Centre Scientifique et Technique du Bâtiment
84 avenue Jean Jaurès
CHAMPS-SUR-MARNE
F-77447 Marne-la-Vallée Cedex 2
Tél. : (33) 01 64 68 82 82
Fax : (33) 01 60 05 70 37

Autorisé et notifié conformément à l'article 10 de la directive 89/106/EEC du Conseil, du 21 décembre 1988, relative au rapprochement des dispositions législatives, réglementaires et administratives des Etats membres concernant les produits de construction.

CSTB le futur en construction

MEMBRE DE L'EOTA

European Technical Approval ETA-99/0009

(English language translation, the original version is in French language)

Nom commercial : **Trade name:**	**Hilti HDA and HDA-R**
Titulaire : **Holder of approval:**	**Hilti AG, Business Unit Anchors** **FL-9494 SCHAAN** **Principality of Liechtenstein**
Type générique et utilisation prévue du produit de construction : **Generic type and use of construction product:**	Cheville métallique à verrouillage de forme par auto ancrage dans le béton, en acier galvanisé diamètres M10, M12, M16 et M20 et en acier inoxydable diamètres M10, M12 et M16. **Self-cutting undercut anchor, made of galvanised steel for use in concrete: sizes M10, M12, M16 and M20 and made of stainless steel for use in concrete: sizes M10, M12 and M16**
Validité du : au : **Validity from / to:**	**25/03/2008** **25/03/2013**
Usine de fabrication : **Manufacturing plant:**	**Hilti AG, usine 1 (plant 1), Principality of Liechtenstein**
Le présent Agrément technique européen contient : **This European Technical Approval contains:**	26 pages incluant 19 annexes faisant partie intégrante du document. **26 pages including 19 annexes which form an integral part of the document.**

This European Technical Approval replaces ETA-99/0009 with validity from 30.03.2004 to 30.03.2009 and ETA-02/0016 with validity from 15.01.2006 to 15.01.2011

Cet Agrément Technique Européen remplace les ETA-99/0009 valide du 30.03.2004 au 30.03.2009 et ETA-02/0016 valide du 15.01.2006 au 15.01.2011

I LEGAL BASES AND GENERAL CONDITIONS

1. This European Technical Approval is issued by the Centre Scientifique et Technique du Bâtiment 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[1], modified by the Council Directive 93/68/EEC of 22 July 1993[2];
   - Décret n°92-647 du 8 juillet 1992[3] concernant l'aptitude à l'usage des produits de construction;
   - Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex of Commission Decision 94/23/EC[4];
   - Guideline for European Technical Approval of « Metal Anchors for use in Concrete » ETAG 001, edition 1997, Part 1 « Anchors in general » and Part 3 « Undercut anchors ».

2. The Centre Scientifique et Technique du Bâtiment is authorised to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant (for example concerning the fulfilment of assumptions made in this European Technical Approval with regard to manufacturing). Nevertheless, the responsibility for the conformity of the products with 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 manufacturer 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 the Centre Scientifique et Technique du Bâtiment pursuant to Article 5 (1) of the 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 the Centre Scientifique et Technique du Bâtiment. 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 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 n° L 40, 11.2.1989, p. 12
2 Official Journal of the European Communities n° L 220, 30.8.1993, p. 1
3 Journal officiel de la République française du 14 juillet 1992
4 Official Journal of the European Communities n° L 17, 20.1.1994, p. 34

II SPECIFIC CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL

1 Definition of product and intended use

1.1. Definition of product

The HILTI HDA anchor in the range of M10 to M20 is a self-cutting undercut anchor made of galvanised steel. The HILTI HDA-R anchor in the range of M10 to M16 is a self-cutting undercut anchor made of stainless steel. Both are available as pre-setting (HDA-P and HDA-PR version) and as through-fastening anchor (HDA-T and HDA-TR version). They are placed into a hole drilled with a special stop drill bit and self-cutting undercut using a special setting tool. The nut is torque tightened to complete the fastening of the fixture.
For the installed anchor see Figures given in Annexes 1 and 2.

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 compromise the stability of the works, 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 C 20/25 minimum to C50/60 maximum according to ENV 206-1: 2000-12. It may be anchored in cracked and non-cracked concrete.

The HDA-P and HDA-T anchors may only be used in concrete subject to dry internal conditions.

The HDA-PR and HDA-TR anchors may be used in concrete subject to dry internal conditions and also in concrete 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 or 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 product and methods of verification

2.1. Characteristics of product

The anchor in the range of M10 to M20 corresponds to the drawings and provisions given in Annexes 1 to 5. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 3 to 5 shall correspond to the respective values laid down in the technical documentation[5] of this European Technical Approval. The characteristic anchor values for the design of anchorages are given in Annexes 9 to 14. The special tools required to use this anchor are described in Annexes 15 to 17.

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5 The technical documentation of this European Technical Approval is deposited at the Centre Scientifique et Technique du Bâtiment 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.

Each anchor is marked with the manufacturer's name, the commercial name, the version, the special stepped drill bit nominal diameter, the nominal diameter of the thread, the effective embedment depth and the maximum thickness of the fixture according to Annex 3.

On the threaded part of the bolt, a small non-threaded coloured ring marking identifies the complete expansion of the sleeve. A letter code corresponding to the total length of the bolt is punched on the head of the bolt.

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 3 « Undercut anchors », on the basis of Option 1.

3 Evaluation of Conformity and CE marking

3.1. Attestation of conformity system

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

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.

3.2. Responsibilities

3.2.1. Tasks of the manufacturer, factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the prescribed test plan[6]. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials such as nuts, washers, wire for bolts and sleeves shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. tensile strength, hardness, surface finish.

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[6] The prescribed test plan has been deposited at the Centre Scientifique et Technique du Bâtiment and is only made available to the approved bodies involved in the conformity attestation procedure.

The manufactured components of the anchor shall be subjected to the following tests:

- Dimensions of component parts:
  bolt (diameters, lengths, thread and ring marking, geometry of the cone);
  sleeve (lengths, internal and external diameters, geometry of the expansion part, cutting edge);
  plastic ring (diameters, thickness);
  hexagonal nut (proper running, wrench size across flats);
  washer (diameters, thickness).
- Material properties: bolt (ultimate tensile strength), sleeve (ultimate tensile strength), plastic ring (material composition), hexagonal nut (proof load), washer (hardness).
- Thickness of the galvanised treatment of the elements.
- Visual control of correct assembly and of completeness of the anchor.

The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the prescribed test plan taking account of the automated manufacturing process of the anchor.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- designation of the product, basic material and components;
- type of control or testing;
- date of manufacture of the product and date of testing of the product or basic material and components;
- result of control and testing and, if appropriate, comparison with requirements;
- signature of person responsible for factory production control.

The records shall be presented to the inspection body during the continuous surveillance. On request, they shall be presented to the Centre Scientifique et Technique du Bâtiment.

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the prescribed test plan which is part of the technical documentation of this European Technical Approval.

3.2.2. Tasks of approved bodies

3.2.2.1. Initial type-testing of the product

For initial type-testing the results of the tests performed as part of the assessment for the European Technical Approval shall be used unless there are changes in the production line or plant. In such cases the necessary initial type-testing has to be agreed between the Centre Scientifique et Technique du Bâtiment and the approved bodies involved.

3.2.2.2. Initial inspection of factory and of factory production control

The approved body shall ascertain that, in accordance with the prescribed test plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1. as well as to the Annexes to the European Technical Approval.

3.2.2.3. Continuous surveillance

The approved body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the prescribed test plan.

Continuous surveillance and assessment of factory production control have to be performed according to the prescribed test plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to the Centre Scientifique et Technique du Bâtiment. In cases where the provisions of the European Technical Approval and the prescribed test plan are no longer fulfilled the conformity certificate shall be withdrawn.

3.3. CE-Marking

The CE marking shall be affixed on each packaging of anchors. The symbol « CE » shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- number of the European Technical Approval;
- use category (ETAG 001-1 Option1);
- size.

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

4.1. Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during inspection of the plant by the Centre Scientifique et Technique du Bâtiment and the approved body and laid down in the technical documentation.

