Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment ETA-02/0032 of 4 November 2020

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 push-in anchor HKD
Product family to which the construction product belongs	Deformation-controlled expansion anchor made of galvanised or stainless steel of sizes M6, M8, M10, M12, M16 and M20 for use in non-cracked concrete
Manufacturer	Hilti Aktiengesellschaft 9494 SCHAAN FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Aktiengesellschaft
This European Technical Assessment contains	19 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 330232-01-0601 Edition 12/2019
This version replaces	ETA-02/0032 issued on 7 January 2015

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Specific Part

1 Technical description of the product

The Hilti push-in anchor HKD is a fastener made of galvanized or stainless steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

The fastener consists of an anchor body and an internal plug.

The fixture shall be anchored with a fastening screw or threaded rod according to Annex B2.

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	Performance
Characteristic resistance to tension load (static and quasi static action) Method A	See Annex B3, C1 and C4
Characteristic resistance to shear load (static and quasi static action)	See Annex C2 and C5
Displacements and Durability	See Annex C3, C6 and B1
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance assessed

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 330232-01-0601 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 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 4 November 2020 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Lange

Deutsches Institut für Bautechnik DIBt

Installed condition

Figure A1:
Hilti push-in anchor HKD with screw

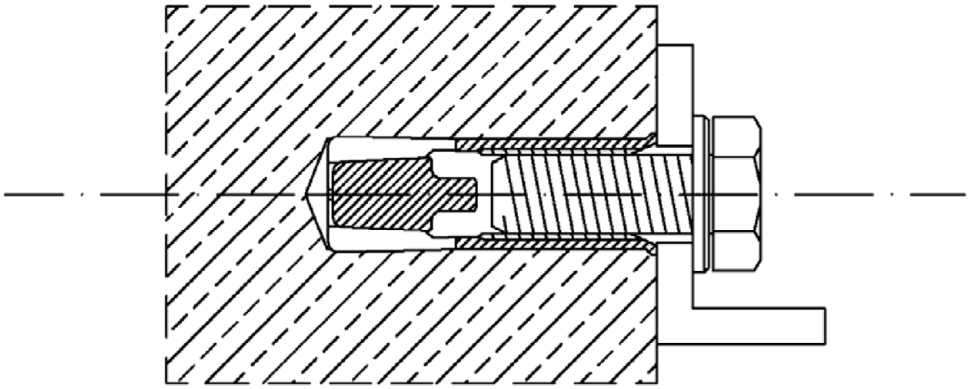
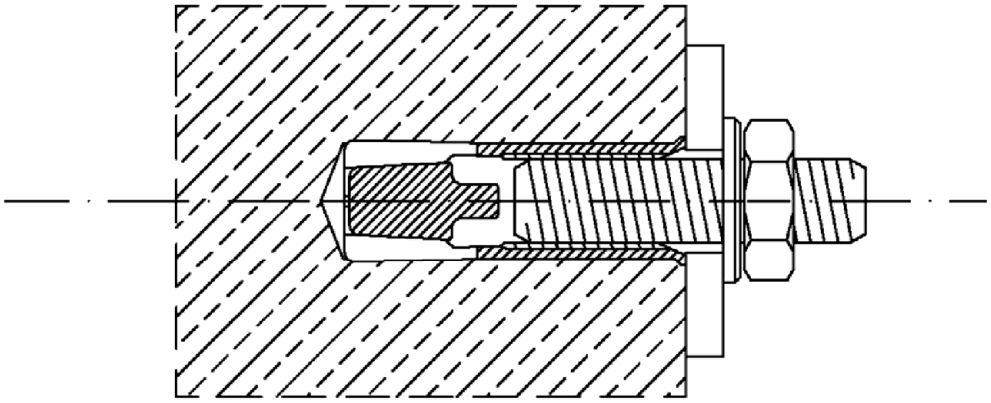
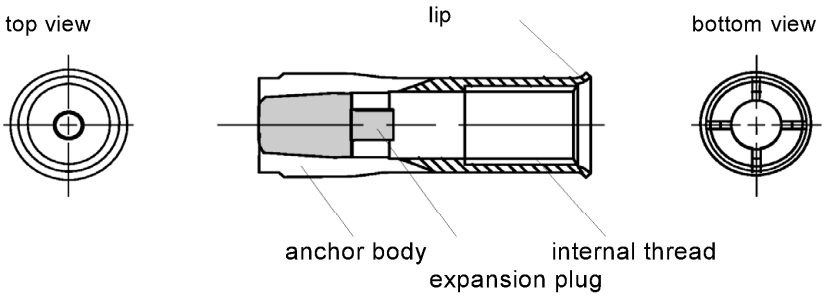


