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# DIBt

Mitglied der EOTA  
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## European Technical Approval ETA-02/0032

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	Hilti Kompaktdübel HKD und HKD-R <i>Hilti push-in anchor HKD and HKD-R</i>
Zulassungsinhaber <i>Holder of approval</i>	Hilti Aktiengesellschaft Business Unit Anchors 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Zulassungsgegenstand und Verwendungszweck  <i>Generic type and use of construction product</i>	Wegkontrolliert spreizender Dübel aus galvanisch verzinktem oder nichtrostendem Stahl in den Größen M6, M8, M10, M12, M16 und M20 zur Verankerung im ungerissenen Beton  <i>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</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> 10. Oktober 2007 bis <i>to</i> 17. Oktober 2012
Herstellwerk <i>Manufacturing plant</i>	Herstellwerk 8

Diese Zulassung umfasst  
*This Approval contains*

17 Seiten einschließlich 10 Anhänge  
*17 pages including 10 annexes*

Diese Zulassung ersetzt  
*This Approval replaces*

ETA-02/0032 mit Geltungsdauer vom 17.10.2002 bis 17.10.2007  
*ETA-02/0032 with validity from 17.10.2002 to 17.10.2007*



Europäische Organisation für Technische Zulassungen  
European Organisation for Technical Approvals

## I LEGAL BASES AND GENERAL CONDITIONS

- 1 This European technical approval is issued by Deutsches Institut für Bautechnik in accordance with:
  - Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, modified by Council Directive 93/68/EEC<sup>2</sup> and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council<sup>3</sup>;
  - Gesetz über das In-Verkehr-Bringen von und den freien Warenverkehr mit Bauprodukten zur Umsetzung der Richtlinie 89/106/EWG des Rates vom 21. Dezember 1988 zur Angleichung der Rechts- und Verwaltungsvorschriften der Mitgliedstaaten über Bauprodukte und anderer Rechtsakte der Europäischen Gemeinschaften (Bauproduktengesetz - BauPG) vom 28. April 1998<sup>4</sup>, zuletzt geändert durch Gesetz vom 06.01.2004<sup>5</sup>;
  - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC<sup>6</sup>;
  - Guideline for European technical approval of "Metal anchors for use in concrete - Part 4: Deformation controlled expansion anchors", ETAG 001-04.
- 2 Deutsches Institut für Bautechnik is authorized to check whether the provisions of this European technical approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European technical approval and for their fitness for the intended use remains with the holder of the European technical approval.
- 3 This European technical approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European technical approval.
- 4 This European technical approval may be withdrawn by Deutsches Institut für Bautechnik, in particular pursuant to information by the Commission according to Article 5(1) of Council Directive 89/106/EEC.
- 5 Reproduction of this European technical approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of Deutsches Institut für Bautechnik. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European technical approval.
- 6 The European technical approval is issued by the approval body in its official language. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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1 Official Journal of the European Communities L 40, 11.2.1989, p. 12  
2 Official Journal of the European Communities L 220, 30.8.1993, p. 1  
3 Official Journal of the European Union L 284, 31.10.2003, p. 25  
4 Bundesgesetzblatt I, p. 812  
5 Bundesgesetzblatt I, p.2, 15  
6 Official Journal of the European Communities L 17, 20.1.1994, p. 34

## II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

### 1 Definition of the construction product and intended use

#### 1.1 Definition of the product

The Hilti-push-in anchor HKD-S (with collar) and HKD-E (without collar) is a deformation-controlled expansion anchor in the range of M6x30, M8x30, M10x30, M8x40, M10x40, M12x50, M16x65 and M20x80 made of galvanised steel.

The Hilti-push-in anchor HKD-SR (with collar) and HKD-ER (without collar) is a deformation-controlled expansion anchor in the range of M8x30, M10x40, M12x50, M16x65 and M20x80 made of stainless steel.

The anchor consists of an expansion sleeve and an internal plug.

An illustration of the product and intended use is given in Annex 1.

The fixture shall be anchored with a fastening screw or threaded rod according to Annex 5.

#### 1.2 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106 EEC shall be fulfilled and failure of anchorages made with these products would cause risk to human life and/or lead to considerable economic consequences. The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 at minimum and C50/60 at most according to EN 206-1:2000-12.

It may be anchored in non-cracked concrete only.

##### Anchor made of galvanised steel (Hilti HKD-S, HKD-E):

The anchor made of galvanised steel may only be used in structures subject to dry internal conditions.

##### Anchor made of stainless steel (Hilti HKD-SR, HKD-ER):

The anchor made of stainless steel may be used in structures subject to dry internal conditions and also in structures subject to external atmospheric exposure (including industrial and marine environment), or exposure in permanently damp internal conditions, if no particular aggressive conditions exist. Such particular aggressive conditions are e.g. permanent, alternating immersion in seawater or the splash zone of seawater, chloride atmosphere of indoor swimming pools or atmosphere with extreme chemical pollution (e. g. in desulphurization plants or road tunnels where de-icing materials are used).

