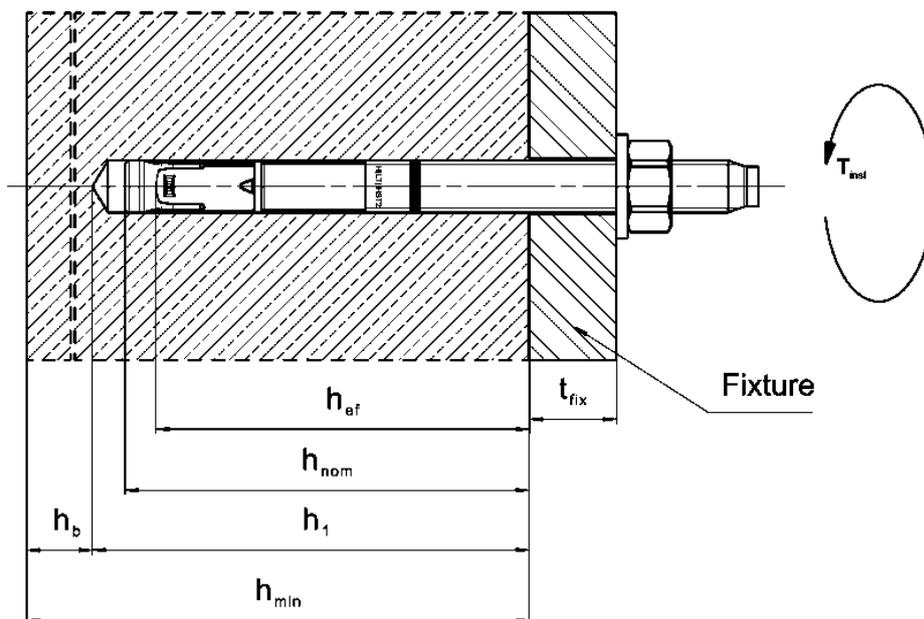
Hilti metal expansion anchor HST2 V3

Intended use
Installation parameters

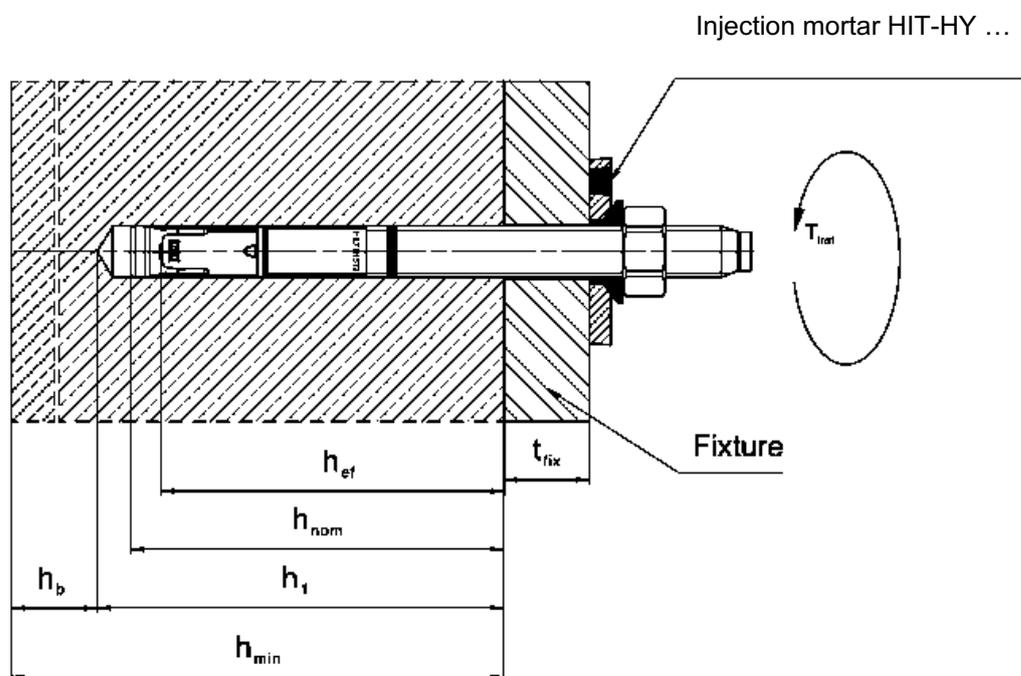
Annex B6

Setting positions for HST2-R V3, HST2-HCR V3

Without the Filling Set to fill the annular gap between the anchor and the fixture



With the Filling Set to fill the annular gap between the anchor and the fixture



Hilti metal expansion anchor HST2 V3

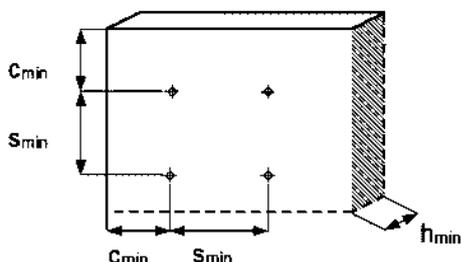
Intended use
Installation parameters

Annex B7

Table B8: Minimum spacing and edge distance for HST2 V3, HST2-F V3

			M8	M10	M12	M16
Minimum thickness of concrete member ¹⁾	h_{min}	[mm]	max (100; 1,5· h_{ef})	max (120; 1,5· h_{ef})	max (140; 1,5· h_{ef})	max (160; 1,5· h_{ef})
Minimum spacing	s_{min}	[mm]	40	55	60	70
	for $c \geq$	[mm]	According to Table B10			
Minimum edge distance	c_{min}	[mm]	45	55	55	70
	for $s \geq$	[mm]	According to Table B10			
Cracked concrete						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Required splitting area	$A_{sp,req}$	[mm ²]	17100	26400	31000	44800
Uncracked concrete						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Required splitting area	$A_{sp,req}$	[mm ²]	19500	32000	38000	50100

