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Leipzig Institute for Materials
Research and Testing

Testing, Inspection and
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Work Group 3.2
Fire Behaviour of Building
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Constructions

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Notice of extension of the validity of the advisory opinion no. GS 3.2/16-259-3 of 9 January 2017

10 March 2022

No. Copy 1

Subject matter: Chemical Capsule Anchor VD-Q
Fire protection assessment of the characteristic steel
strength under tensile load according to Technical Report
TR 020 "Evaluation of Anchorages in Concrete concerning
Resistance to Fire" (May 2004).

Client: B+BTec
Munterij 8
4762 AH Zevenbergen (Netherlands)

Person in charge: Dipl.-Ing. S. Bauer

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1 General

On 9 March 2022, MFPA Leipzig GmbH was commissioned by B+BTec to extend the advisory opinion no. GS 3.2/16-259-3 of 9 January 2017.

2 Validity

The validity of the advisory opinion no. GS 3.2/16-259-3 of 9 January 2017 is extended indefinitely and ends as soon as technical regulations change or the reference documents become invalid.

The results of the tests exclusively relate to the items tested. This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 10 March 2022



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Testing, Inspection and Certification Authority for
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Constructions

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Advisory Opinion No. GS 3.2/16-259-3

9 January 2017

No. Copy 1

Translation of the original German document GS 3.2/16-259-3

Subject matter: Chemical Capsule Anchor VD-Q
Fire protection assessment of the characteristic steel strength under tensile load according to Technical Report TR 020 „Evaluation of Anchorages in Concrete concerning Resistance to Fire“ (Mai 2004).

Client: B+BTec
Munterij 8
4762 AH Zevenbergen (Netherlands)

Date of order: 2. September 2016

Person in charge: Dipl.-Wirtsch.-Ing. S. Kramer

Validity: 8. January 2022

This advisory opinion consists of 3 pages of text and 2 Enclosures.

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1 Objective and request

MFPA Leipzig GmbH was commissioned on 2. September 2016 by B+BTec to prepare an advisory opinion on the Chemical Capsule Anchor VD-Q with a one-side exposure to fire and anchoring in a reinforced concrete surface in order to determine the characteristic tension resistances.

2 Description of the tested construction

The Chemical Capsule Anchor VD-Q adhesive system is a bonded anchor system consisting of glass capsule V-P plus with a threaded rod with hexagon nut and washer of electrogalvanized steel, stainless steel or high corrosion resistant stainless steel of the sizes M8 to M30. The Chemical Capsule Anchor VD-Q is anchored via the bond between anchor rod, chemical mortar and concrete in uncracked concrete.

The system should be used under predominantly static or quasi-static load in reinforced or unreinforced normal concrete of strength class $\geq C 20/25$ and $\leq C 50/60$ in accordance with DIN EN 206: 2014-07 [1]. No further description of the injection will be provided here and reference is made to the ETA-14/0296 [2].

The present tests of Chemical Capsule Anchor VD-Q were performed in the sizes M8, M10 und M16 in electrogalvanized steel of the strength class 5.8. The details of how the test was performed and the individual test results are described in the test report PB 3.2/16-259-1 [3].

3 Test evaluation and conclusions

The test evaluation for steel failure was carried out according to TR 020: 2004-05 [4]. A graphical analysis of the test results is given in Enclosure 2.

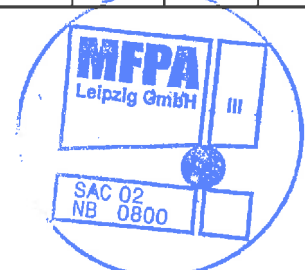
To determine the characteristic tension stress the values for M8, M10 and M16 were interpreted based on the test results. The values for M12 and M14 result from the interpolation of the values for M10 and M16 based on the steel cross section. For bonded anchors $> M16$ the tensile strength of the size M16 was transferred.

On this basis, the following characteristic tension resistances have been determined for the Chemical Capsule Anchor VD-Q (Table 1). To design also the characteristic steel stress under normal temperature have to be considered, the smaller stress is decisive.

Determination of the characteristic values for other types of failure (e.g. „pull-out“ and „concrete cone failure“) was not object of the test; they can be determined according to the simplified verification method of TR 020: 2004-05 [4] or by experiments according to the method described in the TR 020: 2004-05 [4].

