



HILTI HKD (fractional) EXPANSION ANCHOR

ETA-19/0336 (27.07.2020)



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European Technical Assessment

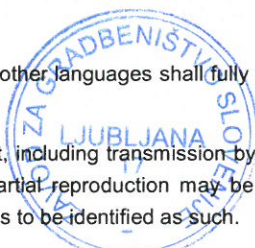
*English version prepared by ZAG***ETA-19/0336
of 27.07.2020**

General Part

**Technical Assessment Body issuing the
European Technical Assessment****ZAG Ljubljana****Trade name of the construction product****Hilti HKD****Product family to which the construction
product belongs****33: Deformation-controlled expansion
anchor of sizes fractional sizes
5/16", 3/8", 1/2" and 5/8" for use
in non-cracked concrete****Manufacturer****HILTI Corporation
Feldkircherstrasse 100
9494 SCHAAN
Liechtenstein
www.hilti.com****Manufacturing plant****HILTI plants****This European Technical Assessment
contains****15 pages including 12 annexes, which
form an integral part of the document****This European Technical Assessment is
issued in accordance with Regulation (EU) No
305/2011, on the basis of****EAD 330232-00-0601: Mechanical
fasteners for use concrete, edition
October 2016****This version replaces****ETA-19/0336 issued on 25.11.2019**

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Specific parts

1 Technical description of the product

Hilti HKD is a deformation controlled expansion anchor of sizes 5/16"×30, 3/8"×30, 3/8"×40, 1/2"×50 and 5/8"×65 made of galvanised 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.

For the installed anchor see Figure given in Annex A1.

2 Specification of the intended use(s) in accordance with the applicable European Assessment Document (hereinafter EAD)

The performances given in Chapter 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the manufacturer, 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)

The basic work requirements for mechanical resistance and stability are listed in Annexes C1 to C3.

3.2 Safety in case of fire (BWR 2)

Anchorage satisfy requirements for class A1.

For resistance to fire no performance was determined for this product.

3.3 General aspects relating to fitness for use

Durability and serviceability are only ensured if specifications of intended use according to Annex B1 are kept.



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

According to the decision 96/582/EC of the European Commission¹ the system of assessment and verification of constancy of performance (see Annex V to regulation (EU) No 305/2011) **1** apply.

5 Technical details necessary for the implementation of the AVCP system, as provided for on the applicable EAD

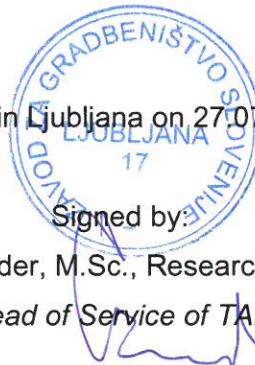
Technical details necessary for the implementation of the AVCP system are laid down in Chapter 3 of EAD 330232-00-0601.

Issued in Ljubljana on 27.07.2020

Signed by:

