



Mfpa Leipzig GmbH

Testing, Inspection and Certification Authority for
Construction Products and Construction Types

Leipzig Institute for Materials Research and Testing
Business Division III - Structural Fire Protection

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Work Group 3.2 - Fire Behaviour of Building Components and special
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Advisory Opinion No. GS 3.2/14-089-4Ä

23 July 2015

No. Copy 1

Short version of GS 3.2/14-089-3Ä from 23 June 2015 (German language)
Translation of the German document GS 3.2/14-089-4Ä

Subject matter: **MKT injection system VMZ**
Preliminary fire protection assessment of the Injection System VMZ under thermal exposure according to the temperature-time curve of ZTV-ING [additional technical terms of contract and guidelines for structural engineering]

Client: **MKT Metall-Kunststoff-Technik GmbH & Co. KG**
Auf dem Immel 2
D – 67685 Weilerbach, Germany

Date of order: 03 June 2014

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

This document consists of 3 pages of text.

This document contains a summary of the results of the advisory opinion GS 3.2/14-089-3Ä of 23 June 2015 by Mfpa Leipzig GmbH. This summary may only be used in combination with the main advisory opinion. When the main advisory opinion expires on 22 June 2020, the validity of this short version will end as well.

On 15 June 2015, an additional test was performed. The results of this test are included in the present short version of the advisory opinion.

This version replaces the advisory opinion GS 3.2/14-089-4 of 21 April 2015.

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1 Objective and request

On 03 June 2014, MKT Metall-Kunststoff-Technik GmbH & Co. KG commissioned MFPA Leipzig GmbH to provide an advisory opinion on the fire behaviour of the MKT injection system VMZ, i. e. the MKT injection mortar VMZ in combination with the MKT anchor rod VMZ-A and the MKT anchors with internal thread VMZ-IG, if positioned perpendicularly to the surface of plates and walls exposed to fire on one side. The results of the advisory opinion GS 3.2/14-089-3Ä dated 23 June 2015 are summarized again in this short report.

2 Fire protection assessment concept

In the following tables, the maximum tension resistances $N_{Rd,fire}$ as a function of the anchoring depths of anchor rods and anchors with internal threads are summarized.

The characteristic values of the concrete cone failure type can be calculated using the equation 2.7 according to TR 020 [1], because the through heating of the concrete exposed to fire according to ZTV-ING is comparable to an exposure to fire after the uniform-temperature-time-curve (ETK) for 120 minutes. It should be noted that the strength class of the underground has to be at least C20/25. In this case, the values of the concrete cone failure type are well above the values given in table 1 and/or table 2, so they are not decisive.

Table 1 Maximum tensile loading of the VMZ with VMZ-A anchor rods made of HCR steel with fire load according to ZTV-ING

Anchor size	Drill Ø [mm]	Anchor rod Ø [mm]	h_{ef} [mm]	Length of the cone area [mm]	Number of cones [/]	Maximum tensile loading [kN]
40 M8	10	8	40	16.3	2	0.00
50 M8			50	22.9	3	0.00
60 M10	12	9.7	60	28.8	3	0.53
75 M10			75			1.08
75 M12	12	10.7	75	29.7	3	1.47
70 M12	14	12.5	70	31.3	3	1.47
80 M12			80	39.6	4	2.39
95 M12			95			2.50
100 M12			100	55.1	6	2.50
100 M12 dyn			100	58.4		2.50
110 M12	110	55.1	2.50			
125 M12	125	12.5	125	55.1	6	2.50
90 M16	18	16.5	90	35.7	3	3.65
105 M16			105	46.8	4	4.10
125 M16			125	65.6	6	4.10
125 M16 dyn			125	69.4		4.10
145 M16			145	65.6		4.10
160 M16	160	74.9	6	4.10		
115 M20	22	19.7	115	42.4	3	6.32
170 M20	24	21.9	170	80.6	6	6.40
190 M20			190			6.40
170 M24	26	23.9	170	89.3	6	9.22
200 M24			200			9.22
225 M24			225			9.22

grey background = steel failure decisive



Table 2 Maximum tensile loading of the VMZ with VMZ-IG anchors with internal threads made of HCR steel with fire load according to ZTV-ING

Thread	Inner bore diameter [mm]	Anchoring depth [mm]	Maximum tensile loading [kN]
M8	12	60	0.50
		75	0.50
M10	14	70	1.08
		80	1.08
M12	18	90	2.50
		105	2.50
		125	2.50
M16	22	115	4.10
	24	170	4.10
M20	26	170	6.40

grey background = steel failure decisive

3 Special notes

The assessment above applies to the MKT injection system VMZ in concrete when installed in accordance with the installation regulations of ETA-04/0092.

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 $\geq 2 h_{ef}$.

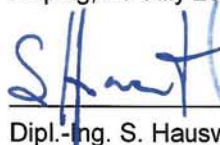
It is possible using existing testing experience to transfer the permissible loads determined for the MKT injection system VMZ with MKT anchor rods to the MKT injection system VMZ with MKT anchors with internal threads that have at least equal geometric dimensions.

Based on this fact, the indicated permissible loads for the MKT injection system VMZ with the MKT anchor rod VMZ-A and the anchor with internal thread VMZ-IG could be determined. The loads also apply to lateral tension and/or diagonal tension.

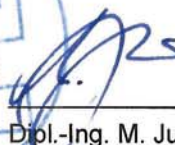
The assessment only applies in combination with reinforced concrete ceilings of strength class $\geq C20/25$ and $\leq C50/60$ according to EN 206-1: 2000-12 with a fire resistance rating that at least corresponds to the fire resistance rating of the anchors and if it is ensured that there is no risk of explosive spalling of the concrete. The information in DIN EN 1992-1-2 (see section 4.5) on spalling prevention must be adhered to.

The results of the tests exclusively refer to the described test objects but not to the main unit. This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 23 July 2015



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