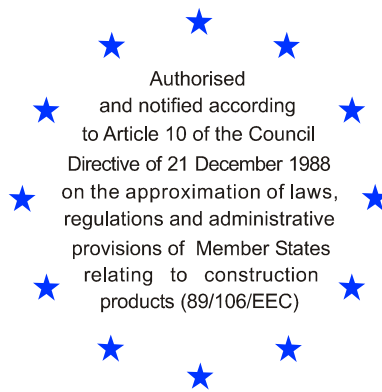


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Mitglied der EOTA
Member of EOTA

European Technical Approval ETA-04/0084

English translation prepared by DIBt - Original version in German language

Handelsbezeichnung <i>Trade name</i>	Hilti HIT-HY 150 MAX mit HIT-TZ/HIT-RTZ <i>Hilti HIT-HY 150 MAX with HIT-TZ/HIT-RTZ</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>	Kraftkontrolliert spreizender Verbunddübel in den Größen M8x55, M10x65, M12x75, M16x90 und M20x120 zur Verankerung im Beton <i>Torque controlled bonded anchor of sizes M8x55, M10x65, M12x75, M16x90 and M20x120 for use in concrete</i>
Geltungsdauer: <i>Validity:</i>	vom <i>from</i> 9 December 2009 bis <i>to</i> 23 September 2014
Herstellwerk <i>Manufacturing plant</i>	Hilti Werke

Diese Zulassung umfasst
This Approval contains

15 Seiten einschließlich 7 Anhänge
15 pages including 7 annexes

Diese Zulassung ersetzt
This Approval replaces

ETA-04/0084 mit Geltungsdauer vom 17.09.2009 bis 23.09.2014
ETA-04/0084 with validity from 17.09.2009 to 23.09.2014



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 (Bauproduktengesetz - 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 5: Bonded anchors", ETAG 001-05.
- 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 product and intended use

1.1 Definition of product

The Hilti HIT-HY 150 MAX with HIT-TZ / HIT-RTZ is a torque controlled bonded anchor consisting of a mortar cartridge with injection mortar Hilti HIT-HY 150 MAX and an anchor rod (including nut and washer) in the sizes of M8x55, M10x65, M12x75, M16x90 and M20x120. The anchor rod (including nut and washer) is made of galvanised steel (HIT-TZ) or stainless steel (HIT-RTZ). The anchor rod is placed into a drill hole filled with injection mortar. The load transfer is realised by mechanical interlock of several cones in the bonding mortar and then via a combination of bonding and friction forces in the base material (concrete).

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

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. Safety in case of fire (Essential Requirement 2) is not covered in this European technical approval. 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 206:2000-12.

The anchor may be anchored in cracked and non-cracked concrete.

The anchor may be installed in dry or wet concrete or in flooded holes excepting sea water.

The anchor may be used in the following temperature range:

Temperature range: -40 °C to +80 °C (max short term temperature +80 °C and
max long term temperature +50 °C)

Anchor rods HIT-TZ (galvanised steel):

The anchor rod (including nut and washer) made of galvanised steel may only be used in structures subject to dry internal conditions.

Anchor rods HIT-RTZ (stainless steel 1.4401, 1.4404):

The anchor rod (including nut and washer) 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 product and methods of verification

2.1 Characteristics of 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 anchor values for the design of anchorages are given in Annexes 6 and 7. Each anchor rod shall be marked according to Annex 1 with the identifying mark of the manufacturer, with the anchor size, with the anchorage depth, with the maximum fixture thickness and with the letters "HIT-TZ" for galvanised steel or "HIT-RTZ" for stainless steel respectively.

The two components of the injection mortar Hilti HIT - HY 150 MAX are delivered in unmixed condition in mortar cartridges in a size of 330 ml, 500 ml and 1400ml (foil pack cartridge) according to Annex 1. Each foil pack is marked with the identifying mark "Hilti HIT-HY 150" with the production date and expiry date.

The anchor shall only be packaged and supplied as a complete unit. Mortar cartridges may be packed separately from anchor rods (including nut and washer).

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 5 "Bonded anchors" as well as the TR 018 "Torque-controlled bonded anchors", on the basis of Option 1.

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 EU 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 96/582/EG of the European Commission⁸ the system 2(i) (referred to as System 1) of 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;

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.

⁸ Official Journal of the European Communities L 254 of 08.10.1996

(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 of 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 January 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 at 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 of 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 of approved bodies

The approved body shall perform the following tasks in accordance with the provisions laid down in the control plan:

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

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.