Figure A2:
Hilti push-in anchor HKD with threaded rod, washer and nut

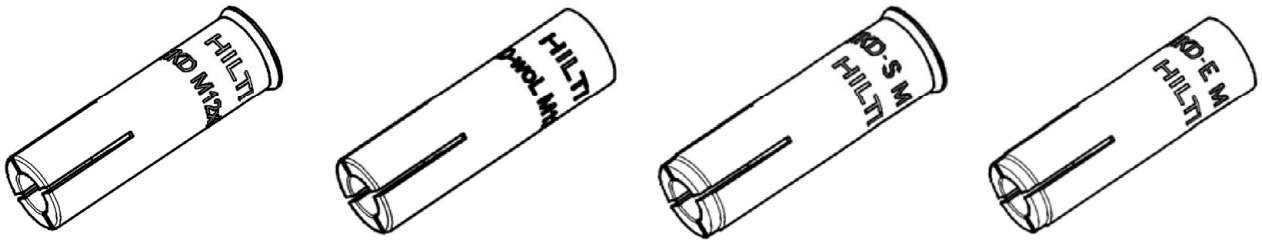


Hilti push-in anchor HKD	Annex A1
Product description Installed condition	

Product description: Hilti push-in anchor HKD



Marking:



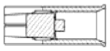
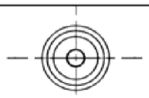
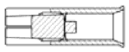
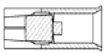
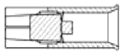
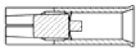
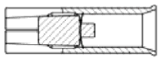
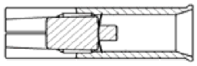
HKD	HKD-woL	HKD-S / HKD-SR	HKD-E / HKD-ER
HKD M8 x 30	HKD-woL M8 x 30	HKD-S M6 x 30 ø8	HKD-E M6 x 30 ø8
HKD M8 x 40	HKD-woL M8 x 40	HKD-S M8 x 30 ø10	HKD-E M8 x 30 ø10
HKD M10 x 30	HKD-woL M10 x 30	HKD-S M8 x 40 ø10	HKD-E M8 x 40 ø10
HKD M10 x 40	HKD-woL M10 x 40	HKD-S M10 x 30 ø12	HKD-E M10 x 30 ø12
HKD M12 x 50	HKD-woL M12 x 50	HKD-S M10 x 40 ø12	HKD-E M10 x 40 ø12
HKD M16 x 65	HKD-woL M16 x 65	HKD-S M12 x 50 ø15	HKD-E M12 x 50 ø15
HKD M20 x 80	HKD-woL M20 x 80	HKD-S M16 x65 ø20	HKD-E M16 x 65 ø20
		HKD-S M20 x 80 ø25	HKD-E M20 x 80 ø25
		HKD-SR	HKD-ER
		HKD-SR M6 x 30 ø8	HKD-ER M6 x 30 ø 8
		HKD-SR M8 x 30 ø10	HKD-ER M8 x 30 ø 8
		HKD-SR M10 x 40 ø12	HKD-ER M10 x 40 ø12
		HKD-SR M12 x 50 ø15	HKD-ER M12 x 50 ø15
		HKD-SR M16 x 65 ø20	HKD-ER M16 x 65 ø20
		HKD-SR M20 x 80 ø25	HKD-ER M20 x 80 ø25

Hilti push-in anchor HKD	**Annex A2**
Product description Anchor types / Marking	

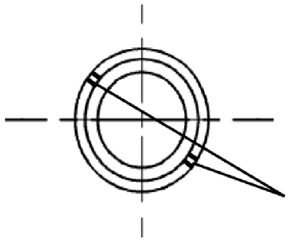
Identification after installation

Each anchor can be identified with setting tool after installation

Table A1: Identification HKD and HKD-woL

Size		Setting tool	Top view
HKD M8x30		HSD-G M8 x 25/30	
HKD M8x40		HSD-G M8 x 40	
HKD M10x30		HSD-G M10 x 25/30	
HKD M10x40		HSD-G M10 x 40	
HKD M12x50		HSD-G M12 x 50	
HKD M16x65		HSD-G M16 x 65	
HKD M20x80		HSD-G M20 x 80	

Identification HKD-E(R) and HKD-S(R)



additional marking on end-face for M8x40 and M10x40

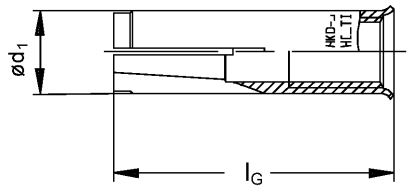
Hilti push-in anchor HKD	Annex A3
Product description Identification after installation	

