Deutsches Institut für Bautechnik

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

European Technical Assessment Body for construction products

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European Technical Assessment ETA-18/0974 of 17 July 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 undercut anchor HDA
Product family to which the construction product belongs	Post-installed fasteners in concrete under fatigue cyclic loading
Manufacturer	Hilti Aktiengesellschaft Feldkircherstrasse 100 9494 SCHAAN FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Werke Hilti Plants
This European Technical Assessment contains	24 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 330250-00-0601, Edition 06/2021
This version replaces	ETA-18/0974 issued on 30 November 2020

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Specific Part

1 Technical description of the product

The Hilti undercut anchor HDA consists of a Hilti Cone bolt HDA -P or HDA -T with ring, sleeve, bolt and cap, a Hilti sealing washer, a spherical washer, nut and a lock nut and an injection mortar Hilti HIT-HY 200-A V3 or Hilti HIT-HY 200-R V3.

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 anchor 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 (static and quasi-static loading and seismic loading)	**Performance**
Characteristic resistance to tension load (static and quasi-static loading)	see Annex B5 and C1
Characteristic resistance to shear load (static and quasi-static loading)	see Annex C2
Displacements under short-term and long-term loading (static and quasi-static loading)	No performance assessed on basis of EAD 330250-00-0601
Characteristic resistance and displacements for seismic performance categories C1 and C2	

Essential characteristic (fatigue loading, Assessment method A: Continuous function of fatigue resistance)	**Performance**
Characteristic fatigue resistance under cyclic tension loading	
Characteristic steel fatigue resistance $\Delta N_{Rk,s,0,n}$ (n = 1 to n = ∞)	see Annex C3 and C6
Characteristic concrete cone, pull-out and splitting fatigue resistance $\Delta N_{Rk,c,0,n}$ $\Delta N_{Rk,p,0,n}$ $\Delta N_{Rk,sp,0,n}$ (n = 1 to n = ∞)	

Essential characteristic (fatigue loading, Assessment method A: Continuous function of fatigue resistance)	**Performance**
Characteristic fatigue resistance under cyclic shear loading	
Characteristic steel fatigue resistance $\Delta V_{Rk,s,0,n}$ (n = 1 to n = ∞)	See Annex C4 to C7
Characteristic concrete edge fatigue resistance $V_{Rk,c,0,n}$ (n = 1 to n = ∞)	
Characteristic concrete pry out fatigue resistance $\Delta V_{Rk,cp,0,n}$ (n = 1 to n = ∞)	
Characteristic fatigue resistance under cyclic combined tension and shear loading	
Characteristic steel fatigue resistance a_{sn} (n = 1 to n = ∞)	See Annex C7
Load transfer factor for cyclic tension and shear loading	
Load transfer factor ψ_{FN}, ψ_{FV}	See Annex C3 to C7

3.2 Safty in case of fire (BWR 2)

Essential characteristic	**Performance**
Reaction to fire	Class A1
Resistance to fire	No performance assessed on basis of EAD 330250-00-0601

3.3 Aspects of durability linked with the Basic Works Requirements

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 European Assessment Document No. 330250-00-0601, the applicable European legal act is: [96/582/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 European Assessment Document

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

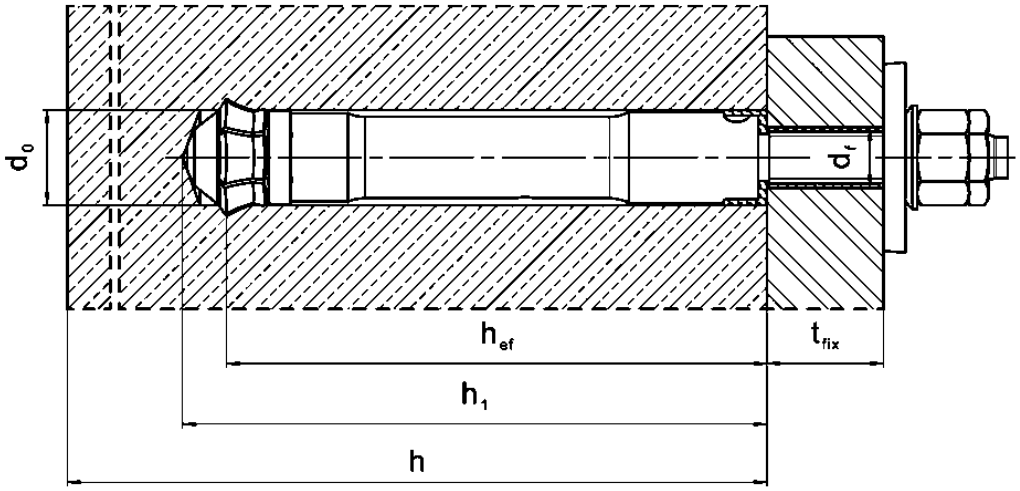
Issued in Berlin on 17 July 2025 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

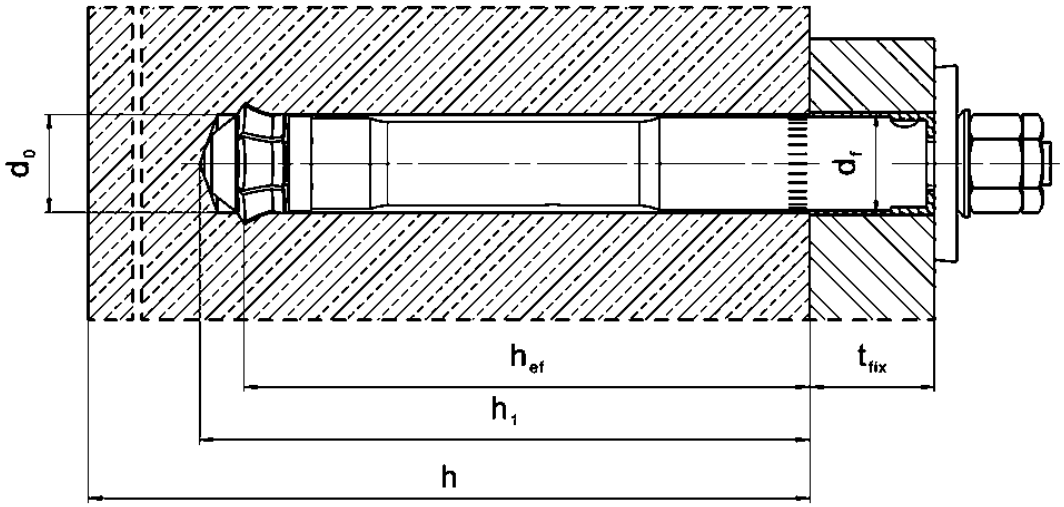
beglaubigt:
Stiller

Installed condition

Hilti HDA-P installed with Hilti filling set (Prepositioning)