4.2. Installation

4.2.1. Design of anchorages

The fitness of the anchors 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, for undercut anchors under the responsibility of an engineer experienced in anchorages and concrete work.

For concrete cone failure, the initial value of the characteristic resistance of an HDA anchor placed in cracked concrete is obtained by: $N^{0}_{Rk,c} = 8{,}3 \,.\, \sqrt{f_{ck,\,cube}} \,.\, {h_{ef}}^{1{,}5}$ instead of equation (5.2a) in Annex C, §5.2.2.4.

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 support, etc.).

4.2.2. Installation of anchors

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

1) anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on the site;

2) use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor;
3) anchor installation in accordance with the manufacturer's specifications and drawings prepared for that purpose and using the appropriate special tools (hammer drill, setting tool, stop drill bit, centering washer if needed);
4) thickness of the fixture corresponding to the range of required thickness values for the type of anchor;.
5) 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;
6) check of concrete being well compacted, e.g. without significant voids;
7) cleaning the hole of drilling dust;
8) anchor installation ensuring the specified embedment depth using the special required stop drill bit;
9) anchor installation ensuring complete expansion of the sleeve with checking that the non-threaded coloured ring marking on the bolt is visible above the top edge of the anchor sleeve; therefore it is required using the special setting tool, that is the appropriate depth ring marking of the setting tool at least flush with the concrete surface (pre-setting) respecting with the fixture surface (through-fastening).
10) anchor installation ensuring complete shear load capacity, the recess of the top edge of the sleeve respecting with the concrete surface (pre-setting) or with surface of the fixture (through-fastening) has to be in the specified range according to Annex 8; the use of a centering washer (see Annex 3) ensures the shear load capacity for HDA-T anchors with the minimum fixture thickness according Annex 12 and/or Annex 13;
11) keeping of the edge distance and spacing to the specified values without minus tolerances;
12) positioning of the drill holes without damaging the reinforcement;
13) 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 to the anchor in the direction of load application;
14) application of the torque moment given in Annex 8 using a calibrated torque wrench.

4.2.3. Responsibility of the manufacturer

It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to in 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:

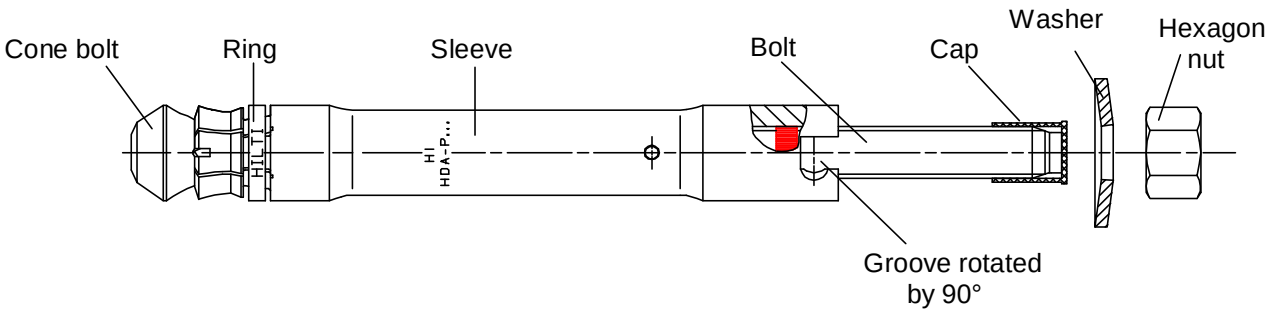
- drill bit diameter,
- thread diameter,
- maximum thickness of the fixture,
- required installation and hole depth,
- required torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

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

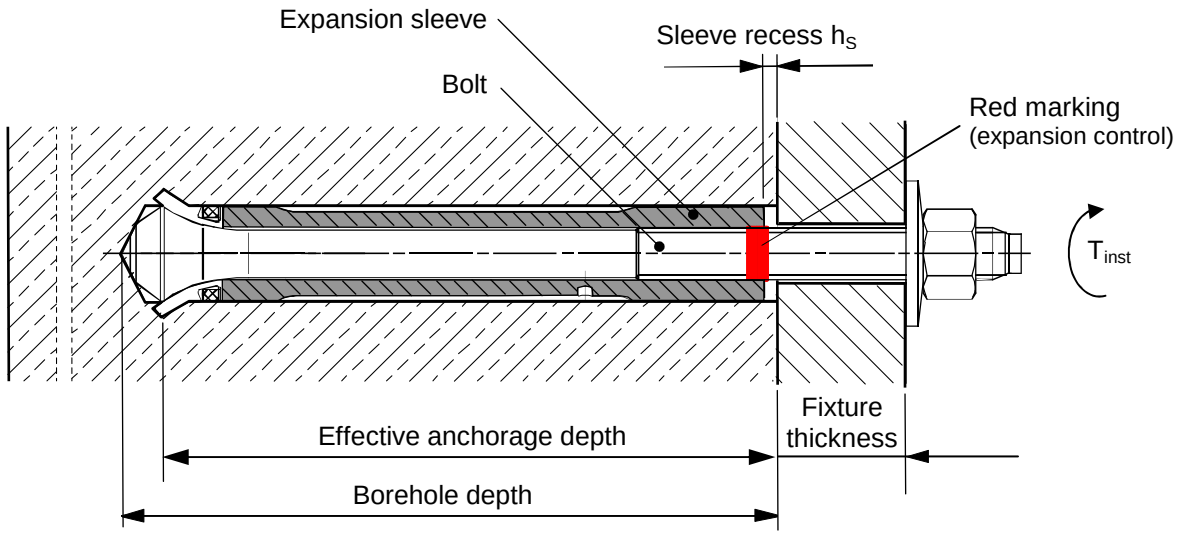
The original French version is signed by

Le Directeur Technique
H. BERRIER

Pre-setting anchor HDA-P and HDA-PR (Prepositioning)

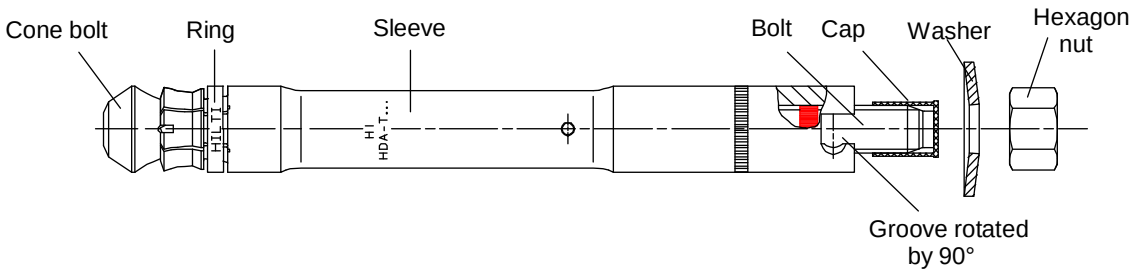


Pre-setting anchor HDA-P and HDA-PR (Prepositioning)

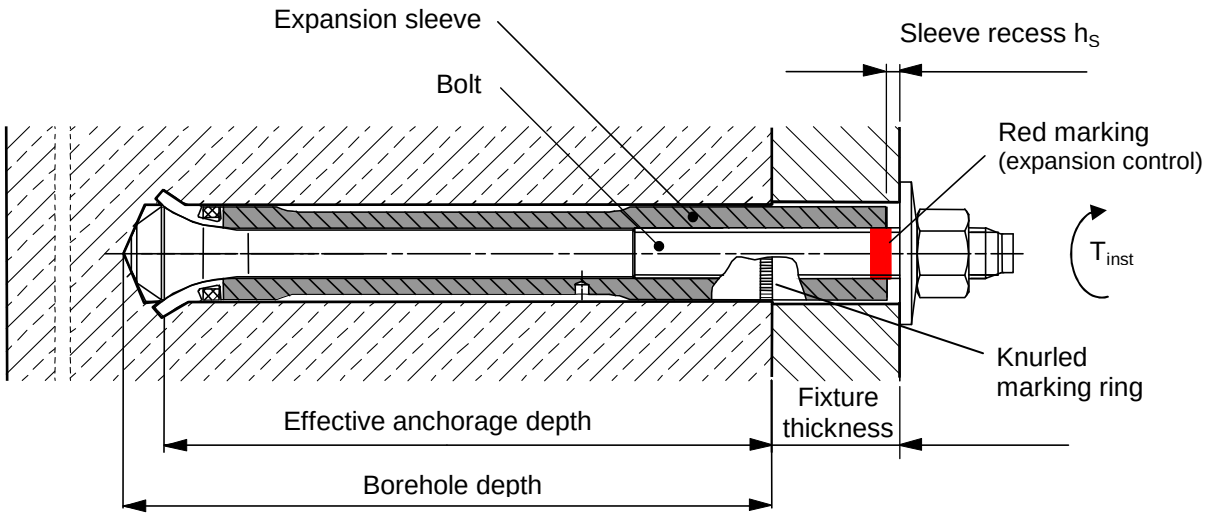


Hilti Design Anchor HDA	**Annex 1**
HDA-P and HDA-PR **Product and intended use**	of European Technical Approval **ETA-99/0009**