Materials and dimensions

Table A2: Materials

designation	material
HKD; HKD-woL	
anchor body	cold formed steel – galvanised to ≥ 5 µm
expansion plug	cold formed steel
HKD-S; HKD-E	
anchor body	Steel Fe/Zn5 (galvanised ≥ 5 µm)
expansion plug	cold formed steel
HKD-SR; HKD-ER	
anchor body	Stainless steel of corrosion resistance class III according to EN1993-1-4:2006+A1:2015 1.4401, 1.4404 or 1.4571 according to EN 10088-1:2014
expansion plug	

anchor body



expansion plug

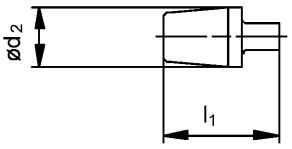


Table A3: Dimensions

Anchor size			**M6x30**	**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Anchor length	l_G	[mm]	30	30	40	30	40	50	65	80
Anchor diameter	$Ød_1$	[mm]	8	9,95	9,95	11,8	12	14,9	19,8	24,8
Plug diameter	$Ød_2$	[mm]	5	6,5	6,35	8,2	8,2	10,3	13,8	16,4
Plug length	l_1	[mm]	15	12	16	12	16	20	29	30

Hilti push-in anchor HKD	**Annex A4**
Product description Materials and dimensions	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loading.

Base materials:

- Compacted, reinforced or unreinforced normal weight concrete without fibers in accordance with EN 206:2013+A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206:2013+A1:2016.
- Uncracked concrete only.

Table B1: Overview use categories and performance categories

Anchorages subject to:	**HKD / HKD-woL / HKD-E(R) and HKD-S(R) with …**
	Threaded rod or screw
Hammer drilling	✓
Static and quasi-static loading in uncracked concrete	M6 to M20 Table : C1, C2, C3, C4, C5 and C6

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions (zinc coated steel or stainless steel).
- For all other conditions according EN 1993-1-4:2006+A1:2015 corresponding to corrosion resistance classes Annex A4 Table A2 (stainless steels).

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 static or quasi-static actions are designed in accordance with: EN 1992-4:2018.

Installation:

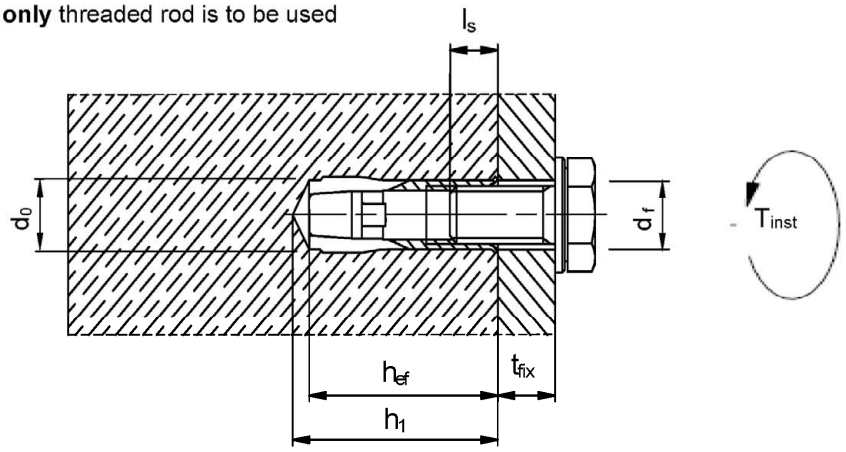
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- The anchor may only be set once.
- Overhead applications are permitted.

Hilti push-in anchor HKD	**Annex B1**
Intended use Specifications	

Table B2: Installation parameters for HKD-S(R), HKD-E(R), HKD and HKD-woL

HKD			M6x30	M8x30	M8x40	M10x30[1)]	M10x40	M12x50	M16x65	M20x80
Nominal diameter of drill bit	d_0	[mm]	8	10	10	12	12	15	20	25
Diameter of thread	d	[mm]	6	8	8	10	10	12	16	20
drill hole depth	h_1	[mm]	32	33	43	33	43	54	70	85
Effective embedment depth	h_{ef}	[mm]	30	30	40	30	40	50	65	80
Thread engagement length	$l_{s,max}$	[mm]	12,5	14,5	17,5	12,7	18	23,5	30,5	42
Minimum screwing depth [1)]	$l_{s,min}$	[mm]	6	8	8	10	10	12	16	20
Maximum torque moment	T_{inst}	[Nm]	4	8	8	15	15	35	60	100
Maximum diameter of clearance hole in the fixture	d_f	[mm]	7	9	9	12	12	14	18	22

[1)] with anchor size M10x30 **only** threaded rod is to be used



Requirements for fastening screw or threaded rod:

For anchors made of galvanised steel (HKD, HKD-woL, HKD-E and HKD-S) fastening screws or threaded rods of steel grade 4.6 / 5.6 / 5.8 or 8.8 according to EN ISO 898-1:2013 shall be specified.