Table 1 Characteristic tension resistance of the Chemical Capsule Anchor VD-Q (electrogalvanized, strength class ≥ 5.8)

Chemical Capsule Anchor VD-Q			M8	M10	M12	M14	M16	M20	M22	M24	M30
Min embedment depth	h_{nom}	[mm]	80	90	110	120	125	170	190	210	280
30 min	$N_{Rk,s,fi(30)}$	[kN]	0.94	2.20	2.99	3.92	5.18	8.09	10.00	11.65	18.52
60 min	$N_{Rk,s,fi(60)}$	[kN]	0.77	1.64	2.34	3.15	4.26	6.65	8.22	9.58	15.22
90 min	$N_{Rk,s,fi(90)}$	[kN]	0.60	1.08	1.68	2.38	3.34	5.21	6.44	7.50	11.92
120 min	$N_{Rk,s,fi(120)}$	[kN]	0.51	0.80	1.35	1.99	2.87	4.48	5.55	6.46	10.27



4 Special notes

The assessment above applies for the Chemical Capsule Anchor VD-Q, when installed in accordance with the installation regulations of the firm of B+BTec or a general building inspectorate approval or European Technical Assessment.

The assessment further applies only for bonded anchors of electrogalvanised steel from strength classes ≥ 5.8 in uncracked reinforced concrete. On account of the better high-temperature behaviour the results also apply for stainless steel A4 and high corrosion resistant stainless steel.

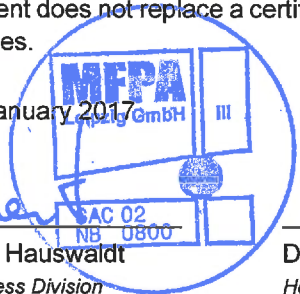
The assessment applies in general to a one-sided fire loading of the structural elements. In the event of a fire loading on several sides, the verification procedure can only be applied if the distance to the outer edge of the anchor is $c \geq 300$ mm and ≥ 2 hef.

Based on this the provided resistances also apply to lateral tension and/or diagonal tension.

The assessment only applies in combination with reinforced concrete ceilings of strength class $\geq C 20/25$ and $\leq C 50/60$ according to DIN EN 206: 2014-07 [1], that can be classified in at least the fire-resistance class corresponding to that of the anchors. In addition, the notes contained in DIN EN 1992-1-2: 2010-12 [5] (see section 4.5) on the avoidance of concrete spalling also apply. According to this, the moisture content must be less than three (or four according to the National Annex) -% by weight.

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Leipzig, 9 January 2017


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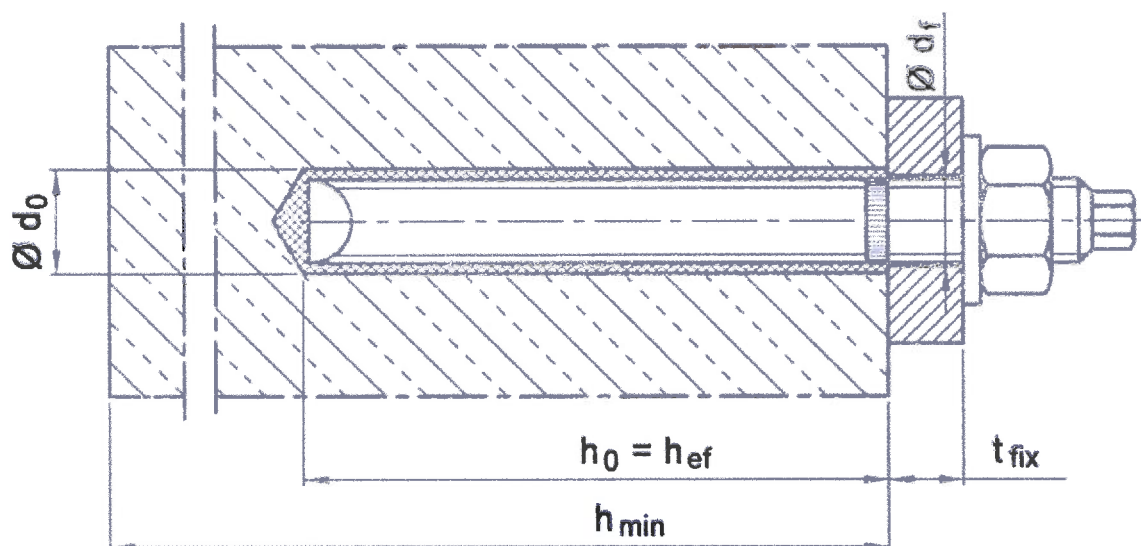
List of Enclosures