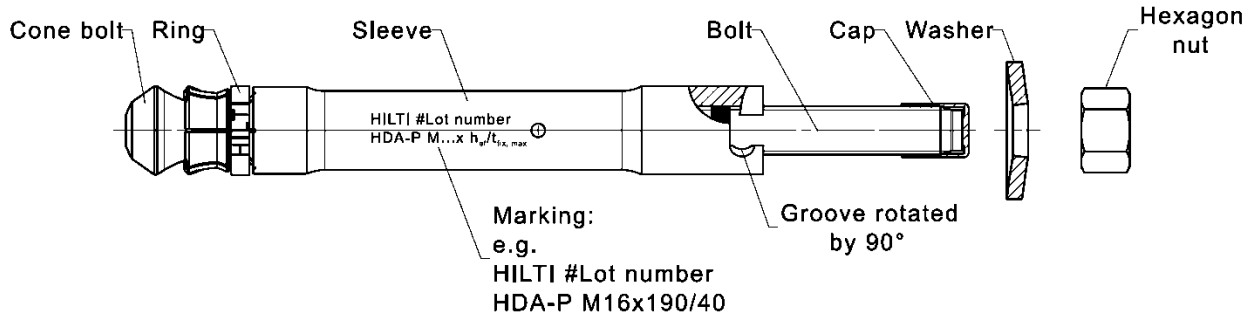
Hilti HDA-T installed with Hilti filling set (Post positioning)



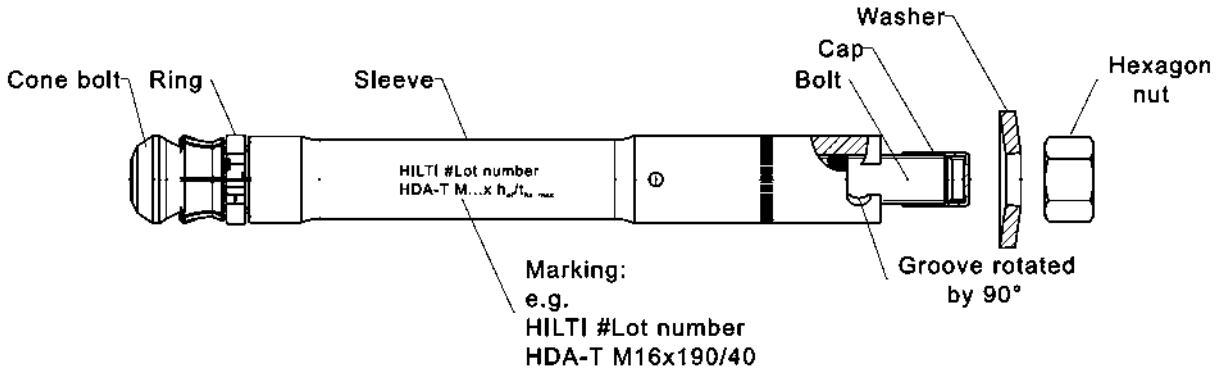
Hilti undercut anchor HDA	**Annex A1**
Product description Installed condition	

Product description

Hilti undercut anchor HDA-P



Hilti undercut anchor HDA-T



Hilti undercut anchor HDA	**Annex A2**
Product description Product types and parts	

Injection mortar Hilti HIT-HY 200-A V3 and Hilti HIT-HY 200-R V3: hybrid system with aggregate
Foil pack 330 ml and 500 ml

Marking:
HILTI HIT
Production number and
production line
Expiry date mm/yyyy

Product name: “Hilti HIT-HY 200-A V3”

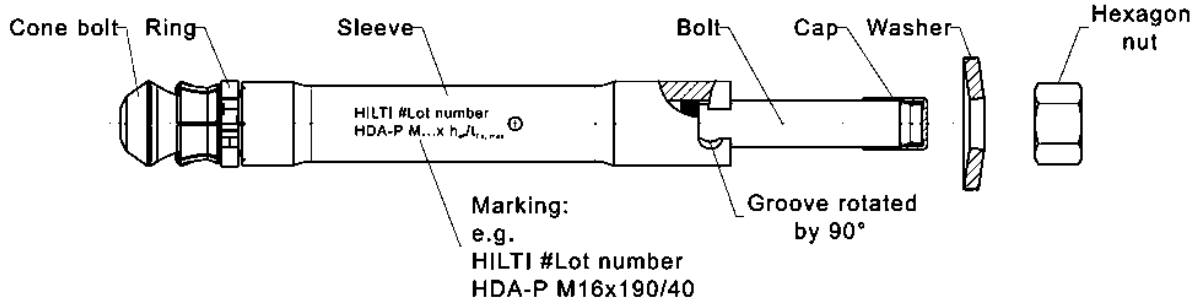
Product name: “Hilti HIT-HY 200-R V3”

Static mixer Hilti HIT-RE-M

Hilti undercut anchor HDA	**Annex A3**
Product description Product types and parts	