The provisions made in this European technical approval are based on an assumed intended working life of the anchor of 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.

## **2 Characteristics of the product and methods of verification**

### **2.1 Characteristics of the product**

The anchor corresponds to the drawings and provisions given in Annexes 2 and 3. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 2 and 3 shall correspond to the respective values laid down in the technical documentation<sup>7</sup> of this European Technical Approval.

The characteristic values for the design of anchorages are given in Annexes 6 to 10.

Each anchor is marked with the identifying mark of the producer, the anchor identity, the thread size, the effective anchorage depth ( $h_{ef}$ ) and the outer diameter of the anchor sleeve ( $\varnothing d_1$ ) according to Annex 1. In addition, the expansion sleeve for anchor size M8x40 and M10x40 are marked on the top of the sleeve according to Annex 1. The anchor made of stainless steel is marked with the additional letter "R".

The anchor shall only be packaged and supplied as a complete unit.

### **2.2 Methods of verification**

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Part 1 "Anchors in general" and Part 4 "Deformation-controlled expansion anchors" on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the Construction Products Directive, these requirements need also to be complied with, when and where they apply.

## **3 Evaluation and attestation of conformity and CE marking**

### **3.1 System of attestation of conformity**

According to the Decision 89/106/EEC of the European Commission<sup>8</sup> system 2(i) (referred to as System 1) of the attestation of conformity applies.

This system of attestation of conformity is defined as follows:

System 1: Certification of the conformity of the product by an approved certification body on the basis of:

- (a) Tasks for the manufacturer:
  - (1) factory production control;
  - (2) further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan;
- (b) Tasks for the approved body:
  - (3) initial type-testing of the product;
  - (4) initial inspection of factory and of factory production control;
  - (5) continuous surveillance, assessment and approval of factory production control.

Note: Approved bodies are also referred to as "notified bodies".

<sup>7</sup> The technical documentation of this European technical approval is deposited at the Deutsches Institut für Bautechnik and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies.

<sup>8</sup> Official Journal of the European Communities L 254 of 08.10.1996

## **3.2 Responsibilities**

### **3.2.1 Tasks for the manufacturer**

#### **3.2.1.1 Factory production control**

The manufacturer shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall insure that the product is in conformity with this European technical approval.

The manufacturer may only use initial/raw/constituent materials stated in the technical documentation of this European technical approval.

The factory production control shall be in accordance with the control plan of 10 October 2007 which is part of the technical documentation of this European technical approval. The control plan is laid down in the context of the factory production control system operated by the manufacturer and deposited with Deutsches Institut für Bautechnik.<sup>9</sup>

The results of factory production control shall be recorded and evaluated in accordance with the provisions of the control plan.

#### **3.2.1.2 Other tasks for the manufacturer**

The manufacturer shall, on the basis of a contract, involve a body which is approved for the tasks referred to in section 3.1 in the field of anchors in order to undertake the actions laid down in section 3.2.2. For this purpose, the control plan referred to in sections 3.2.1.1 and 3.2.2 shall be handed over by the manufacturer to the approved body involved.

The manufacturer shall make a declaration of conformity, stating that the construction product is in conformity with the provisions of this European technical approval.

### **3.2.2 Tasks for the approved bodies**

The approved body shall perform the

- initial type-testing of the product,
- initial inspection of factory and of factory production control,
- continuous surveillance, assessment and approval of factory production control

in accordance with the provisions laid down in the control plan.

The approved body shall retain the essential points of its actions referred to above and state the results obtained and conclusions drawn in a written report.

The approved certification body involved by the manufacturer shall issue an EC certificate of conformity of the product stating the conformity with the provisions of this European technical approval.

In cases where the provisions of the European technical approval and its control plan are no longer fulfilled the certification body shall withdraw the certificate of conformity and inform Deutsches Institut für Bautechnik without delay.

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<sup>9</sup> The control plan is a confidential part of the European technical approval and only handed over to the approved body involved in the procedure of attestation of conformity. See section 3.2.2.

### **3.3 CE marking**

The CE marking shall be affixed on the ...(product itself - indicate where on the product, if necessary - or the label attached to it; packaging; accompanying commercial document, e.g. the EC declaration of conformity). The letters "CE" shall be followed by the identification number of the approved certification body, where relevant, and be accompanied by the following additional information:

- the name and address of the producer (legal entity responsible for the manufacture),
- the last two digits of the year in which the CE marking was affixed,
- the number of the EC certificate of conformity for the product,
- the number of the European technical approval,
- the number of the guideline for European technical approval,
- use category (ETAG 001-1, option 7),
- size.

## **4 Assumptions under which the fitness of the product for the intended use was favourably assessed**

### **4.1 Manufacturing**

The European technical approval is issued for the product on the basis of agreed data/information, deposited with Deutsches Institut für Bautechnik, which identifies the product that has been assessed and judged. Changes to the product or production process, which could result in this deposited data/information being incorrect, should be notified to Deutsches Institut für Bautechnik before the changes are introduced. Deutsches Institut für Bautechnik will decide whether or not such changes affect the approval and consequently the validity of the CE marking on the basis of the approval and if so whether further assessment or alterations to the approval shall be necessary.