Franč Capuder, M.Sc., Research Engineer

Head of Service of TAB

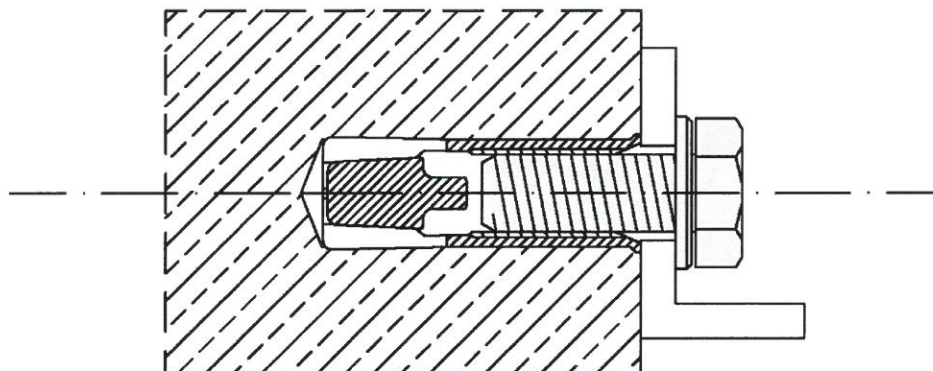


¹

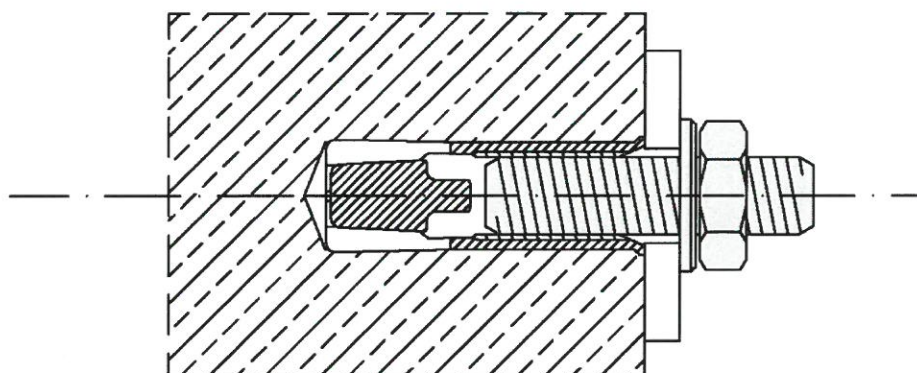
Official Journal of the European Communities L 254 of 8.10.1996

Installed condition

Hilti HKD with screw



Hilti HKD with threaded rod, washer and nut

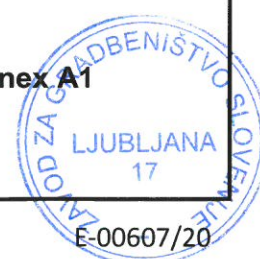


Hilti HKD

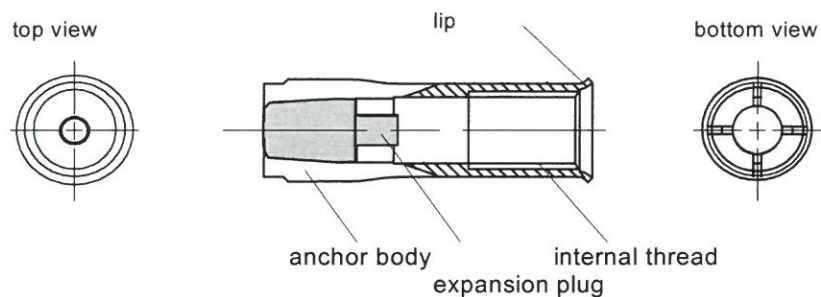
Product description

Installed condition

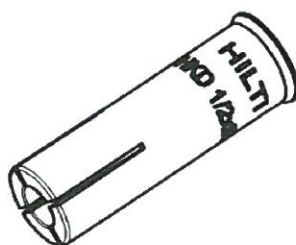
Annex A1



Product description: Hilti HKD



Marking:



Hilti HKD

HKD 5/16" x 30

HKD 3/8" x 30

HKD 3/8" x 40

HKD 1/2" x 50

HKD 5/8" x 65

Hilti HKD

Product description

Anchor types / Marking

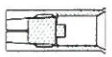

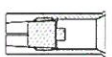
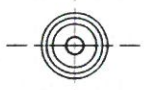
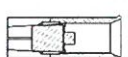





Annex A2



Identification after installation

Each anchor can be identified with setting tool after installation

Table A1: Identification of Hilti HKD

Size		Setting tool	Top view
HKD 5/16"x30		HSD-G M8-5/16" x 25/30	
HKD 3/8"x30		HSD-G M10-3/8" x 25/30	
HKD 3/8"x40		HSD-G M10-3/8" x 40	
HKD 1/2"x50		HSD-G M12-1/2" x 50	
HKD 5/8"x65		HSD-G M16-5/8" x 65	

Hilti HKD

Product description

Identification after installation

Annex A3

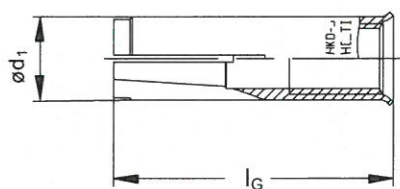


Materials and dimensions

Table A2: Materials

Designation	Material
Anchor body	cold formed steel – galvanised to $\geq 5 \mu\text{m}$
Expansion plug	cold formed steel
HKD 5/8"	
Anchor body	Steel Fe/Zn5 – galvanized $\geq 5\mu\text{m}$
Expansion plug	cold formed steel