¹⁾ Under consideration of minimum concrete thickness below borehole bottom: $h_{min} \geq h_1 + h_b$ as given in Table B6



For the calculation of the minimum edge distance and spacing in combination with variable embedment depths and slab thickness the following equation must be fulfilled:

$$A_{sp,ef} \geq A_{sp,req}$$

With:

$A_{sp,ef}$: Effective splitting area according to Table B10

$A_{sp,req}$: Minimum required splitting area according to Table B8

Hilti metal expansion anchor HST2 V3

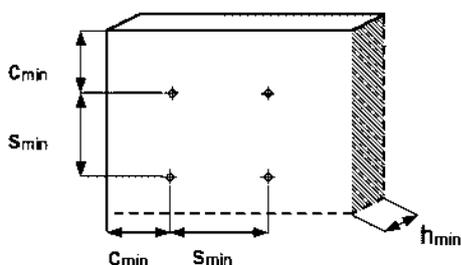
Intended Use
Minimum spacing and minimum edge distance

Annex B8

Table B9: Minimum spacing and edge distance for HST2-R V3, HST2-HCR V3

			M8	M10	M12	M16
Minimum thickness of concrete member ¹⁾	h_{min}	[mm]	max (100; 1,5· h_{ef})	max (120; 1,5· h_{ef})	max (140; 1,5· h_{ef})	max (160; 1,5· h_{ef})
Minimum spacing	s_{min}	[mm]	40	55	60	70
	for $c \geq$	[mm]	According to Table B10			
Minimum edge distance	c_{min}	[mm]	45	50	55	60
	for $s \geq$	[mm]	According to Table B10			
Cracked concrete						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Minimum required splitting area	$A_{sp,req}$	[mm ²]	18000	28800	36400	48700
Uncracked concrete						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Minimum required splitting area	$A_{sp,req}$	[mm ²]	21600	31800	42000	58250

¹⁾ Under consideration of minimum concrete thickness below borehole bottom: $h_{min} \geq h_1 + h_b$ as given in Table B7



For the calculation of the minimum edge distance and spacing in combination with variable embedment depths and slab thickness the following equation must be fulfilled:

$$A_{sp,ef} \geq A_{sp,req}$$

With:

$A_{sp,ef}$: Effective splitting area according to Table B10

$A_{sp,req}$: Minimum required splitting area according to Table B9

Hilti metal expansion anchor HST2 V3

Intended Use
Minimum spacing and minimum edge distance

Annex B9

Table B10: Effective splitting area $A_{sp,ef}$ ¹⁾

Effective splitting area $A_{sp,ef}$¹⁾ for a concrete member thickness $h > h_{ef} + 1,5 \cdot c$ and $h \geq h_{min}$			
Single anchor and anchor groups (for $c \geq c_{min}$) with	$s > 3 \cdot c$ $h_{ef} < 1,5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (h_{ef} + 1,5 \cdot c)$	[mm ²]
Anchor groups (for $c \geq c_{min}$, $s \geq s_{min}$) with	$s \leq 3 \cdot c$ $h_{ef} < 1,5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (h_{ef} + 1,5 \cdot c)$	[mm ²]
Single anchor and anchor groups (for $c \geq c_{min}$) with	$s > 3 \cdot c$ $h_{ef} \geq 1,5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (3 \cdot c)$	[mm ²]
Anchor groups (for $c \geq c_{min}$, $s \geq s_{min}$) with	$s \leq 3 \cdot c$ $h_{ef} \geq 1,5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (3 \cdot c)$	[mm ²]
Effective splitting area $A_{sp,ef}$¹⁾ for a concrete member thickness $h \leq h_{ef} + 1,5 \cdot c$ and $h \geq h_{min}$			
Single anchor and anchor groups (for $c \geq c_{min}$) with	$s > 3 \cdot c$ $h_{ef} < 1,5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot h$	[mm ²]
Anchor groups (for $c \geq c_{min}$, $s \geq s_{min}$) with	$s \leq 3 \cdot c$ $h_{ef} < 1,5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot h$	[mm ²]
Single anchor and anchor groups (for $c \geq c_{min}$) with	$s > 3 \cdot c$ $h_{ef} \geq 1,5 \cdot c$	$A_{sp,ef} = (6 \cdot c) \cdot (h - h_{ef} + 1,5 \cdot c)$	[mm ²]
Anchor groups (for $c \geq c_{min}$, $s \geq s_{min}$) with	$s \leq 3 \cdot c$ $h_{ef} \geq 1,5 \cdot c$	$A_{sp,ef} = (3 \cdot c + s) \cdot (h - h_{ef} + 1,5 \cdot c)$	[mm ²]

¹⁾ Edge distance and spacing must be rounded up in 5 mm increments

Hilti metal expansion anchor HST2 V3

Intended Use

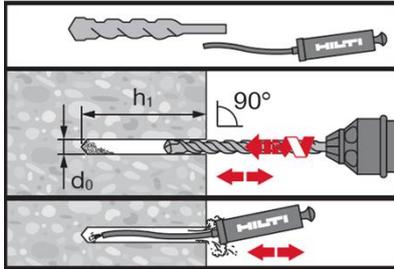
Minimum spacing and minimum edge distance