### **4.2 Installation**

#### **4.2.1 Design of anchorages**

The fitness of the anchor for the intended use is given under the following conditions:

The anchorages are designed in accordance with the "Guideline for European technical approval of Metal Anchors for Use in Concrete", Annex C, Method A 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).

The minimum strength class and the minimum screwing depth of the fastening screw or the threaded rod for installation of the fixture shall meet the requirements according to Annex 5. The length of the fastening screw shall be defined taking into account available thread length, the minimum screwing depth, the thickness of fixture and tolerances of member and fixture.

#### **4.2.2 Installation of anchors**

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor.

- Checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply.
- Check of concrete being well compacted, e. g. without significant voids.
- Positioning of the drill holes without damaging the reinforcement.
- Clearing of the hole of drilling dust.
- Edge distance and spacing not less than the specified values without minus tolerances.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not in the direction of load application.
- Anchor installation such that the effective setting depth is complied with. This compliance is ensured, if the expansion sleeve does not exceed the concrete surface.
- Anchor expansion by impact on the plug using the setting tools given in Annex 3 and 4. The anchor is properly set if the stop of the pin reaches the expansion sleeve, and the impression of the manual setting tool HSD-G is visible as illustrated in Annex 4.
- The fastening screw or threaded rod shall correspond to the requirements given in Annex 5.
- Installation torque moments are not required for functioning of the anchor. However, the torque moments given in Annex 5 must not be exceeded.

#### 4.2.3 Responsibility of the manufacturer

It is in the responsibility of the manufacturer to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to and 4.2.1 and 4.2.2 is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

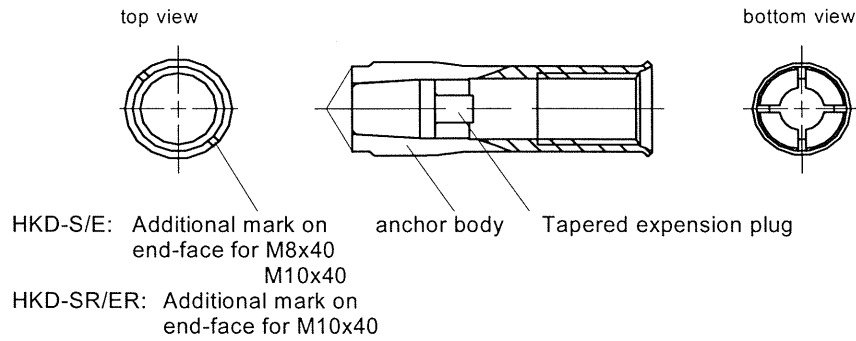
- drill bit diameter,
- thread diameter,
- minimum effective anchorage depth,
- available thread length and minimum screwing depth of the fastening screw or threaded rod,
- minimum strength class of the screw or threaded rod according to EN ISO 898-1
- minimum hole depth,
- torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

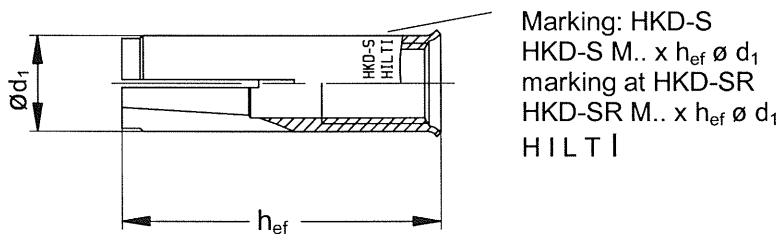
Dipl.-Ing. E. Jasch  
President of Deutsches Institut für Bautechnik  
Berlin, 10 October 2007

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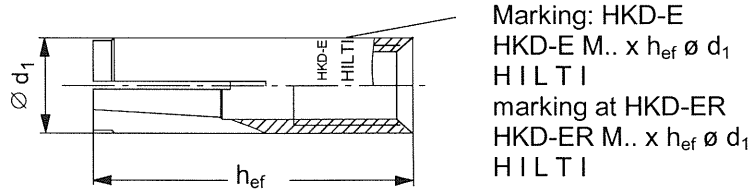
### Hilti push-in anchor HKD-S, HKD-SR, HKD-E und HKD-ER



