Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Member of EOTA
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Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment

ETA-09/0265 of 27 August 2014

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Injection system Hilti HIT-HY 70
Product family to which the construction product belongs	Injection system of sizes M8 to M16 for use in non-cracked concrete
Manufacturer	Hilti Aktiengesellschaft Business Unit Anchors 9494 Schaan FÜRSTENTUM LIECHTENSTEIN
Manufacturing plant	Hilti Werke
This European Technical Assessment contains	15 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 5: "Bonded anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The Injection system Hilti HIT-HY 70 is a bonded anchor consisting of a foil pack with injection mortar Hilti HIT-HY 70 and a steel element. The steel element consist of a threaded rod Hilti HIT-V or Hilti HAS-(E) with washer and hexagon nut in the range of M8 to M16.

The steel element is placed into a drilled hole filled with injection mortar and is anchored via the bond between metal part, injection mortar and concrete.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

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

The verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 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.

3 Performance of the product and references to the methods used for its assessment

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for tension loads in non-cracked concrete	See Annex C 1
Characteristic resistance for shear loads in non-cracked concrete	See Annex C 2
Displacements under tension and shear loads	See Annex C 3

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances there may be requirements (e.g. transposed European legislation and national laws, regulations and administrative provisions) applicable to the products falling within the scope of this European Technical Assessment. In order to meet the provisions of Regulation (EU) No 305/2011, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

The essential characteristics regarding Safety in use are included under the Basic Works Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

The sustainable use of natural resources was not investigated.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 24 June 1996 (96/582/EC) (OJ L 254 of 08.10.96 p. 62-65), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

Issued in Berlin on 27 August 2014 by Deutsches Institut für Bautechnik

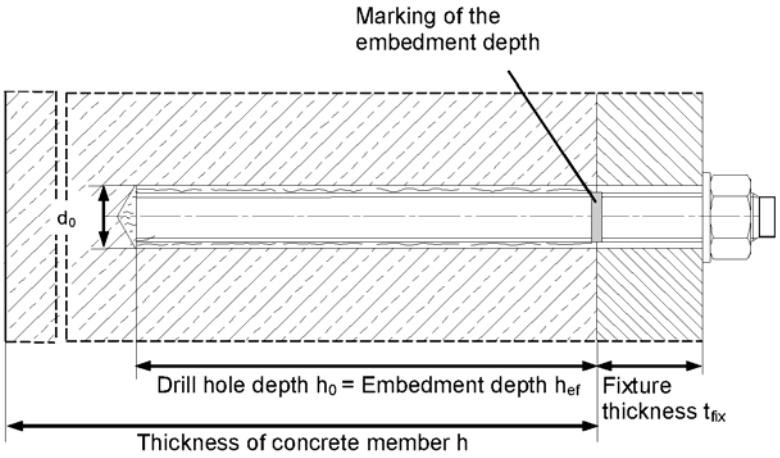
Uwe Bender
Head of Department

beglaubigt:
Lange

Deutsches Institut für Bautechnik

Installed condition

Figure A1:
Threaded rod HIT-V- … and HAS-(E)…



Injection System Hilti HIT-HY 70	Annex A1
Product description Installed condition	

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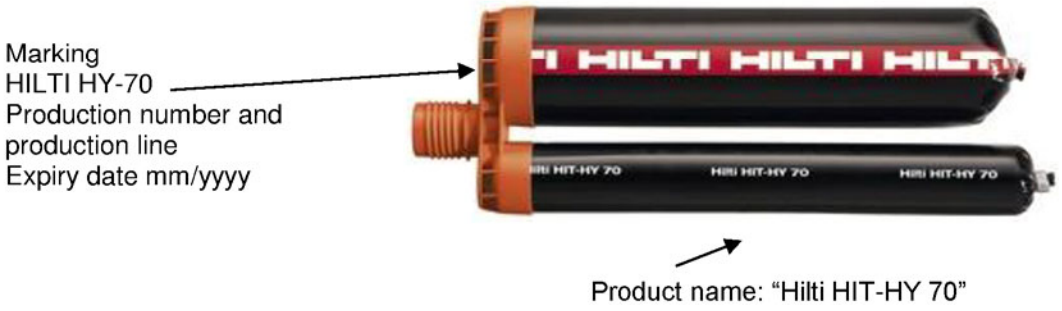
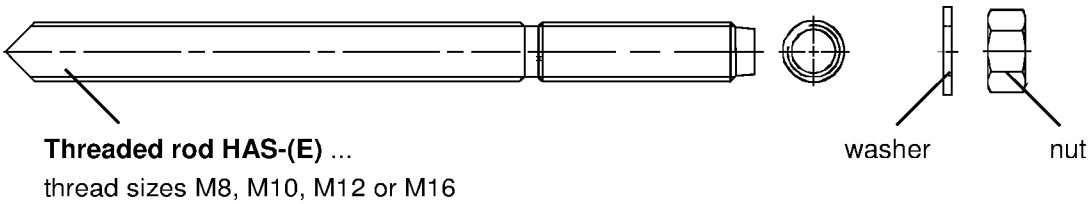
Product description: Injection mortar and steel elements