Product materials and marking

Hilti undercut anchor HDA-P



Hilti undercut anchor HDA-T

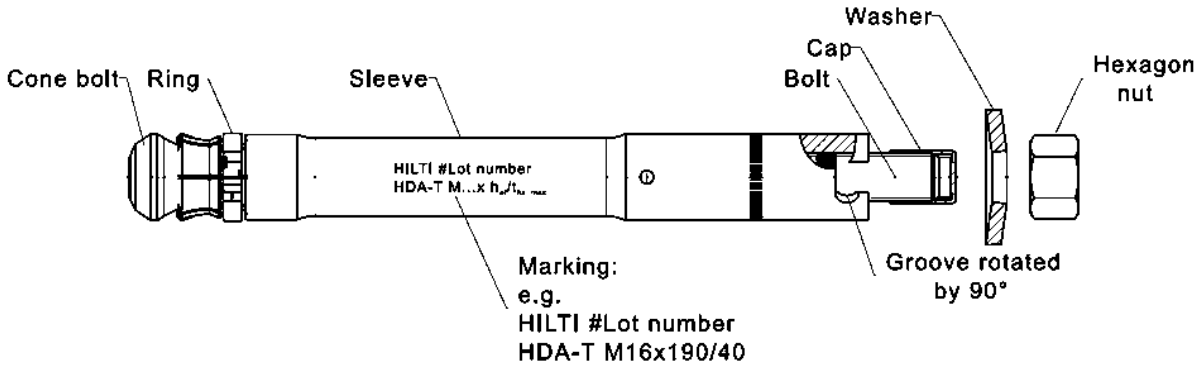


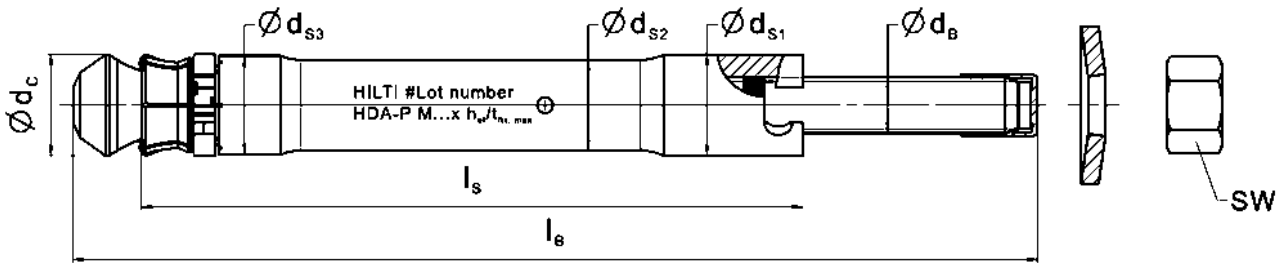
Table A1: Materials of HDA-P/HDA-T and the Filling set

Designation	**HDA-P / HDA-T**
Sleeve	Carbon steel, galvanized, ≥ 5 μm
Bolt	Carbon steel, galvanized, ≥ 5 μm
Hexagon nut	Carbon steel, galvanized, ≥ 5 μm
Washer	Carbon steel, galvanized, ≥ 5 μm
Ring	Plastic ring
Protective Cap	Plastic cap
Hilti Filling Set	
Sealing washer	Galvanized carbon steel
Spherical washer	Galvanized carbon steel
Mortar	
Injection mortar	Injection mortar Hilti HIT-HY…

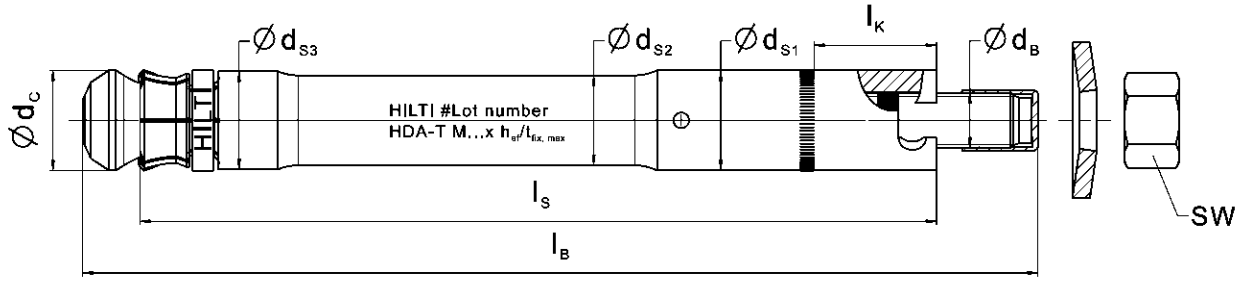
Table A2: Fastener dimensions

Fastener type	$t_{fix,max}$ [mm]	l_B [mm]	Length code letter	l_S [mm]	l_k [mm]	SW	d_{S1} [mm]	d_{S2} [mm]	d_{S3} [mm]	d_C [mm]	d_B [mm]
HDA-P M10x100/20	20	150	I	100	-	17	19	16,8	18,5	19,5	10
HDA-T M10x100/20	20	150	I	120	17	17	19	16,8	18,5	19,5	10
HDA-P M12x125/30	30	190	L	125	-	19	21	18,8	20,5	21,4	12
HDA-P M12x125/50	50	210	N	125	-	19	21	18,8	20,5	21,4	12
HDA-T M12x125/30	30	190	L	155	27	19	21	18,8	20,5	21,4	12
HDA-T M12x125/50	50	210	N	175	47	19	21	18,8	20,5	21,4	12
HDA-P M16x190/40	40	275	R	190	-	24	29	26	28,5	29	16
HDA-P M16x190/60	60	295	S	190	-	24	29	26	28,5	29	16
HDA-T M16x190/40	40	275	R	230	35,5	24	29	26	28,5	29	16
HDA-T M16x190/60	60	295	S	250	55,5	24	29	26	28,5	29	16
HDA-P M20x250/50	50	360	V	250	-	30	35	32	34,5	36	20
HDA-P M20x250/100	100	410	X	250	-	30	35	32	34,5	36	20
HDA-T M20x250/50	50	360	V	300	45	30	35	32	34,5	36	20
HDA-T M20x250/100	100	410	X	350	95	30	35	32	34,5	36	20

Pre-setting anchor HDA-P (Prepositioning)



Through-fastening anchor HDA-T (Post positioning)