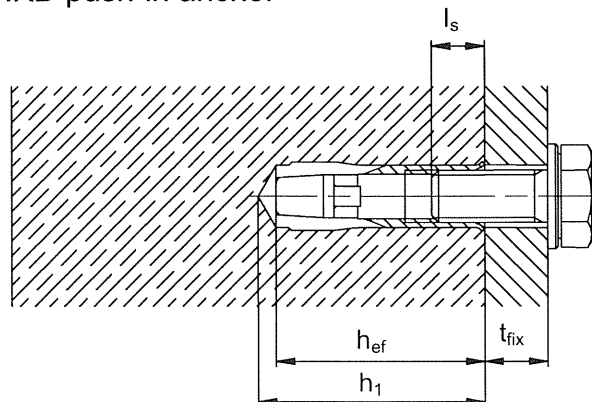
#### Anchor body HKD-S und HKD-SR



#### Anchor body HKD-E und ER



#### Installed condition: HKD push-in anchor



Hilti push-in anchor HKD and HKD-R

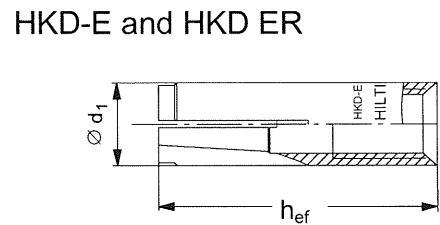
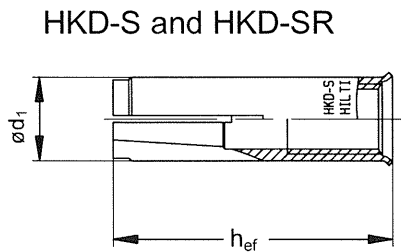
Product and intended use

Annex 1

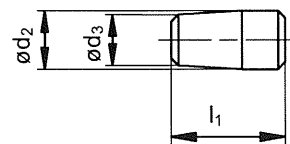
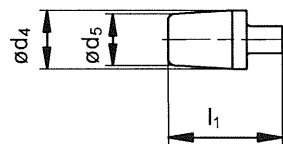
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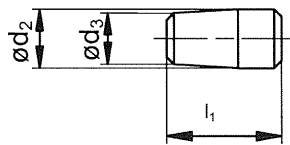
1 HKD anchor body



2a HKD-S and HKD-E Expansion plugs



2b HKD-SR and HKD-ER Expansion plugs



**Table 1: Materials**

HKD-S; HKD-E		
designation		material
1	Anchor body	steel Fe/Zn5 (galvanised to $\geq 5 \mu\text{m}$ ), EN 10087, EN 10277-3
2a	Tapered expansion plug	Steel, material 1.0213, EN 10263-2 or material 1.0204, DIN 17111
HKD-SR; HKD-ER		
designation		material
1	Anchor body	Stainless steel, material 1.4401, EN 10088-3 1.4404, EN 10088-3
2b	Tapered expansion plug	

Hilti push-in anchor HKD and HKD-R

Anchor materials

Annex 2

of European  
technical approval  
ETA-02/0032

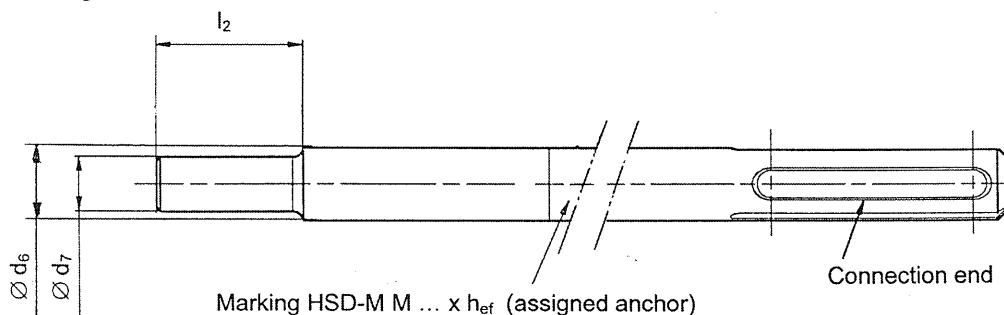
**Table 2a: Dimensions HKD-S and HKD-E**

Anchor typ HKD-S, HKD-E	S M6x30 E M6x30	S M8x30 E M8x30	S M10x30	S M8x40 E M8x40	S M10x40 E M10x40	S M12x50 E M12x50	S M16x65 E M16x65	S M20x80 E M20x80
$h_{ef}$ [mm]	30	30	30	40	40	50	65	80
$d_1$ [mm]	8	9,95	11,8	9,95	11,95	14,9	19,8	24,8
$d_2$ [mm]	5	-	8,2	-	-	-	-	-
$d_3$ [mm]	3,9	-	7,55	-	-	-	-	-
$d_4$ [mm]	-	6,5	-	6,5	8,2	10,3	13,8	16,5
$d_5$ [mm]	-	5,8	-	5,8	7,1	9,3	12,9	15,5
$l_1$ [mm]	15	12	12	12	16	20	29	30

**Table 2b: Dimensions HKD-SR and HKD-ER**

Anchor typ HKD-SR HKD-ER	SR M8x30 ER M8x30	SR M10x40 ER M10x40	SR M12x50 ER M12x50	SR M16x65 ER M16x65	SR M20x80 ER M20x80
$h_{ef}$ [mm]	30	40	50	65	80
$d_1$ [mm]	9,95	11,95	14,9	19,8	24,8
$d_2$ [mm]	6,5	8,2	10,3	13,8	17,5
$d_3$ [mm]	5,3	7,1	9,3	12,9	16,4
$l_1$ [mm]	12	16	20	29	30

