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Technical data

No. 17/0005 of 02/11/2017

General Part

Trade name	**Injection system Hilti HIT-RE 500 V3**
Scope of document	**Design recommendations for Hilti HIT-RE 500 V3 for use in concrete in oversized boreholes with a diameter of maximum 1,5 times the diameter of the anchor element (d_0 = 1,5 x d)**
Assessment by	Hilti Corporation Feldkircherstrasse 100 FL-9494 Schaan Principality of Liechtenstein
This assessment contains	5 pages which form an integral part of this assessment
Basis of Technical data assessment	ETA-16/0143 (issue date: 07/2017) ETA-16/0180 (issue date: 10/2016) ARA 17-009 (issue date: 11/2017)

This document is subject to revision.

Design recommendations for Hilti HIT-RE 500 V3 for use in concrete with drill holes up to d_0 = 1,5 x d.

Table 1 is summarizing the assessment of results gained by extensive testing at independent test labs.

Following design recommendations apply for Hilti HIT-RE 500 V3 in concrete with drill holes up to d_0 = 1,5 x d:

Table 1: Design recommendations for anchoring

Topic	Recommendation
Tension load	
Steel failure	Same as in ETA-16/0143 and ETA-16/0180
Combined pull-out and concrete cone failure	Same as in ETA-16/0143 and ETA-16/0180 • for **temperature range I only** (max. long term 20°C, max short term 43°C) • for **uncracked concrete only** • **Values given for diamond coring** apply for hammer drilling methods and diamond coring with roughening as well. See also Table 4 and Table 5 of this document.
Concrete cone failure	Same as in ETA-16/0143 and ETA-16/0180
Splitting failure	Same as in ETA-16/0143 and ETA-16/0180
Shear load	
Steel failure	Same as in ETA-16/0143 and ETA-16/0180
pry-out and concrete edge failure	Same as in ETA-16/0143 and ETA-16/0180
Installation	
Installation parameters	Same as in ETA-16/0143 and ETA-16/0180
Minimum edge distance, spacing and concrete thickness	See Table 2 and Table 3 of this document.
Displacements	
Displacements	Not determined
Not applicable	
Temp. range II (lt: 43°C / st: 70°C)	Not applicable
Cracked concrete	Not applicable
Seismic C1 and C2	Not applicable
Installation in flooded borehole or submerged concrete.	Not applicable

Installation parameters

Table 2: Installation parameters metric threaded rods

Threaded rod			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Diameter of element	$d = d_{nom}$	[mm]	8	10	12	16	20	24	27	30
Diameter of drill bit and brush (standard borehole diameter)	d_0	[mm]	10	12	14	18	22	28	30	35
Diameter of drill bit and brush **(large borehole diameter)**	d_0	[mm]	**12**	**15**	**18**	**24**	**30**	**36**	**40**	**45**
Effective embedment depth and drill hole depth	min h_{ef}	[mm]	60	60	70	80	90	96	108	120
	max h_{ef}	[mm]	160	200	240	320	400	480	540	600
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30	33
Minimum thickness of concrete member	h_{min}	[mm]	h_{ef} + 30 ≥ 100 mm			h_{ef} + 2 d_0				
Maximum torque moment	T_{max}	[Nm]	10	20	40	80	150	200	270	300
Minimum spacing	s_{min}	[mm]	50	60	75	100	120	145	160	180
Minimum edge distance	c_{min}	[mm]	40	45	45	50	60	75	80	90

