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DIBt

Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-02/0032

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung
Trade name

Hilti Kompaktdübel HKD
Hilti push-in anchor HKD

Zulassungsinhaber
Holder of approval

Hilti Aktiengesellschaft
Business Unit Anchors
9494 Schaan
FÜRSTENTUM LIECHTENSTEIN

Zulassungsgegenstand
und Verwendungszweck

Wegkontrolliert spreizender Dübel aus galvanisch verzinktem oder nichtrostendem Stahl in den Größen M6, M8, M10, M12, M16 und M20 zur Verankerung im ungerissenen Beton

*Generic type and use
of construction product*

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

Geltungsdauer:
Validity: vom
from
bis
to

22 April 2010
17 October 2012

Herstellwerk
Manufacturing plant

Hilti Aktiengesellschaft

Diese Zulassung umfasst
This Approval contains

21 Seiten einschließlich 13 Anhänge
21 pages including 13 annexes

Diese Zulassung ersetzt
This Approval replaces

ETA-02/0032 mit Geltungsdauer vom 10.10.2007 bis 17.10.2012
ETA-02/0032 with validity from 10.10.2007 to 17.10.2012



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 products¹, modified by Council Directive 93/68/EEC² and Regulation (EC) N° 1882/2003 of the European Parliament and of the Council³;
 - 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 (Bauprodukten-gesetz - BauPG) vom 28. April 1998⁴, as amended by law of 31 October 2006⁵;
 - Common Procedural Rules for Requesting, Preparing and the Granting of European technical approvals set out in the Annex to Commission Decision 94/23/EC⁶;
 - 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.

1 Official Journal of the European Communities L 40, 11 February 1989, p. 12
2 Official Journal of the European Communities L 220, 30 August 1993, p. 1
3 Official Journal of the European Union L 284, 31 October 2003, p. 25
4 *Bundesgesetzblatt Teil I* 1998, p. 812
5 *Bundesgesetzblatt Teil I* 2006, p. 2407, 2416
6 Official Journal of the European Communities L 17, 20 January 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 of sizes M6, M8, M10, M12, M16 and M20 is an anchor made of galvanised or stainless steel which is placed into a drilled hole and anchored by deformation-controlled expansion.

The anchor consists of an anchor body 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, HKD-woL, 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 1 to 3. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 1 to 3 shall correspond to the respective values laid down in the technical documentation⁷ of this European technical approval.

The characteristic values for the design of anchorages are given in Annexes 7 to 13.

The following designations are used for different anchor versions (see Annex 1):

- HKD cold formed anchor made of galvanised steel with lip
- HKD-woL cold formed anchor made of galvanised steel without lip
- HKD-S machined anchor made of galvanised steel with lip
- HKD-SR machined anchor made of stainless steel with lip
- HKD-E machined anchor made of galvanised steel without lip
- HKD-ER machined anchor made of stainless steel without lip

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 body ($\varnothing d_1$) according to Annex 1. In addition, the anchor body for anchor size M8x40 and M10x40 are marked on the top of the anchor body according to Annex 2. 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.

⁷

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.

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 Commission⁸ 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 the control 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".

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 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.⁹

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.

⁸ Official Journal of the European Communities L 254 of 08.10.1996

⁹ 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.

3.2.2 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.

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 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.

4.3 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.
- Drill hole by hammer drilling only.
- Cleaning 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 acc. to manufacturer's instructions given in Annex 6.
- Anchor expansion by impact on the plug using the setting tools given in Annex 4. The anchor is properly set if the stop of the pin reaches the anchor body, 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.

5 Indications to 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 and 4.3 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,

- vorhandene Gewindelänge und minimale Einschraubtiefe der Befestigungsschraube bzw. Gewindestange
- Minimale Bohrlochtiefe,
- Drehmoment,
- Angaben über den Einbauvorgang einschließlich Reinigung des Bohrlochs, vorzugsweise durch bildliche Darstellung,
- Hinweis auf erforderliche Spreizwerkzeuge,
- Herstelllos.

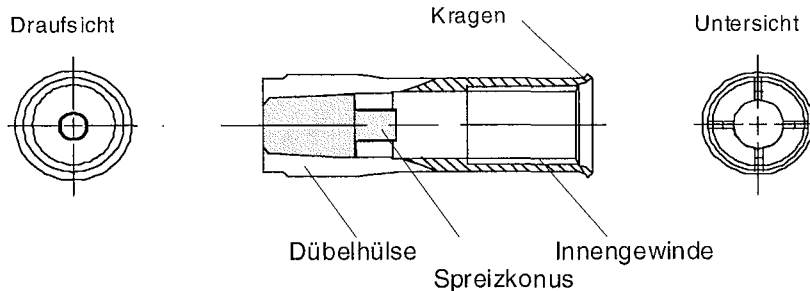
Alle Angaben müssen in deutlicher und verständlicher Form erfolgen.