Injection mortar Hilti HIT-HY 70: hybrid system with aggregate
330 ml, 500 ml and 1400 ml



Static mixer Hilti HIT-RE-M

Steel elements



or

Commercial standard threaded rod with:

- Materials, dimensions and mechanical properties acc. Table A1
- Inspection certificate 3.1 according to EN 10204:2004
- Marking of embedment depth

Injection System Hilti HIT-HY 70	**Annex A2**
Product description Injection mortar / Static mixer / Steel elements	

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Table A1: Materials

Designation	Material
Metal parts made of zinc coated steel	
Threaded rod HIT-V-5.8(F) HAS-(E)	Strength class 5.8, f_{uk} = 500 N/mm²; f_{yk} = 400 N/mm², elongation at fracture (l_0=5d) > 8% ductile Electroplated zinc coated ≥ 5 µm (F) Hot dip galvanized ≥ 45 µm
Threaded rod HIT-V-8.8(F)	Strength class 8.8 , f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², elongation at fracture (l_0=5d) > 8% ductile Electroplated zinc coated ≥ 5 µm (F) Hot dip galvanized ≥ 45 µm
Washer	Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
Nut	Strength class of nut adapted to strength class of threaded rod Electroplated zinc coated ≥ 5 µm Hot dip galvanized ≥ 45 µm
Metal parts made of stainless steel	
Threaded rod HIT-V-R HAS-(E)R	Strength class 70, f_{uk} = 700 N/mm², f_{yk} = 450 N/mm²; elongation at fracture (l_0=5d) > 8% ductile Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2011
Washer	Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2011
Nut	Strength class of nut adapted to strength class of threaded rod Stainless steel 1.4401, 1.4404, 1.4578, 1.4571, 1.4439, 1.4362 EN 10088-1:2011
Metal parts made of high corrosion resistant steel	
Threaded rod HIT-V-HCR HAS-(E)HCR	f_{uk} = 800 N/mm², f_{yk} = 640 N/mm², elongation at fracture (l_0=5d) > 8% ductile High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2011
Washer	High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2011
Nut	Strength class of nut adapted to strength class of threaded rod High corrosion resistant steel 1.4529, 1.4565 EN 10088-1:2011

Injection System Hilti HIT-HY 70	**Annex A3**
Product description Materials	

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Specifications of intended use

Anchorages subject to:

- Static and quasi-static loading

Base material:

- Reinforced or unreinforced normal weight concrete according to EN 206-1:2014.
- Strength classes C20/25 to C50/60 according to EN 206-1:2014.
- Non-cracked concrete.

Temperature in the base material:

- **at installation**
  -5° C bis +40° C
- **in-service**
  Temperature range I:
  -40 °C to +40 °C (max. long term temperature +24 °C and max. short term temperature +40 °C
  Temperature range II:
  -40 °C to +80 °C (max. long term temperature +50 °C and max. short term temperature +80 °C)

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions
  (zinc coated steel, stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal conditions, if no particular aggressive conditions exist
  (stainless steel or high corrosion resistant steel).
- Structures subject to external atmospheric exposure and to permanently damp internal conditions, if other particular aggressive conditions exist
  (high corrosion resistant steel).
  Note: 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 products are used).