⁹ The control plan is a confidential part of the documentation of the European technical approval, but not published together with 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 each packaging of anchors. 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 manufacturer),
- 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 1),
- 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 in the inspection of the plant by the Deutsches Institut für Bautechnik and the approved body and laid down in the technical documentation.

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 European technical approval and consequently the validity of the CE marking on the basis of the European technical approval and if so whether further assessment or alterations to the European technical 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, 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:

- 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;
- anchor installation in accordance with the manufacturer's specifications and drawings using the tools indicated in the technical documentation of this European technical approval;

- 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;
- keeping of the edge distance and spacing to the specified values without minus tolerances;
- positioning of the drill holes without damaging the reinforcement;
- drilling a cylindrical hole by hammer drilling or hand guided diamond drilling, hand guided diamond drilling only by using the Hilti diamond drilling machine DD EC-1 and the corresponding core bits DD-C;
- keeping the effective anchorage depth;
- in case of aborted drill hole: the drill hole shall be filled with mortar;
- before installation of the anchor checking the minimum embedment depth by inserting the anchor rod into the drill hole up to the marking of setting depth acc. to Annex 1;
- the anchor component installation temperature shall be at least +5 °C;
- the temperature of the concrete during installation and curing of the injection mortar must not fall below +5 °C;
- during gelling time t_{gel} according to Annex 5 the element must be fully set up to the designated setting depth; it must not be loaded during the curing time t_{cure} acc. to Annex 5;
- The fixture must not be attached before end of the curing time t_{cure} acc. to Annex 5. The torque moments given in Annex 2 must be observed.

5 Indications to the manufacturer

5.1 Responsibility of the manufacturer

The manufacturer is responsible 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 as well as 5 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,
- hole depth,
- diameter of anchor rod;
- minimum effective anchorage depth,
- maximum thickness of the fixture;
- information on the installation procedure, including cleaning of the hole with the cleaning equipments, preferably by means of an illustration,
- anchor component installation temperature,
- ambient temperature of the concrete during installation of the anchor,
- admissible processing time (open time) of the mortar,
- curing time until the anchor may be loaded as a function of the ambient temperature in the concrete during installation,
- maximum torque moment,
- identification of the manufacturing batch.

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

5.2 Recommendations concerning packaging, transport and storage

The mortar cartridges shall be protected against sun radiation and shall be stored according to the manufacturer instructions in dry condition at temperatures of at least +5 °C to not more than +25 °C.

Mortar cartridges with expired shelf life must no longer be used.

The anchor shall only be packaged and supplied as a complete unit. Mortar cartridges may be packed separately from anchor rods (including nut and washer).

The manufacture's installation instruction shall indicate that the mortar Hilti HIT-HY 150 MAX shall be used only with the corresponding anchor rods of the manufacturer according to Annex 2.

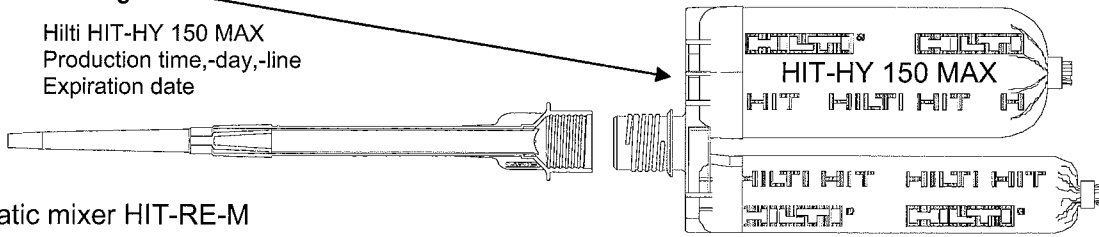
In Vertretung
Dipl.-Ing. Seyfert
Vice-President of Deutsches Institut für Bautechnik
Berlin, 9 December 2009

beglaubigt
Lange

Injection mortar Hilti HIT-HY 150 MAX:
 hybrid system with resin, hardener and cement water component
 Foil pack 330ml, 500ml and 1400ml