For anchors made of stainless steel (HKD-ER and HKD-SR) fastening screw or threaded rod of steel grade 70 according EN ISO 3506:2020 shall be specified.

Minimum screw depth $l_{s,min}$: The length of the screw shall be determined depending on thickness of fixture t_{fix}, admissible tolerances and available thread length $l_{s,max}$ as well as minimum screw depth $l_{s,min}$ according to Table B2

Hilti push-in anchor HKD	**Annex B2**
Intended Use Installation parameters	

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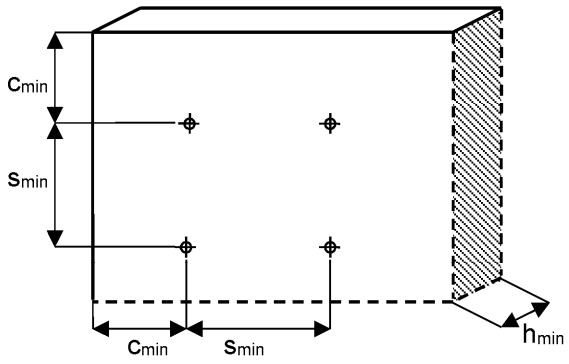
Table B3: Minimum spacing and minimum edge distance for HKD-S(R) and HKD-E(R)

HKD-S(R), HKD-E(R)			**M6x30 M8x30 M10x30**	**M8x40 M10x40**	**M12x50**	**M16x65**	**M20x80**
Minimum thickness of concrete member	h_{min}	[mm]	100	100	100	130	160
Minimum spacing	s_{min}	[mm]	60	80	125	130	160
Minimum edge distance	c_{min}	[mm]	105	140	175	230	280

Table B4: Minimum spacing and minimum edge distance for HKD and HKD-woL

HKD, HKD-woL			**M8x30 M10x30**	**M8x40 M10x40**	**M12x50**	**M16x65**	**M20x80**
Minimum thickness of concrete member	h_{min}	[mm]	100	100	100	130	160
Minimum spacing	s_{min}	[mm]	60	80	125	130	160
	for c ≥	[mm]	105	140	175	230	280
Minimum edge distance	c_{min}	[mm]	80	140	175	230	280
	for s≥	[mm]	120	80	125	130	160

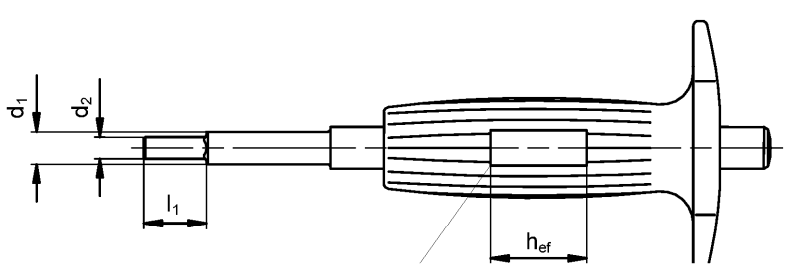


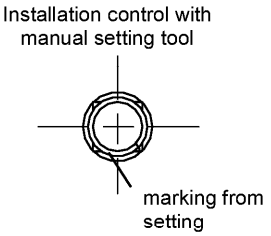
Hilti push-in anchor HKD	**Annex B3**
Intended Use Minimum spacing and minimum edge distance	

Table B5: Dimensions of the setting tools

Setting tools HSD			M6x30	M8x30	M8x40	M10x30	M10x40	M12x50	M16x65	M20x80
Diameter	d_1	[mm]	7,5	9,5	9,5	11,5	11,5	14,5	18	22
Diameter	d_2	[mm]	5	6,5	6,5	8	8	10,2	13,5	16,5
Length	l_1	[mm]	15	18	28	18	24	30	36	50

Manual setting tool HSD-G M.. x h_{ef} (e.g. HSD-G M8 x 30)