Dipl.-Ing. Georg Feistel
Leiter der Abteilung Konstruktiver Ingenieurbau
des Deutschen Instituts für Bautechnik
Berlin, 22. April 2010

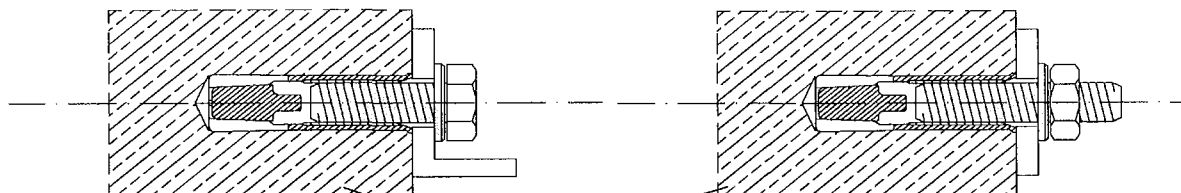


Hilti Kompaktdübel HKD

Für die Verwendung im ungerissenen Beton

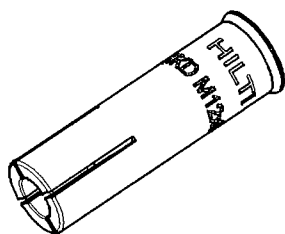


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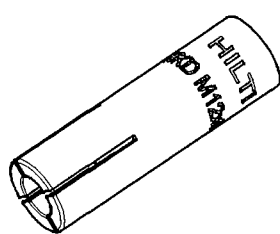


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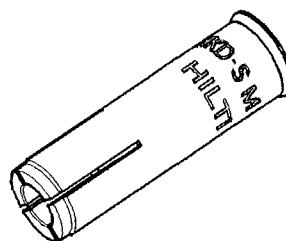
Beton C20/25 bis C50/60



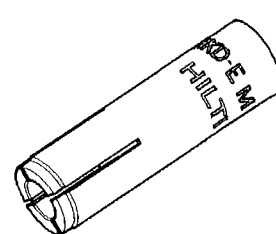
HKD



HKD-woL



**HKD-S /
HKD-SR**



**HKD-E /
HKD-ER**

HKD

HKD M8 x 30
HKD M8 x 40
HKD M10 x 30
HKD M10 x 40
HKD M12 x 50
HKD M16 x 65
HKD M20 x 80

HKD-woL

HKD-woL M8 x 30
HKD-woL M8 x 40
HKD-woL M10 x 30
HKD-woL M10 x 40
HKD-woL M12 x 50
HKD-woL M16 x 65
HKD-woL M20 x 80

HKD-S

HKD-S M6 x 30 ø8
HKD-S M8 x 30 ø10
HKD-S M8 x 40 ø10
HKD-S M10 x 30 ø12
HKD-S M10 x 40 ø12
HKD-S M12 x 50 ø15
HKD-S M16 x 65 ø20
HKD-S M20 x 80 ø25

HKD-SR

HKD-SR M6 x 30 ø8
HKD-SR M8 x 30 ø10
HKD-SR M10 x 40 ø12
HKD-SR M12 x 50 ø15

HKD-E

HKD-E M6 x 30 ø8
HKD-E M8 x 30 ø10
HKD-E M8 x 40 ø10
HKD-E M10 x 30 ø12
HKD-E M10 x 40 ø12
HKD-E M12 x 50 ø15
HKD-E M16 x 65 ø20
HKD-E M20 x 80 ø25

HKD-ER

HKD-ER M6 x 30 ø8
HKD-ER M8 x 30 ø8
HKD-ER M10 x 40 ø12
HKD-ER M12 x 50 ø15

Hilti Kompaktdübel HKD

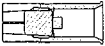
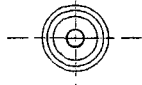
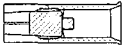
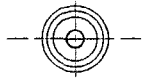

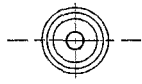

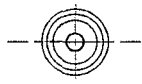

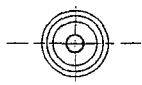

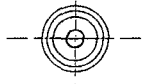
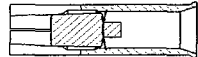
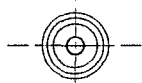
Produkt und Einbauzustand

Anhang 1

der europäischen
technischen Zulassung
ETA-02/0032

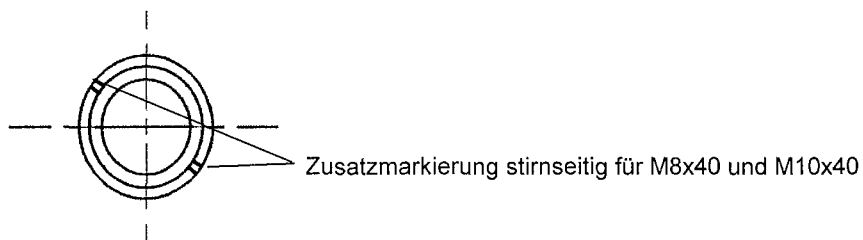
Identifikation nach Installation

Tabelle 1: Identifikation HKD und HKD-woL

Größe		Setzwerkzeug	Draufsicht
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	