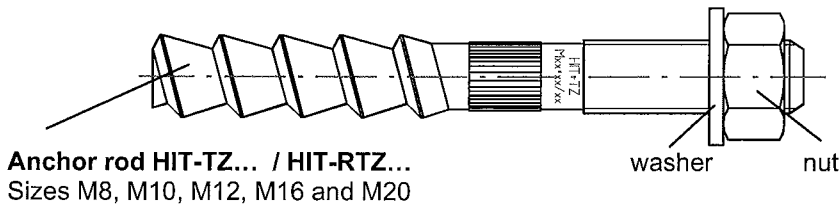
Marking:

Hilti HIT-HY 150 MAX
 Production time,-day,-line
 Expiration date



Static mixer HIT-RE-M

Steel element:



Anchor rod HIT-TZ... / HIT-RTZ...
 Sizes M8, M10, M12, M16 and M20

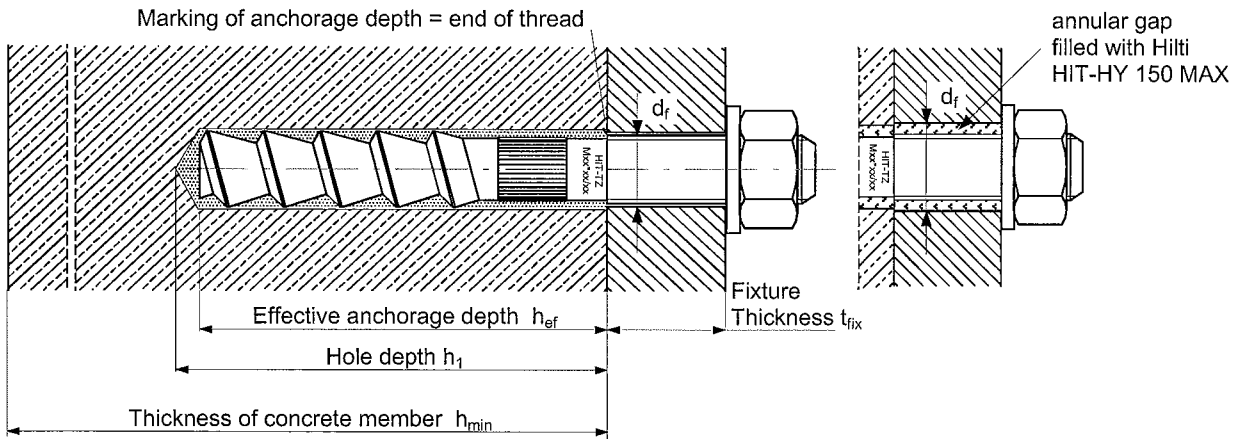
HIT-TZ / HIT-RTZ intended use

Pre-setting:

Install anchor before
 positioning fixture

Through-setting:

Install anchor through
 positioned fixture



Use category:

Qualified for installation in:

- cracked and non cracked concrete
- dry or wet concrete
- flooded holes excepting sea water

Installation in dry or wet concrete or in flooded holes (excepting sea water)

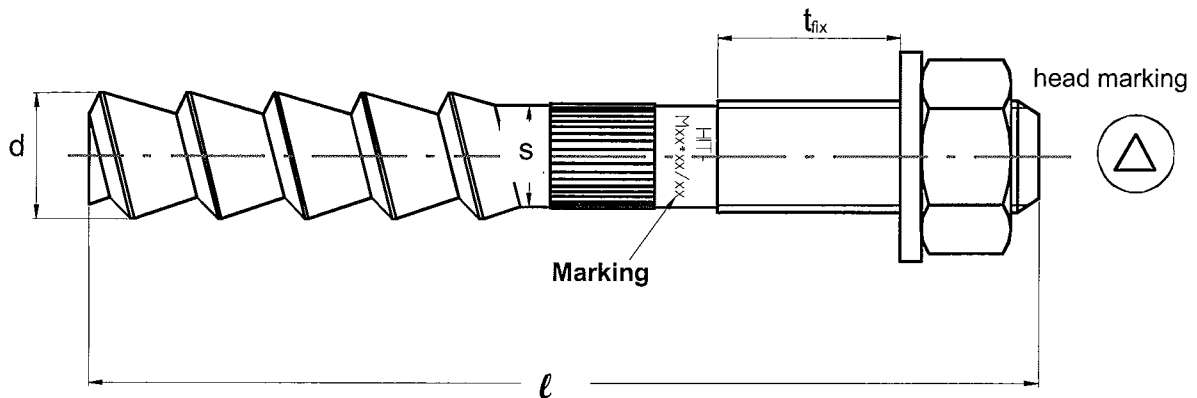
Temperature range: Installation: +5 °C to +40 °C