Through-fastening anchor HDA-T and HDA-TR (Postpositioning)

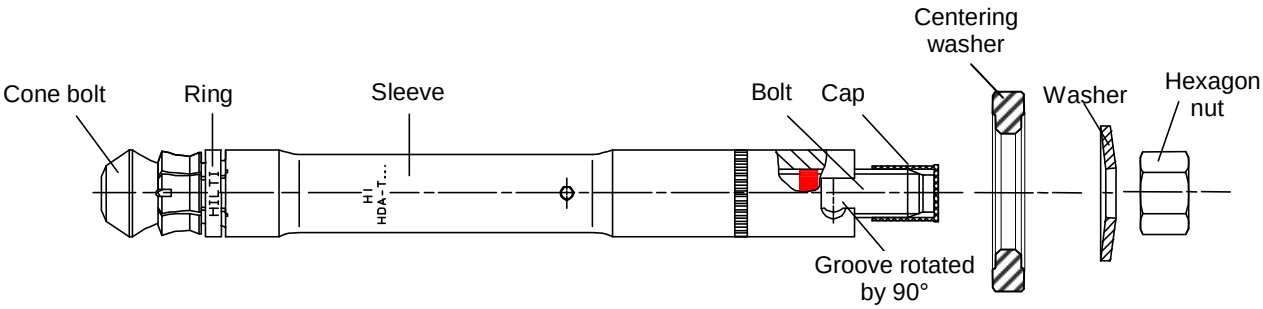


Through-fastening anchor HDA-T and HDA-TR (Postpositioning)

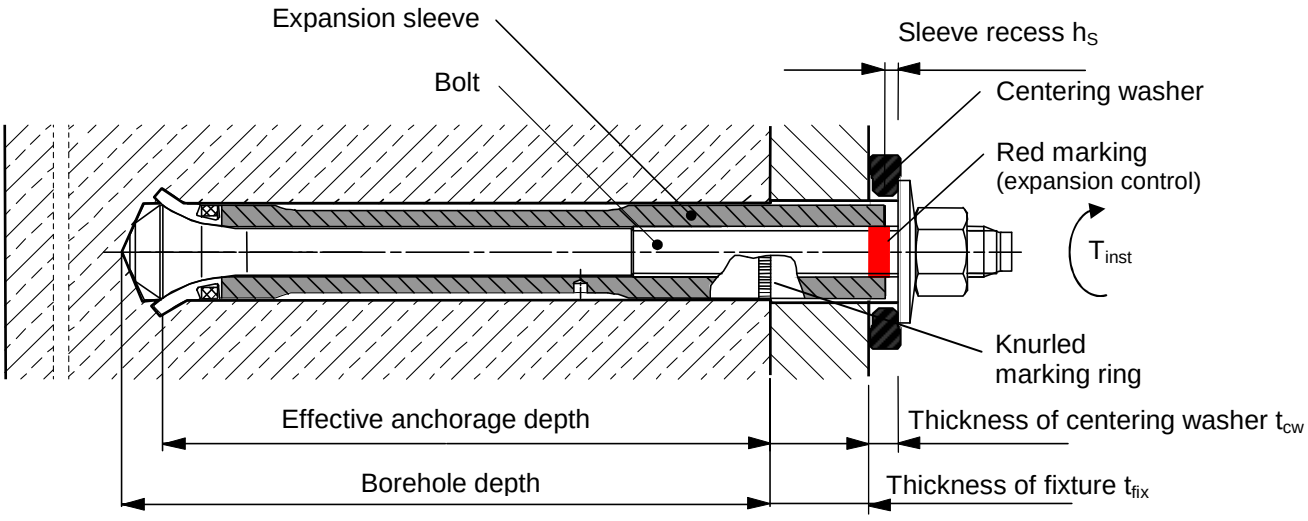


Hilti Design Anchor HDA	**Annex 2**
HDA-T and HDA-TR **Product and intended use**	of European Technical Approval **ETA-99/0009**

Through-fastening anchor HDA-T and HDA-TR with centering washer (Postpositioning)



Through-fastening anchor HDA-T and HDA-TR with centering washer (Postpositioning)



The maximum fastenable thickness $t_{fix,max}$ (see Table 2, Annex 6) is kept if following equation is fulfilled:

$$t_{fix,max} \geq t_{fix} + t_{cw}$$

with:

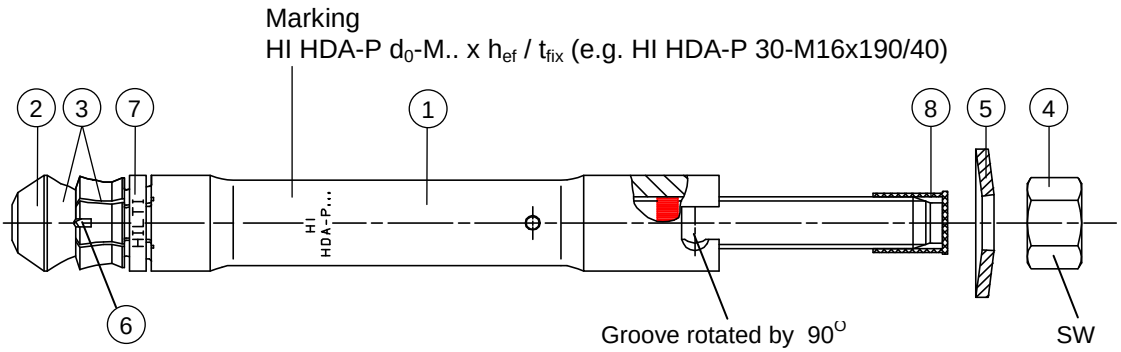
t_{fix} … thickness of the fixture

t_{cw} … thickness of the centering washer (5mm for all sizes)

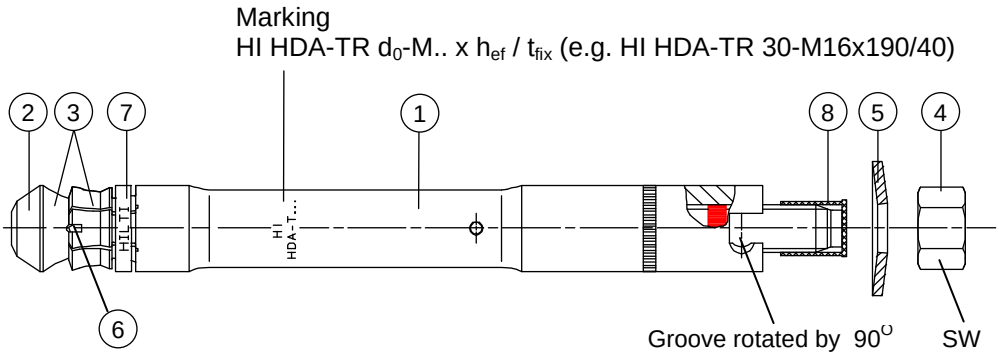
Nota: The centering washer must be used for the drilling of the hole to ensure the proper embedment depth

Hilti Design Anchor HDA	**Annex 3**
HDA-T and HDA-TR with centering washer **Product and intended use**	of European Technical Approval **ETA-99/0009**