Identifikation HKD-E(R) und HKD-S(R)

jeder Dübel ist nach dem Setzen mit Hilfe des Setzwerkzeugs identifizierbar



Hilti Kompaktdübel HKD

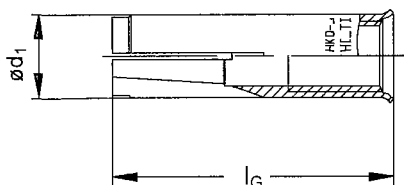
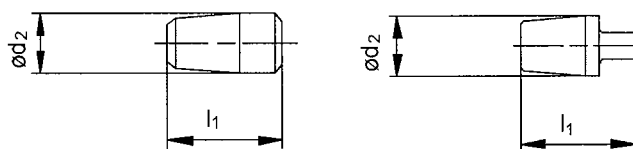
Identifikation nach Installation

Anhang 2

der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 2: Werkstoffe

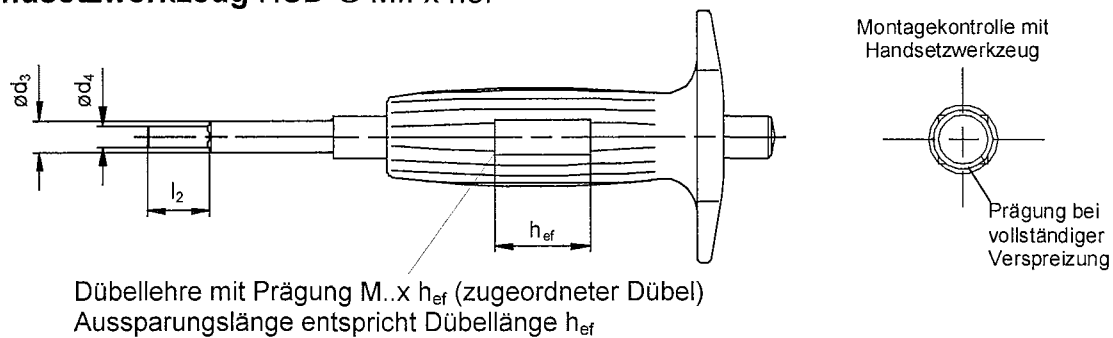
HKD; HKD-wol		
Dübelteil		Werkstoff
1	Dübelhülse	kalt umgeformter Stahl – galvanisch verzinkt $\geq 5 \mu\text{m}$, EN 10084 oder EN 10111
2	Spreizkegel	kalt umgeformter Stahl, EN 10084 oder EN 10111
HKD-S; HKD-E		
Dübelteil		Werkstoff
1	Dübelhülse	Stahl Fe/Zn5 (galvanisch verzinkt $\geq 5 \mu\text{m}$), EN 10087, EN 10277-3
2	Spreizkegel	Stahl 1.0213, EN 10263-2 oder Stahl 1.0204, DIN 17111
HKD-SR; HKD-ER		
Dübelteil		Werkstoff
1	Dübelhülse	Nichtrostender Stahl, 1.4401, 1.4404 oder 1.4571 EN 10088-3
2	Spreizkegel	

1 Dübelhülse**2** Spreizkegel**Tabelle 3: Abmessungen**

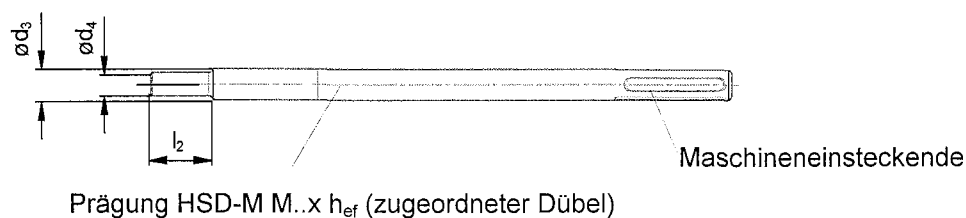
Dübelgröße	l_G [mm]	$\varnothing d_1$ [mm]	$\varnothing d_2$ [mm]	l_1 [mm]
M6x30	30	8	5	15
M8x30	30	9,95	6,5	12
M8x40	40	9,95	6,35	16
M10x30	30	11,80	8,2	12
M10x40	40	11,95	8,2	16
M12x50	50	14,90	10,3	20
M16x65	60	19,75	13,8	29
M20x80	80	24,75	16,4	30

Hilti Kompaktdübel HKD**Werkstoffe und Abmessungen****Anhang 3**
 der europäischen
 technischen Zulassung
ETA-02/0032