In service: -40 °C to +80 °C

(max short term temperature +80 °C and max long term temperature +50 °C)

Hilti injection anchor HIT-TZ / HIT-RTZ	Annex 1
product intended use	of European technical approval ETA-04/0084

Anchor rod HIT-TZ / HIT-RTZ



Marking: HIT-TZ for galvanised steel; HIT-RTZ for stainless steel; M.. h_{ef}/t_{fix}
 (e.g. HIT-TZ M12x75/50)

Table 1: Installation parameters

HIT-TZ / HIT-RTZ		M8x55/ t_{fix}	M10x65/ t_{fix}	M12x75/ t_{fix}	M16x90/ t_{fix}	M20x120/ t_{fi} x	
Length of anchor	min l	[mm]	82	93	106	136	174
	max l	[mm]	1500				
Diameter of anchor cone	d [mm]		9,4	11,4	13,4	17,4	21,35
Diameter of shaft	s [mm]		7,1	9,0	10,7	14,5	18,1
Nominal diameter of drill bit ¹⁾	d_0 [mm]		10	12	14	18	22
Depth of drilled hole	$h_1 \geq$ [mm]		60	70	80	95	125
Effective anchorage depth	$h_{ef} =$ [mm]		55	65	75	90	120
Pre-setting: Diameter of clearance hole in the fixture	$d_f \leq$ [mm]		9	12	14	18	22
Through-setting: Diameter of clearance hole in the fixture	$d_f \leq$ [mm]		12	14	16	20	24
Torque moment	$T_{inst} =$ [Nm]		12	23	40	70	130

¹⁾ Nominal diameter of drill bits of percussion drilling machines or nominal diameter of core bits DD-C of diamond drilling machines DD EC-1 respectively

Description see Annex 1 (intended use)

Hilti injection anchor HIT-TZ / HIT-RTZ	Annex 2 of European technical approval ETA-04/0084
installation parameters	

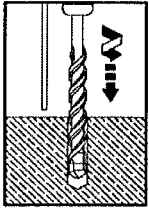
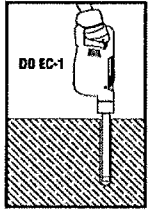
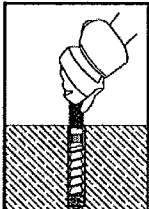
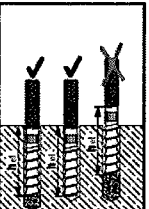
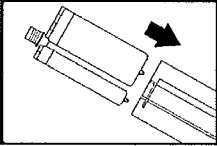
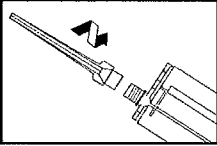
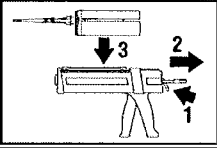
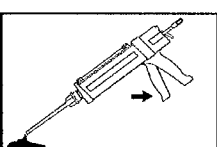
Table 2: Minimum thickness of concrete member, minimum spacing and minimum edge distance of anchors

HIT-TZ / HIT-RTZ			M8x55	M10x65	M12x75	M16x90	M20x120
Minimum thickness	h_{min}	[mm]	110	130	150	180	240
Cracked concrete							
Minimum spacing	s_{min}	[mm]	40	50	55	70	80
	for $c \geq$	[mm]	50	70	75	80	90
Minimum edge distance	c_{min}	[mm]	40	50	55	70	80
	for $s \geq$	[mm]	70	80	85	85	90
Non cracked concrete							
Minimum spacing	s_{min}	[mm]	40	60	70	80	100
	for $c \geq$	[mm]	65	85	100	100	120
Minimum edge distance	c_{min}	[mm]	50	60	70	80	100
	for $s \geq$	[mm]	80	120	130	140	150

Table 3: Materials

Designation	Material
Metal parts made of zinc coated steel	
Anchor rod HIT-TZ, M8 to M20	Cold formed steel, steel galvanised A2 according to DIN EN ISO 4042, coated
Nut EN 24032	Strength class 8, EN 20898-2, steel galvanised A2 according to DIN EN ISO 4042
Washer DIN 125	Steel galvanised A2 according to DIN EN ISO 4042
Metal parts made of stainless steel	
Anchor rod HIT-RTZ, M8 to M20	Cold formed steel; 1.4404, 1.4401 EN 10088, coated
Nut EN 24032	1.4404, 1.4401 EN 10088, A4-70 DIN ISO 3506
Washer DIN 125	A4; EN 10088