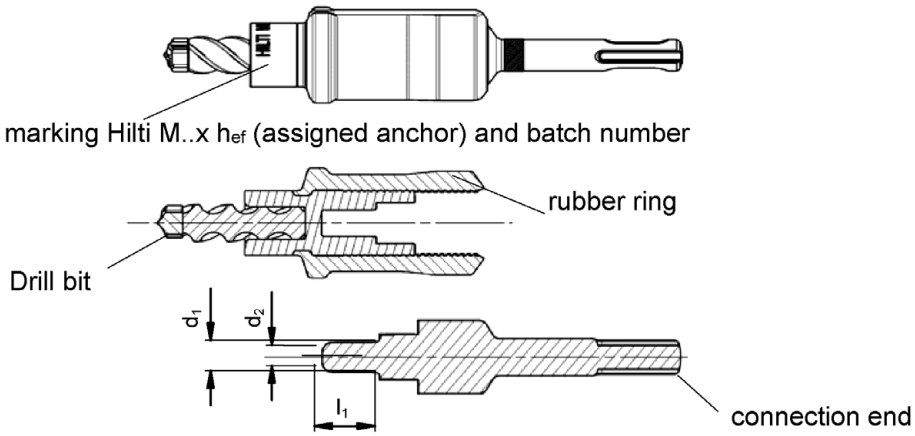


anchor gauge with imprint M..x h_{ef} (assigned anchor)
the recess length corresponds to the anchor length h_{ef}

Machine setting tool HSD-M M.. x h_{ef} (e.g. HSD-M M8 x 30)

marking HSD-M M..x h_{ef} (assigned anchor)

Machine setting tool HSD-TE CX M.. x h_{ef} (e.g. HSD-TE-CX M8 x 30)



Hilti push-in anchor HKD	**Annex B4**
Intended Use Setting tools	

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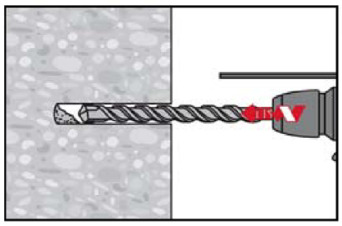
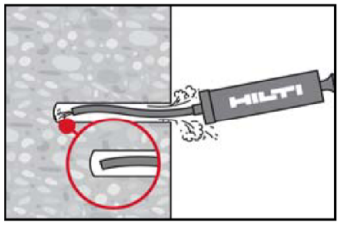
Installation instructions

Hole drilling and cleaning

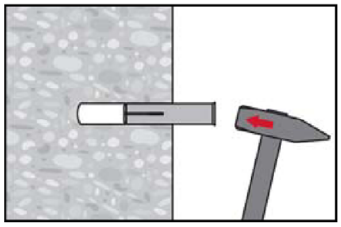


Make a cylindrical hole.

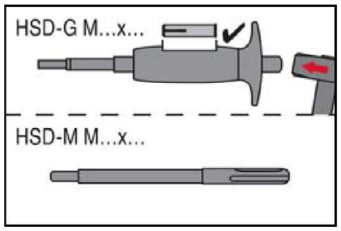


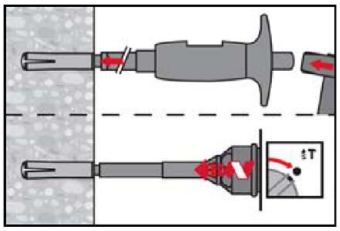
Clean the drill hole.

Fastener setting



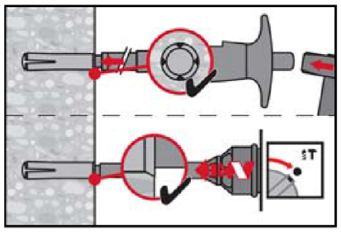
Install the anchor by hammering.





Choose the setting tool; and confirm the size of setting tool according to the size of the anchor.

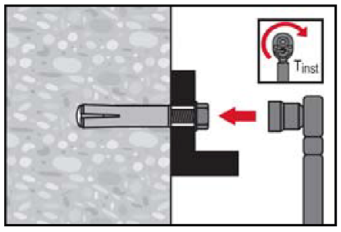
Setting check



HSD-G M…x…: Hammer on the top of setting tool until the 4 marks are visible on the lips of the anchor.

HSD-M M…x…: set the anchor until the setting tool touches the rim of the anchor.

Loading the anchor



Apply the torque (check the values for T_{inst}) using torque wrench.