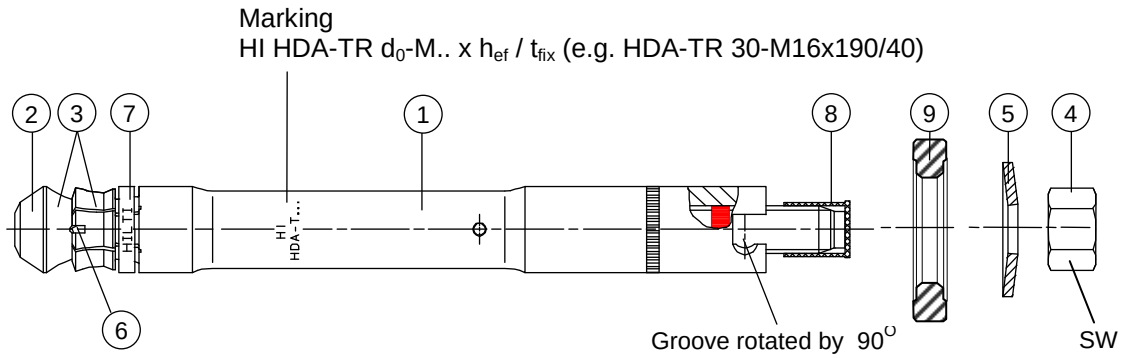
Pre-setting anchor HDA-P and HDA-PR (Prepositioning)



Through-fastening anchor HDA-T and HDA-TR (Postpositioning)



Through-fastening anchor HDA-T and HDA-TR with centering washer (Postpositioning)



Hilti Design Anchor HDA	**Annex 4**
Material of anchor	of European Technical Approval **ETA-99/0009**

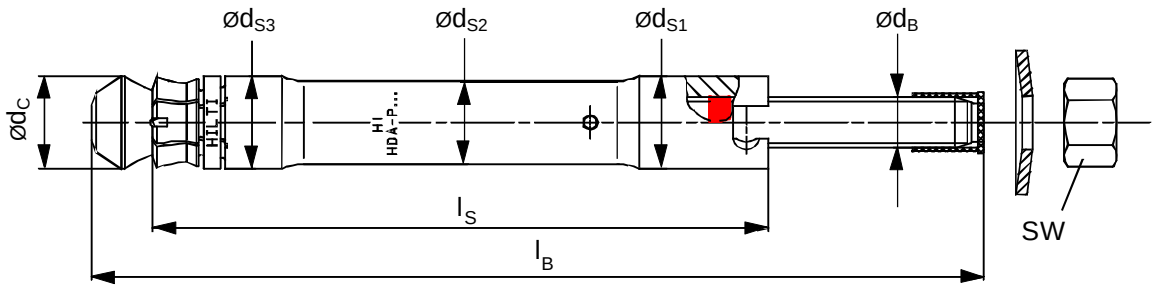
Table 1a: Materials HDA-P and HDA-T

Part	Designation	HDA-P / HDA-T (galvanized ≥5µm)
1	Sleeve	Machined steel with brazed tungsten carbide tips
2	Bolt	M10 - M16: Cold formed steel, grade 8.8 M20: Cone machined, rod grade 8.8
3	Coating of bolt and sleeve	Galvanized 5-25µm
4	Hexagon nut	M10 - M16: Class 8, h=1*d, galvanized M20: Class 8, galvanized
5	Washer	M10 - M16: Spring washer, coated M20: washer, galvanized
6	Cutting edges	Tungsten carbide
7	Ring	Plastic ring
8	Cap	Plastic cap
9	Centering washer	Machined steel

Table 1b: Materials HDA-PR and HDA-TR

Part	Designation	HDA-PR / HDA-TR
1	Sleeve	Machined stainless steel 1.4401, 1.4404, or 1.4571 with brazed tungsten carbide tips
2	Bolt	Rod: machined stainless steel 1.4401, 1.4404 or 1.4571 Cone: machined stainless steel 1.4401, 1.4404 or 1.4571
3	Coating of cone	Hardchrome > 10 µm
4	Hexagon nut	Grade A4-80, h=1*d
5	Washer	Spring washer stainless steel
6	Cutting edges	Tungsten carbide
7	Ring	Plastic ring
8	Cap	Plastic cap
9	Centering washer	Machined stainless steel, 1.4401

Pre-setting anchor HDA-P and HDA-PR (Prepositioning)



Through-fastening anchor HDA-T and HDA-TR (Postpositioning)

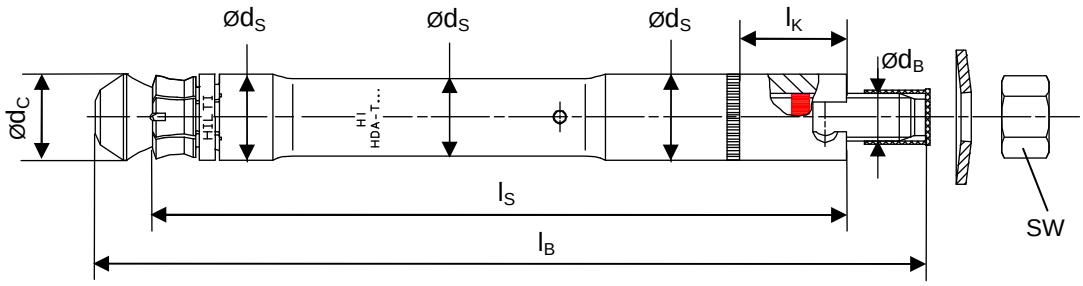


Table 2: Anchor Dimensions

Anchor type	t_{fix} [1)] [mm] min-max	l_B [mm]	Length code letter	l_S [mm]	l_k [mm]	SW	d_{S1} [mm]	d_{S2} [mm]	d_{S3} [mm]	d_C [mm]	d_B [mm]
HDA-P(R) 20-M10*100/20	0 - 20	150	I	100	-	17	19	16,8	18,5	19,5	10
HDA-T(R) 20-M10*100/20	10 - 20	150	I	120	17	17	19	16,8	18,5	19,5	10
HDA-P(R) 22-M12*125/30	0 - 30	190	L	125	-	19	21	18,8	20,5	21,4	12
HDA-P(R) 22-M12*125/50	0 - 50	210	N	125	-	19	21	18,8	20,5	21,4	12
HDA-T(R) 22-M12*125/30	10 - 30	190	L	155	27	19	21	18,8	20,5	21,4	12
HDA-T(R) 22-M12*125/50	10 - 50	210	N	175	47	19	21	18,8	20,5	21,4	12
HDA-P(R) 30-M16*190/40	0 - 40	275	R	190	-	24	29	26	29	29	16
HDA-P(R) 30-M16*190/60	0 - 60	295	S	190	-	24	29	26	29	29	16
HDA-T(R) 30-M16*190/40	15 - 40	275	R	230	35,5	24	29	26	29	29	16
HDA-T(R) 30-M16*190/60	15 - 60	295	S	250	35,5	24	29	26	29	29	16
HDA-P 37-M20*250/50	0 - 50	360	V	250	-	30	35	32	35	36	20
HDA-P 37-M20*250/100	0 - 100	410	X	250	-	30	35	32	35	36	20
HDA-T 37-M20*250/50	20 - 50	360	V	300	45	30	35	32	35	36	20
HDA-T 37-M20*250/100	50 - 100	410	X	350	95	30	35	32	35	36	20

1) first value: $t_{fix,min}$ minimum fastenable thickness for pure tension load (shear load see Table 9a and Table 9b)
second value: $t_{fix,max}$ maximum fastenable thickness

Hilti Design Anchor HDA	**Annex 6**
HDA-P, HDA-PR, HDA-T and HDA-TR **Dimensions of anchor**	of European Technical Approval **ETA-99/0009**