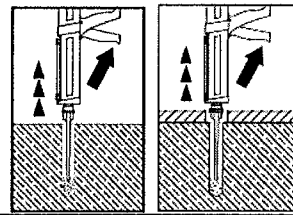
Hilti injection anchor HIT-TZ / HIT-RTZ	Annex 3 of European technical approval ETA-04/0084
minimum spacing and edge distance, materials	

Instruction for use	
Bore hole drilling	
 	<p>Pre-setting: Drill hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit. Diamond coring is permissible only when the Hilti DD EC-1 diamond core drilling machine and the corresponding DD-C core bit are used.</p> <p>Through-setting: Drill hole through the clearance hole in the fixture to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit. Diamond coring is permissible only when the Hilti DD EC-1 diamond core drilling machine and the corresponding DD-C core bit are used.</p>
Check of setting depth and compress of the drilling dust	
 	<p>Check the setting depth and compress the drilling dust. The element has to fit in the hole until the required embedment depth. It is not necessary to clean the bore hole.</p>
Injection preparation Use with injection mortar Hilti HIT-HY150 MAX	
	<p>Insert foil pack in foil pack holder. Never use damaged foil packs and/or damaged or unclean foil pack holders. Attach new mixer prior to dispensing a new foil pack (snug fit).</p>
	<p>Tightly attach Hilti HIT-RE-M mixer to foil pack manifold. Do not modify the mixer in any way. Make sure the mixing element is in the mixer. Use only the mixer supplied with the adhesive.</p>
	<p>Insert foil pack holder with foil pack into HIT-dispenser. Push release trigger, retract plunger and insert foil pack holder into the appropriate Hilti dispenser.</p>
	<p>Discard initial adhesive. The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discard quantities are 2 strokes for 330 ml foil pack, 3 strokes for 500 ml foil pack 45 ml for 1400 ml foil pack.</p>
<p>Hilti injection anchor HIT-TZ / HIT-RTZ</p>	
<p>installation instructions I</p>	
<p>Annex 4</p> <p>of European technical approval</p> <p>ETA-04/0084</p>	

Installation of the element

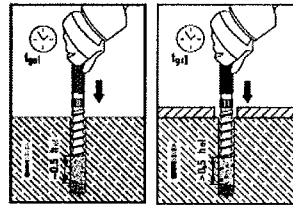
(Pre-setting pictures on the left side, through-setting pictures on the right side)

Inject adhesive from the back of the borehole without forming air voids



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull. Fill holes approximately 2/3 full. After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

Under Water application fill borehole completely with mortar.

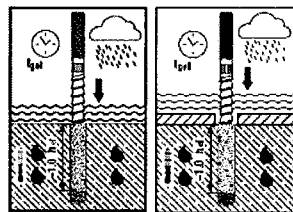


Installation in dry concrete and wet concrete:

Before use, verify that the element is dry and free of oil and other contaminants.

Set element to the required embedment depth till working time t_{gel} has elapsed. After setting the element the annular gap between the anchor and the fixture (through-setting) or concrete (pre-setting) has to be completely filled with mortar.

The working time t_{gel} is given in Table 4

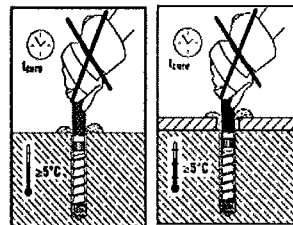


Installation in flooded holes excepting sea water:

Before use, verify that the element is free of oil and other contaminants. When mounted in flooded holes the hole should be completely filled with mortar.

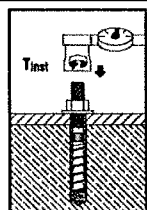
Set element to the required embedment depth till working time t_{gel} has elapsed.

The working time t_{gel} is given in Table 4



After required curing time t_{cure} remove excess mortar.

The anchor can be loaded (see Table 4).



Loading the anchor:

The applied installation torque shall not exceed the values T_{inst} given in Table 1.