Hilti undercut anchor HDA

Product description
Fastener dimensions

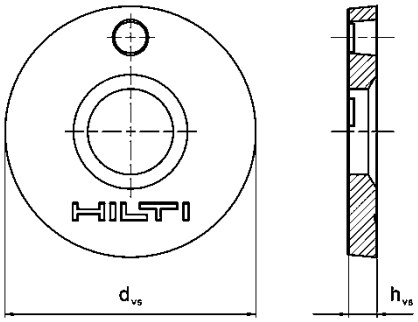
Annex A5

Table A3: Dimensions of the Filling Set

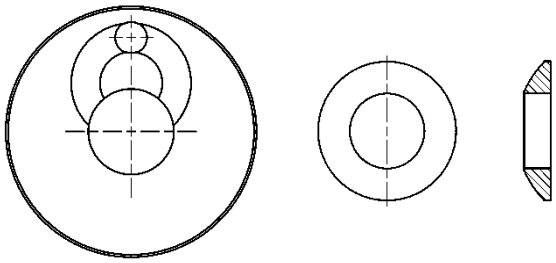
Filling Set used for HDA-P and HDA-T			**M10**	**M12**	**M16**	**M20**
Diameter of sealing washer	$d_{vs}d_{VS}$	[mm]	42	44	52	60
Thickness of sealing washer	h_{vs}	[mm]	5		6	
Thickness of Hilti Filling Set	h_{fs}	[mm]	9	10	11	13

Filling Set to fill the annular gap between the fastener and the fixture

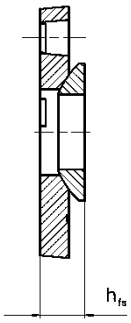
Sealing washer



Spherical washer



Filling Set



Hilti undercut anchor HDA

Product description
Filling set dimensions

Annex A6

Specifications of intended use

Anchorages subject to:

- Static and quasi-static loading
- Fatigue cycling loading.

Base material:

- Reinforced or unreinforced normal weight concrete according to EN 206:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013 + A1:2016.
- Cracked and uncracked concrete.

Use conditions (environmental conditions):

- Structures subject to dry internal conditions.

Design:

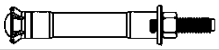
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under fatigue cycling loading are designed in accordance with:
  EN 1992-4:2018 and EOTA Technical Report TR 061.

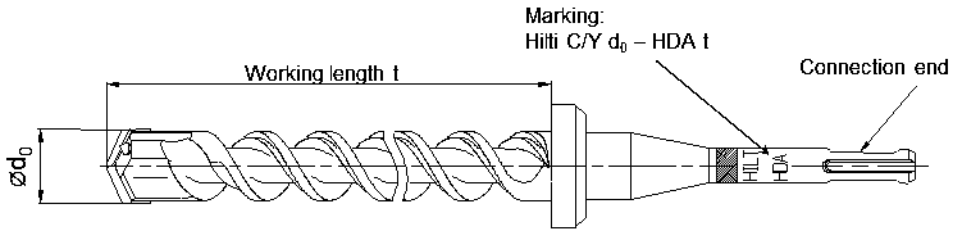
Installation:

- Drilling technique: hammer drilling with Hilti stop drill bit.
- Fastener installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Fastener installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools (hammer drill, setting tool, stop drill bit, filling set).
- The drill hole is realized with the specified Hilti stop drill bit by hammer drilling technique.
- The fastener is inserted in the cleaned drill hole by hand.
- With the specified setting tool and hammer drill, the fastener is expanded in the drill hole until the marking of the setting tool matches with the surface of the concrete (HDA-P) or with the surface of the fixture (HDA-T).
- The fastener is completely expanded, if the coloured ring of the rod exceeds beyond the upper end of the sleeve. In case the coloured ring is not visible yet out of the sleeve, the setting must be continued.
- After the complete expansion of the fastener, the recess of the sleeve with respect to the concrete surface (HDA-P) or to the surface of the fixture (HDA-T) shall be in the range specified in Table B3, Annex B4.
- Application of the torque moment given in Table B3, Annex B4 using a calibrated torque wrench.

Hilti undercut anchor HDA	**Annex B1**
Intended use Specifications	

Table B1: Required stop drill bits for HDA

Fastener 	**Stop drill bit with**		**Nominal Working length**	**Drill bit diameter**
	TE-C connection end 	**TE-Y** connection end 	**t** [mm]	**d_0** [mm]
HDA-P M10x100/20	TE-C-HDA-B 20x100	TE-Y-HDA-B 20x100	107	20
HDA-T M10x100/20	TE-C-HDA-B 20x120	TE-Y-HDA-B 20x120	127	20
HDA-P M12x125/30 HDA-P M12x125/50	TE-C HDA-B 22x125	TE-Y HDA-B 22x125	133	22
HDA-T M12x125/30	TE-C HDA-B 22x155	TE-Y HDA-B 22x155	163	22
HDA-T M12x125/50	TE-C HDA-B 22x175	TE-Y HDA-B 22x175	183	22
HDA-P M16x190/40 HDA-P M16x190/60	-	TE-Y HDA-B 30x190	203	30
HDA-T M16x190/40	-	TE-Y HDA-B 30x230	243	30
HDA-T M16x190/60	-	TE-Y HDA-B 30x250	263	30
HDA-P M20x250/50 HDA-P M20x250/100	-	TE-Y HDA-B 37x250	266	37
HDA-T M20x250/50	-	TE-Y HDA-B 37x300	316	37
HDA-T M20x250/100	-	TE-Y HDA-B 37x350	366	37

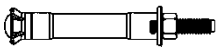
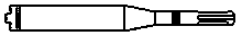


Hilti undercut anchor HDA

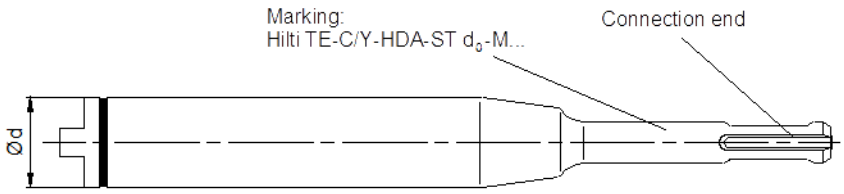
Intended use
Required stop drill bits

Annex B2

Table B2: Required setting tools for HDA[1)]

Fastener	Setting tool with		Ød [mm]
	**TE-C** connection end 	**TE-Y** connection end 	
HDA-P M10x100/20	TE-C-HDA-ST 20-M10	TE-Y-HDA-ST 20-M10	20
HDA-T M10x100/20			
HDA-P M12x125/30 HDA-P M12x125/50	TE-C-HDA-ST 22-M12	TE-Y-HDA-ST 22-M12	22
HDA-T M12x125/30 HDA-T M12x125/50			
HDA-P M16x190/40 HDA-P M16x190/60	-	TE-Y-HDA-ST 30-M16	30
HDA-T M16x190/40 HDA-T M16x190/60			
HDA-P M20x250/50 HDA-P M20x250/100	-	TE-Y-HDA-ST 37-M20	37
HDA-T M20x250/50 HDA-T M20x250/100			

[1)] Required drilling machine for HDA as defined by the manufacturer in the manufacturer's product installation instructions.