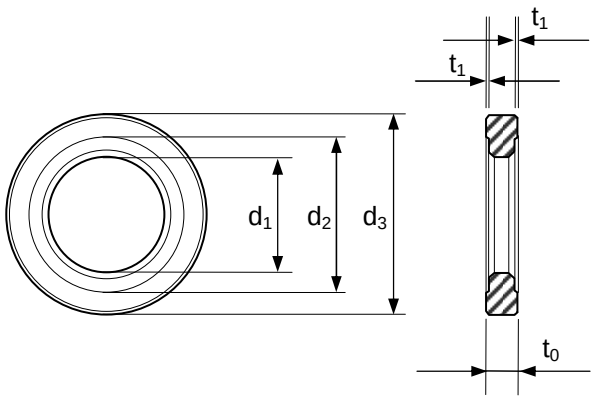


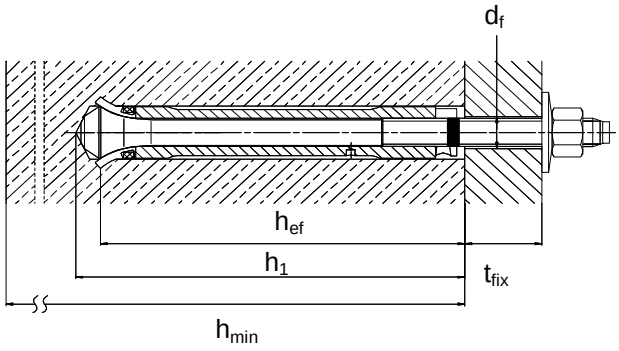
Table 3: Dimensions of centering washer

Centering washer	t_{CW} [1)] [mm]	t_0 [mm]	t_1 [mm]	d_1 [mm]	d_2 [mm]	d_3 [mm]	Anchor type
HDA-F-CW 5-M10	5	5,5	0,5	21	28	36	HDA-T 20-M10*100/20
HDA-F-CW 5-M12	5	5,5	0,5	23	33	42	HDA-T 22-M12*125/30 HDA-T 22-M12*125/50
HDA-F-CW 5-M16	5	5,5	0,5	32	46	56	HDA-T 30-M16*190/40 HDA-T 30-M16*190/60
HDA-F-CW 5-M20	5	5,5	0,5	40	50	62	HDA-T 37-M20*250/50
HDA-R-CW 5-M10	5	5,5	0,5	21	28	36	HDA-TR 20-M10*100/20
HDA-R-CW 5-M12	5	5,5	0,5	23	33	42	HDA-TR 22-M12*125/30 HDA-TR 22-M12*125/50
HDA-R-CW 5-M16	5	5,5	0,5	32	46	56	HDA-TR 30-M16*190/40 HDA-TR 30-M16*190/60

[1)] effective thickness of centering washer

Hilti Design Anchor HDA	**Annex 7**
Dimension of centering washer	of European Technical Approval **ETA-99/0009**

Pre-setting anchor
HDA-P (Prepositioning)



Through-fastening anchor
HDA-T (Postpositioning)

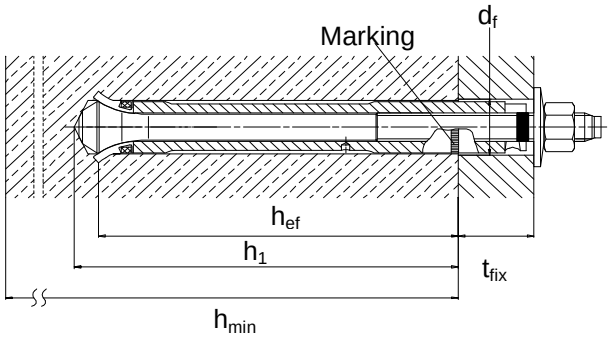


Table 4: Characteristic values of anchors and installation

Anchor type		**HDA M10**		**HDA M12**		**HDA M16**		**HDA M20**	
Pre-setting/Through-setting		**P(R)**	**T(R)**	**P(R)**	**T(R)**	**P(R)**	**T(R)**	**P**	**T**
Nominal diameter of drill bit	d_0 [mm]	20		22		30		37	
Cutting diameter of drill bit	$d_{cut}\leq$ [mm]	20,55		22,55		30,55		37,70	
Depth of drill hole	h_1 [mm]	107	≥107	133	≥133	203	≥203	266	≥266
Diameter of clearance hole in the fixture	d_f [mm]	12	21	14	23	18	32	22	40
Minimum fixture thickness	$t_{fix,min}$ [mm]	0	10	0	10	0	15	0	20
Sleeve recess[1)]	h_S [mm]	$2 \leq h_S \leq 6$		$2 \leq h_S \leq 7$		$2 \leq h_S \leq 8$		$2 \leq h_S \leq 8$	
Torque moment	T_{inst} [Nm]	50		80		120		300	

[1)] sleeve recess after setting of the anchor
a) Pre-setting anchor HDA-P(R):
distance from surface of the concrete member to top edge of the anchor sleeve, see Annex 1
b) Through-fastening anchor HDA-T(R):
distance from top edge of the fixture to top edge of the anchor sleeve, see Annex 2

Table 5a: Minimum thickness of concrete member, HDA-P and HDA-PR

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

Table 5b: Minimum thickness of concrete member, HDA-T and HDA-TR

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

1) $t_{fix,max}$ maximum fastenable thickness, see Table 2, Annex 6

2) h_{min} is dependent on the actual fixture thickness t_{fix} (use of a stop drill bit)
e.g. HDA-T 22-M12*125/50 : t_{fix} = 20mm → h_{min} = 250-20 = 230mm
t_{fix} = 50mm → h_{min} = 250-50 = 200mm

Table 6: Minimum spacing and minimum edge distances of anchors

HDA-P(R) / HDA-T(R)			**M10**	**M12**	**M16**	**M20**
Cracked concrete						
Minimum spacing [1)]	s_{min}	[mm]	100	125	190	250
Minimum edge distance [2)]	c_{min}	[mm]	80	100	150	200
Non-cracked concrete						
Minimum spacing [1)]	s_{min}	[mm]	100	125	190	250
Minimum edge distance [2)]	c_{min}	[mm]	80	100	150	200

1) ratio $s_{min} / h_{ef} = 1.0$
2) ratio $c_{min} / h_{ef} = 0.8$

Table 7a: Characteristic values of resistance to tension loads of design method A, HDA-P and HDA-T

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Steel failure						
Characteristic resistance	$N_{Rk,s}$	[kN]	46	67	126	192
Partial safety factor	γ_{Ms}		1,5			
Pull-out failure*						
Characteristic resistance in cracked concrete only	$N_{Rk,p}$ [kN]	C20/25	25	35	75	95
Partial safety factor in cracked concrete only	γ_2		1,0			
	γ_{Mp}		1,5			
Increasing factors for $N_{Rk,p}$ for cracked concrete only	ψ_c	C30/37	1,22			
		C40/50	1,41			
		C50/60	1,55			
Concrete cone failure and splitting failure**						
Effective anchorage depth	h_{ef}	[mm]	100	125	190	250
Partial safety factor in cracked and non cracked concrete	γ_2		1,0			
	γ_{Mc}		1,5			
Spacing	$s_{cr,N}$	[mm]	300	375	570	750
Edge distance	$c_{cr,N}$	[mm]	150	190	285	375
Spacing	$s_{cr,sp}$	[mm]	300	375	570	750
Edge distance	$c_{cr,sp}$	[mm]	150	190	285	375

* The pull-out failure mode is not decisive in non-cracked concrete; it does not have to be calculated by the designer.

** For concrete cone failure, the initial value of the characteristic resistance of an HDA anchor placed in cracked concrete is obtained by: $N^0_{Rk,c} = 8{,}3 \cdot \sqrt{f_{ck,cube}} \cdot h_{ef}^{1,5}$ instead of equation (5.2a) in ETAG 001 Annex C, § 5.2.2.4.