Hilti push-in anchor HKD	
Intended Use Installation instructions	**Annex B5**

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Table C1: Characteristic resistance for Hilti push-in anchor HKD-S(R) and HKD-E(R) under tension loads in uncracked concrete

HKD-S (R) HKD-E (R)			**M6x30**[2]	**M8x30**[2]	**M8x40**	**M10x30**[2]	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Installation safety factor	γ_{inst}		1,0		1,2	1,0				
Steel failure										
Steel grade 4.6	$N_{Rk,s}$	[kN]	8,0	14,6	14,6	23,2	23,2	33,7	62,8	98,0
Partial safety factor	γ_{Ms} [1]		2,0							
Steel grade 5.6	$N_{Rk,s}$	[kN]	10,1	18,3	18,3	18,5	19,9	42,2	54,7	86,9
Partial safety factor	γ_{Ms} [1]		2,0			1,49		2,0	1,47	
Steel grade 5.8	$N_{Rk,s}$	[kN]	10,1	17,4	17,4	18,5	19,9	35,3	54,7	86,9
Partial safety factor	γ_{Ms} [1]		1,50	1,53		1,49			1,47	
Steel grade 8.8	$N_{Rk,s}$	[kN]	13,4	17,4	17,4	18,5	19,9	35,3	54,7	86,9
Partial safety factor	γ_{Ms} [1]		1,53			1,49			1,47	
Steel grade 70	$N_{Rk,s}$	[kN]	12,8	16,8	version not available		21,1	37,3	64,2	102,0
Partial safety factor	γ_{Ms} [1]		1,83				1,83			
Pullout failure										
Characteristic resistance C20/25	$N_{Rk,p}$	[kN]	8,1	8,1	9,0	8,1	12,4	17,4	25,8	35,2
Increasing factors for $N_{Rk,p}$	ψ_c	C30/37	1,22							
		C40/50	1,41							
		C50/60	1,58							
Concrete cone and splitting failure										
Characteristic resistance to prevent splitting	$N^0_{Rk,sp}$	[kN]	8,1	8,1	9,0	8,1	12,4	17,4	25,8	35,2
Factor	k_{ucr}	[-]	11,0							
Factor	k_{cr}	[-]	No performance assessed							
Effective embedment depth	h_{ef}	[mm]	30[2]	30[2]	40	30[2]	40	50	65	80
Spacing	$s_{cr,N}$	[mm]	90	90	120	90	120	150	195	240
Edge distance	$c_{cr,N}$	[mm]	45	45	60	45	60	75	97	120
Spacing	$s_{cr,sp}$	[mm]	210	210	280	210	280	350	455	560
Edge distance	$c_{cr,sp}$	[mm]	105	105	140	105	140	175	227	280

[1] In absence of other national regulations.

[2] For application with dry internal exposure only and statically indeterminate structural components only.

Hilti push-in anchor HKD

Performances
Characteristic resistance for Hilti push-in anchor HKD-S(R) and HKD-E(R) under tension loads in uncracked concrete

Annex C1

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Table C2: Characteristic resistance for Hilti push-in anchor HKD-S(R) and HKD-E(R) under shear loads in uncracked concrete

HKD-S (R) HKD-E (R)			M6x30[2]	M8x30[2]	M8x40	M10x30[2]	M10x40	M12x50	M16x65	M20x80
Steel failure without lever arm										
Steel grade 4.6	$V^0_{Rk,s}$	[kN]	4,0	7,3	7,3	7,4	8,0	16,9	21,9	34,7
Partial safety factor	γ_{Ms} [1]		1,67			1,25		1,67	1,25	
Steel grade 5.6	$V^0_{Rk,s}$	[kN]	5,0	7,0	7,0	7,4	8,0	14,1	21,9	34,7
Partial safety factor	γ_{Ms} [1]		1,67	1,27		1,25				
Steel grade 5.8	$V^0_{Rk,s}$	[kN]	5,0	7,0	7,0	7,4	8,0	14,1	21,9	34,7
Partial safety factor	γ_{Ms} [1]		1,25	1,27		1,25				
Steel grade 8.8	$V^0_{Rk,s}$	[kN]	5,3	7,0	7,0	7,4	8,0	14,1	21,9	34,7
Partial safety factor	γ_{Ms} [1]		1,27			1,25				
Steel grade 70	$V^0_{Rk,s}$	[kN]	6,4	8,4	version not available		10,5	18,7	32,1	51,0
Partial safety factor	γ_{Ms} [1]		1,52				1,52			
Ductility factor	k_7	[-]	1,0							
Steel failure with lever arm										
Steel grade 4.6	$M^0_{Rk,s}$	[Nm]	6	15	15	30	30	52	133	260
Partial safety factor	γ_{Ms} [1]		1,67							
Steel grade 5.6	$M^0_{Rk,s}$	[Nm]	8	19	19	37	37	65	166	325
Partial safety factor	γ_{Ms} [1]		1,67							
Steel grade 5.8	$M^0_{Rk,s}$	[Nm]	8	19	19	37	37	65	166	325
Partial safety factor	γ_{Ms} [1]		1,25							
Steel grade 8.8	$M^0_{Rk,s}$	[Nm]	12	30	30	60	60	105	266	519
Partial safety factor	γ_{Ms} [1]		1,25							
Steel grade 70	$M^0_{Rk,s}$	[Nm]	11	26	version not available		52	92	233	454
Partial safety factor	γ_{Ms} [1]		1,56				1,56			
Ductility factor	k_7	[-]	1,0							
Concrete pry-out failure										
Pry-out factor	k_8	[-]	2,0							
Concrete edge failure										
Effective length of anchor	l_f	[mm]	30	30	40	30	40	50	65	80
External diameter of anchor	d_{nom}	[mm]	8	10	10	12	12	15	20	25