Annex B10

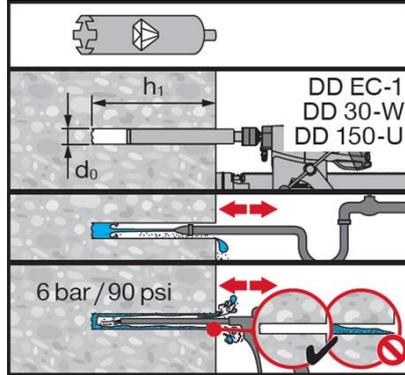
Installation instruction

Hole drilling and cleaning

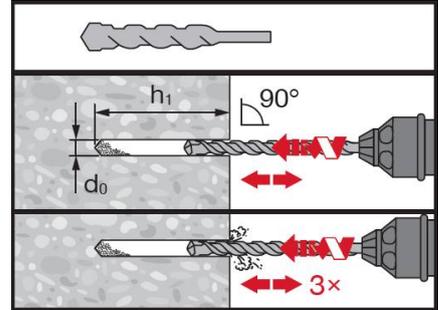
a) Hammer drilling (HD):
M8 to M16



b) Diamond coring (DD):
M8 to M16

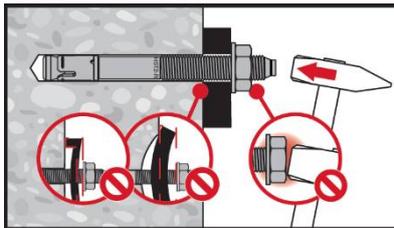


c) Hammer drilling non-cleaned (HD NC): M8 to M16

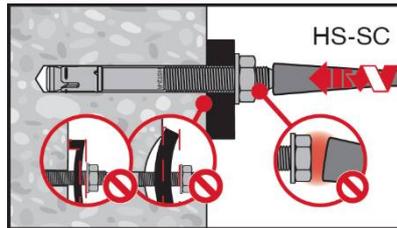


Anchor setting

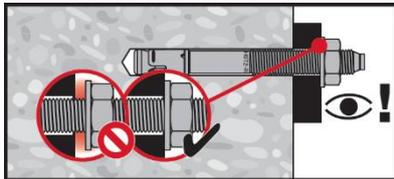
a) Hammer setting:
M8 to M16



b) Machine setting (setting tool):
M8 to M16

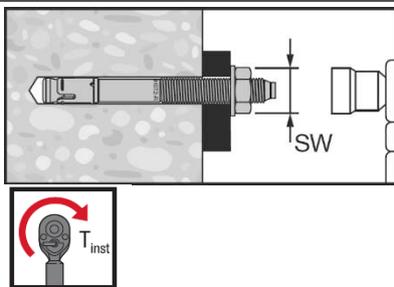


Check setting

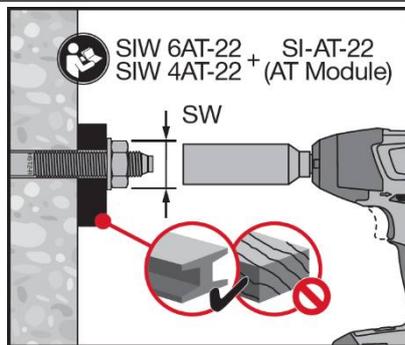


Anchor torquing

a) Torque wrench:
M8 to M16



b) Machine torquing:
M8 to M16



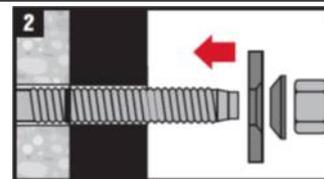
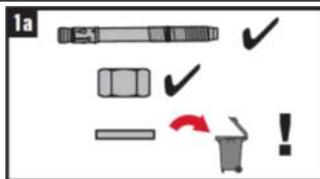
Hilti metal expansion anchor HST2 V3

Intended Use
Installation instructions

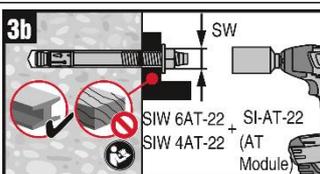
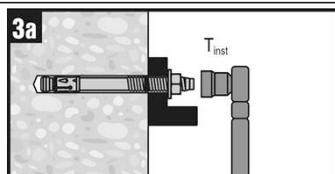
Annex B11

Installation with Filling Set

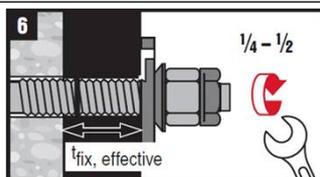
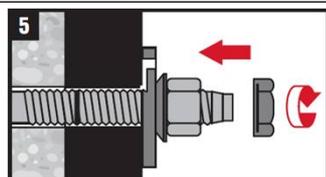
Installation of sealing washer



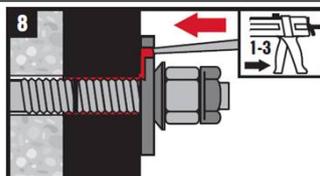
Anchor torquing



Installation of counter nut (optional)



Injection of mortar



Hilti metal expansion anchor HST2 V3

Intended Use
Installation instructions

Annex B12

Table C1: Characteristic values of resistance under tension load in case of static and quasi-static loading in cracked and uncracked concrete

		M8	M10	M12	M16
Effective anchorage depth	h_{ef} [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Steel failure					
HST2 V3, HST2-F V3					
Characteristic resistance	$N_{Rk,s}$ [kN]	16,5	28,0	41,4	82,6
Partial factor	$\gamma_{Ms,N}^{1)}$ [-]	1,40			
HST2-R V3, HST2-HCR V3					
Characteristic resistance	$N_{Rk,s}$ [kN]	17,6	30,5	43,1	78,2
Partial factor	$\gamma_{Ms,N}^{1)}$ [-]	1,40			
Pull-out failure					
HST2 V3, HST2-F V3 with Hammer drilling					
Cracked concrete C20/25					
Effective embedment depth	h_{ef} [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	$N_{Rk,p,cr}$ [kN]	$\text{Min}(0, 1333 \cdot h_{ef} + 1,0; 7,0)$	$\text{Min}(11,0; N_{Rk,c}^{0,2)})$	$\text{Min}(14,0; N_{Rk,c}^{0,2)})$	$\text{Min}(25,0; N_{Rk,c}^{0,2)})$