Handsetzwerkzeug HSD-G M.. x hef



Maschinensetzwerkzeug HSD-M M.. x hef



Maschinensetzwerkzeug HSD-TE CX M.. x hef

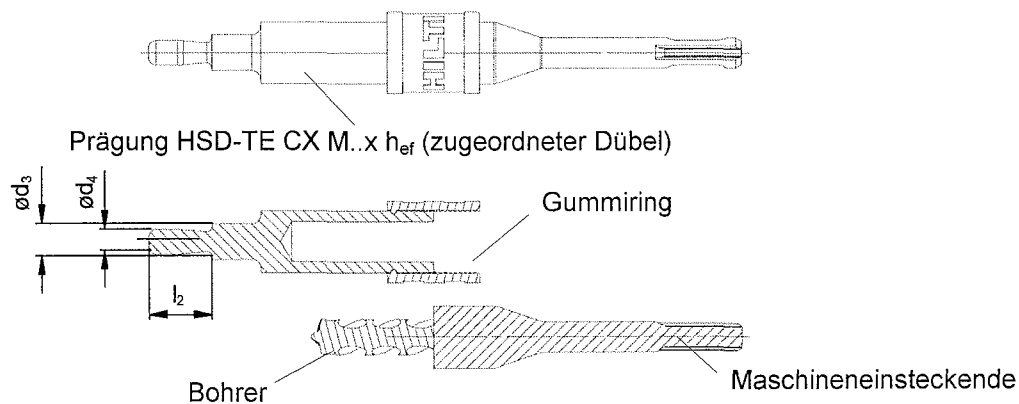


Tabelle 4: Abmessungen Setzwerkzeug

Setzwerkzeug HSD / HSG	$\varnothing d_3$ [mm]	$\varnothing d_4$ [mm]	l_2 [mm]
M6x30	7,5	5,0	15
M8x30	9,5	6,5	18
M8x40	9,5	6,5	28
M10x30	11,5	8,0	18
M10x40	11,5	8,0	24
M12x50	14,5	10,2	30
M16x65	18,0	13,5	36
M20x80	22,0	16,5	50

Hilti Kompaktdübel HKD

Setzwerkzeug

Anhang 4

der europäischen
technischen Zulassung
ETA-02/0032

Montagekennwerte

Befestigungsschraube oder Gewindestange:

Für den Dübel aus galvanisch verzinktem Stahl (HKD, HKD-woL, HKD-E und HKD-S) sind die Festigkeitsklassen 4.6 / 5.6 / 5.8 oder 8.8 gemäß EN ISO 898-1 zu verwenden.

Für den Dübel aus nichtrostendem Stahl (HKD-ER und HKD-SR) ist Festigkeitsklasse A4-70 gemäß EN ISO 3506 zu verwenden.

Mindesteinschraubtiefe $l_{s,min}$: Die Länge der Befestigungsschraube ist in Abhängigkeit der Dicke des Anbauteils t_{fix} , zulässiger Toleranzen und nutzbarer Gewindelänge $l_{s,max}$ sowie der Mindesteinschraubtiefe $l_{s,min}$ festzulegen.

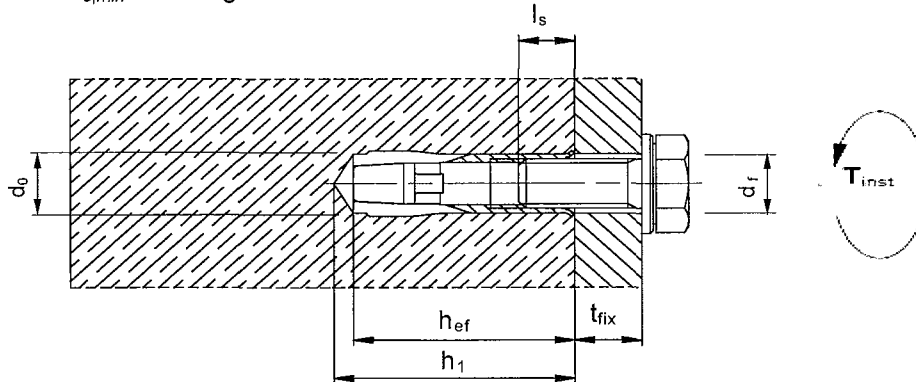


Tabelle 5: Montagekennwerte

Dübel- größe	Bohrdurch- messer	Gewinde- durch- messer	Bohrloch- tiefe	Effektive Verankerungs- tiefe	Maximale Einschraub- tiefe	Mindest- einschraub- tiefe	Maximales Drehmoment	Durchmesser Durchgangs- loch
	d_0 [mm]	d [mm]	h_1 [mm]	h_{ef} [mm]	$l_{s,max}$ [mm]	$l_{s,min}$ [mm]	T_{inst} [Nm]	d_f [mm]
M6x30	8	6	32	30	12,5	6	≤ 4	7
M8x30	10	8	33	30	14,5	8	≤ 8	9
M8x40	10	8	43	40	17,5	8	≤ 8	9
M10x30 ¹⁾	12	10	33	30	12,7	10	≤ 15	12
M10x40	12	10	43	40	18,0	10	≤ 15	12
M12x50	15	12	54	50	23,5	12	≤ 35	14
M16x65	20	16	70	65	30,5	16	≤ 60	18
M20x80	25	20	85	80	42,0	20	≤ 100	22