Anchor body



Expansion plug

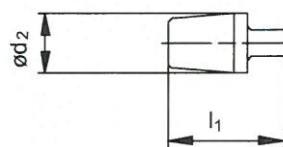


Table A3: Dimensions

Anchor size		5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Anchor length	l_G [mm]	30	30	40	50	65
Anchor diameter	$\varnothing d_1$ [mm]	9,9	11,9	11,95	15,85	19,75
Plug diameter	$\varnothing d_2$ [mm]	6,35	8,2	7,86	10,2	13,8
Plug length	l_1 [mm]	12	12	16,2	20	29

Hilti HKD

Product description
Materials and dimensions

Annex A4



Specifications of intended use

Anchorage subjected to:

- Static and quasi static load.

Base materials:

- 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.
- Non-cracked 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 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.

Table B1: Overview use categories and performance categories

Anchorage subjected to:	Threaded rod or screw
Hammer drilling 	✓
Static and quasi static loading in non-cracked concrete	5/16" to 5/8" Table : C1, C2 and C3

Hilti HKD

Intended use
Specifications

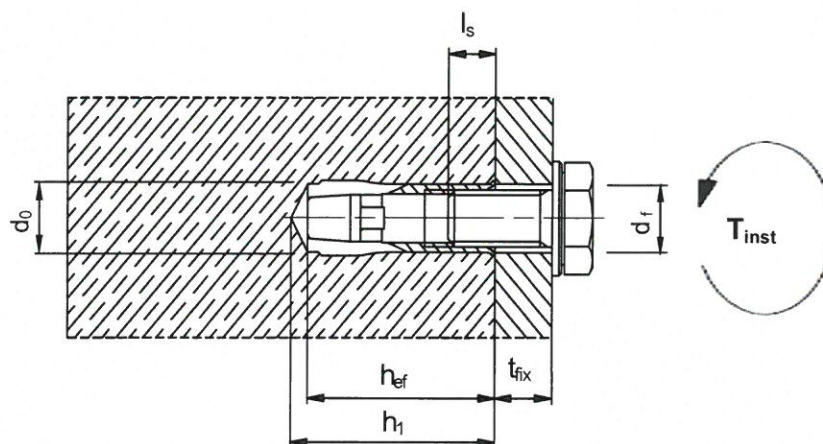
Annex B1



Table B2: Installation parameters for Hilti HKD

Hilti HKD		5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Nominal diameter of drill bit	d_0 [mm]	10	12	12	16	20
Thread diameter	d [mm]	7,94	9,53	9,53	12,7	15,9
Drill hole depth	h_1 [mm]	33	33	43	54	70
Effective embedment depth	h_{ef} [mm]	30	30	40	50	65
Thread engagement length	$l_{s,max}$ [mm]	14,5	13	18	23,5	23
Minimum screwing depth ¹⁾	$l_{s,min}$ [mm]	8	10	10	12,7	16
Maximum torque moment	T_{inst} [Nm]	≤ 8	≤ 15	≤ 15	≤ 35	≤ 60
Maximum diameter of clearance hole in the fixture	d_f [mm]	9	12	12	14	18

¹⁾ with anchor size 3/8"x30 only threaded rod is to be used.



Requirements for fastening screw or threaded rod:

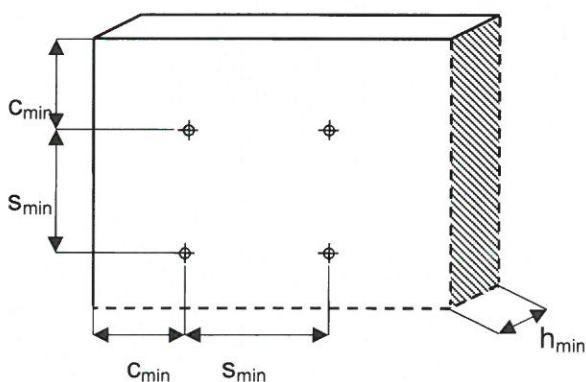
For anchors made of galvanised steel (Hilti HKD) fastening screws or threaded rods of steel grade 4.6 / 5.6 / 5.8 or 8.8 according to EN ISO 898-1:2013 shall be specified.