Table 3: Installation parameters fractional threaded rods

Threaded rod			**3/8"**	**1/2"**	**5/8"**	**3/4"**	**7/8"**	**1"**	**1 1/4"**
Diameter of element	$d = d_{nom}$	[mm]	9,5	12,7	15,9	19,1	22,2	25,4	31,8
Diameter of drill bit and brush (standard borehole diameter)	d_0	[mm]	11,1	14,3	19,1	22,2	25,4	28,6	34,9
			7/16	9/16	3/4	7/8	1	1 1/8	1 3/8
Diameter of drill bit and brush **(large borehole diameter)**	d_0	[mm]	**14,3**	**19,1**	**22,2**	**28,6**	**31,8**	**38,1**	**47,6**
			9/16	**3/4**	**7/8**	**1 1/8**	**1 1/4**	**1 1/2**	**1 7/8**
Effective embedment depth and drill hole depth	min h_{ef}	[mm]	60,3	69,9	79,4	88,9	88,9	101,6	127,0
			2 3/8	2 3/4	3 1/8	3 1/2	3 1/2	4	5
	max h_{ef}	[mm]	190,5	254,0	317,5	381,0	444,5	508,0	635,0
			7 1/2	10	12 1/2	15	17 1/2	20	25
Maximum diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	18	22	26	30
Minimum thickness of concrete member	h_{min}	[mm]	h_{ef} + 30 ≥ 100 mm		h_{ef} + 2 d_0				
Maximum torque moment	T_{max}	[Nm]	20	41	81	136	169	203	271
Minimum spacing	s_{min}	[mm]	60	80	90	115	130	155	195
Minimum edge distance	c_{min}	[mm]	45	50	50	60	65	80	100

Bond strength tables

Table 4: Characteristic resistance for metric threaded rods under tension load in concrete

Threaded rod			**M8**	**M10**	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Installation safety factor										
Diamond coring	$\gamma_2 = \gamma_{inst}$	[-]	1,2			1,4				
Combined pullout and concrete cone failure										
Characteristic bond resistance in non-cracked concrete C20/25 in diamond cored holes. (applicable for Hammer drilling, Hammer drilling with Hilti hollow drill bit TE-CD and TE-YD and for diamond coring with roughening with Hilti roughening tool TE-YRT as well)										
Temperature range I: 40°C / 24°C	$\tau_{Rk,ucr}$	[N/mm²]	12	12	12	12	12	11	11	11
Factor acc. to section 6.2.2.3 of CEN/TS 1992-4:2009 part 5	k_8 [2)]	[-]	10,1							
Increasing factors for τ_{Rk} in concrete	ψ_c	C30/37	1,04							
		C40/50	1,07							
		C50/60	1,09							

Table 5: Characteristic resistance for fractional threaded rods under tension load in concrete

Threaded rod			**3/8"**	**1/2"**	**5/8"**	**3/4"**	**7/8"**	**1"**	**1 1/4"**
Installation safety factor									
Diamond coring	$\gamma_2 = \gamma_{inst}$	[-]	1,2		1,4				
Combined pullout and concrete cone failure									
Characteristic bond resistance in non-cracked concrete C20/25 in diamond cored holes. (applicable for Hammer drilling, Hammer drilling with Hilti hollow drill bit TE-CD and TE-YD and for diamond coring with roughening with Hilti roughening tool TE-YRT as well)									
Temperature range I: 40°C / 24°C	$\tau_{Rk,ucr}$	[N/mm²]	12	12	12	12	12	11	11
Factor acc. to section 6.2.2.3 of CEN/TS 1992-4:2009 part 5	k_8 [2)]	[-]	10,1						
Increasing factors for τ_{Rk} in concrete	ψ_c	C30/37	1,04						
		C40/50	1,07						
		C50/60	1,09						

References:

[1] ETA-16/0143 European Technical Assessment: Bonded fastener with threaded rods, rebar, internally sleeve and Hilti tension anchor HZA for use in concrete, issued from 12.07.2017

[2] ETA-16/0180 European Technical Assessment: Bonded fastener with threaded rods, rebar, internally sleeve for use in concrete, issued from 04.10.2016

[3] Hilti instruction for use (IFU) Hilti HIT-RE 500 V3, 2017

[4] Hilti Assessment report ARA 17-009

[5] ETAG 001, part 5 used EAD

[7] EN 1992-1-1

Assessment done by

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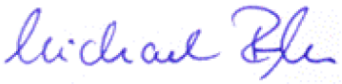
X 

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Revision log

Version	Date	Comment
1.0	02.11.2017	First release