- Enclosure 1 Installation parameters of Chemical Capsule Anchor VD-Q
Enclosure 2 Graphical analysis of the test results according to TR 020: 2004-05 [4]

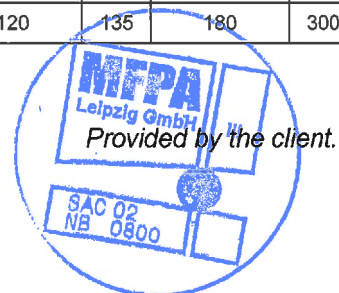
Sources

- [1] DIN EN 206: 2014-07 *Concrete - Specification, performance, production and conformity*
[2] European Technical Assessment ETA-14/0296 *Trade name: B+BTec Chemical Capsule Anchor VD-Q, Product family: Bonded capsule anchor for use in non cracked concrete: sizes M8, M10, M12, M14, M16, M20, M22, M24 and M30, CSTB: 04. August 2014, B+BTec*
[3] PB 3.2/16-259-1, MFPA Leipzig GmbH: 14. December 2016, B+BTec
[4] TR 020: 2004-05 *Evaluation of Anchorages in Concrete concerning Resistance to Fire*
[5] DIN EN 1992-1-2: 2010-12 *Eurocode 2: Design of concrete structures - Part 1-2: General rules - Structural fire design*

Enclosure 1 Installation parameters of Chemical Capsule Anchor VD-Q



Anchor size			M8	M10	M12	M12 /1,5t	M14	M16	M16 /1,5t	M20	M20 /1,5t	M22	M24	M24 /1,5t	M30
Nominal drill hole $\varnothing$	d_0	[mm]	10	12	14		16	18		22		244	26		32
Cutting diameter	$d_{cut} \leq$	[mm]	10,5	1,5	14,5		16,5	18,5		22,5		24,5	26,5		32,5
Depth of drill hole	h_0	[mm]	80	90	110	165	120	125	190	170	255	190	210	315	280
$\varnothing$ of clearance hole in the fixture	d_f	[mm]	9	12	14		16	18		22		24	26		33
Steel brush	D	[mm]	11	13	16		18	20		24		26	28		34
Torque moment	T_{inst}	[Nm]	10	20	40		60	80		120		135	180		300



Enclosure 2 Graphical analysis of the test results according to TR 020: 2004-05 [4]