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 table B2.

Hilti HKD	Annex B2 ZAVOD ZA GRAJENIŠTVO SLOVENIJE LJUBLJANA 17
Intended use Installation parameters	

Table B3: Minimum spacing and minimum edge distance for Hilti HKD

Hilti HKD			5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Minimum thickness of concrete member	h_{min}	[mm]	100	100	100	100	130
Minimum spacing	s_{min}	[mm]	60	60	80	125	130
	for $c \geq$	[mm]	105	105	140	175	230
Minimum edge distance	c_{min}	[mm]	80	80	140	175	230
	for $s \geq$	[mm]	120	120	80	125	130



Hilti HKD

Intended use

Minimum spacing and minimum edge distance

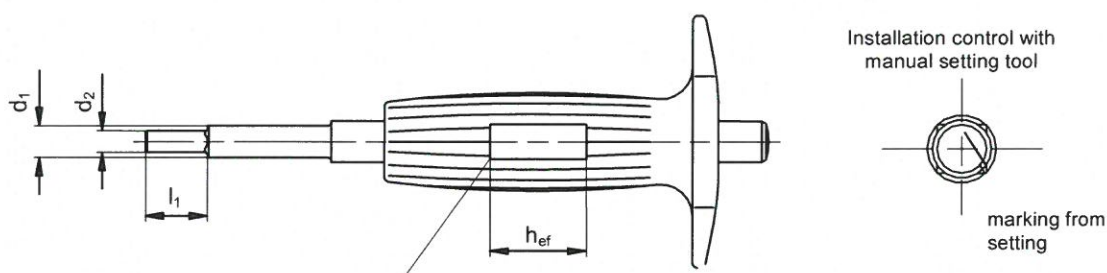
Annex B3



Table B4: Dimensions of the setting tools

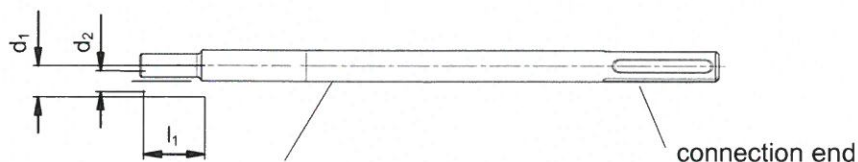
Setting tools HSD			5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Diameter	d_1	[mm]	9,5	11,5	11,5	14,5	18
Diameter	d_2	[mm]	6,5	8	8	10,2	13,5
Length	l_1	[mm]	18	18	24	30	36

Manual setting tool HSD-G M.. x h_{ef} (e.g. HSD-G M8-5/16"x 30)



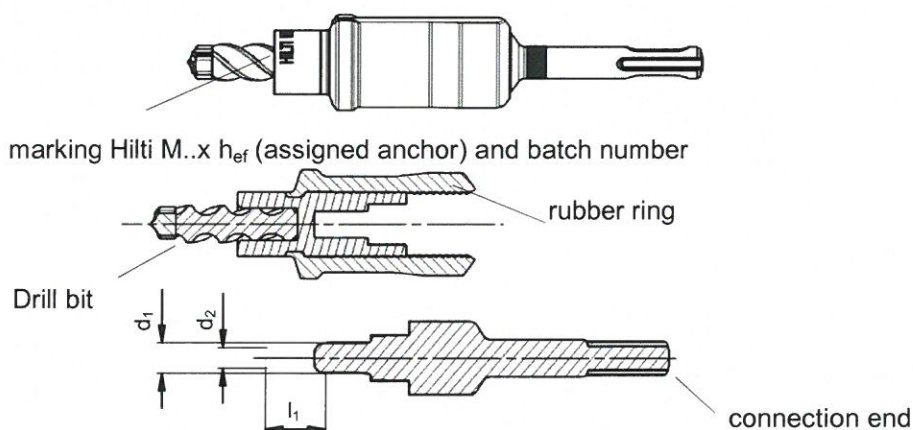
anchor gauge with imprint M..x h_{ef} (assigned anchor)
the recess length corresponds to the anchor length h_{ef}