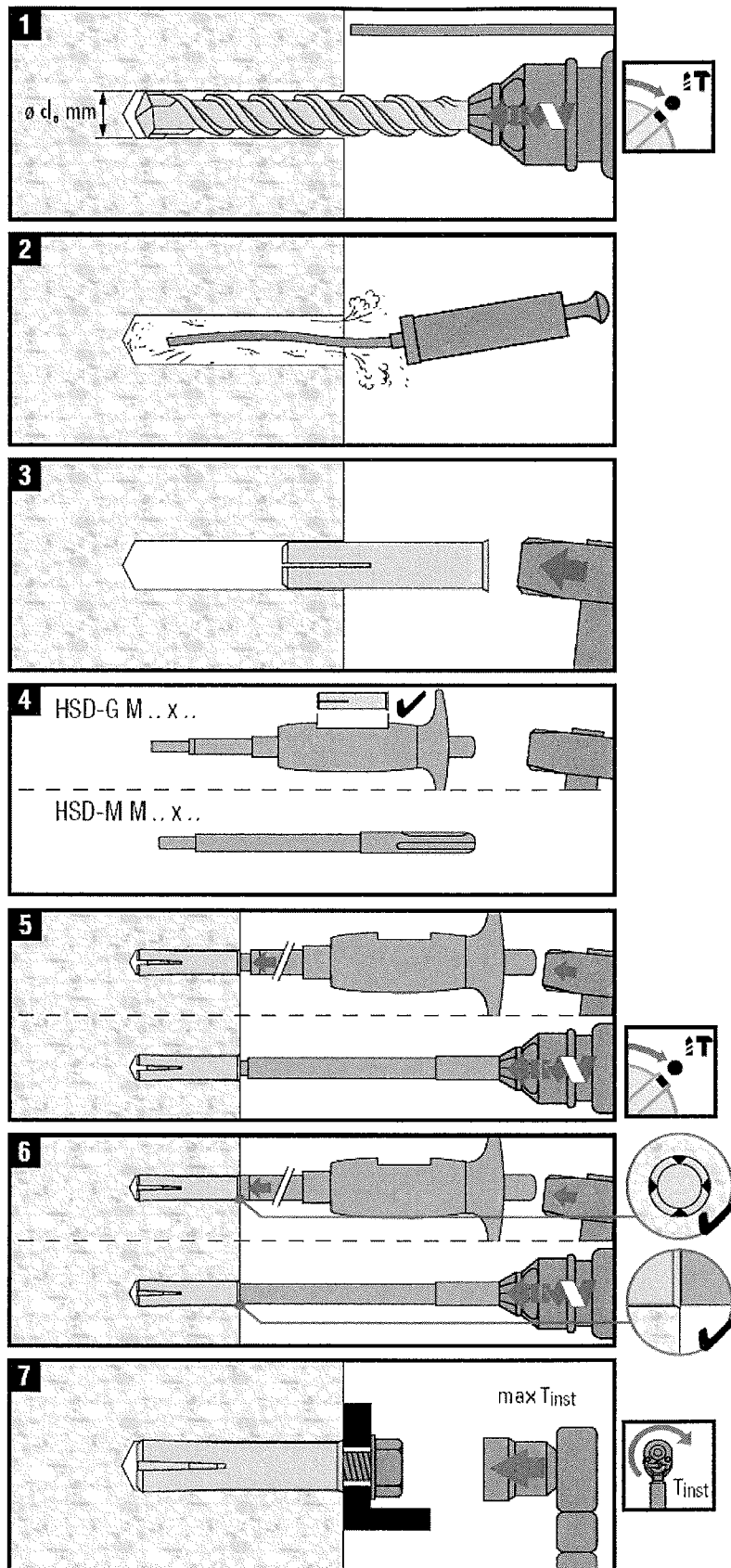
¹⁾ bei der Dimension M10x30 dürfen **nur** Gewindestangen verwendet werden

Hilti Kompaktdübel HKD

Montagekennwerte

Anhang 5

der europäischen
technischen Zulassung
ETA-02/0032



Hilti Kompaktdübel HKD

Montageanweisung

Anhang 6

der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 6: Minimale Achs- und Randabstände

HKD-S(R), HKD-E(R)			M6x30 M8x30 M10x30	M8x40 M10x40	M12x50	M16x65	M20x80
Mindestbauteildicke	h_{min}	[mm]	100	100	100	130	160
Mindestachsabstand	s_{min}	[mm]	60	80	125	130	160
Mindestrandabstand	c_{min}	[mm]	105	140	175	230	280
HKD, HKD-woL			M8x30 M10x30	M8x40 M10x40	M12x50	M16x65	M20x80
Mindestbauteildicke	h_{min}	[mm]	100	100	100	130	160
Mindestachsabstand	s_{min}	[mm]	60	80	125	130	160
	for $c \geq$	[mm]	105	140	175	230	280
Mindestrandabstand	c_{min}	[mm]	120	140	175	230	280
	for $s \geq$	[mm]	80	80	125	130	160