Table 8a: Displacements under tension loads, HDA-P and HDA-T

HDA-P / HDA-T			**M10**	**M12**	**M16**	**M20**
Tension load in C20/25 to C50/60 cracked concrete		[kN]	11,9	16,7	35,7	45,2
Displacement	δ_{N0}	[mm]	0,1	0,8	2,1	2,1
	$\delta_{N\infty}$	[mm]	1,3	1,3	2,1	2,1
Tension load in C20/25 to C50/60 non-cracked concrete		[kN]	21,9	31,9	60,0	91,4
Displacement	δ_{N0}	[mm]	0,4	0,8	1,7	2,4
	$\delta_{N\infty}$	[mm]	1,3	1,3	1,7	2,4

Table 7b: Characteristic values of resistance to tension loads of design method A, HDA-PR and HDA-TR

HDA-PR / HDA-TR				**M10**	**M12**	**M16**
Steel failure						
Characteristic resistance	$N_{Rk,s}$		[kN]	46	67	126
Partial safety factor	γ_{Ms}			1,60		
Pull-out failure*						
Characteristic resistance in cracked concrete only	$N_{Rk,p}$	[kN]	C20/25	25	35	75
Partial safety factor in cracked concrete only	γ_2			1,0		
	γ_{Mp}			1,5		
Increasing factors for $N_{Rk,p}$ for cracked concrete only	ψ_c		C30/37	1,22		
			C40/50	1,41		
			C50/60	1,55		
Concrete cone failure and splitting failure**						
Effective anchorage depth	h_{ef}		[mm]	100	125	190
Partial safety factor in cracked and non cracked concrete	γ_2			1,0		
	γ_{Mc}			1,5		
Spacing	$s_{cr,N}$		[mm]	300	375	570
Edge distance	$c_{cr,N}$		[mm]	150	190	285
Spacing	$s_{cr,sp}$		[mm]	300	375	570
Edge distance	$c_{cr,sp}$		[mm]	150	190	285

* The pull-out failure mode is not decisive in non-cracked concrete; also it has not to be calculated by the designer.

** For concrete cone failure, the initial value of the characteristic resistance of an HDA-R anchor placed in cracked concrete is obtained by: $N^0_{Rk,c} = 8{,}3 \cdot \sqrt{f_{ck,cube}} \cdot h_{ef}^{1,5}$ instead of equation (5.2a) in Annex C, § 5.2.2.4.

Table 8b: Displacements under tension loads, HDA-PR and HDA-TR

HDA-PR / HDA-TR			**M10**	**M12**	**M16**
Tension load in C20/25 to C50/60 cracked concrete		[kN]	11,9	16,7	35,7
Displacement	δ_{N0}	[mm]	0,8	0,9	1,6
	$\delta_{N\infty}$	[mm]	1,3	1,3	2,1
Tension load in C20/25 to C50/60 non-cracked concrete		[kN]	20,5	29,9	56,3
Displacement	δ_{N0}	[mm]	1,4	1,1	1,7
	$\delta_{N\infty}$	[mm]	1,4	1,1	1,7

Table 9a: Characteristic values of resistance to shear loads of design method A HDA-P and HDA-T

HDA-P			M10	M12	M16	M20
Steel failure without lever arm						
Characteristic resistance	$V_{Rk,s}$	[kN]	22	30	62	92
Partial safety factor	γ_{Ms}		1,25			
Steel failure with lever arm						
Distance according ETAG 001, Annex C 4.2.2.3	a_3	[mm]	8	10	13	15
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	60	105	266	519
Partial safety factor	γ_{Ms}		1,25			

HDA-T			M10		M12			M16					M20			
Steel failure without lever arm																
Characteristic resistance	for t_{fix}	[mm]	10≤ <15	15≤ ≤20	10≤ <15	15≤ <20	20≤ ≤50	15≤ <20	20≤ <25	25≤ <30	30≤ <35	35≤ ≤60	20≤ <25	25≤ <40	40≤ <55	55≤ ≤100
	$V_{Rk,s}$	[kN]	65*)	65	80*)	80	100	140*)	140	155	170	190	205*)	205	235	250
Partial safety factor	γ_{Ms}		1,5													

HDA-T			M10	M12	M16	M20
Steel failure with lever arm						
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	60	105	266	519
Partial safety factor	γ_{Ms}		1,25			

HDA-P / HDA-T			M10	M12	M16	M20
Concrete pryout failure						
Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3.	k		2,0			
Partial safety factor	γ_2		1,0			
	γ_{Mc}		1,5			
Concrete edge failure						
Effective length of anchor in shear loading	l_f	[mm]	70	88	90	120
External diameter of anchor	d_{nom}	[mm]	19	21	29	35
Prtial safety factor	γ_2		1,0			
	γ_{Mc}		1,5			

*) only with use of centering washer, t_{fix} = thickness of the base plate without thickness of the centering washer, see Annex 3

Hilti Design Anchor HDA

HDA-P and HDA-T
Design method A, characteristic values of resistance to shear loads

Annex 12
of European Technical Approval
ETA-99/0009

Table 9b: Characteristic values of resistance to shear loads of design method A HDA-PR and HDA-TR

HDA-PR			M10		M12				M16			
Steel failure without lever arm												
Characteristic resistance	$V_{Rk,s}$	[kN]	23		34				63			
Partial safety factor	γ_{Ms}		1,33									
Steel failure with lever arm												
Distance according ETAG 001, Annex C 4.2.2.3	a_3	[mm]	8		10				13			
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	60		105				266			
Partial safety factor	γ_{Ms}		1,33									
HDA-TR			**M10**		**M12**				**M16**			
Steel failure without lever arm												
Characteristic resistance	for t_{fix}	[mm]	10≤	15≤	10≤	15≤	20≤	30≤	15≤	20≤	25≤	35≤
			<15	≤20	<15	<20	<30	≤50	<20	<25	<35	≤60
	$V_{Rk,s}$	[kN]	71*)	71	87*)	87	94	109	152*)	152	158	170
Partial safety factor	γ_{Ms}		1,33									
Steel failure with lever arm												
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	60		105				266			
Partial safety factor	γ_{Ms}		1,33									
HDA-PR / HDA-TR			**M10**		**M12**				**M16**			
Concrete pryout failure												
Factor in equation (5.6) of ETAG Annex C, § 5.2.3.3.	k		2,0									
Partial safety factor	γ_2		1,0									
	γ_{Mc}		1,5									
Concrete edge failure												
Effective length of anchor in shear loading	l_f	[mm]	70		88				90			
External diameter of anchor	d_{nom}	[mm]	19		21				29			
Partial safety factor	γ_2		1,0									
	γ_{Mc}		1,5									

*) only with use of centering washer, t_{fix} = thickness of the base plate without thickness of the centering washer, see Annex 3

Hilti Design Anchor HDA

HDA-PR and HDA-TR
Design method A, characteristic values of resistance to shear loads

Annex 13
of European Technical Approval
ETA-99/0009

Table 10a: Displacements under shear loads, HDA-P and HDA-T

HDA-P		**M10**	**M12**	**M16**	**M20**
Shear load in C20/25 to C50/60 cracked and non-cracked concrete	[kN]	11,4	17,1	35,9	51
Displacement	δ_{V0} [mm]	2,8	2,5	4,1	5,0
	$\delta_{V\infty}$ [mm]	4,1	3,8	6,2	7,5
HDA-T		**M10**	**M12**	**M16**	**M20**
Shear load in C20/25 to C50/60 cracked and non-cracked concrete	[kN]	33,3	42,8	95,2	119
Displacement	δ_{V0} [mm]	6,2	6,9	10,1	12,0
	$\delta_{V\infty}$ [mm]	9,3	10,3	15,1	18,0

Table 10b: Displacements under shear loads, HDA-PR and HDA-TR

HDA-P		**M10**	**M12**	**M16**
Shear load in C20/25 to C50/60 cracked and non-cracked concrete	[kN]	13,3	19,3	35,9
Displacement	δ_{V0} [mm]	4,2	3,0	6,9
	$\delta_{V\infty}$ [mm]	6,3	4,5	10,4
HDA-T		**M10**	**M12**	**M20**
Shear load in C20/25 to C50/60 cracked and non-cracked concrete	[kN]	41,7	46,9	73,7
Displacement	δ_{V0} [mm]	4,2	3,0	6,9
	$\delta_{V\infty}$ [mm]	6,3	4,5	10,4