Machine setting tool HSD-M M.. x h_{ef} (e.g. HSD-M M8-5/16"x30)



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

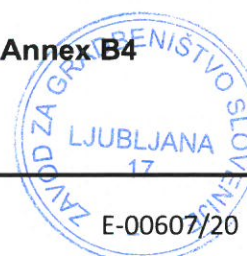
Machine setting tool HKD-TE CX M.. x h_{ef} (e.g. HKD-TE-CX M8-5/16"x30)



Hilti HKD

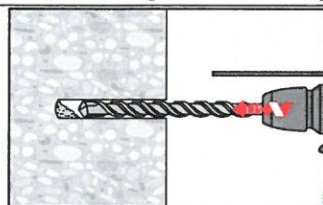
Intended use
Setting tools

Annex B4

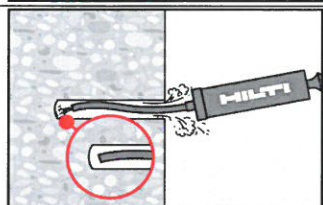


Installation instructions

Hole drilling and cleaning

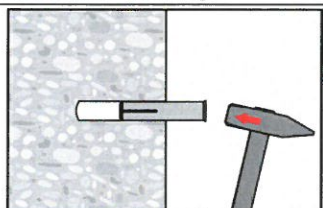


Make a cylindrical hole.

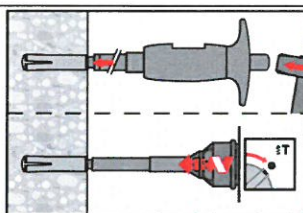
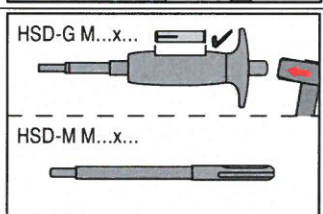


Remove dust.

Fastener setting

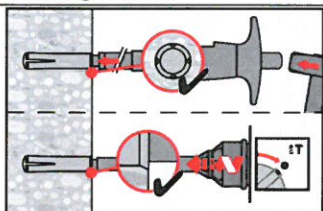


Install the anchor by hammering.



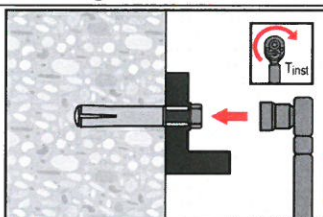
Choose the setting tool; and confirm the size of setting tool according to the size of the anchor.
HSD-G M...x...: Hammer setting
HSD-M M...x...: Machine setting

Setting check



HSD-G M...x...: Hammer on the top of setting tool until to observe the 4 marks on the lips of the anchor.
HSD-M M...x...: set the anchor until the setting tool touches on the border

Loading the anchor



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

Hilti HKD

Intended use

Installation instructions

Annex B5



Table C1: Essential characteristics for Hilti HKD under tension loads in non-cracked concrete

Hilti HKD			5/16"x30 ²⁾	3/8"x30 ²⁾	3/8"x40	1/2"x50	5/8"x65
Installation safety factor γ_2			1,0				
Steel failure							
Steel grade 4.6	$N_{Rk,s}$	[kN]	11,8	17,6	17,6	31,4	50,6
Partial safety factor $\gamma_{Ms}^{1)}$			2,0				1,5
Steel grade 5.6	$N_{Rk,s}$	[kN]	14,8	22,0	22,0	39,2	50,6
Partial safety factor $\gamma_{Ms}^{1)}$			2,0				1,5
Steel grade 5.8	$N_{Rk,s}$	[kN]	14,8	22,0	22,0	39,2	50,6
Partial safety factor $\gamma_{Ms}^{1)}$			1,5				
Steel grade 8.8	$N_{Rk,s}$	[kN]	17,6	23,1	26,8	40,8	50,6
Partial safety factor $\gamma_{Ms}^{1)}$			1,5				
Pull-out failure							
Characteristic resistance $N_{Rk,p}$			3)				
Concrete cone and splitting failure							
Effective embedment depth	h_{ef}	[mm]	30 ²⁾	30 ²⁾	40	50	65
Spacing	$s_{cr,N}$	[mm]	90	90	120	150	195
Edge distance	$c_{cr,N}$	[mm]	45	45	60	75	98
Spacing	$s_{cr,sp}$	[mm]	210	210	280	350	456
Edge distance	$c_{cr,sp}$	[mm]	105	105	140	175	228