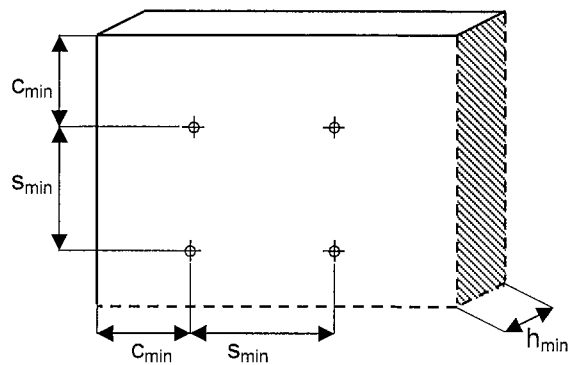
**Hilti Kompaktdübel HKD****Minimale Achs- und Randabstände****Anhang 7**
 der europäischen
 technischen Zulassung
ETA-02/0032

Tabelle 7: Bemessungsverfahren A - Charakteristische Zugtragfähigkeit

HKD-S (R) HKD-E (R)			M6x30 ⁴⁾	M8x30 ⁴⁾	M10x30 ⁴⁾	M8x40	M10x40	M12x50	M16x65	M20x80
Stahlversagen										
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 4.6	8,0	14,6	23,2	14,6	23,2	33,7	62,8	98,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		2,0							
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 5.6	10,1	18,3	18,5	18,3	19,9	42,2	54,7	86,9
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		2,0	2,0	1,49	2,0	1,49	2,0	1,47	1,47
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 5.8	10,1	17,4	18,5	17,4	19,9	35,3	54,7	86,9
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,50	1,53	1,49	1,53	1,49	1,49	1,47	1,47
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 8.8	13,4	17,4	18,5	17,4	19,9	35,3	54,7	86,9
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,53	1,53	1,49	1,53	1,49	1,49	1,47	1,47
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	A4-70	12,8	16,8	-	-	21,1	37,3	64,2	102,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,83							
Herausziehen										
Charakt. Tragfähigkeit	N _{Rk,p} [kN]	C20/25	-- ⁵⁾			9,0	-- ⁵⁾			
Teilsicherheitsbeiwert im ungerissenen Beton	γ _{Mp} ¹⁾					1,8 ²⁾				
Erhöhungsfaktor für N _{Rk,p}	ψ _c	C30/37	1,22							
		C40/50	1,41							
		C50/60	1,55							
Betonausbruch und Spalten										
Effektive Verankerungstiefe	h _{ef}	[mm]	30 ⁴⁾	30 ⁴⁾	30 ⁴⁾	40	40	50	65	80
Teilsicherheitsbeiwert im ungerissenen Beton	γ _{Mc} = γ _{M,sp} ¹⁾		1,8 ²⁾						1,5 ³⁾	
Achsabstand	s _{cr,N}	[mm]	90	90	90	120	120	150	195	240
Randabstand	c _{cr,N}	[mm]	45	45	45	60	60	75	97	120
Achsabstand	s _{cr,sp}	[mm]	210	210	210	280	280	350	455	560
Randabstand	c _{cr,sp}	[mm]	105	105	105	140	140	175	227	280

¹⁾ Sofern andere nationale Regelungen fehlen²⁾ In diesem Wert ist der Teilsicherheitsbeiwert $\gamma_2 = 1,2$ enthalten³⁾ In diesem Wert ist der Teilsicherheitsbeiwert $\gamma_2 = 1,0$ enthalten⁴⁾ Nur zur Verankerung statisch unbestimmt gelagerter Bauteile⁵⁾ Herausziehen nicht maßgebend**Hilti Kompaktdübel HKD****Charakteristische Zugtragfähigkeit
HKD- S(R) und HKD- E(R)****Anhang 8**der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 8 Bemessungsverfahren A - Charakteristische Zugtragfähigkeit