¹⁾ In absence of other national regulations

²⁾ $N_{Rk,c}^0$ according to EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances
Characteristic resistance under tension load

Annex C1

Table C1: Continued

		M8	M10	M12	M16
Uncracked concrete C20/25					
Effective embedment depth	$h_{ef,1}$ [mm]	30 - 40	40 - 50	50 - 65	65 - 80
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	$\text{Min}(12,4; N_{Rk,c}^{0,1})$	$\text{Min}(0,2555 \cdot h_{ef} + 2,2254; 15,0)$	$\text{Min}(0,5072 \cdot h_{ef} - 7,9657; 25,0)$	$\text{Min}(0,5480 \cdot h_{ef} - 9,8416; 34,0)$
Effective embedment depth	$h_{ef,2}$ [mm]	41 - 70	51 - 80	66 - 100	81 - 120
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	$\text{Min}(0,1185 \cdot h_{ef} + 7,7052; 16,0)$	$\text{Min}(0,3 \cdot h_{ef}; 24,0)$	$\text{Min}(0,2571 \cdot h_{ef} + 8,2857; 34,0)$	$\text{Min}(0,25 \cdot h_{ef} + 14,0; 44,0)$
HST2 V3, HST2-F V3 with Diamond coring					
Cracked concrete C20/25					
Effective embedment depth	$h_{ef,1}$ [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	$N_{Rk,p,cr}$ [kN]	$\text{Min}(0,1333 \cdot h_{ef} + 1,0; 7,0)$	$\text{Min}(0,2857 \cdot h_{ef} - 4,4286; 9,0)$	$\text{Min}(0,4 \cdot h_{ef} - 10,0; 12,0)$	$\text{Min}(0,3529 \cdot h_{ef} - 8,9412; 20,0)$
Uncracked concrete C20/25					
Effective embedment depth	$h_{ef,1}$ [mm]	30 - 40	40 - 50	50 - 65	65 - 80
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	$\text{Min}(0,4 \cdot h_{ef} - 6,0; 10,0)$	$\text{Min}(0,3 \cdot h_{ef} - 2,0; 13,0)$	$\text{Min}(0,5072 \cdot h_{ef} - 7,9657; 25,0)$	$\text{Min}(0,5480 \cdot h_{ef} - 9,8416; 34,0)$
Effective embedment depth	$h_{ef,2}$ [mm]	41 - 70	51 - 80	66 - 100	81 - 120
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	$\text{Min}(0,1 \cdot h_{ef} + 6,0; 13,0)$	$\text{Min}(0,2333 \cdot h_{ef} + 1,3333; 20,0)$	$\text{Min}(0,2571 \cdot h_{ef} + 8,2857; 34,0)$	$\text{Min}(0,25 \cdot h_{ef} + 14,0; 44,0)$

¹⁾ $N_{Rk,c}^0$ according to EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances
Characteristic resistance under tension load

Annex C2

Table C1: Continued

		M8	M10	M12	M16
HST2-R V3, HST2-HCR V3 with Hammer drilling					
Cracked concrete C20/25					
Effective embedment depth	h_{ef} [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	$N_{Rk,p,cr}$ [kN]	5,0	9,0	12,0	25,0
Uncracked concrete C20/25					
Effective embedment depth	$h_{ef,1}$ [mm]	30 - 40	40 - 50	50 - 65	65 - 80
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	Min(12,4; $N_{Rk,c}^{0,1}$)	Min(0,2555· h_{ef} +2,2254; 15,0)	Min(25,8; $N_{Rk,c}^{0,1}$)	Min(35,2; $N_{Rk,c}^{0,1}$)
Effective embedment depth	$h_{ef,2}$ [mm]	41 - 70	51 - 80	66 - 100	81 - 120
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	Min(0,1185· h_{ef} +7,7052; 16,0)	Min(0,3333· h_{ef} -1,6667; 25,0)	Min(0,2634· h_{ef} +8,6563; 35,0)	Min(0,27· h_{ef} +13,6; 46,0)
HST2-R V3, HST2-HCR V3 with Diamond coring					
Cracked concrete C20/25					
Effective embedment depth	h_{ef} [mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	$N_{Rk,p,cr}$ [kN]	5,0	9,0	12,0	25,0
Uncracked concrete C20/25					
Effective embedment depth	$h_{ef,1}$ [mm]	30 - 40	40 - 50	50 - 65	65 - 80
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	Min(0,4· h_{ef} -6,0; 10,0)	Min(0,2· h_{ef} +2,0; 12,0)	Min(0,4· h_{ef} -6,0; 20,0)	Min(0,5333· h_{ef} -14,6667; 28,0)
Effective embedment depth	$h_{ef,2}$ [mm]	41 - 70	51 - 80	66 - 100	81 - 120
Characteristic resistance	$N_{Rk,p,ucr}$ [kN]	Min(0,0667· h_{ef} +7,3333; 12,0)	Min(0,2667· h_{ef} -1,3333; 20,0)	Min(0,2286· h_{ef} +5,1429; 28,0)	Min(0,2· h_{ef} +12,0; 36,0)
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3					
Increasing factor for $N_{Rk,p}$ (cr and ucr concrete)	ψ_c C30/37	1,22			
	ψ_c C40/50	1,41			
	$\psi_c = (f_{ck}/20)^{0,5}$ ψ_c C50/60	1,58			

¹⁾ $N_{Rk,c}^0$ according to EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances
Characteristic resistance under tension load