Hilti undercut anchor HDA

Intended use
Required setting tools

Annex B3

Table B3: Installation parameters

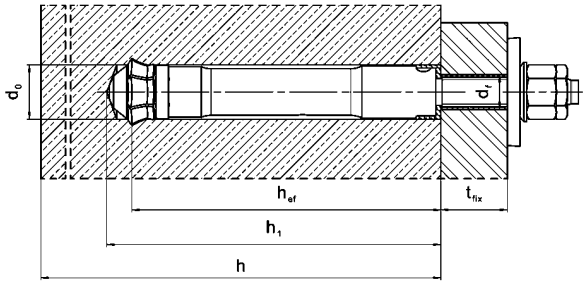
Fastener type / **Pre-setting/ Through-fastening**			**HDA M10**		**HDA M12**		**HDA M16**		**HDA M20**	
			P	**T**	**P**	**T**	**P**	**T**	**P**	**T**
Nominal diameter of drill bit	d_0	[mm]	20		22		30		37	
Maximum cutting diameter of drill bit	$d_{cut} \leq$	[mm]	20,55		22,55		30,55		37,70	
Depth of drill hole	h_1	[mm]	107	≥107	133	≥133	203	≥203	266	≥266
Maximum diameter of clearance hole in the fixture	d_f	[mm]	12	21	14	23	18	32	22	40
Minimum fixture thickness	$t_{fix,min}$	[mm]	10	15	10	20	10	20	10	20
Maximum fixture thickness	$t_{fix,max}$	[mm]	see Table A2, Annex A5							
Sleeve recess[1)]	h_S	[mm]	$2 \leq h_S \leq 6$		$2 \leq h_S \leq 7$		$2 \leq h_S \leq 8$		$2 \leq h_S \leq 8$	
Installation torque	T_{inst}	[Nm]	50		80		120		300	

[1)] sleeve recess after setting of the fastener:

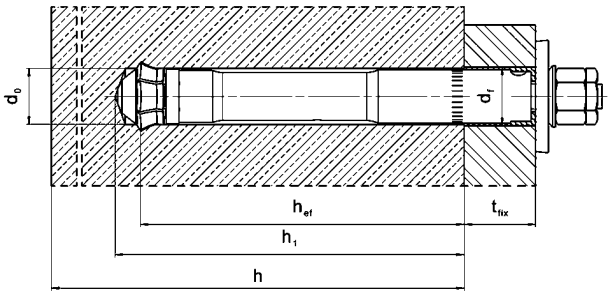
a) Pre-setting anchor HDA-P:
distance from surface of the concrete member to top edge of the anchor sleeve, see Annex A1.

b) Through-fastening anchor HDA-T:
distance from top edge of the fixture to top edge of the anchor sleeve, see Annex A1.

Pre-setting anchor
HDA-P (Prepositioning)



Through-fastening anchor
HDA-T (Post positioning)



Hilti undercut anchor HDA

Intended use
Installation parameters

Annex B4

Table B4: Minimum thickness of concrete member, HDA-P

Fastener type			**HDA-P M10**	**HDA-P M12**	**HDA-P M16**	**HDA-P M20**
Minimum thickness of concrete member	h_{min}	[mm]	180	200	270	350

Table B5: Minimum thickness of concrete member, HDA-T

Fastener type			**HDA-T M10**	**HDA-T M12**		**HDA-T M16**		**HDA-T M20**	
Maximum fixture thickness	$t_{fix,max}$ [1]	[mm]	20	30	50	40	60	50	100
Minimum thickness of concrete member	h_{min} [2]	[mm]	200-t_{fix}	230-t_{fix}	250-t_{fix}	310-t_{fix}	330-t_{fix}	400-t_{fix}	450-t_{fix}

[1] $t_{fix,max}$ maximum fastenable thickness, see Table B3, Annex B4.

[2] h_{min} is dependent on the actual fixture thickness t_{fix} (use of a stop drill bit).

e.g. HDA-T 22-M12x125/50: t_{fix} = 20mm → h_{min} = 250-20 = 230mm

t_{fix} = 50mm → h_{min} = 250-50 = 200mm

Table B6: Minimum spacing and minimum edge distances of fasteners

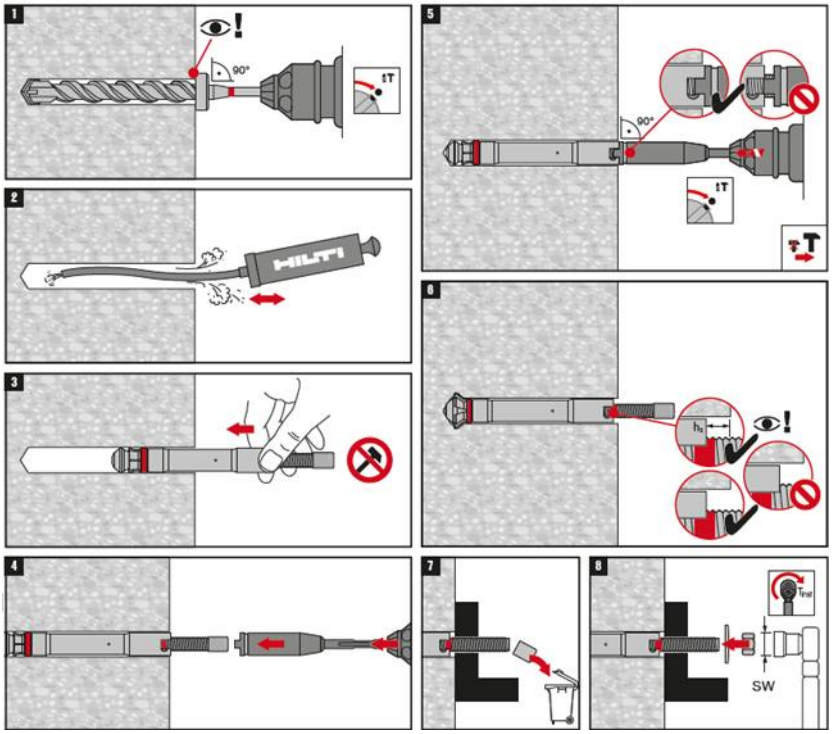
HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Cracked concrete						
Minimum spacing	s_{min}	[mm]	80	90	120	150
Minimum edge distance	c_{min}	[mm]	80	90	120	150
Uncracked concrete						
Minimum spacing	s_{min}	[mm]	80	90	120	150
Minimum edge distance	c_{min}	[mm]	80	90	120	150