[1] In absence of other national regulations.

[2] For application with dry internal exposure only and statically indeterminate structural components only.

Hilti push-in anchor HKD	**Annex C2**
Performances Characteristic resistance for Hilti push-in anchor HKD-S(R) and HKD-E(R) under shear loads in uncracked concrete	

Deutsches Institut für Bautechnik DIBt

Table C3: Displacements under tension load for HKD-S(R) and HKD-E(R)

HKD-S(R) HKD-E(R)			**M6x30**	**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Tension load in C20/25 to C50/60 uncracked concrete	N	[kN]	3,3	3,3	3,6	3,3	5,1	7,1	12,6	17,2
Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{N\infty}$	[mm]	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2

Table C4: Displacements under shear load for HKD-S and HKD-E

HKD-S HKD-E			**M6x30**	**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Shear load in C20/25 to C50/60 uncracked concrete	V	[kN]	1,7	3,1	3,1	4,3	4,6	7,2	12,5	19,8
Displacement	δ_{V0}	[mm]	0,35	0,35	0,40	0,35	0,40	0,45	0,75	0,75
	$\delta_{V\infty}$	[mm]	0,50	0,50	0,60	0,50	0,60	0,70	1,1	1,1

Table C5: Displacements under shear load for HKD-SR and HKD-ER

HKD-SR HKD-ER			**M6x30**	**M8x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Shear load in C20/25 to C50/60 uncracked concrete	V	[kN]	1,7	3,9	4,9	8,8	15,1	24,0
Displacement	δ_{V0}	[mm]	0,35	0,45	0,45	0,55	0,9	0,9
	$\delta_{V\infty}$	[mm]	0,50	0,65	0,65	0,85	1,3	1,3

Hilti push-in anchor HKD

Performance
Displacements under tension load and under shear load for HKD-S(R) and HKD-E(R)

Annex C3

Deutsches Institut für Bautechnik DIBt

Table C6: Characteristic resistance for Hilti push-in anchor HKD and HKD-woL under tension loads in uncracked concrete

HKD HKD-woL			**M8x30**[2]	**M8x40**	**M10x30**[2]	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Installation safety factor	γ_{inst}		1,0	1,2	1,0				
Steel failure									
Steel grade 4.6	$N_{Rk,s}$	[kN]	14,6	14,6	19,9	22,1	33,7	62,8	98,0
Partial safety factor	γ_{Ms} [1]		2,0		1,5		2,0		
Steel grade 5.6	$N_{Rk,s}$	[kN]	17,1	19,4	19,9	22,1	36,6	67,5	99,0
Partial safety factor	γ_{Ms} [1]		1,5						
Steel grade 5.8	$N_{Rk,s}$	[kN]	17,1	19,4	19,9	22,1	36,6	67,5	99,0
Partial safety factor	γ_{Ms} [1]		1,5						
Steel grade 8.8	$N_{Rk,s}$	[kN]	17,1	19,4	19,9	22,1	36,6	67,5	99,0
Partial safety factor	γ_{Ms} [1]		1,5						
Pullout failure									
Characteristic resistance C20/25	$N_{Rk,p}$	[kN]	8,1	9,0	8,1	12,4	17,4	25,8	35,2
Increasing factors for $N_{Rk,p}$	ψ_C	C30/37	1,22						
		C40/50	1,41						
		C50/60	1,58						
Concrete cone and splitting failure									
Characteristic resistance to prevent splitting	$N^0_{Rk,sp}$	[kN]	8,1	9,0	8,1	12,4	17,4	25,8	35,2
Factor	k_{ucr}	[-]	11,0						
Factor	k_{cr}	[-]	No performance assessed						
Effective embedment depth	h_{ef}	[mm]	30 [2]	40	30 [2]	40	50	65	80
Spacing	$s_{cr,N}$	[mm]	90	120	90	120	150	195	240
Edge distance	$c_{cr,N}$	[mm]	45	60	45	60	75	97	120
Spacing	$s_{cr,sp}$	[mm]	210	280	210	280	350	455	560
Edge distance	$c_{cr,sp}$	[mm]	105	140	105	140	175	227	280

