



# Mfpa Leipzig GmbH

Testing, inspection and certification body for  
building materials, building products and building systems

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## Advisory opinion no. GS 3.2/17-410-3

21<sup>st</sup> March 2018

1st copy

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Subject matter: RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem  
Summarising evaluation of the test results for the bonded anchor.

Client: ITW Australia (Ramset)  
1 Ramset Drive  
Chirnside Park  
VIC 3116  
Australia

Date of order: 10<sup>th</sup> January 2018

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

Validity: 6<sup>th</sup> March 2023

This document consists of 3 text pages and 2 enclosures.

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## 1 Objective and request

On 10<sup>th</sup> January 2018, MFPA Leipzig GmbH was commissioned by SPIT with the assessment of the resistance to fire of the bonded anchor RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem with fire exposure from one side and anchored to a reinforced concrete base in order to determine the characteristic parameters for a load under tensile stress.

## 2 Description of the tested structure

The Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem is a bonded anchor consisting of a cartridge with injection mortar RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem and a steel element. The steel element consist of a threaded rod CHEMSET ANCHOR STUD with washer and a hexagon nut or a CHEMSET ANCHOR STUD XTREM stud or a reinforcing bar. 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 and can be used in cracked and uncracked reinforced concrete. The bonded anchor may be anchored under static and quasi-static load in reinforced and unreinforced normal concrete with a stability class between C 20/25 and C 50/60 in accordance with DIN EN 206:2014-07 [1]. No further description of the product will be provided here and reference is made to the European Technical Assessment ETA-18/0045 [2] dated 22. February 2018.

Threaded rods with washer and hexagon nut made of galvanized steel (property class  $\geq 8.8$ ) in sizes M8 and M12 each with one anchorage depth were tested. The test set-up and the results are shown in test report PB 3.2/17-410-1 [3].

## 3 Test analysis and evaluation

The test evaluation for steel failure was conducted in accordance with TR 020:2004-05 [4]. A graphical analysis of the test results can be found in enclosure 2. In order to determine the characteristic tensile stresses, the values were evaluated on the basis of the test results.

For size M12, one result is odd. For the test result which is marked in orange in enclosure 2, diagram 2.2, the failure occurred so early due to slipping of the hexagonal nut that it is to be traced back to the very low or non-existent protrusion of the threaded rod (compared to the other test specimens) when the nut was tightened. This result is therefore not included in the evaluation.

The following characteristic parameters for the load under central tension can be quoted for the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem on this basis (table 1). The characteristic steel stress at normal temperature also has to be taken into account for the assessment; the smaller stress value is decisive in each case.

The determination of the characteristic parameters for other failure types (e.g. "pulling out", or "concrete break-out" was not the subject of the tests; they can be determined according to the simplified verification procedure described in TR 020:2004-05 [4], or experimentally according to the method described in TR 048:2016-08 [5].

Table 1 Characteristic tension resistance for the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem with threaded rod made of galvanized steel (property class  $\geq 8.8$ )

Size of threaded rod			M8	M10	M12	M16	M20	M24	M30
Minimal embedment depth			10d	10d	10d	10d	10d	10d	10d
30 min	$N_{Rk,s,fi(30)}$	[kN]	1.60	2.33	3.10	5.77	9.01	12.98	20.62
60 min	$N_{Rk,s,fi(60)}$	[kN]	1.06	1.68	2.44	4.54	7.09	10.21	16.23
90 min	$N_{Rk,s,fi(90)}$	[kN]	0.53	1.04	1.79	3.33	5.20	7.49	11.91
120 min	$N_{Rk,s,fi(120)}$	[kN]	0.26	0.71	1.46	2.72	4.24	6.11	9.71

#### 4 Special notes

The evaluation above only applies to the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem which is installed in compliance with the installation regulations of ITW and the European Technical Assessment ETA-18/0045 [2] dated 22. February 2018.

The evaluation still only applies in uncracked and cracked reinforced concrete.

The results of the tests for threaded rods made of galvanized steel may also be transferred to threaded rods made of stainless steel A4 and high corrosion resistant steel (HCR).

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

Based on this, the specified loads also apply to lateral tension and/or diagonal tension.