Design:

- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored. The position of the anchor is indicated on the design drawings (e. g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static or quasi-static loading are designed in accordance with EOTA Technical Report TR 029, Edition September 2010.

Installation:

- Use category: installation in dry or wet concrete, no installation in water filled drill holes
- Hammer drilling
- Overhead installation is admissible
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.

Injection System Hilti HIT-HY 70	**Annex B1**
Intended Use Specifications	

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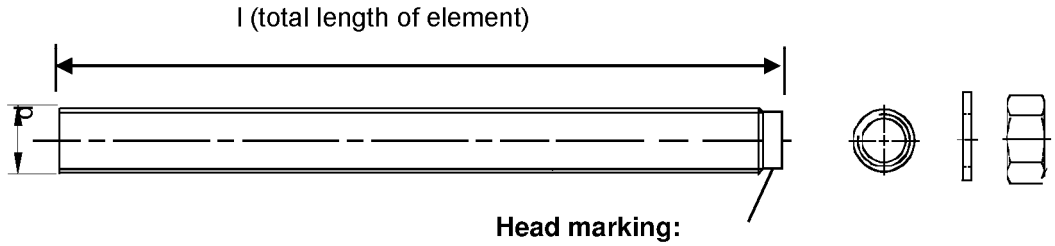
Table B2: Installation parameters of threaded rod HIT-V-… and HAS-(E)…

HIT-V-… and HAS-(E)…			M8	M10	M12	M16
Diameter of element	d	[mm]	8	10	12	16
Nominal diameter of drill bit	d_0	[mm]	10	12	14	18
Effective embedment depth	h_{ef}	[mm]	80	90	110	125
Maximum diameter of clearance hole in the fixture [1)]	d_f	[mm]	9	12	14	18
Minimum thickness of concrete member	h_{min}	[mm]	110	120	140	160
Maximum torque moment	T_{max}	[Nm]	10	20	40	80
Minimum spacing	s_{min}	[mm]	40	50	60	80
Minimum edge distance	c_{min}	[mm]	40	50	60	80

1) for larger clearance hole in the fixture see “TR 029 section 1.1”

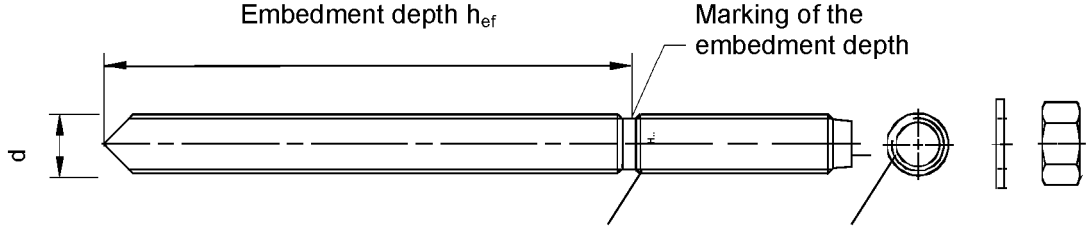
HIT-V-…



Head marking:

5.8 - l	=	HIT-V-5.8	M…x l
5.8F - l	=	HIT-V-5.8F	M…x l
8.8 - l	=	HIT-V-8.8	M…x l
8.8F - l	=	HIT-V-8.8F	M…x l
R - l	=	HIT-V-R	M …x l
HCR - l	=	HIT-V-HCR	M .. x l

HAS-(E)…



Marking:

identifying mark - H, embossing "1"	HAS-(E)
identifying mark - H, embossing “=”	HAS-(E)R
identifying mark - H, embossing “CR”	HAS-(E)HCR

Injection System Hilti HIT-HY 70

Intended Use
Installation parameters

Annex B2

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Table B3: Maximum working time and minimum curing time[1)]

Temperature in the base material T	Maximum working time t_{work}	Minimum curing time t_{cure}
-5 °C to -1 °C	10 min	6 h
0 °C to 4 °C	10 min	4 h
5 °C to 9 °C	10 min	2,5 h
10 °C to 19 °C	7 min	1,5 h
20 °C to 29 °C	4 min	30 min
30 °C to 39 °C	2 min	20 min
40 °C	1 min	15 min

[1)] The curing time data are valid for dry base material only.
In wet base material the curing times must be doubled.