[1] In absence of other national regulations.

[2] For application with dry internal exposure only and statically indeterminate structural components only.

Hilti push-in anchor HKD	**Annex C4**
Performances Characteristic resistance for Hilti push-in anchor HKD and HKD-woL under tension loads in uncracked concrete	

Deutsches Institut für Bautechnik DIBt

Table C7: Characteristic resistance for Hilti push-in anchor HKD and HKD-woL under shear loads in uncracked concrete

HKD **HKD-woL**			**M8x30**[2]	**M8x40**	**M10x30**[2]	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Steel failure without lever arm									
Steel grade 4.6	$V^0_{Rk,s}$	[kN]	7,3	7,3	10,0	11,0	16,9	31,4	49
Partial safety factor	γ_{Ms} [1]		1,67		1,25		1,67		
Steel grade 5.6	$V^0_{Rk,s}$	[kN]	8,6	9,2	10,0	11,0	18,3	33,8	49,5
Partial safety factor	γ_{Ms} [1]		1,25	1,67	1,25				
Steel grade 5.8	$V^0_{Rk,s}$	[kN]	8,6	9,2	10,0	11,0	18,3	33,8	49,5
Partial safety factor	γ_{Ms} [1]		1,25						
Steel grade 8.8	$V^0_{Rk,s}$	[kN]	8,6	9,2	10,0	11,0	18,3	33,8	49,5
Partial safety factor	γ_{Ms} [1]		1,25						
Ductility factor	k_7	[-]	1,0						
Steel failure with lever arm									
Steel grade 4.6	$M^0_{Rk,s}$	[Nm]	15	15	30	30	52	133	260
Partial safety factor	γ_{Ms} [1]		1,67						
Steel grade 5.6	$M^0_{Rk,s}$	[Nm]	19	19	37	37	65	166	325
Partial safety factor	γ_{Ms} [1]		1,67						
Steel grade 5.8	$M^0_{Rk,s}$	[Nm]	19	19	37	37	65	166	325
Partial safety factor	γ_{Ms} [1]		1,25						
Steel grade 8.8	$M^0_{Rk,s}$	[Nm]	30	30	60	60	105	266	519
Partial safety factor	γ_{Ms} [1]		1,25						
Ductility factor	k_7	[-]	1,0						
Concrete pry-out failure									
Pry-out factor	k_8	[-]	2,0						
Concrete edge failure									
Effective length of anchor	l_f	[mm]	30	40	30	40	50	65	80
External diameter of anchor	d_{nom}	[mm]	10	10	12	12	15	20	25

[1] In absence of other national regulations.

[2] For application with dry internal exposure only and statically indeterminate structural components only.

Hilti push-in anchor HKD	**Annex C5**
Performances Characteristic resistance for Hilti push-in anchor HKD and HKD-woL under shear loads in uncracked concrete	

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Table C8: Displacements under tension load for HKD and HKD-woL

HKD **HKD-woL**			**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Tension load in C20/25 to C50/60 uncracked concrete	N	[kN]	4,0	4,3	4,0	6,1	8,5	12,6	17,2
Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{N\infty}$	[mm]	0,3	0,3	0,3	0,3	0,3	0,2	0,2

Table C9: Displacements under shear load for HKD and HKD-woL

HKD **HKD-woL**			**M8x30**	**M8x40**	**M10x30**	**M10x40**	**M12x50**	**M16x65**	**M20x80**
Shear load in C20/25 to C50/60 uncracked concrete	N	[kN]	3,1	3,1	4,3	4,6	7,2	12,5	19,8
Displacement	δ_{V0}	[mm]	0,35	0,40	0,35	0,40	0,45	0,75	0,75
	$\delta_{V\infty}$	[mm]	0,50	0,60	0,50	0,60	0,70	1,1	1,1

Hilti push-in anchor HKD

Performance
Displacements under tension load and under shear load for HKD and HKD-woL

Annex C6