

## Evaluation Report for the assessment of

Trade name of the construction product

Injection System VMU plus for masonry

Product family  
to which the construction product belongs

Injection system for use in masonry

Author of the Evaluation Report

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## 1. General information

MKT GmbH & Co. KG authorized the evaluation of the fire resistance of the chemical anchor system VMU plus for axial tension and shear loads. The evaluation concerning steel strength and pullout resistance carried out in dependence on section 2.3 of Technical Report 020 [1]. The evaluation is based on tests that were conducted by the Technical University Kaiserslautern under fire exposure according to DIN EN 1363-1:2012 [2]. The test results are summarized in test report 16030CT/15511 [3]

This evaluation provides fire resistances which covers anchors with fire attack from one side only.

## 2. Reference documents

- [1] Evaluation of Anchorages in Concrete Concerning Resistance to fire, EOTA TR 020, Edition May 2004
- [2] Feuerwiderstandsprüfungen – Teil 1: Allgemeine Anforderungen, DIN EN 1363-1; Edition Oktober 2012
- [3] Report on fire tests according TR020 with MKT VMU plus adhesive in masonry, Test Report 16030CT/15511, January 2017

## 3. Product description

The MKT VMU plus is a bonded anchor system consisting of a plastic cartridge containing the injection mortar and a steel part. For usage in hollow bricks also a perforated sleeve is part of the system.

The injection system VMU plus is designed for the use masonry according to the European Technical Approval ETA-13/0909.

## 4. Scope of evaluation

The present evaluation of fire resistance for VMU plus anchor systems in masonry is assessed with respect to its fire resistance properties as anchor applications in walls. The tests which this evaluation refers to, are executed with horizontal arranged anchors and axial load application. Furthermore the anchors were exposed to the standard temperature-time curve (ETK) [2]. In the tests a fixture according to TR020 was used, therefore the following fire resistances cover only anchors protected from fire by attachments similar to the fixture according to TR020 [1].

The assessment is carried out in dependence on TR020 [1]. Divergent test results of all types of failure (steel failure, pullout failure) are assessed together.

- a. Steel failure:  
No additional tests for the assessment of steel failure are necessary because the resulting fire resistances are smaller and values with steel failure are assessed together. Threaded rods with a minimum steel grade of 5.8 shall be used. The evaluation covers threaded rods made of stainless steel as well.
- b. Pullout failure:  
Most results delivers pullout failure in the fire tests.
- c. Brick failure:  
No absolute brick breakout failure could be observed.

In hollow bricks the worse position in brick was tested, so that the fire resistances which are given in the following covers all positions in a hollow brick.

The fire resistances which are given in chapter 5 covers axial loads and shear loads as well.

## 5. Summary

Table 5-1 shows the fire resistances for the use of anchor system VMU plus in the proved undergrounds. The given fire resistances covers axial and radial loads.

Table 5-1: Summary of the characteristic resistance against pullout or steel failure

Characteristic resistance against pullout/steel failure							
Brick type	anchors size	anchorage depth	perforated sleeve	R30	R60	R90	R120
[-]	[mm]	[mm]	[mm x mm]	[kN]	[kN]	[kN]	[kN]
clay full brick	8	80	-	0,75	0,65	0,55	0,50
	10	90		1,25	1,05	0,85	0,75
	12	100		1,80	1,50	1,20	1,00
	16	100		3,80	2,65	1,50	0,95
aerated concrete	8	80	-	1,20 (1,35) <sup>1)</sup>	0,85	0,35	0,10
	10	90		1,70	1,15	0,65	0,35
	12	100		2,05	1,45	0,90	0,60
	16	100		1,70	1,20	0,70	0,45
clay solid brick (HLZ)	8	130	SH 16 x 130	0,21	0,13	0,05	0
	10	130	SH 16 x 130	0,21	0,13	0,05	0
	12	130	SH 20 x 130	0,21	0,13	0,05	0
sand lime (KSL)	8	130	SH 16 x 130	0,21	0,13	0,05	0
	10	130	SH 16 x 130	0,21	0,13	0,05	0
	12	130	SH 20 x 130	0,21	0,13	0,05	0

<sup>1)</sup> applies for stainless steel A4

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