Table B4: Parameters of cleaning and setting tools

Elements	Drill and clean		Installation
HIT-V-.../HAS-(E)-...	Hammer drilling	Brush	Piston plug
			
[mm]	d_0 [mm]	HIT-RB	HIT-SZ
8	10	10	-
10	12	12	12
12	14	14	14
16	18	18	18

Cleaning alternatives

Manual Cleaning (MC):
Hilti hand pump for blowing out drill holes with diameters $d_0 \leq 18$ mm and drill hole depths $h_0 \leq 10 \cdot d$

Compressed air cleaning (CAC):
Air nozzle with an orifice opening of minimum 3,5 mm in diameter.

Injection System Hilti HIT-HY 70	Annex B3
Intended Use Installation parameters	

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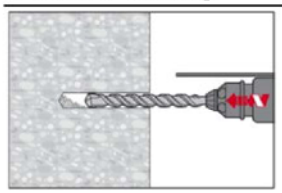
Installation instructions

Hole drilling

Hammer drilling

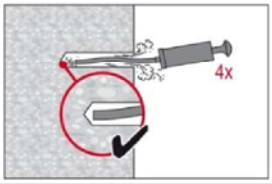


Drill hole to the required embedment depth with a hammer drill set in rotation-hammer mode using an appropriately sized carbide drill bit.

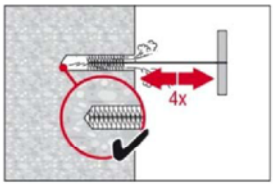
Drill hole cleaning

Just before setting an anchor, the drilled hole must be free of dust and debris. Inadequate hole cleaning = poor load values.

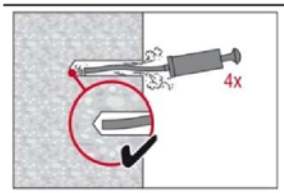
Manual Cleaning (MC)



The Hilti manual pump may be used for blowing out drill holes up to diameters $d_0 \leq 18$ mm and embedment depths up to $h_{ef} \leq 10 \cdot d$.
Blow out at least 4 times from the back of the drilled hole until return air stream is free of noticeable dust

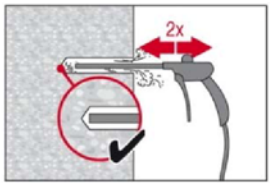


Brush 4 times with the specified brush (see Table B3) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the drilled hole (brush Ø ≥ drill hole Ø) - if not the brush is too small and must be replaced with the proper brush diameter.

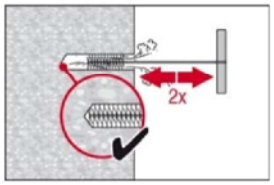


Blow out again with manual pump at least 4 times until return air stream is free of noticeable dust.

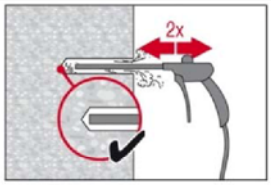
Compressed air cleaning (CAC)



Blow 2 times from the back of the hole (if needed with nozzle extension) over the hole length with oil-free compressed air (min. 6 bar at 6 m³/h) until return air stream is free of noticeable dust.



Brush 2 times with the specified brush (see Table B3) by inserting the steel brush Hilti HIT-RB to the back of the hole (if needed with extension) in a twisting motion and removing it.
The brush must produce natural resistance as it enters the drilled hole (brush Ø ≥ drill hole Ø) - if not the brush is too small and must be replaced with the proper brush diameter.



Blow again with compressed air 2 times until return air stream is free of noticeable dust.

Injection System Hilti HIT-HY 70	
Intended Use Installation instructions	**Annex B4**

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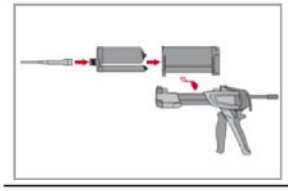
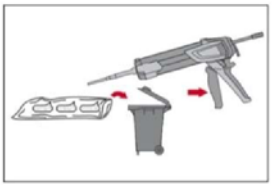
Injection preparation



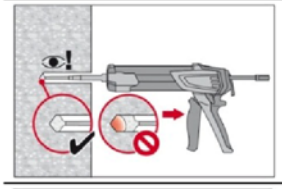
Tightly attach new Hilti mixing nozzle HIT-RE-M to foil pack manifold (snug fit). Do not modify the mixing nozzle.
Observe the instruction for use of the dispenser and the mortar.
Check foil pack holder for proper function. Do not use damaged foil packs / holders.
Insert foil pack into foil pack holder and put holder into HIT-dispenser.