Hilti undercut anchor HDA

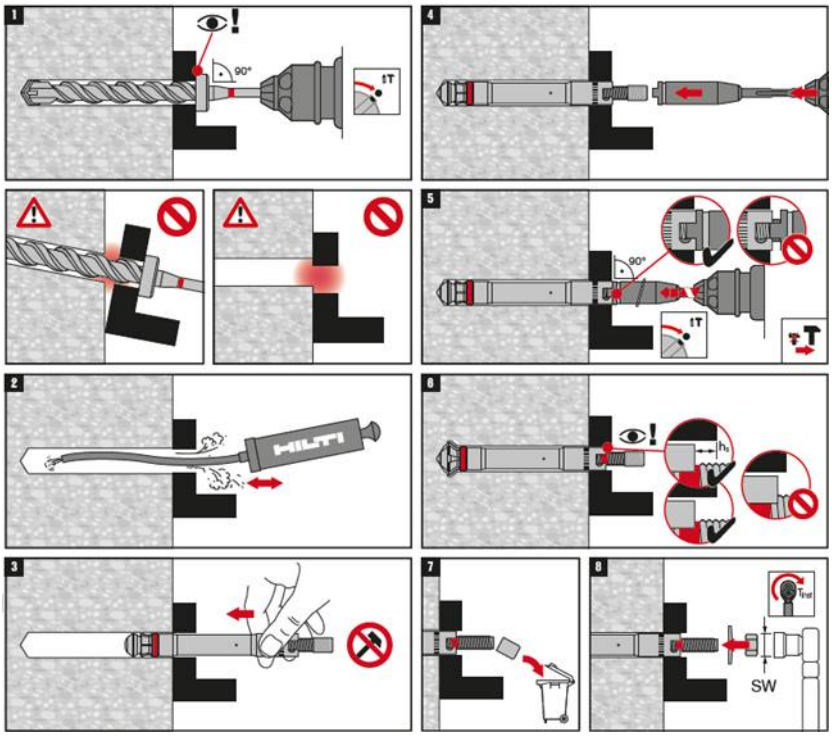
Intended use
Minimum concrete thickness, minimum spacing and minimum edge distance

Annex B5

Installation instructions: HDA-P (Prepositioning)



Installation instructions: HDA-T (Post positioning)



Hilti undercut anchor HDA

Intended use
Installation instructions

Annex B6

Installation instructions for the filling set

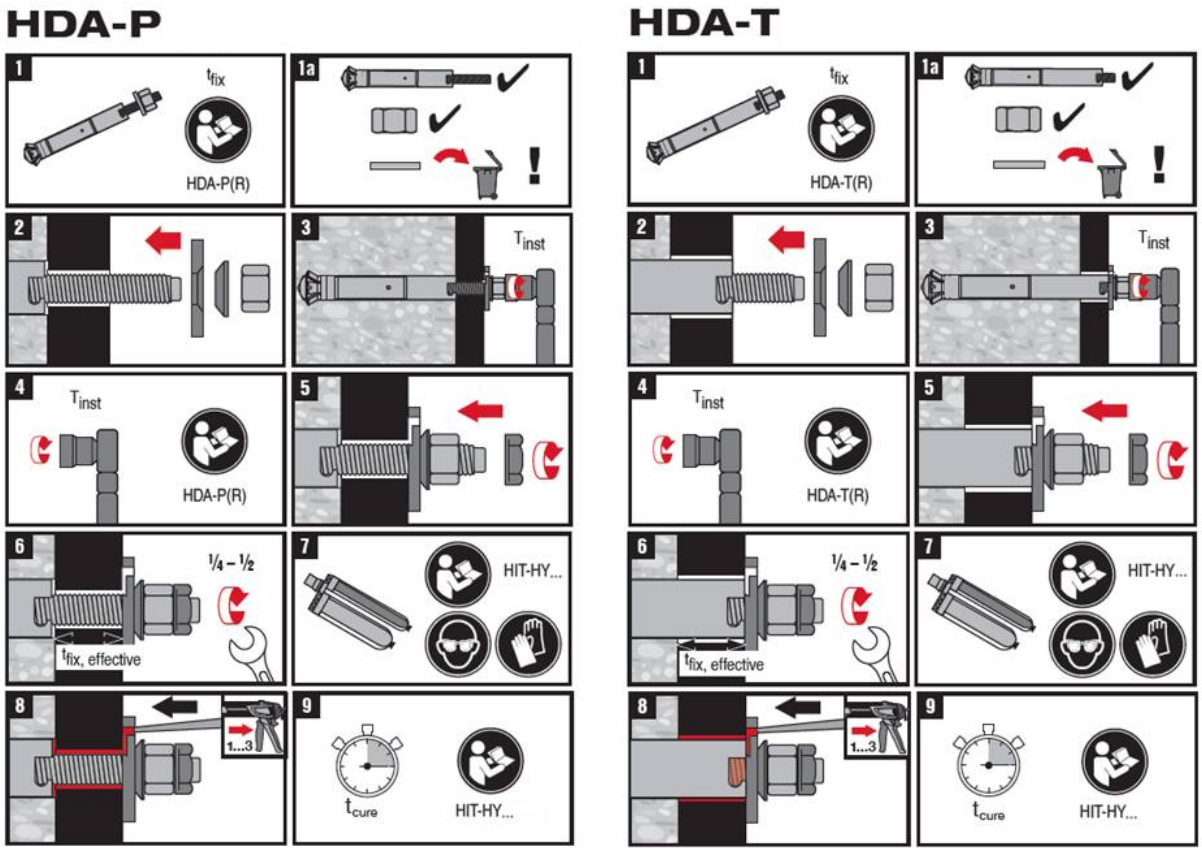


Table B7: Maximum working time and minimum curing time HY 200-A V3

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
> 0 °C to 5 °C	25 min	2 hours
> 5 °C to 10 °C	15 min	75 min
> 10 °C to 20 °C	7 min	45 min
> 20 °C to 30 °C	4 min	30 min
> 30 °C to 40 °C	3 min	30 min