Annex C3

Table C1 continued

			M8	M10	M12	M16
Concrete cone failure and Splitting failure						
Installation factor	γ_{inst}	[-]	1,0			
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Factor for cracked concrete	$k_1 = k_{cr,N}$	[-]	7,7			
Factor for uncracked concrete	$k_1 = k_{ucr,N}$	[-]	11,0			
Spacing	$s_{cr,N}$	[mm]	3 h_{ef}			
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}			
Characteristic resistance	$N^0_{Rk,sp}$	[kN]	Min ($N_{Rk,p}$; $N^0_{Rk,c}$) ¹⁾			
Splitting area required to determine $c_{cr,sp}$	A_{rqd}	[mm ²]	$(N^0_{Rk,sp,C20} - b) / a$ ²⁾			
HST2 V3, HST2-F V3						
Calculation factor for A_{rqd}	b	[-]	-9,058	2,543	3,0415	11,556
Calculation factor for A_{rqd}	a	[-]	0,0008	0,0003	0,0004	0,0003
HST2-R V3, HST2-HCR V3						
Calculation factor for A_{rqd}	b	[-]	2,079	1,471	-2,756	-4,469
Calculation factor for A_{rqd}	a	[-]	0,0003	0,0004	0,0005	0,0004
Spacing (splitting)	$s_{cr,sp}$	[mm]	2 · $c_{cr,sp}$			
Edge distance (splitting) ³⁾	$c_{cr,sp}$	[mm]	MIN [$(A_{rqd} + 0,8 \cdot (h_{min} - h_{ef})^2) / (3,41 \cdot h_{min} - 0,59 \cdot h_{ef})$; $A_{rqd} / (h_{min} \cdot 8^{0,5})$] $\geq (1,5 \cdot h_{ef})$ ⁴⁾			

¹⁾ $N^0_{Rk,c}$ according to EN 1992-4:2018

²⁾ $N^0_{Rk,sp,C20}$ in kN, calculated for C20/25 uncracked concrete

³⁾ h_{min} = minimum member thickness (refer Table B6 and B7), under consideration $h_{min} \leq 4 \cdot h_{ef}$

⁴⁾ $c_{cr,sp} \geq (1,5 \cdot h_{ef})$ if concrete cone failure is decisive on the evaluation of the $N^0_{Rk,sp}$

Hilti metal expansion anchor HST2 V3

Performances
Characteristic resistance under tension load

Annex C4

Table C2: Characteristic values of resistance under shear load in case of static and quasi-static loading

			M8	M10	M12	M16
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Steel failure without lever arm						
HST2 V3, HST2-F V3						
Characteristic resistance	$V_{Rk,s}^0$	[kN]	10,6	18,9	29,5	51,0
Characteristic resistance using Filling Set	$V_{Rk,s}^0$	[kN]	10,6	18,9	29,5	51,0
Partial factor	$\gamma_{Ms,V}^{1)}$	[-]	1,25			
Ductility factor	k_7	[-]	1,0			
HST2-R V3, HST2-HCR V3						
Characteristic resistance	$V_{Rk,s}^0$	[kN]	15,7	25,3	36,7	63,6
Characteristic resistance using Filling Set	$V_{Rk,s}^0$	[kN]	15,7	25,3	36,7	63,6
Partial factor	$\gamma_{Ms,V}^{1)}$	[-]	1,25			
Ductility factor	k_7	[-]	1,0			
Steel failure with lever arm						
HST2 V3, HST2-F V3						
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	21,7	48,6	91,7	216
Partial factor	$\gamma_{Ms,V}^{1)}$	[-]	1,25			
HST2-R V3, HST2-HCR V3						
Characteristic resistance	$M_{Rk,s}^0$	[Nm]	27	53	93	216
Partial factor	$\gamma_{Ms,V}^{1)}$	[-]	1,25			
Concrete pry-out failure						
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3						
Pry-out factor	k_8	[-]	2,34	2,55	2,57	2,82
Installation factor	γ_{inst}	[-]	1,00			
Concrete edge failure						
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3						
Effective length of anchor in shear loading	$l_f = h_{ef}$	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Diameter of anchor	d_{nom}	[mm]	8	10	12	16
Installation factor	γ_{inst}	[-]	1,00			

¹⁾ In absence of other national regulations

Hilti metal expansion anchor HST2 V3

Performances
Characteristic resistance under shear load

Annex C5

Table C3: Displacements under tension and shear load in case of static and quasi-static loading

			M8	M10	M12	M16
Displacements under tension loading						
HST2 V3, HST2-F V3						
Effective anchorage depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Tension load in cracked concrete	N	[kN]	3,3	5,2	6,7	11,9
Corresponding displacement	δ_{N0}	[mm]	1,11	1,18	0,77	2,20
	$\delta_{N\infty}$	[mm]	1,70	1,28	1,73	1,13
Tension load in uncracked concrete	N	[kN]	7,6	11,4	16,2	21,0
Corresponding displacement	δ_{N0}	[mm]	0,96	0,31	2,17	2,07
	$\delta_{N\infty}$	[mm]	1,70	1,28	1,73	1,13
HST2-R V3, HST2-HCR V3						
Effective anchorage depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Tension load in cracked concrete	N	[kN]	2,4	4,3	5,7	11,9
Corresponding displacement	δ_{N0}	[mm]	0,6	0,2	0,8	1,0
	$\delta_{N\infty}$	[mm]	1,09	1,33	1,06	1,2
Tension load in uncracked concrete	N	[kN]	7,6	11,9	16,7	21,9
Corresponding displacement	δ_{N0}	[mm]	2,17	1,76	0,95	4,1
	$\delta_{N\infty}$	[mm]	1,09	1,33	1,06	1,2
Displacements under shear loading						
HST2 V3, HST2-F V3						
Effective anchorage depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Shear load in cracked and uncracked concrete	V	[kN]	6,1	10,8	16,9	29,1
Corresponding displacement	δ_{V0}	[mm]	2,28	2,28	2,21	2,41
	$\delta_{V\infty}$	[mm]	3,42	3,42	3,32	3,62
HST2-R V3, HST2-HCR V3						
Effective anchorage depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Shear load in cracked and uncracked concrete	V	[kN]	9,0	14,5	21,0	36,3
Corresponding displacement	δ_{V0}	[mm]	1,9	4,3	6,0	2,9
	$\delta_{V\infty}$	[mm]	2,9	6,4	9,1	4,4