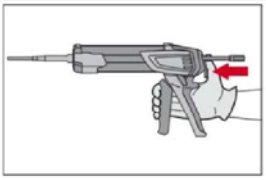
The foil pack opens automatically as dispensing is initiated. Depending on the size of the foil pack an initial amount of adhesive has to be discarded. Discarded quantities are

2 strokes	for 330 ml foil pack,
3 strokes	for 500 ml foil pack,
45 ml	for 1400 ml foil pack.

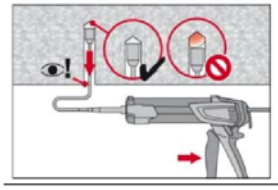
Inject adhesive from the back of the drilled hole without forming air voids



Inject the adhesive starting at the back of the hole, slowly withdrawing the mixer with each trigger pull.
Fill holes approximately 2/3 full, or as required to ensure that the annular gap between the anchor and the concrete is completely filled with adhesive along the embedment length.

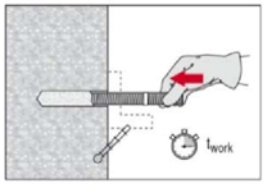


After injection is completed, depressurize the dispenser by pressing the release trigger. This will prevent further adhesive discharge from the mixer.

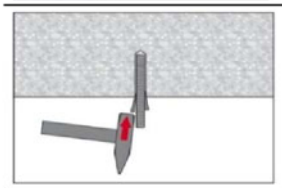


For overhead installation the injection is only possible with the aid of extensions and piston plugs. Assemble HIT-RE-M mixer, extension(s) and appropriately sized piston plug (see Table B3). Insert piston plug to back of the hole and inject adhesive. During injection the piston plug will be naturally extruded out of the drill hole by the adhesive pressure.

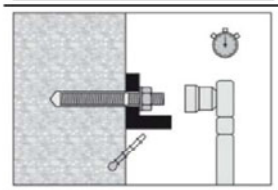
Setting the element



Before use, verify that the element is dry and free of oil and other contaminants.
Mark and set element to the required embedment depth until working time t_{work} has elapsed. The working time t_{work} is given in Table B2.



For overhead installation use piston plugs and fix embedded parts with e.g. wedges (Hilti HIT-OHW).



Loading the anchor: After required curing time t_{cure} (see Table B2) the anchor can be loaded.
The applied installation torque shall not exceed the values T_{max} given in Table B1.

Injection System Hilti HIT-HY 70	
Intended Use Installation instructions	**Annex B5**

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Table C1: Characteristic values of resistance for threaded rod under tension loads in non-cracked concrete

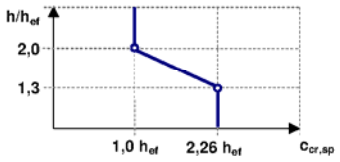
HIT-HY 70 with threaded rod HIT-V-… and HAS-(E)-...			**M8**	**M10**	**M12**	**M16**
Installation safety factor	γ_2	[-]	1,0	1,2		
Steel failure threaded rods						
HIT-V-5.8(F), threaded rod-5.8	$N_{Rk,s}$	[kN]	18	29	42	79
HIT-V-8.8(F), threaded rod-8.8	$N_{Rk,s}$	[kN]	29	46	67	126
HIT-V-R, threaded rod-A4-70	$N_{Rk,s}$	[kN]	26	41	59	110
HIT-V-HCR, threaded rod-HCR-80	$N_{Rk,s}$	[kN]	29	46	67	126
HAS-(E)-5.8	$N_{Rk,s}$	[kN]	17	26	38	72
HAS-(E)-R	$N_{Rk,s}$	[kN]	23	37	53	101
HAS-(E)-HCR	$N_{Rk,s}$	[kN]	27	42	61	115
Combined pullout and concrete cone failure						
Characteristic bond resistance in non-cracked concrete C20/25						
Temp. range I: 40 °C/24 °C	$\tau_{Rk,ucr}$	[N/mm²]	9,0	9,0	9,0	7,0
Temp. range II: 80 °C/50 °C	$\tau_{Rk,ucr}$	[N/mm²]	7,0	7,0	7,0	5,0
Increasing factors for τ_{Rk}	ψ_c	C30/37	1,04			
		C40/50	1,07			
		C50/60	1,09			
Splitting failure						
Edge distance $c_{cr,sp}$ [mm] for		$h / h_{ef} \geq 2,0$	$1,0 \cdot h_{ef}$			
		$2,0 > h / h_{ef} > 1,3$	$4,6\ h_{ef} - 1,8\ h$			
		$h / h_{ef} \leq 1,3$	$2,26\ h_{ef}$			
Spacing	$s_{cr,sp}$	[mm]	$2 \cdot c_{cr,sp}$			