HKD HKD wol			M8x30 ³⁾	M10x30 ³⁾	M8x40	M10x40	M12x50	M16x65	M20x80
Stahlversagen									
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 4.6	14,6	19,9	14,6	22,1	33,7	62,8	98,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		2,0	1,5	2,0	1,5	2,0		
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 5.6	17,1	19,9	19,4	22,1	36,6	67,5	99,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,5						
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 5.8	17,1	19,9	19,4	22,1	36,6	67,5	99,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,5						
Charakt. Tragfähigkeit	N _{Rk,s} [kN]	Stahl 8.8	17,1	19,9	19,4	22,1	36,6	67,5	99,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,5						
Herausziehen									
Charakt. Tragfähigkeit	N _{Rk,p} [kN]	C20/25	-- ⁴⁾		9,0	-- ⁴⁾			
Teilsicherheitsbeiwert im ungerissenen Beton	γ _{Mp} ¹⁾				1,5 ²⁾				
Erhöhungsfaktor für N _{Rk,p}	ψ _c	C30/37	1,22						
		C40/50	1,41						
		C50/60	1,55						
Betonausbruch und Spalten									
Effektive Verankerungstiefe	h _{ef}	[mm]	30 ³⁾	30 ³⁾	40	40	50	65	80
Teilsicherheitsbeiwert im ungerissenen Beton	γ _{Mc} = γ _{M,sp} ¹⁾		1,5 ²⁾						
Achsabstand	s _{cr,N}	[mm]	90	90	120	120	150	195	240
Randabstand	c _{cr,N}	[mm]	45	45	60	60	75	97	120
Achsabstand	s _{cr,sp}	[mm]	210	210	280	280	350	455	560
Randabstand	c _{cr,sp}	[mm]	105	105	140	140	175	227	280

¹⁾ Sofern andere nationale Regelungen fehlen²⁾ In diesem Wert ist der Teilsicherheitsbeiwert $\gamma_2 = 1,0$ enthalten³⁾ Nur zur Verankerung statisch unbestimmt gelagerter Bauteile⁴⁾ Herausziehen nicht maßgebend**Hilti Kompaktdübel HKD****Charakteristische Zugtragfähigkeit
HKD und HKD- wol****Anhang 9**der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 9: Verschiebungen unter Zugbelastung

HKD-S (R) HKD-E (R)			M6x30	M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Zuglast im ungerissenen Beton C20/25 bis C50/60	N	[kN]	3,3	3,3	3,3	3,6	5,1	7,1	12,6	17,2
Verschiebung	δ_{N0}	[mm]	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{N_{20}}$	[mm]	0,2	0,2	0,2	0,2	0,2	0,2	0,2	0,2

Tabelle 10: Verschiebungen unter Zugbelastung

HKD HKD wol			M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Zuglast im ungerissenen Beton C20/25 bis C50/60	N	[kN]	4,0	4,0	4,3	6,1	8,5	12,6	17,2
Verschiebung	δ_{N0}	[mm]	0,1	0,1	0,1	0,1	0,1	0,1	0,1
	$\delta_{N_{20}}$	[mm]	0,3	0,3	0,3	0,3	0,3	0,2	0,2

Hilti Kompaktdübel HKD**Verschiebungen unter Zugbelastung****Anhang 10**
 der europäischen
 technischen Zulassung
ETA-02/0032

Tabelle 11: Bemessungsverfahren A - Charakteristische Quertragfähigkeit

HKD-S HKD-E			M6x30	M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Stahlversagen ohne Hebelarm										
Charakt. Tragfähigkeit	V _{Rk,s} [kN]	Stahl 4.6	4,0	7,3	7,4	7,3	8,0	16,9	21,9	34,7
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,67	1,67	1,25	1,67	1,25	1,67	1,25	1,25
Charakt. Tragfähigkeit	V _{Rk,s} [kN]	Stahl 5.6	5,0	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,67	1,27	1,25	1,27	1,25	1,25	1,25	1,25
Charakt. Tragfähigkeit	V _{Rk,s} [kN]	Stahl 5.8	5,0	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,25	1,27	1,25	1,27	1,25	1,25	1,25	1,25
Charakt. Tragfähigkeit	V _{Rk,s} [kN]	Stahl 8.8	5,3	7,0	7,4	7,0	8,0	14,1	21,9	34,7
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,27	1,27	1,25	1,27	1,25	1,25	1,25	1,25
Charakt. Tragfähigkeit	V _{Rk,s} [kN]	A4-70	6,4	8,4	-	-	10,5	18,7	32,1	51,0
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,52	1,52	-	-	1,52	1,52	1,52	1,52
Stahlversagen mit Hebelarm										
Charakt. Tragfähigkeit	M ⁰ _{Rk,s} [Nm]	Stahl 4.6	6	15	30	15	30	52	133	260
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,67							
Charakt. Tragfähigkeit	M ⁰ _{Rk,s} [Nm]	Stahl 5.6	8	19	37	19	37	65	166	325
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,67							
Charakt. Tragfähigkeit	M ⁰ _{Rk,s} [Nm]	Stahl 5.8	8	19	37	19	37	65	166	325
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,25							
Charakt. Tragfähigkeit	M ⁰ _{Rk,s} [Nm]	Stahl 8.8	12	30	60	30	60	105	266	519
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,25							
Charakt. Tragfähigkeit	M ⁰ _{Rk,s} [Nm]	A4-70	11	26	-	-	52	92	233	454
Teilsicherheitsbeiwert	γ _{Ms} ¹⁾		1,56		-		1,56			
Betonausbruch auf der lastabgewandten Seite										
Faktor in Gleichung (5.6) ETAG Annex C, §5.2.3.3	k		2,0							
Teilsicherheitsbeiwert	γ _{Mcp} ¹⁾		1,5 ²⁾							
Betonkantenbruch										
Wirksame Dübellänge bei Querlast	l _f	[mm]	30	30	30	40	40	50	65	80
wirksamer Außendurchmesser	d _{nom}	[mm]	8	10	12	10	12	15	20	25
Teilsicherheitsbeiwert	γ _{Mc} ¹⁾		1,5 ²⁾							