Hilti metal expansion anchor HST2 V3

Performances
Displacements

Annex C6

Table C4: Characteristic values of resistance under tension load in case of seismic performance category C1 – hammer drilling only

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Steel failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$N_{Rk,s,C1}$ [kN]	28,0	41,4	82,6
Partial safety factor	$\gamma_{Ms,C1}^{1)}$ [-]	1,40		
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$N_{Rk,s,C1}$ [kN]	30,5	43,1	78,2
Partial safety factor	$\gamma_{Ms,C1}^{1)}$ [-]	1,40		
Pullout failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$N_{Rk,p,C1}$ [kN]	11,0	14,0	22,7
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$N_{Rk,p,C1}$ [kN]	8,0	10,7	18,0
Concrete cone failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		
Splitting failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		

¹⁾ In absence of other national regulations

²⁾ For concrete cone failure and splitting failure see EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances

Characteristic tension resistance for seismic performance category C1

Annex C7

Table C5: Characteristic values of resistance under shear load in case of seismic performance category C1 – hammer drilling only

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Steel failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$V_{Rk,s,C1}$ [kN]	11,9	21,4	39,7
Partial factor	$\gamma_{Ms,C1}^{1)}$ [-]	1,25		
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$V_{Rk,s,C1}$ [kN]	13,6	23,1	37,5
Partial factor	$\gamma_{Ms,C1}^{1)}$ [-]	1,25		
Concrete pry-out failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		
Concrete edge failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		

¹⁾ In absence of other national regulations

²⁾ For concrete pry-out failure and concrete edge failure see EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances

Characteristic shear resistance for seismic performance category C1

Annex C8

Table C6: Characteristic values of resistance under tension load in case of seismic performance category C2 – hammer drilling only

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Steel failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	28,0	41,4	82,6
Partial factor	$\gamma_{Ms,C2}^{1)}$ [-]	1,40		
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$N_{Rk,s,C2}$ [kN]	30,5	43,1	78,2
Partial factor	$\gamma_{Ms,C2}^{1)}$ [-]	1,40		
Pullout failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$N_{Rk,p,C2}$ [kN]	5,5	14,0	18,0
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$N_{Rk,p,C2}$ [kN]	3,3	10,0	12,8
Concrete cone failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		
Splitting failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		

¹⁾ In absence of other national regulations

²⁾ For concrete pry-out failure and concrete edge failure see EN 1992-4:2018

Hilti metal expansion anchor HST2 V3

Performances

Characteristic tension resistance for seismic performance category C2

Annex C9

**Table C7: Displacements under tension loads for seismic performance category C2
– hammer drilling only**

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Displacements under tension loading				
HST2 V3, HST2-F V3				
Displacement	$\delta_{N,C2(0,5)}$ [mm]	3,55	5,21	5,25
Displacement	$\delta_{N,C2(0,8)}$ [mm]	13,56	14,93	15,77
HST2-R V3, HST2-HCR V3				
Displacement	$\delta_{N,C2(0,5)}$ [mm]	1,4	6,7	4,0
Displacement	$\delta_{N,C2(0,8)}$ [mm]	8,6	15,9	13,3

Hilti metal expansion anchor HST2 V3

Performances

Displacements under tension loads for seismic performance category C2

Annex C10

Table C8: Characteristic values of resistance under shear load in case of seismic performance category C2 – hammer drilling only

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Steel failure				
HST2 V3, HST2-F V3				
Characteristic resistance	$V_{Rk,s,C2}$ [kN]	7,4	11,1	25,0
Partial factor	$\gamma_{Ms,C2}^{1)}$ [-]	1,25		
HST2-R V3, HST2-HCR V3				
Characteristic resistance	$V_{Rk,s,C2}$ [kN]	12,0	18,0	37,5
Partial factor	$\gamma_{Ms,C2}^{1)}$ [-]	1,25		
Concrete pry-out failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		
Concrete edge failure ²⁾				
HST2 V3, HST2-F V3, HST2-R V3, HST2-HCR V3				
Installation factor	γ_{inst} [-]	1,00		

¹⁾ In absence of other national regulations

²⁾ For concrete pry-out failure and concrete edge failure see EN 1992-4:2018

Table C9: Displacements under shear loads for seismic performance category C2 – hammer drilling only

		M10	M12	M16
Effective embedment depth	h_{ef} [mm]	60	70	85
Displacements under shear loading				
HST2 V3, HST2-F V3				
Displacement	$\delta_{V,C2(0,5)}$ [mm]	4,53	4,18	4,42
Displacement	$\delta_{V,C2(0,8)}$ [mm]	6,21	5,89	6,68
HST2-R V3, HST2-HCR V3				
Displacement	$\delta_{V,C2(0,5)}$ [mm]	4,2	5,3	5,7
Displacement	$\delta_{V,C2(0,8)}$ [mm]	7,5	7,9	8,9

Hilti metal expansion anchor HST2 V3

Performances

Characteristic shear resistance and displacements for seismic performance category C2

Annex C11

Table C10: Characteristic tension resistance under fire exposure for Hilti metal expansion anchor HST2 V3, HST2-F V3 in cracked and uncracked concrete