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Table C2: Characteristic values of resistance for threaded rod under shear loads in non-cracked concrete

HIT-HY70 with HIT-V…			**M8**	**M10**	**M12**	**M16**
Steel failure without lever arm						
HIT-V 5.8(F)	$V_{Rk,s}$	[kN]	9	15	21	39
HIT-V 8.8(F)	$V_{Rk,s}$	[kN]	15	23	34	63
HIT-V R	$V_{Rk,s}$	[kN]	13	20	30	55
HIT-V HCR	$V_{Rk,s}$	[kN]	15	23	34	63
Steel failure with lever arm						
HIT-V 5.8(F)	$M^0_{Rk,s}$	[Nm]	19	37	66	167
HIT-V 8.8(F)	$M^0_{Rk,s}$	[Nm]	30	60	105	266
HIT-V R	$M^0_{Rk,s}$	[Nm]	26	52	92	233
HIT-V HCR	$M^0_{Rk,s}$	[Nm]	30	60	105	266
Concrete pry-out failure						
Factor in equation (5.7) of Technical Report TR 029 for the design of bonded anchors	k	[-]	2,0			
HIT-HY70 with HAS-(E)-…			**M8**	**M10**	**M12**	**M16**
Steel failure without lever arm						
HAS-(E)-5.8	$V_{Rk,s}$	[kN]	8,5	13	19	36
HAS-(E)-R	$V_{Rk,s}$	[kN]	12	19	27	51
HAS-(E)-HCR	$V_{Rk,s}$	[kN]	13	21	31	58
Steel failure with lever arm						
HAS-(E)-5.8	$M^0_{Rk,s}$	[Nm]	16	33	56	147
HAS-(E)-R	$M^0_{Rk,s}$	[Nm]	23	45	79	205
HAS-(E)-HCR	$M^0_{Rk,s}$	[Nm]	26	52	90	234
Concrete pry-out failure						
Factor in equation (5.7) of Technical Report TR 029 for the design of bonded anchors	k	[-]	2,0			

Injection System Hilti HIT-HY 70

Performances
Characteristic values of resistance under tension loads in non-cracked concrete
Design according to „EOTA Technical Report TR 029, Edition September 2010“

Annex C2

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Table C3: Displacements under tension load

HIT-HY 70 with HIT-V-... or HAS-(E)-...			M8	M10	M12	M16
Temperature range I: 40 °C / 24 °C						
Displacement	δ_{N0}	[mm/(N/mm²)]	0,03	0,03	0,03	0,04
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	0,08	0,09	0,10	0,12
Temperature range II: 80 °C / 50 °C						
Displacement	δ_{N0}	[mm/(N/mm²)]	0,04	0,04	0,05	0,05
Displacement	$\delta_{N\infty}$	[mm/(N/mm²)]	0,10	0,11	0,12	0,14

Table C4: Displacements under shear load

HIT-HY 70 with HIT-V-... or HAS-(E)-...			M8	M10	M12	M16
Displacement	δ_{V0}	[mm/kN]	0,09	0,07	0,06	0,05
Displacement	$\delta_{V\infty}$	[mm/kN]	0,14	0,11	0,09	0,07