¹⁾ Sofern andere nationale Regelungen fehlen²⁾ In diesem Wert ist der Teilsicherheitsbeiwert $\gamma_2 = 1,0$ enthalten**Hilti Kompaktdübel HKD****Charakteristische Quertragfähigkeit
HKD- S(R) und HKD- E(R)****Anhang 11**der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 12: Bemessungsverfahren A - Charakteristische Quertragfähigkeit

HKD HKD-woL			M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Stahlversagen ohne Hebelarm									
Charakt. Tragfähigkeit	$V_{Rk,s}$ [kN]	Stahl 4.6	7,3	10,0	7,3	11,0	16,9	31,4	49
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,67	1,25	1,67	1,25	1,67	1,67	1,67
Charakt. Tragfähigkeit	$V_{Rk,s}$ [kN]	Stahl 5.6	8,6	10,0	9,2	11,0	18,3	33,8	49,5
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,25	1,25	1,67	1,25	1,25	1,25	1,25
Charakt. Tragfähigkeit	$V_{Rk,s}$ [kN]	Stahl II 5.8	8,6	10,0	9,2	11,0	18,3	33,8	49,5
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,25	1,25	1,25	1,25	1,25	1,25	1,25
Charakt. Tragfähigkeit	$V_{Rk,s}$ [kN]	Stahl 8.8	8,6	10,0	9,2	11,0	18,3	33,8	49,5
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,25	1,25	1,25	1,25	1,25	1,25	1,25
Stahlversagen mit Hebelarm									
Charakt. Tragfähigkeit	$M^0_{Rk,s}$ [Nm]	Stahl 4.6	15	30	15	30	52	133	260
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,67						
Charakt. Tragfähigkeit	$M^0_{Rk,s}$ [Nm]	Stahl 5.6	19	37	19	37	65	166	325
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,67						
Charakt. Tragfähigkeit	$M^0_{Rk,s}$ [Nm]	Stahl 5.8	19	37	19	37	65	166	325
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,25						
Charakt. Tragfähigkeit	$M^0_{Rk,s}$ [Nm]	Stahl 8.8	30	60	30	60	105	266	519
Teilsicherheitsbeiwert	γ_{Ms} ¹⁾		1,25						
Betonausbruch auf der lastabgewandten Seite									
Faktor in Gleichung (5.6) ETAG Annex C, §5.2.3.3	k		2,0						
Teilsicherheitsbeiwert	γ_{Mcp} ¹⁾		1,5 ²⁾						
Betonkantenbruch									
Wirksame Dübellänge bei Querlast	l_f	[mm]	30	30	40	40	50	65	80
wirksamer Außendurchmesser	d_{nom}	[mm]	10	12	10	120	15	20	25
Teilsicherheitsbeiwert	γ_{Mc} ¹⁾		1,5 ²⁾						

¹⁾ Sofern andere nationale Regelungen fehlen²⁾ In diesem Wert ist der Teilsicherheitsbeiwert $\gamma_2 = 1,0$ enthalten**Hilti Kompaktdübel HKD****Charakteristische Quertragfähigkeit
HKD und HKD- woL****Anhang 12**der europäischen
technischen Zulassung
ETA-02/0032

Tabelle 13: Verschiebungen unter Querbelastung

HKD-S HKD-E			M6x30	M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Querlast im ungerissenen Beton C20/25 bis C50/60	V	[kN]	1,7	3,1	4,3	3,1	4,6	7,2	12,5	19,8
Verschiebung	δ_{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

Tabelle 14: Verschiebungen unter Querbelastung

HKD-SR HKD-ER			M6x30	M8x30	M10x40	M12x50	M16x65	M20x80
Querlast im ungerissenen Beton C20/25 bis C50/60	V	[kN]	1,7	3,9	4,9	8,8	15,1	24,0
Verschiebung	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

Tabelle 15: Verschiebungen unter Querbelastung

HKD HKD wol			M8x30	M10x30	M8x40	M10x40	M12x50	M16x65	M20x80
Querlast im ungerissenen Beton C20/25 bis C50/60	V	[kN]	3,1	4,3	3,1	4,6	7,2	12,5	19,8
Verschiebung	δ_{v0}	[mm]	0,35	0,35	0,40	0,40	0,45	0,75	0,75
	$\delta_{v\infty}$	[mm]	0,50	0,50	0,60	0,60	0,70	1,1	1,1

Hilti Kompaktdübel HKD**Verschiebungen unter Querbelastung****Anhang 13**
 der europäischen
 technischen Zulassung
ETA-02/0032