Table B8: Maximum working time and minimum curing time HY 200-R V3

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
> 0 °C to 5 °C	45 min	4 hours
> 5 °C to 10 °C	30 min	2,5 hours
> 10 °C to 20 °C	15 min	1,5 hours
> 20 °C to 30 °C	9 min	1 hour
> 30 °C to 40 °C	6 min	1 hour

Hilti undercut anchor HDA

Intended use
Installation instructions of filling set

Annex B7

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

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Effective anchorage depth	h_{ef}	[mm]	100	125	190	250
Steel failure						
Partial safety factor	$\gamma_{Ms,N}$ [1)]	[-]	1,50			
Characteristic resistance	$N_{Rk,s}$	[kN]	- [2)]			
Pull-out failure						
Characteristic resistance in concrete C20/25						
Installation safety factor	γ_{inst}	[-]	1,00			
Uncracked concrete	$N_{Rk,p,uncr}$	[kN]	46	67	126	192
Cracked concrete	$N_{Rk,p,cr}$	[kN]	39,8	55,6	104,2	157,3
Increasing factor for $N_{Rk,p}$ for cracked and uncracked concrete: $N_{Rk,p} = \psi_c \cdot N_{Rk,p}$ (C20/25) $\psi_c = (f_{ck}/20)^{0,5}$	ψ_c	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,58			
Concrete cone and splitting failure						
Installation safety factor	γ_{inst}	[-]	1,00			
Factor	$k_1=k_{ucr,N}$	[-]	12,7			
	$k_1=k_{cr,N}$	[-]	8,9			
Spacing	$s_{cr,N}$	[mm]	$3 \cdot h_{ef}$			
Edge distance	$c_{cr,N}$	[mm]	$1,5 \cdot h_{ef}$			
Characteristic resistance in splitting	$N^0_{Rk,sp}$	[kN]	Min ($N_{Rk,p}$; $N^0_{Rk,c}$ [3)])			
Spacing	$s_{cr,sp}$	[mm]	$3 \cdot h_{ef}$			
Edge distance	$c_{cr,sp}$	[mm]	$1,5 \cdot h_{ef}$			

[1)] In absence of other national regulations.
[2)] No performance assessed based on EAD 330250-00-0601.
[3)] $N^0_{Rk,c}$ according to EN 1992-4:2018

Hilti undercut anchor HDA

Performances
Characteristic resistance under tension load

Annex C1

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

HDA-P/ HDA-T			**M10**	**M12**	**M16**	**M20**
Effective anchorage depth	h_{ef}	[mm]	100	125	190	250
Steel failure without lever arm						
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1,25			
Ductility factor	k_7	[-]	1,00			
Characteristic resistance	$V^0_{Rk,s}$	[kN]	- [2)]			
Steel failure with lever arm						
Partial safety factor	$\gamma_{Ms,V}$ [1)]	[-]	1,25			
Ductility factor	k_7	[-]	1,00			
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	- [2)]			
Concrete pry out failure						
Pry-out factor	k_8	[-]	2,0			
Installation safety factor	γ_{inst}	[-]	1,00			
Concrete edge failure						
Effective length of anchor	$l_f = h_{ef}$	[mm]	100	125	190	250
Diameter of anchor	d_{nom}	[mm]	19	21	29	35
Installation safety factor	γ_{inst}	[-]	1,00			

[1)] In absence of other national regulations
[2)] No performance assessed based on EAD 330250-00-0601.

Hilti undercut anchor HDA

Performances
Characteristic resistance under shear load

Annex C2

Table C3: Essential characteristics under tension fatigue load in concrete (design method I acc. to TR 061)

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Steel failure						
Characteristic resistance		[kN]	$\Delta N_{Rk,s,0,n}$			
Number of cycles	n	$\leq 10^5$	15,4	20,3	48,3	64,9
		$\leq 3 \cdot 10^5$	12,3	17,9	34,8	49,5
		$\leq 10^6$	10,4	16,8	26,5	38,0
		∞	9,2	16,3	22,7	26,7
Partial factor	$\gamma_{Ms,N,fat}$	[-]	acc. to TR 061, Eq. (3)			
Concrete failure						
Effective embedment depth	h_{ef}	[mm]	100	125	190	250
Reduction factor[1)]		[-]	$\eta_{k,c,N,fat,n}$			
Number of cycles	n	$\leq 10^5$	0,64			
		$\leq 3 \cdot 10^5$	0,64			
		$\leq 10^6$	0,64			
		∞	0,64			
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5			
Load transfer factor for fastener groups	ψ_{FN}	[-]	0,77			

[1)] $\Delta N_{Rk,(c,sp,cb),0,n} = \eta_{k,c,N,fat,n} \cdot N_{Rk,(c,sp,cb)}$ with $N_{Rk,(c,sp,cb)}$ according to Table C1 and EN 1992-4:2018.