Machine setting tool HSD-M M.. x  $h_{ef}$



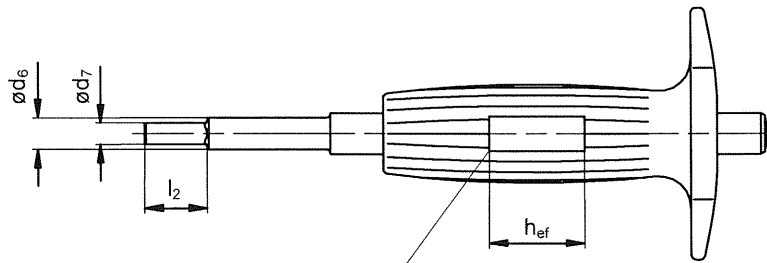
**Table 3: Dimensions of the machine setting tool**

Machine setting tool	Anchor size	$d_6$ [mm]	$d_7$ [mm]	$l_2$ [mm]
HSD-M M 6x30	M 6x30	7,5	5	15
HSD-M M 8x30	M 8x30	9,5	6,5	18
HSD-M M10x30	M10x30	11,5	8	18
HSD-M M 8x40	M 8x40	9,5	6,5	28
HSD-M M10x40	M10x40	11,5	8	24
HSD-M M12x50	M12x50	14,5	10,2	30
HSD-M M16x65	M16x65	18	13,5	36
HSD-M M20x80	M20x80	22	16,5	50

Remark: For HKD and HKD-R the same machine setting tools can be used.

<b>Hilti push-in anchor HKD and HKD-R</b>	<b>Annex 3</b> of European technical approval <b>ETA-02/0032</b>
<b>Anchor dimensions and machine setting tool</b>	

Manual setting tool HSD-G M.. x h<sub>ef</sub>



Anchor gauge with imprint M..x h<sub>ef</sub> (assigned anchor).  
The recess length corresponds to the anchor length h<sub>ef</sub>

Installation control with manual setting tool HSD-G M.. x h<sub>ef</sub>

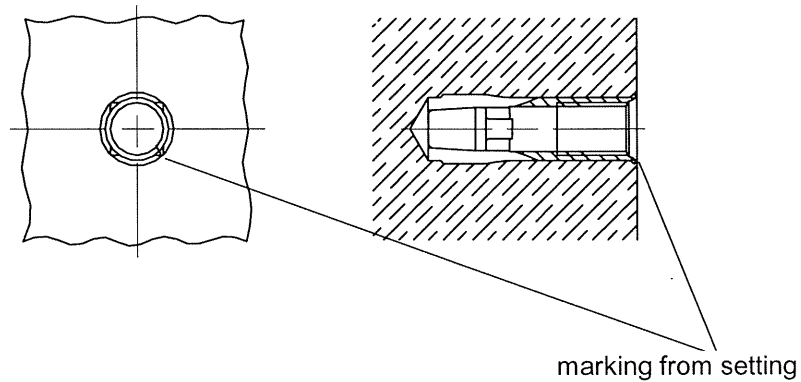


Table 4: Dimensions of manual setting tools

Manual setting tool	Anchor size	d <sub>6</sub> [mm]	d <sub>7</sub> [mm]	l <sub>2</sub> [mm]
HSD-G M 6x30	M 6x30	7,5	5	15
HSD-G M 8x30	M 8x30	9,5	6,5	18
HSD-G M10x30	M10x30	11,5	8	18
HSD-G M 8x40	M 8x40	9,5	6,5	28
HSD-G M10x40	M10x40	11,5	8	24
HSD-G M12x50	M12x50	14,5	10,2	30
HSD-G M16x65	M16x65	18	13,5	36
HSD-G M20x80	M20x80	22	16,5	50

Remark: For HKD and HKD-R the same manual setting tools can be used.

Hilti push-in anchor HKD and HKD-R

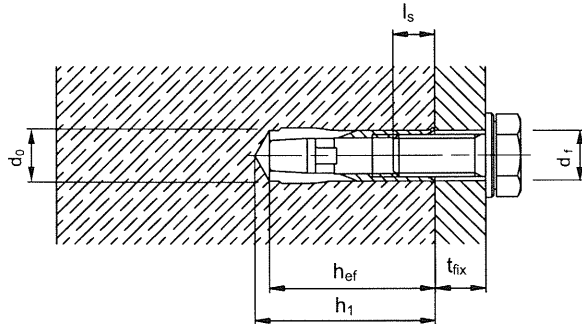
Manuel setting tool

Annex 4

of European  
technical approval  
ETA-02/0032

**Table 5: HKD(-R) Installation data**

Fastening screw or threaded rod:  
 For HKD-S(E) minimum property class 4.6/5.6/5.8 or 8.8 acc. to EN ISO 898-1 (see table 7a)  
 For HKD-SR(ER) the minimum property class is A4-70 acc. to EN ISO 3506 (see table 7b)  
 Minimum screwing depth  $l_{s,min}$  :  
 The length of the fastening screw shall be determined depending on thickness of fixture  $t_{fix}$ , admissible tolerances and available thread length  $l_{s,max}$  as well as minimum screwing depth  $l_{s,min}$ .