Setting tool HDA

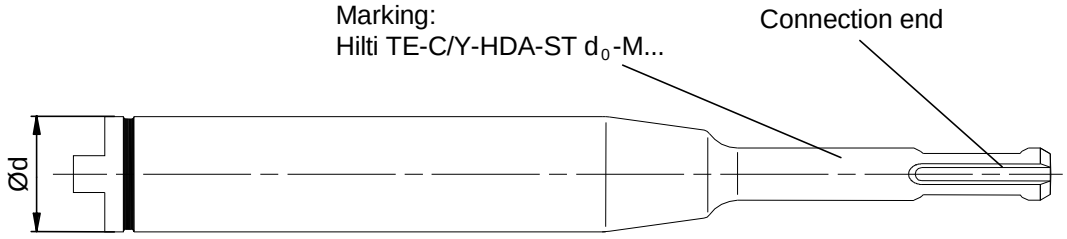


Table 11: Required setting tools for HDA and HDA-R

Setting tool	Ød [mm]	Connection end
TE-C-HDA-ST 20-M10	20	TE-C
TE-C-HDA-ST 22-M12	22	TE-C
TE-Y-HDA-ST 20-M10	20	TE-Y
TE-Y-HDA-ST 22-M12	22	TE-Y
TE-Y-HDA-ST 30-M16	30	TE-Y
TE-Y-HDA-ST 37-M20	37	TE-Y

Stop drill bit HDA

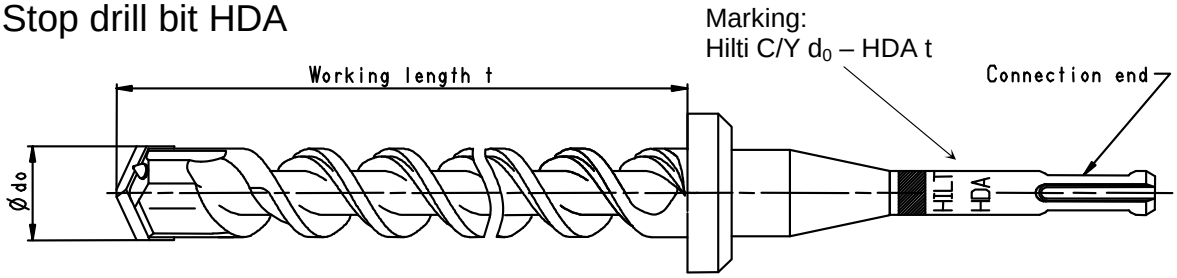


Table 12: Required stop drill bits for HDA and HDA-R

Stop drill bit	t [mm]	d_0 [mm]	Connection end
TE-C-HDA-B 20*100	107	20	TE-C
TE-C-HDA-B 20*120	127	20	TE-C
TE-C-HDA-B 22*125	133	22	TE-C
TE-C-HDA-B 22*155	163	22	TE-C
TE-C-HDA-B 22*175	183	22	TE-C
TE-Y-HDA-B 20*100	107	20	TE-Y
TE-Y-HDA-B 20*120	127	20	TE-Y
TE-Y-HDA-B 22*125	133	22	TE-Y
TE-Y-HDA-B 22*155	163	22	TE-Y
TE-Y-HDA-B 22*175	183	22	TE-Y
TE-Y-HDA-B 30*190	203	30	TE-Y
TE-Y-HDA-B 30*230	243	30	TE-Y
TE-Y-HDA-B 30*250	263	30	TE-Y
TE-Y-HDA-B 37*250	266	37	TE-Y
TE-Y-HDA-B 37*300	316	37	TE-Y
TE-Y-HDA-B 37*350	366	37	TE-Y

Hilti Design Anchor HDA	**Annex 15**
HDA setting tools	of European Technical Approval **ETA-99/0009**

Table 13: Required setting tools and stop drill bits for HDA and HDA-R

Anchor type	Stop drill bit	Setting tool
HDA-P(R) 20-M10*100/20	TE-C-HDA-B 20*100	TE-C-HDA-ST 20-M10
HDA-T(R) 20-M10*100/20	TE-C-HDA-B 20*120	
HDA-P(R) 20-M10*100/20	TE-Y-HDA-B 20*100	TE-Y-HDA-ST 20-M10
HDA-T(R) 20-M10*100/20	TE-Y-HDA-B 20*120	
HDA-P(R) 22-M12*125/30	TE-C-HDA-B 22*125	TE-C-HDA-ST 22-M12
HDA-P(R) 22-M12*125/50		
HDA-T(R) 22-M12*125/30	TE-C-HDA-B 22*155	
HDA-T(R) 22-M12*125/50	TE-C-HDA-B 22*175	
HDA-P(R) 22-M12*125/30	TE-Y-HDA-B 22*125	TE-Y-HDA-ST 22-M12
HDA-P(R) 22-M12*125/50		
HDA-T(R) 22-M12*125/30	TE-Y-HDA-B 22*155	
HDA-T(R) 22-M12*125/50	TE-Y-HDA-B 22*175	
HDA-P(R) 30-M16*190/40	TE-Y-HDA-B 30*190	TE-Y-HDA-ST 30-M16
HDA-P(R) 30-M16*190/60		
HDA-T(R) 30-M16*190/40	TE-Y-HDA-B 30*230	
HDA-T(R) 30-M16*190/60	TE-Y-HDA-B 30*250	
HDA-P 37-M20*250/50	TE-Y-HDA-B 37*250	TE-Y-HDA-ST 37-M20
HDA-P 37-M20*250/100		
HDA-T 37-M20*250/50	TE-Y-HDA-B 37*300	
HDA-T 37-M20*250/100	TE-Y-HDA-B 37*350	

Table 14a: Required setting hammer drills, HDA-P and HDA-T

Anchor size HDA-P / HDA-T	**M10**	**M12**	**M16**	**M20**
Drilling system for anchor setting as given or equivalent	TE24 TE25[1)] TE40 TE56[2)3)] / TE56-ATC[2)3)]		TE70 / TE70-ATC TE75 TE76[3)] / TE76-ATC[3)]	TE70 / TE70-ATC TE76[3)] / TE76-ATC[3)]
Single impact energy [J]	3.7 - 5.3		7.0 - 10.5	8.0 - 10.5
Speed under load [1/min]	250 - 555		150 - 360	280 - 360
Connection end	TE-C for TE24, TE25 TE-C for TE40 TE-Y for TE56[2)] TE-Y for TE56-ATC[2)]		TE-Y	TE-Y

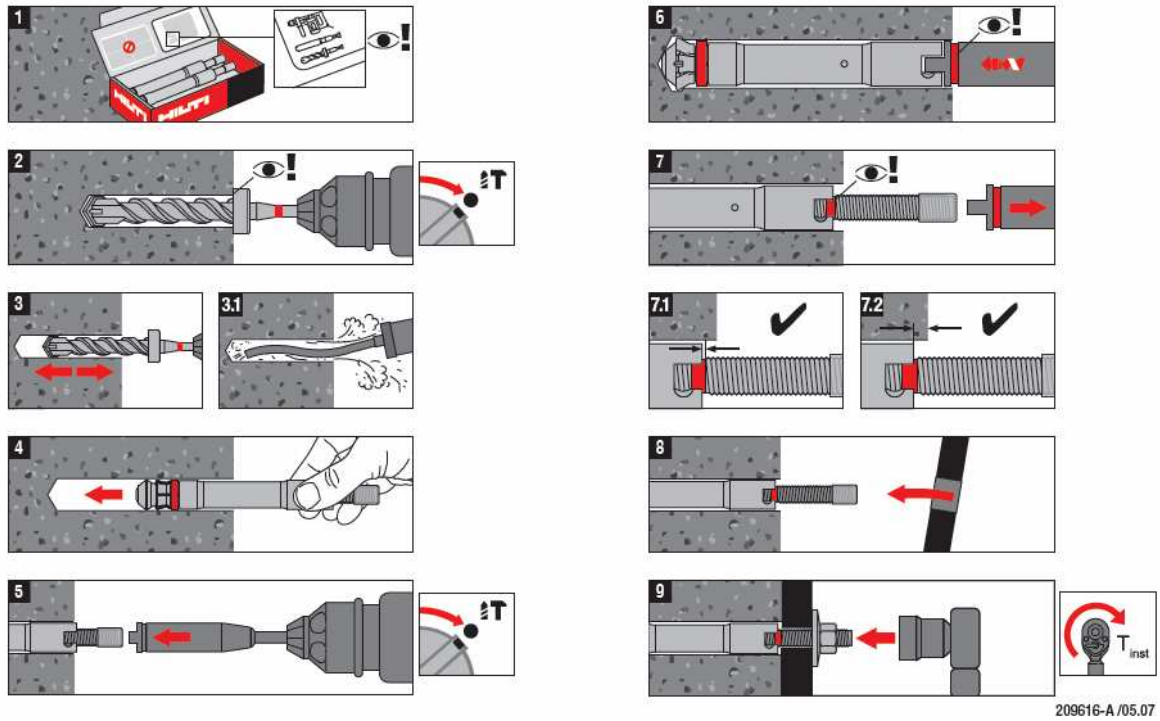
1) TE25: first gear only
2) TE 56 / TE 56-ATC: The impact energy range is only applicable for the specified setting tools (see Table 11 and Table 13a).
3) TE56 / TE56-ATC, TE76 /TE76-ATC: use with max. hammering power