Hilti undercut anchor HDA	**Annex C3**
Performance Essential characteristics under tension fatigue load in concrete (design method I acc. To TR 061)	

Table C4: Essential characteristics under shear fatigue load in concrete (design method I acc. to TR 061)

HDA-P				**M10**	**M12**	**M16**	**M20**
Steel failure							
Characteristic resistance			[kN]	$\Delta V_{Rk,s,0,n}$			
Number of cycles	n	$\leq 10^5$		5,0	8,8	14,9	29,1
		$\leq 3 \cdot 10^5$		3,3	6,7	11,2	22,4
		$\leq 10^6$		2,6	6,1	9,6	18,9
		∞		2,5	6,0	9,0	17,5
Partial factor	$\gamma_{Ms,V,fat}$		[-]	acc. to TR 061, Eq. (3)			
Concrete failure							
Effective length of fastener	$l_f = h_{ef}$		[mm]	100	125	190	250
Effective outside diameter of fastener	d_{nom}		[mm]	19	21	29	35
Reduction factor[1)]			[-]	$\eta_{k,c,V,fat,n}$			
Number of cycles	n	$\leq 10^5$		0,55			
		$\leq 3 \cdot 10^5$		0,55			
		$\leq 10^6$		0,55			
		∞		0,55			
Partial factor	$\gamma_{Mc,fat}$		[-]	1,5			
Load transfer factor for fastener groups	ψ_{FV}		[-]	0,83			

[1)] $\Delta V_{Rk,(c,cp),0,n} = \eta_{k,c,V,fat,n} \cdot V_{Rk,(c,cp)}$ with $V_{Rk,(c,cp)}$ according to Table C2 and EN 1992-4:2018.

Hilti undercut anchor HDA	**Annex C4**
Performance Essential characteristics under shear fatigue load in concrete (design method I acc. to TR 061)	

Table C5: Essential characteristics under shear fatigue load in concrete (design method I acc. to TR 061)

HDA-T				**M10**	**M12**	**M16**	**M20**
Steel failure							
Characteristic resistance			[kN]	$\Delta V_{Rk,s,0,n}$			
Number of cycles	n	$\leq 10^5$		15,9	21,8	34,2	29,1
		$\leq 3 \cdot 10^5$		12,6	18,5	27,7	22,4
		$\leq 10^6$		10,3	16,5	24,4	18,9
		∞		8,5	15,0	23,0	17,5
Partial factor	$\gamma_{Ms,V,fat}$		[-]	acc. to TR 061, Eq. (3)			
Concrete failure							
Effective length of fastener	$l_f = h_{ef}$		[mm]	100	125	190	250
Effective outside diameter of fastener	d_{nom}		[mm]	19	21	29	35
Reduction factor[1)]			[-]	$\eta_{k,c,V,fat,n}$			
Number of cycles	n	$\leq 10^5$		0,55			
		$\leq 3 \cdot 10^5$		0,55			
		$\leq 10^6$		0,55			
		∞		0,55			
Partial factor	$\gamma_{Mc,fat}$		[-]	1,5			
Load transfer factor for fastener groups	ψ_{FV}		[-]	0,83			

[1)] $\Delta V_{Rk,(c,cp),0,n} = \eta_{k,c,V,fat,n} \cdot V_{Rk,(c,cp)}$ with $V_{Rk,(c,cp)}$ according to Table C2 and EN 1992-4:2018.

Hilti undercut anchor HDA	**Annex C5**
Performance Essential characteristics under shear fatigue load in concrete (design method I acc. to TR 061)	

Table C6: Essential characteristics under tension fatigue load in concrete (design method II acc. to TR 061)

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Steel failure						
Characteristic resistance	$\Delta N_{Rk,s,0,\infty}$	[kN]	9,2	16,3	22,7	26,7
Partial factor	$\gamma_{Ms,N,fat}$	[-]	1,35			
Concrete failure						
Effective embedment depth	h_{ef}	[mm]	100	125	190	250
Reduction factor[1)]	$\eta_{k,c,N,fat,\infty}$	[-]	0,64			
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5			
Load transfer factor for fastener groups	ψ_{FN}	[-]	0,77			

[1)] $\Delta N_{Rk,(c,sp,cb),0,\infty} = \eta_{k,c,N,fat,\infty} \cdot N_{Rk,(c,sp,cb)}$ with $N_{Rk,(c,sp,cb)}$ according to Table C1 and EN 1992-4:2018.

Table C7: Essential characteristics under shear fatigue load in concrete (design method II acc. to TR 061)

HDA-P			**M10**	**M12**	**M16**	**M20**
Steel failure						
Characteristic resistance	$\Delta V_{Rk,s,0,\infty}$	[kN]	2,5	6,0	9,0	17,5
Partial factor	$\gamma_{Ms,V,fat}$	[-]	1,35			
Concrete failure						
Effective length of fastener	$l_f = h_{ef}$	[mm]	100	125	190	250
Effective outside diameter of fastener	d_{nom}	[mm]	19	21	29	35
Reduction factor[1)]	$\eta_{k,c,V,fat,\infty}$	[-]	0,55			
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5			
Load transfer factor for fastener groups	ψ_{FV}	[-]	0,83			

[1)] $\Delta V_{Rk,(c,cp),0,\infty} = \eta_{k,c,V,fat,\infty} \cdot V_{Rk,(c,cp)}$ with $V_{Rk,(c,cp)}$ according to Table C2 and EN 1992-4:2018.

Hilti undercut anchor HDA	**Annex C6**
Performance Essential characteristics under tension and shear fatigue load in concrete (design method II acc. to TR 061)	

Table C8: Essential characteristics under shear fatigue load in concrete (design method II acc. to TR 061)

HDA-T			**M10**	**M12**	**M16**	**M20**
Steel failure						
Characteristic resistance	$\Delta V_{Rk,s,0,\infty}$	[kN]	8,5	15,0	23,0	17,5
Partial factor	$\gamma_{Ms,V,fat}$	[-]	1,35			
Concrete failure						
Effective length of fastener	$l_f = h_{ef}$	[mm]	100	125	190	250
Effective outside diameter of fastener	d_{nom}	[mm]	19	21	29	35
Reduction factor[1)]	$\eta_{k,c,V,fat,\infty}$	[-]	0,55			
Partial factor	$\gamma_{Mc,fat}$	[-]	1,5			
Load transfer factor for fastener groups	ψ_{FV}	[-]	0,83			

[1)] $\Delta V_{Rk,(c,cp),0,\infty} = \eta_{k,c,V,fat,\infty} \cdot V_{Rk,(c,cp)}$ with $V_{Rk,(c,cp)}$ according to Table C2 and EN 1992-4:2018.

Table C9: Essential characteristics for combined fatigue load in concrete (design method I and II acc. to TR 061)

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Exponent for combined fatigue load	α_{sn}	[-]	1,0			1,25
	α_c	[-]	1,5			

Hilti undercut anchor HDA

Performance
Essential characteristics under shear and combined fatigue load in concrete (design method I and II acc. to TR 061)

Annex C7