				M8	M10	M12	M16
Steel failure							
HST2 V3, HST2-F V3							
Effective embedment depth	$h_{ef,1}$	[mm]		30 - 44	40 - 59	50 - 69	65 - 84
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60	$N_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90	$N_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120	$N_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Effective embedment depth	$h_{ef,2}$	[mm]		45 - 70	60 - 80	70 - 100	85 - 120
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	1,2	2,6	4,8	9,0
	R60	$N_{Rk,s,fi}$	[kN]	1,0	2,1	3,8	7,0
	R90	$N_{Rk,s,fi}$	[kN]	0,8	1,5	2,7	5,0
	R120	$N_{Rk,s,fi}$	[kN]	0,6	1,2	2,1	4,0
Pullout failure							
Effective embedment depth	h_{ef}	[mm]		30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance in concrete $\geq C20/25$	R30	$N_{Rk,p,fi}$	[kN]	$0,25 \cdot N_{Rk,p}^{1)}$			
	R60	$N_{Rk,p,fi}$	[kN]				
	R90	$N_{Rk,p,fi}$	[kN]				
	R120	$N_{Rk,p,fi}$	[kN]	$0,20 \cdot N_{Rk,p}^{1)}$			

¹⁾ $N_{Rk,p}$ is the characteristic resistance for pull-out failure $N_{Rk,p,cr}$ (see Table C1) in cracked concrete C20/25 under ambient temperature

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under tension loading under fire exposure in cracked and uncracked concrete

Annex C12

Table C10: Continued

			M8	M10	M12	M16
Concrete cone failure						
HST2 V3, HST2-F V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance in concrete $\geq C20/25$	R30	$N^0_{Rk,c,fi}$ [kN]	$h_{ef} / 200 \cdot N^0_{Rk,c} \leq N^0_{Rk,c}$			
	R60	$N^0_{Rk,c,fi}$ [kN]				
	R90	$N^0_{Rk,c,fi}$ [kN]	$0,8 \cdot h_{ef} / 200 \cdot N^0_{Rk,c} \leq N^0_{Rk,c}$			
	R120	$N^0_{Rk,c,fi}$ [kN]				
Spacing	$s_{cr,N}$	[mm]	4 h_{ef}			
	s_{min}	[mm]	40	55	60	70
Edge distance	$c_{cr,N}$	[mm]	2 h_{ef}			
	c_{min}	[mm]	Fire attack from one side: 2 h_{ef} Fire attack from more than one side: ≥ 300			

In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under tension loading under fire exposure in cracked and uncracked concrete

Annex C13

Table C11: Characteristic tension resistance under fire exposure for Hilti metal expansion anchor HST2-R V3, HST2-HCR V3 in cracked and uncracked concrete

				M8	M10	M12	M16
Steel failure							
HST2-R V3, HST2-HCR V3							
Effective embedment depth	$h_{ef,1}$	[mm]		30 - 44	40 - 59	50 - 69	65 - 84
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60	$N_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90	$N_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120	$N_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Effective embedment depth	$h_{ef,2}$	[mm]		45 - 70	60 - 80	70 - 100	85 - 120
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,9	2,5	5,0	9,0
	R60	$N_{Rk,s,fi}$	[kN]	0,7	1,5	3,5	6,0
	R90	$N_{Rk,s,fi}$	[kN]	0,6	1,0	2,0	3,5
	R120	$N_{Rk,s,fi}$	[kN]	0,5	0,7	1,0	2,0
Pullout failure							
Effective embedment depth	h_{ef}	[mm]		30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance in concrete $\geq C20/25$	R30	$N_{Rk,p,fi}$	[kN]	$0,25 \cdot N_{Rk,p}^{1)}$			
	R60	$N_{Rk,p,fi}$	[kN]				
	R90	$N_{Rk,p,fi}$	[kN]				
	R120	$N_{Rk,p,fi}$	[kN]	$0,20 \cdot N_{Rk,p}^{1)}$			

¹⁾ $N_{Rk,p}$ is the characteristic resistance for pull-out failure $N_{Rk,p,cr}$ (see Table C1) in cracked concrete C20/25 under ambient temperature

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under tension loading under fire exposure in cracked and uncracked concrete

Annex C14

Table C11: Continued

			M8	M10	M12	M16
Concrete cone failure						
HST2-R V3, HST2-HCR V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance in concrete $\geq C20/25$	R30	$N^0_{Rk,c,fi}$ [kN]	$h_{ef} / 200 \cdot N^0_{Rk,c} \leq N^0_{Rk,c}$			
	R60	$N^0_{Rk,c,fi}$ [kN]				
	R90	$N^0_{Rk,c,fi}$ [kN]	$0,8 \cdot h_{ef} / 200 \cdot N^0_{Rk,c} \leq N^0_{Rk,c}$			
	R120	$N^0_{Rk,c,fi}$ [kN]				
Spacing	$s_{cr,N}$	[mm]	4 h_{ef}			
	s_{min}	[mm]	40	55	60	70
Edge distance	$c_{cr,N}$	[mm]	2 h_{ef}			
	c_{min}	[mm]	Fire attack from one side: 2 h_{ef} Fire attack from more than one side: ≥ 300			

In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under tension loading under fire exposure in cracked and uncracked concrete

Annex C15

Table C12: Characteristic shear resistance under fire exposure for Hilti metal expansion anchor HST2 V3, HST2-F V3 in cracked and uncracked concrete