Table 14b: Required setting hammer drills, HDA-PR and HDA-TR

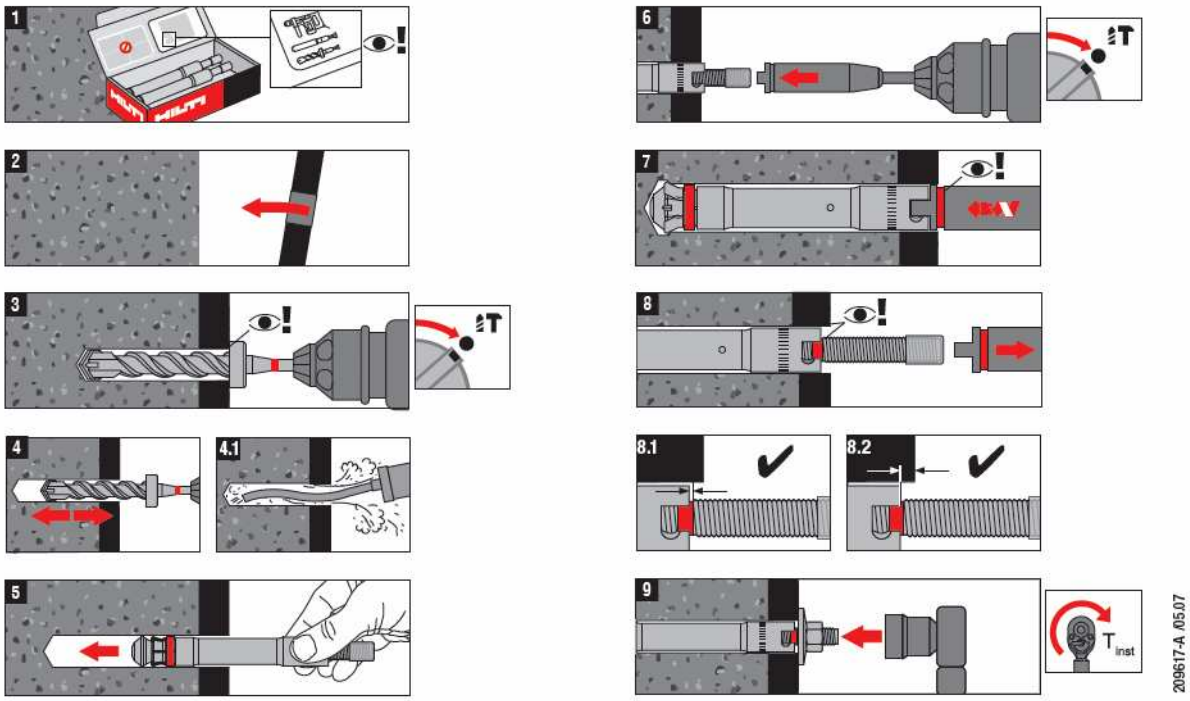
Anchor size HDA-PR/HDA-TR	**M10**	**M12**	**M16**
Drilling system for anchor setting as given or equivalent	TE25[1)] TE35 TE40 TE56[2)3)] / TE56-ATC[2)3)]		TE70 / TE70-ATC TE75 TE76[3)] / TE76-ATC[3)]
Single impact energy [J]	3.7 - 5.3		7.0 - 10.5
Speed under load [1/min]	250 - 555		150 - 360
Connection end	TE-C for TE25 TE-C for TE35, TE40 TE-Y for TE56[2)] TE-Y for TE56-ATC[2)]		TE-Y

1) TE25: first gear only
2) TE 56 / TE 56-ATC: The impact energy range is only applicable for the specified setting tools (see Table 11 and Table 13a).
3) TE56 / TE56-ATC, TE76 /TE76-ATC: use with max. hammering power

Instruction for Use: HDA-P and HDA-PR

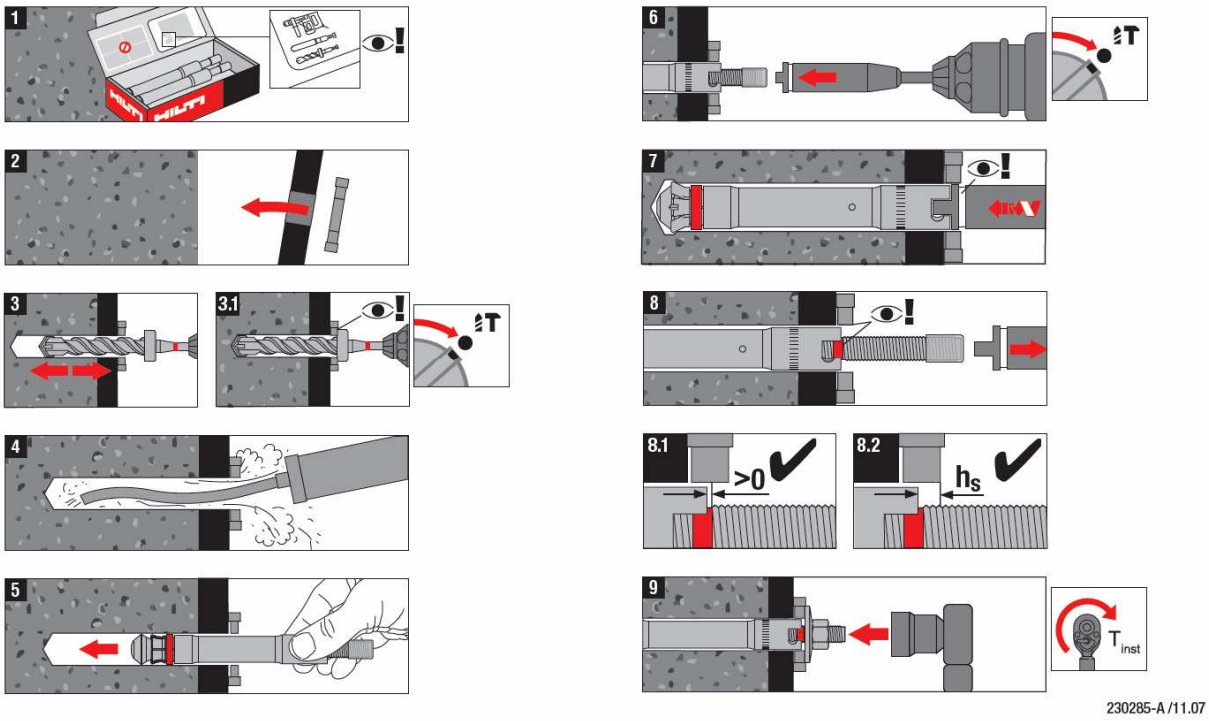


Instruction for Use: HDA-T and HDA-TR



Hilti Design Anchor HDA	**Annex 18**
HDA-P, HDA-PR , HDA-T and HDA-TR **Instruction for use**	of European Technical Approval **ETA-99/0009**

Instruction for Use: HDA-T and HDA-TR with centering washer



Hilti Design Anchor HDA	**Annex 19**
HDA-T and HDA-TR with centering washer **Instruction for use**	of European Technical Approval **ETA-99/0009**