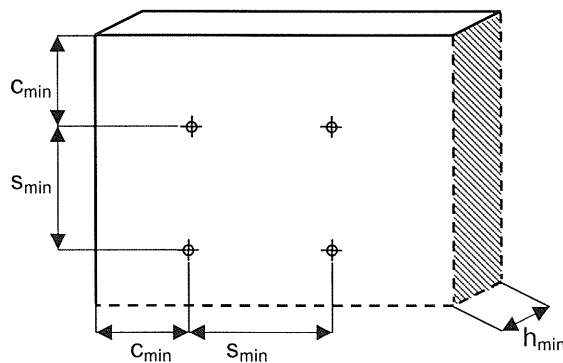
Anchor size HKD-S HKD-E	Drill hole diameter $d_0$ [mm]	Thread diameter $d$ [mm]	Depth of drilled hole $h_1$ [mm]	Effective anchorage depth $h_{ef}$ [mm]	Available thread length $l_{s,max}$ [mm]	Minimum screwing depth $l_{s,min}$ [mm]	Tightening torque $T_{inst}$ [Nm]	Clearance hole diameter $d_f$ [mm]
M 6x30	8	6	32	30	12,5	7,5	≤ 4	7
M 8x30	10	8	33	30	14,5	9,5	≤ 8	9
M10x30 <sup>*1)</sup>	12	10	33	30	12	12	≤ 15	12
M 8x40	10	8	43	40	15	9,5	≤ 8	9
M10x40	12	10	43	40	18	11,5	≤ 15	12
M12x50	15	12	54	50	22	14	≤ 35	14
M16x65	20	16	70	65	28	18	≤ 60	18
M20x80	25	20	85	80	34	23	≤ 120	22
HKD-SR HKD-ER								
M 8x30	10	8	33	30	14,5	9,5	≤ 8	9
M10x40	12	10	43	40	18	11,5	≤ 15	12
M12x50	15	12	54	50	22	14	≤ 35	14
M16x65	20	16	70	65	28	18	≤ 60	18
M20x80	25	20	85	80	34	23	≤ 120	22

\*1) With the anchor size M10x30 only threaded rod are to be used

<b>Hilti push-in anchor HKD and HKD-R</b>	<b>Annex 5</b>
<b>Installation data</b>	of European technical approval <b>ETA-02/0032</b>

**Table 6: Minimum thickness of concrete member, minimum spacing and minimum edge distances**

Anchor size HKD-S HKD-E	Minimum thickness of concrete member $h_{min}$ [mm]	Minimum spacing $s_{min}$ [mm]	Minimum edge distance $c_{min}$ [mm]
M 6x30	100	60	105
M 8x30	100	60	105
M10x30	100	60	105
M 8x40	100	80	140
M10x40	100	80	140
M12x50	100	125	175
M16x65	130	130	227
M20x80	160	160	280
HKD-SR HKD-ER			
M 8x30	100	60	105
M10x40	100	80	140
M12x50	100	125	175
M16x65	130	130	227
M20x80	160	160	280



**Hilti push-in anchor HKD and HKD-R**

**Installation data**

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**Table 7a: Characteristic resistance to tension loads (design method A)**

HKD-S HKD-E			S M6x30*) E M6x30*)	S M8x30*) E M8x30*)	S M10x30*)	S M8x40 E M8x40	S M10x40 E M10x40	S M12x50 E M12x50	S M16x65 E M16x65	S M20x80 E M20x80
<b>Steel failure</b>										
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 4.6	8,0	14,6	23,2	14,6	23,2	33,7	62,8	98,0
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		2,0							
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 5.6	10,1	18,3	18,5	18,3	19,9	42,2	54,7	86,9
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		2,0	2,0	1,49	2,0	1,49	2,0	1,47	1,47
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 5.8	10,1	17,4	18,5	17,4	19,9	35,3	54,7	86,9
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		1,50	1,53	1,49	1,53	1,49	1,49	1,47	1,47
Characteristic resistance	$N_{Rk,s}$ [kN]	steel 8.8	13,4	17,4	18,5	17,4	19,9	35,3	54,7	86,9
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		1,53	1,53	1,49	1,53	1,49	1,49	1,47	1,47
<b>Pull-out failure</b>										
Characteristic resistance	$N_{Rk,p}$ [kN]	C20/25	--**)			9,0	--**)			
Partial safety factor in Non-cracked concrete	$\gamma_{Mp}$ <sup>1)</sup>					1,8 <sup>2)</sup>				
Increasing factors for $N_{Rk,p}$	$\psi_c$	C30/37				1,22				
		C40/50				1,41				
		C50/60				1,55				
<b>Concrete cone and splitting failure</b>										
Effective anchorage depth	$h_{ef}$	[mm]	30*)	30*)	30*)	40	40	50	65	80
Partial safety factor in Non-cracked concrete	$\gamma_{Mc} = \gamma_{M,sp}$ <sup>1)</sup>		1,8 <sup>2)</sup>						1,5 <sup>3)</sup>	
Spacing	$s_{cr,N}$	[mm]	90	90	90	120	120	150	195	240
Edge distance	$c_{cr,N}$	[mm]	45	45	45	60	60	75	97	120
Spacing	$s_{cr,sp}$	[mm]	210	210	210	280	280	350	455	560
Edge distance	$c_{cr,sp}$	[mm]	105	105	105	140	140	175	227	280