			M8	M10	M12	M16
Steel failure without lever arm						
HST2 V3, HST2-F V3						
Effective embedment depth	$h_{ef,1}$	[mm]	30 - 44	40 - 59	50 - 69	65 - 84
Characteristic resistance	R30	$V_{Rk,s,fi}$ [kN]	0,4	0,9	1,7	3,1
	R60	$V_{Rk,s,fi}$ [kN]	0,3	0,8	1,3	2,4
	R90	$V_{Rk,s,fi}$ [kN]	0,3	0,6	1,1	2,0
	R120	$V_{Rk,s,fi}$ [kN]	0,2	0,5	0,8	1,6
Effective embedment depth	$h_{ef,2}$	[mm]	45 - 70	60 - 80	70 - 100	85 - 120
Characteristic resistance	R30	$V_{Rk,s,fi}$ [kN]	1,2	2,6	4,8	9,0
	R60	$V_{Rk,s,fi}$ [kN]	1,0	2,1	3,8	7,0
	R90	$V_{Rk,s,fi}$ [kN]	0,8	1,5	2,7	5,0
	R120	$V_{Rk,s,fi}$ [kN]	0,6	1,2	2,1	4,0
Steel failure with lever arm						
HST2 V3, HST2-F V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	R30	$M^0_{Rk,s,fi}$ [Nm]	1,3	3,4	7,5	19,1
	R60	$M^0_{Rk,s,fi}$ [Nm]	1,0	2,7	5,8	14,8
	R90	$M^0_{Rk,s,fi}$ [Nm]	0,8	2,0	4,2	10,6
	R120	$M^0_{Rk,s,fi}$ [Nm]	0,7	1,6	3,3	8,5
Concrete pry-out failure						
HST2 V3, HST2-F V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Pry-out factor	k_8	[-]	2,34	2,55	2,57	2,82
Characteristic resistance in concrete \geq C20/25	R30	$V_{Rk,cp,fi}$ [kN]	$k_8 \cdot N_{Rk,c,fi(90)}^{1)}$			
	R60	$V_{Rk,cp,fi}$ [kN]				
	R90	$V_{Rk,cp,fi}$ [kN]				
	R120	$V_{Rk,cp,fi}$ [kN]	$k_8 \cdot N_{Rk,c,fi(120)}^{1)}$			

¹⁾ $N_{Rk,c,fi(90)}$ and $N_{Rk,c,fi(120)}$ see Annex C13 with $N^0_{Rk,c,fi}$ under fire exposure for 90 or 120 minutes respectively

In absence of other national regulations, the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under shear loading under fire exposure in cracked and uncracked concrete

Annex C16

Table C12: Continued

Concrete edge failure
HST2 V3, HST2-F V3
Concrete edge failure in concrete C20/25 to C50/60 under fire exposure $V_{Rk,c,fi}^0 = 0,25 \times V_{Rk,c}^0 \quad (\leq R90)$ $V_{Rk,c,fi}^0 = 0,20 \times V_{Rk,c}^0 \quad (R120)$ with $V_{Rk,c}^0$ = initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature

Table C13: Characteristic shear resistance under fire exposure for Hilti metal expansion anchor HST2-R V3, HST2-HCR V3 in cracked and uncracked concrete

			M8	M10	M12	M16
Steel failure without lever arm						
HST2-R V3, HST2-HCR V3						
Effective embedment depth	$h_{ef,1}$	[mm]	30 - 44	40 - 59	50 - 69	65 - 84
Characteristic resistance	R30	$V_{Rk,s,fi}$ [kN]	0,4	0,9	1,7	3,1
	R60	$V_{Rk,s,fi}$ [kN]	0,3	0,8	1,3	2,4
	R90	$V_{Rk,s,fi}$ [kN]	0,3	0,6	1,1	2,0
	R120	$V_{Rk,s,fi}$ [kN]	0,2	0,5	0,8	1,6
Effective embedment depth	$h_{ef,2}$	[mm]	45 - 70	60 - 80	70 - 100	85 - 120
Characteristic resistance	R30	$V_{Rk,s,fi}$ [kN]	0,9	2,5	5,0	9,0
	R60	$V_{Rk,s,fi}$ [kN]	0,7	1,5	3,5	6,0
	R90	$V_{Rk,s,fi}$ [kN]	0,6	1,0	2,0	3,5
	R120	$V_{Rk,s,fi}$ [kN]	0,5	0,7	1,0	2,0
Steel failure with lever arm						
HST2-R V3, HST2-HCR V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Characteristic resistance	R30	$M_{Rk,s,fi}^0$ [Nm]	1,0	3,3	8,1	20,6
	R60	$M_{Rk,s,fi}^0$ [Nm]	0,8	2,4	5,7	14,4
	R90	$M_{Rk,s,fi}^0$ [Nm]	0,7	1,6	3,2	8,2
	R120	$M_{Rk,s,fi}^0$ [Nm]	0,6	1,2	2,0	5,1

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under shear loading under fire exposure in cracked and uncracked concrete

Annex C17

Table C13: Continued

			M8	M10	M12	M16
Concrete pry-out failure						
HST2-R V3, HST2-HCR V3						
Effective embedment depth	h_{ef}	[mm]	30 - 70	40 - 80	50 - 100	65 - 120
Pry-out factor	k_8	[-]	2,34	2,55	2,57	2,82
Characteristic resistance in concrete \geq C20/25	R30	$V_{Rk,cp,fi}$ [kN]	$k_8 \cdot N_{Rk,c,fi(90)}^{1)}$			
	R60	$V_{Rk,cp,fi}$ [kN]				
	R90	$V_{Rk,cp,fi}$ [kN]				
	R120	$V_{Rk,cp,fi}$ [kN]	$k_8 \cdot N_{Rk,c,fi(120)}^{1)}$			
Concrete edge failure						
HST2-R V3, HST2-HCR V3						
Concrete edge failure in concrete C20/25 to C50/60 under fire exposure						
$V_{Rk,c,fi}^0 = 0,25 \times V_{Rk,c}^0 \quad (\leq R90)$ $V_{Rk,c,fi}^0 = 0,20 \times V_{Rk,c}^0 \quad (R120)$						
with $V_{Rk,c}^0$ = initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature						

¹⁾ $N_{Rk,c,fi(90)}$ and $N_{Rk,c,fi(120)}$ see Annex C15 with $N_{Rk,c,fi}^0$ under fire exposure for 90 or 120 minutes respectively

In absence of other national regulations the partial safety factor for resistance under fire exposure $\gamma_{M,fi} = 1,0$ is recommended.

Hilti metal expansion anchor HST2 V3

Performances

Characteristic values of resistance under shear loading under fire exposure in cracked and uncracked concrete

Annex C18