Diagram A2.1 Graphical analysis of the bonded anchor size M8

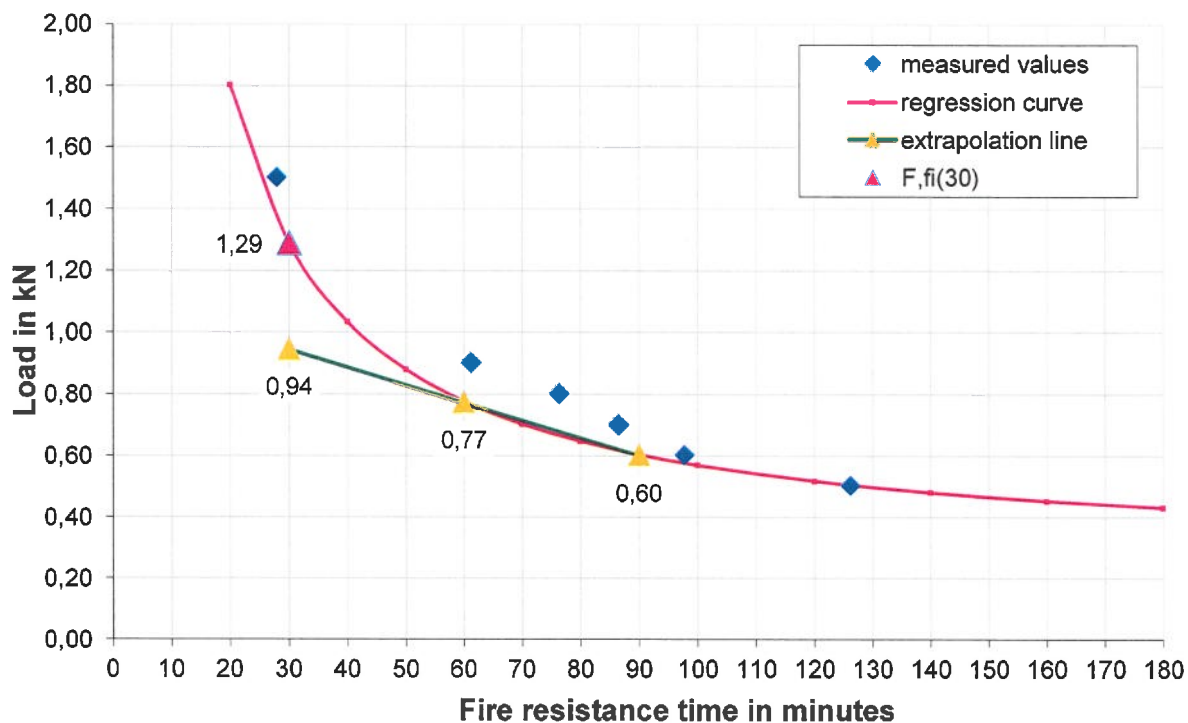


Diagram A2.2 Graphical analysis of the bonded anchor size M10

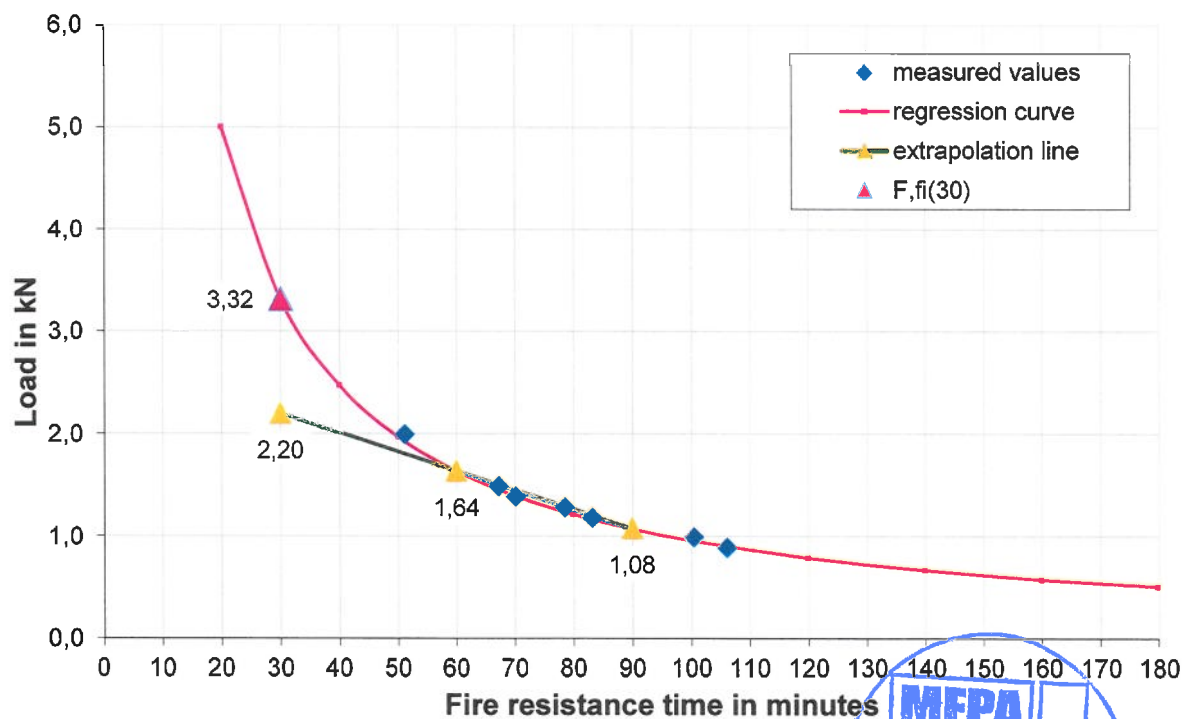


Diagram A2.3 Graphical analysis of the bonded anchor size M16