\*) For application with statically indeterminate structural components only

\*\*) Pull-out failure mode not determining

1) In absence of other national regulations

2)  $\gamma_2 = 1,2$  is included

3)  $\gamma_2 = 1,0$  is included

**Hilti push-in anchor HKD and HKD-R**

**Characteristic resistance to tension load (design method A), displacements**

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**Table 7b: Characteristic resistance to tension loads (design method A)**

HKD-SR HKD-ER			SR M8x30* ER M8x30* <sup>1)</sup>	SR M10x40 ER M10x40	SR M12x50 ER M12x50	SR M16x65 ER M16x65	SR M20x80 ER M20x80
<b>Steel failure</b>							
Characteristic resistance	$N_{RK,s}$ [kN]	A4-70	16,8	21,1	37,3	64,2	102,0
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		1,83				
<b>Concrete cone and splitting failure **)</b>							
Effective anchorage depth	$h_{ef}$	[mm]	30* <sup>1)</sup>	40	50	65	80
Partial safety factor in non-cracked concrete	$\gamma_{Mc} = \gamma_{M,sp}$ <sup>1)</sup>		1,8 <sup>2)</sup>			1,5 <sup>3)</sup>	
Spacing	$s_{cr,N}$	[mm]	90	120	150	195	240
Edge distance	$c_{cr,N}$	[mm]	45	60	75	97	120
Spacing	$s_{cr,sp}$	[mm]	210	280	350	455	560
Edge distance	$c_{cr,sp}$	[mm]	105	140	175	227	280

\*) For application with statically indeterminate structural components only

\*\*\*) Pull-out failure mode not determining

1) In absence of other national regulations;

2)  $\gamma_2 = 1,2$  is included;

3)  $\gamma_2 = 1,0$  is included

**Table 8a: Displacements under tension loads**

HKD-S HKD-E		S M6x30 E M6x30	S M8x30 E M8x30	S M10x30	S M8x40 E M8x40	S M10x40 E M10x40	S M12x50 E M12x50	S M16x65 E M16x65	S M20x80 E M20x80
Tension load in C20/25 to C50/60 non-cracked concrete	N [kN]	3,3	3,3	3,3	3,6	5,1	7,1	12,6	17,2
Displacement	$\delta_{N0}$ [mm]	0,12	0,12	0,12	0,12	0,12	0,12	0,12	0,12
	$\delta_{N\infty}$ [mm]	0,21	0,21	0,21	0,21	0,21	0,21	0,21	0,21

**Table 8b: Displacements under tension loads**

HKD-SR HKD-ER		SR M8x30 ER M8x30	SR M10x40 ER M10x40	SR M12x50 ER M12x50	SR M16x65 ER M16x65	SR M20x80 ER M20x80
Tension load in C20/25 to C50/60 non-cracked concrete	N [kN]	3,3	5,1	7,1	12,6	17,2
Displacement	$\delta_{N0}$ [mm]	0,12	0,12	0,12	0,12	0,12
	$\delta_{N\infty}$ [mm]	0,21	0,21	0,21	0,21	0,21

**Hilti push-in anchor HKD and HKD-R**

**Characteristic resistance to tension load (design method A), displacements**

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**Table 9a: Characteristic resistance to shear loads (design method A)**