¹⁾ In absence of other national regulations

²⁾ For application with statically indeterminate structural components only

³⁾ Pull-out failure is not decisive

Hilti HKD

Performances

Essential characteristic for Hilti HKD under tension loads in non-cracked concrete

Annex C1



Table C2: Essential characteristics for Hilti HKD under shear loads in non-cracked concrete

Hilti HKD			5/16"x30 ²⁾	3/8"x30 ²⁾	3/8"x40	1/2"x50	5/8"x65
Steel failure without lever arm							
Steel grade 4.6	V _{Rk,s}	[kN]	5,9	8,8	8,8	15,7	25,3
Partial safety factor	γ _{Ms} ¹⁾		1,67				1,25
Steel grade 5.6	V _{Rk,s}	[kN]	7,4	11,0	11,0	19,6	25,3
Partial safety factor	γ _{Ms} ¹⁾		1,67				1,25
Steel grade 5.8	V _{Rk,s}	[kN]	7,4	11,0	11,0	19,6	25,3
Partial safety factor	γ _{Ms} ¹⁾		1,25				
Steel grade 8.8	V _{Rk,s}	[kN]	8,8	11,5	13,4	20,4	25,3
Partial safety factor	γ _{Ms} ¹⁾		1,25				
Steel failure with lever arm							
Steel grade 4.6	M ⁰ _{Rk,s}	[Nm]	11	20	20	47	101,6
Partial safety factor	γ _{Ms} ¹⁾		1,67				
Steel grade 5.6	M ⁰ _{Rk,s}	[Nm]	14	25	25	59	127,0
Partial safety factor	γ _{Ms} ¹⁾		1,67				
Steel grade 5.8	M ⁰ _{Rk,s}	[Nm]	14	25	25	59	127,0
Partial safety factor	γ _{Ms} ¹⁾		1,25				
Steel grade 8.8	M ⁰ _{Rk,s}	[Nm]	22	40	40	94	203,2
Partial safety factor	γ _{Ms} ¹⁾		1,25				
Concrete pry-out failure							
Factor in equation (7.39) EN 1992-4:2018, §7.2.2.4			2,00				
Concrete edge failure							
Effective length of anchor	l _f = h _{ef}	[mm]	30	30	40	50	65
External diameter of anchor	d _{nom}	[mm]	10	12	12	16	20

¹⁾ In absence of other national regulations

²⁾ For application with statically indeterminate structural components only


Hilti HKD	Annex C2 
Performances Essential characteristic for Hilti HKD under shear loads in non-cracked concrete	

Table C3: Displacement under tension load for Hilti HKD

Hilti HKD			5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Tension load in C20/25 to C50/60 non-cracked concrete	N	[kN]	3,9	3,9	5,9	8,3	12,3
Displacement	δ_{N0}	[mm]	0,1	0,1	0,1	0,15	0,1
	$\delta_{N\infty}$	[mm]	0,3	0,3	0,3	0,3	0,2

Table C4: Displacement under shear load for Hilti HKD

Hilti HKD			5/16"x30	3/8"x30	3/8"x40	1/2"x50	5/8"x65
Shear load in C20/25 to C50/60 non-cracked concrete	V	[kN]	2,5	3,8	3,8	6,7	14,5
Displacement	δ_{V0}	[mm]	0,35	0,35	0,4	0,8	0,9
	$\delta_{V\infty}$	[mm]	0,5	0,5	0,6	1,2	1,35

Hilti HKD**Performances**

Displacements

Annex C3