Table 4: Working time t_{gel} and minimum curing time t_{cure}

Temperature in the anchorage base [°C]	working time t_{gel} [min]	curing time t_{cure} [min]
5 °C to < 20 °C	8	60
20 °C to < 30 °C	5	30
30 °C to ≤ 40°C	2	30

Hilti injection anchor HIT-TZ / HIT-RTZ

installation instructions II

Annex 5

of European technical approval

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Table 5: Design method A
Characteristic values under tension loads

HIT-TZ / HIT-RTZ			M8x55	M10x65	M12x75	M16x90	M20x120
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	22	35	51	94	147
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,5				
Pullout failure							
Characteristic resistance in cracked concrete	$N_{Rk,p}$	[kN]	9	16	20	30	40
Characteristic resistance in non-cracked concrete	$N_{Rk,p}$	[kN]	16	20	25	- ²⁾	- ²⁾
Increasing factors for $N_{Rk,p}$ for cracked and non-cracked concrete		C30/37	1,22				
		ψ_c C40/50	1,41				
		C50/60	1,55				
Partial safety factor ¹⁾	γ_{Mp}	[-]	1,50 ³⁾				
Concrete cone failure							
Effective anchorage depth	h_{ef}	[mm]	55	65	75	90	120
Spacing	$s_{cr,N}$	[mm]	3 h_{ef}				
Edge distance	$c_{cr,N}$	[mm]	1,5 h_{ef}				
Partial safety factor ¹⁾	γ_{Mc}	[-]	1,50 ³⁾				
Splitting failure							
Effective anchorage depth	h_{ef}	[mm]	55	65	75	90	120
Spacing	$s_{cr,sp}$	[mm]	4 h_{ef}				
Edge distance	$c_{cr,sp}$	[mm]	2 h_{ef}				
Partial safety factor ¹⁾	γ_{Msp}	[-]	1,50 ³⁾				

¹⁾ In absence of other national regulations.

²⁾ Pullout failure is not decisive.

³⁾ The partial safety factor $\gamma_2 = 1.0$ is included.

Table 6: Displacements under tension loads

HIT-TZ / HIT-RTZ			M8x55	M10x65	M12x75	M16x90	M20x120
Tension load in cracked concrete		[kN]	3,6	6,3	7,9	11,9	15,9
Displacement	δ_{N0}	[mm]	0,4	0,4	0,3	0,3	0,3
	$\delta_{N\infty}$	[mm]	0,6	0,8	0,7	0,6	0,6
Tension load in non-cracked concrete		[kN]	6,3	7,9	9,9	17,1	26,3
Displacement	δ_{N0}	[mm]	0,2	0,2	0,2	0,2	0,2
	$\delta_{N\infty}$	[mm]	0,6	0,8	0,7	0,6	0,6

Hilti injection anchor HIT-TZ / HIT-RTZ	Annex 6 of European technical approval ETA-04/0084
Design method A Characteristic values of resistance under tension loads, displacements under tension loadst	

Table 7: Design method A
Characteristic values of resistance under shear loads

HIT-TZ / HIT-RTZ			M8x55	M10x65	M12x75	M16x90	M20x120
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$	[kN]	11	17	25	47	74
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,25				
Steel failure with lever arm							
Characteristic resistance	$M_{Rk,s}$	[Nm]	23	45	79	200	390
Partial safety factor ¹⁾	γ_{Ms}	[-]	1,25				
Concrete pryout failure							
Factor in equation (5.6) of ETAG Annex C, 5.2.3.3	k	[-]	1,0	2,0			
Partial safety factor ¹⁾	γ_{Mcp}	[-]	1,5 ²⁾				
Concrete edge failure							
Effective length of anchor in shear loading	l_f	[mm]	55	65	75	90	120
Diameter of anchor	d_{nom}	[mm]	10	12	14	18	22
Partial safety factor ¹⁾	γ_{Mc}	[-]	1,5 ²⁾				

¹⁾ In absence of other national regulations.

²⁾ The partial safety factor $\gamma_2 = 1.0$ is included.

Table 8: Displacements under shear loads

HIT-TZ / HIT-RTZ			M8x55	M10x65	M12x75	M16x90	M20x120
Shear load in cracked and non-cracked concrete		[kN]	6,3	9,7	14,3	26,9	41,7
Displacement	δ_{V0}	[mm]	1,4	1,9	2,3	2,7	3,0
	$\delta_{V\infty}$	[mm]	2,1	2,9	3,5	4,1	4,5

Hilti injection anchor HIT-TZ / HIT-RTZ	Annex 7 of European technical approval ETA-04/0084
Design method A Characteristic values of resistance under shear loads, displacements under shear loads	