HKD-S HKD-E		S M6x30 E M6x30	S M8x30 E M8x30	S M10x30	S M8x40 E M8x40	S M10x40 E M10x40	S M12x50 E M12x50	S M16x65 E M16x65	S M20x80 E M20x80	
<b>Steel failure without lever arm</b>										
Characteristic resistance	$V_{Rk,s}$ [kN]	steel 4.6	4,0	7,3	7,4	7,3	8,0	16,9	21,9	34,7
Partial safety factor	$\gamma_{Ms}^{1)}$		1,67	1,67	1,25	1,67	1,25	1,67	1,25	1,25
Characteristic resistance	$V_{Rk,s}$ [kN]	steel 5.6	5,0	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Partial safety factor	$\gamma_{Ms}^{1)}$		1,67	1,27	1,25	1,27	1,25	1,25	1,25	1,25
Characteristic resistance	$V_{Rk,s}$ [kN]	steell 5.8	5,0	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Partial safety factor	$\gamma_{Ms}^{1)}$		1,25	1,27	1,25	1,27	1,25	1,25	1,25	1,25
Characteristic resistance	$V_{Rk,s}$ [kN]	steel 8.8	5,3	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Partial safety factor	$\gamma_{Ms}^{1)}$		1,27	1,27	1,25	1,27	1,25	1,25	1,25	1,25
<b>Steel failure with lever arm</b>										
Characteristic resistance	$M_{Rk,s}^0$ [Nm]	steel 4.6	6	15	30	15	30	52	133	260
Partial safety factor	$\gamma_{Ms}^{1)}$		1,67							
Characteristic resistance	$M_{Rk,s}^0$ [Nm]	steel 5.6	8	19	37	19	37	65	166	325
Partial safety factor	$\gamma_{Ms}^{1)}$		1,67							
Characteristic resistance	$M_{Rk,s}^0$ [Nm]	steel 5.8	8	19	37	19	37	65	166	325
Partial safety factor	$\gamma_{Ms}^{1)}$		1,25							
Characteristic resistance	$M_{Rk,s}^0$ [Nm]	steel 8.8	12	30	60	30	60	105	266	519
Partial safety factor	$\gamma_{Ms}^{1)}$		1,25							
<b>Concrete pryout failure</b>										
Factor in equation (5.6) ETAG Annex C, §5.2.3.3	k		2,0							
Partial safety factor	$\gamma_{Mcp}^{1)}$		1,5 <sup>3)</sup>							
<b>Concrete edge failure</b>										
Effective length of anchor	$l_f$	[mm]	30	30	30	40	40	50	65	80
External diameter of anchor	$d_{nom}$	[mm]	8	10	12	10	12	15	20	25
Partial safety factor	$\gamma_{Mc}^{1)}$		1,5 <sup>3)</sup>							

<sup>1)</sup> In absence of other national regulations

<sup>3)</sup>  $\gamma_2 = 1,0$  is included

**Hilti push-in anchor HKD and HKD-R**

**Characteristic resistance to tension load (design method A), displacements**

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**Table 9b: Characteristic resistance to shear load (design method A)**

HKD-SR HKD-ER		SR M8x30 ER M8x30	SR M10x40 ER M10x40	SR M12x50 ER M12x50	SR M16x65 ER M16x65	SR M20x80 ER M20x80	
<b>Steel failure without lever arm</b>							
Characteristic resistance	$V_{Rk,s}$ [kN]	steel A4-70	8,4	10,5	18,7	32,1	51,0
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		1,52				
<b>Steel failure with lever arm</b>							
Characteristic resistance	$M^0_{Rk,s}$ [Nm]	steel A4-70	26	52	92	233	454
Partial safety factor	$\gamma_{Ms}$ <sup>1)</sup>		1,56				
<b>Concrete pryout failure</b>							
Factor in equation (5.6) ETAG Annex C, §5.2.3.3	k		2,0				
Partial safety factor	$\gamma_{Mcp}$ <sup>1)</sup>		1,5 <sup>3)</sup>				
<b>Concrete edge failure</b>							
Effective length of anchor in shear loading	$l_f$	[mm]	30	40	50	65	80
External diameter of anchor	$d_{nom}$	[mm]	10	12	15	20	25
Partial safety factor	$\gamma_{Mc}$ <sup>1)</sup>		1,5 <sup>3)</sup>				

<sup>1)</sup> In absence of other national regulations

<sup>3)</sup>  $\gamma_2 = 1,0$  is included

**Table 10a: Displacement under shear load**

HKD-S HKD-E		S M6x30 E M6x30	S M8x30 E M8x30	S M10x30	S M8x40 E M8x40	S M10x40 E M10x40	S M12x50 E M12x50	S M16x65 E M16x65	S M20x80 E M20x80
Shear load in C20/25 to C50/60 non-cracked concrete	V [kN]	1,7	3,1	4,3	3,1	4,6	7,2	12,5	19,8
Displacement	$\delta_{v0}$ [mm]	0,35	0,35	0,35	0,40	0,40	0,45	0,75	0,75
	$\delta_{v\infty}$ [mm]	0,50	0,50	0,50	0,60	0,60	0,70	1,1	1,1

**Table 10b: Displacement under shear load**

HKD-SR HKD-ER		SR M8x30 ER M8x30	SR M10x40 ER M10x40	SR M12x50 ER M12x50	SR M16x65 ER M16x65	SR M20x80 ER M20x80
Shear load in C20/25 to C50/60 non-cracked concrete	V [kN]	3,9	4,9	8,8	15,1	24,0
Displacement	$\delta_{v0}$ [mm]	0,45	0,45	0,55	0,9	0,9
	$\delta_{v\infty}$ [mm]	0,65	0,65	0,85	1,3	1,3

**Hilti push-in anchor HKD and HKD-R**

**Characteristic resistance to Shear loads (design method A), displacements**

**Annex 10**

of European technical approval  
**ETA-02/0032**