The assessment only applies in conjunction with reinforced concrete ceilings of strength class  $\geq C 20/25$  and  $\leq C 50/60$  acc. to DIN EN 206:2014-07 [1] that have at least the same fire resistance rating as the fire-resistance period of the anchors. In addition, the notes contained in DIN EN 1992-1-2:2010-12 [6] (see section 4.5) on the avoidance of concrete spalling apply. This means that the moisture content must be less than three % by weight (or four according to the National Annex).

This document does not replace any certificate of conformity or usability as defined by the building regulations (national/European).

Leipzig, 21<sup>st</sup> March 2018

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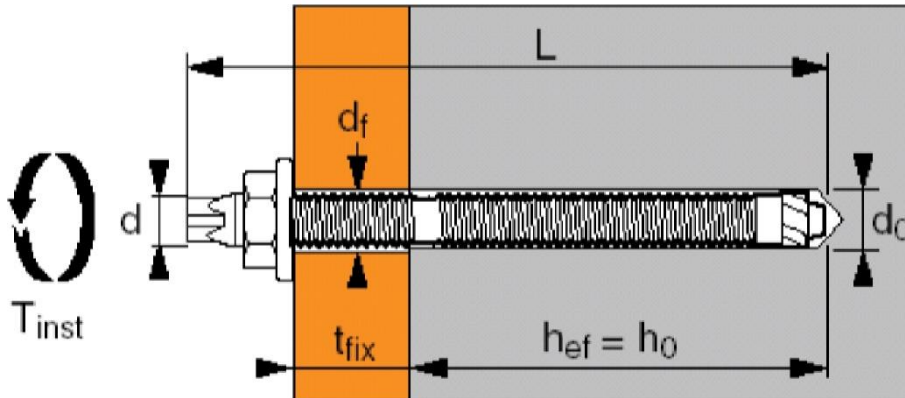
#### List of enclosures

- Annex 1 Installation parameters of the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem in conjunction with threaded rod
- Annex 2 Graphical evaluation of the test results according to TR 020: 2004-05 [4]

#### Corresponding documents

- [1] DIN EN 206:2014-07 *Concrete - Specification, performance, production and conformity*
- [2] European Technical Assessment ETA-18/0045 dated 22. February 2018 and issued by DIBt, *Trade name: RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem, Product family: Bonded anchor for use in concrete*
- [3] Test report PB 3.2/17-410-1 *SPIT VIPER XTREM - Testing according to Technical Report TR 020 "Evaluation of Anchorages in Concrete concerning Resistance to Fire" (May 2004) to determine the characteristic steel stresses under tensile stress, MFPA Leipzig GmbH of 07/03/2018)*
- [4] TR 020:2004-05 *Evaluation of Anchorages in Concrete concerning Resistance to Fire*
- [5] TR 048:2016-08 *Details of tests for post-installed fasteners in concrete*
- [6] DIN EN 1992-1-2:2010-12 *Design of concrete structures - Part 1-2: General rules - Structural fire design*

Annex 1 Installation parameters of the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem in conjunction with threaded rod



Picture A1.1 Figure in installation condition

Table A1.2 Material parameters for threaded rods

Nominal thread size	Nominal diameter of the drill bit	Clearance hole in the fixture	Tightening torque	Effective embedment depth and drill hole depth $h_{ef} = h_0$			minimum thickness of the concrete member $h_{min}$		
	$d_0$	$d_f$	$T_{inst}$	Std <sup>1)</sup>	Min	Max <sup>2)</sup>	Std <sup>1)</sup>	min	max
	[mm]	[mm]	[Nm]	[mm]	[mm]	[mm]	[mm]	[mm]	[mm]
M8	10	9	10	80	56	160	110	$h_{ef} + 30 \text{ mm}$ $\geq 100 \text{ mm}$	
M10	12	12	20	90	70	200	120		
M12	14	14	30	110	84	240	140		
M16	18	18	60	125	112	320	160	$h_{ef} + 2d_0$	
M20	25	22	120	170	140	400	220		
M24	28	26	200	210	168	480	265		
M30	35	33	400	280	210	360	350		

<sup>1)</sup> Effective embedment depth for anchor rods SPIT MAXIMA.

<sup>2)</sup> The maximum embedment depth is limited to 12 d for installation in flooded holes

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

Diagram A2.1 Graphical evaluation of the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem in size 8 with threaded rod made of galvanized steel ( $\geq 8.8$ )

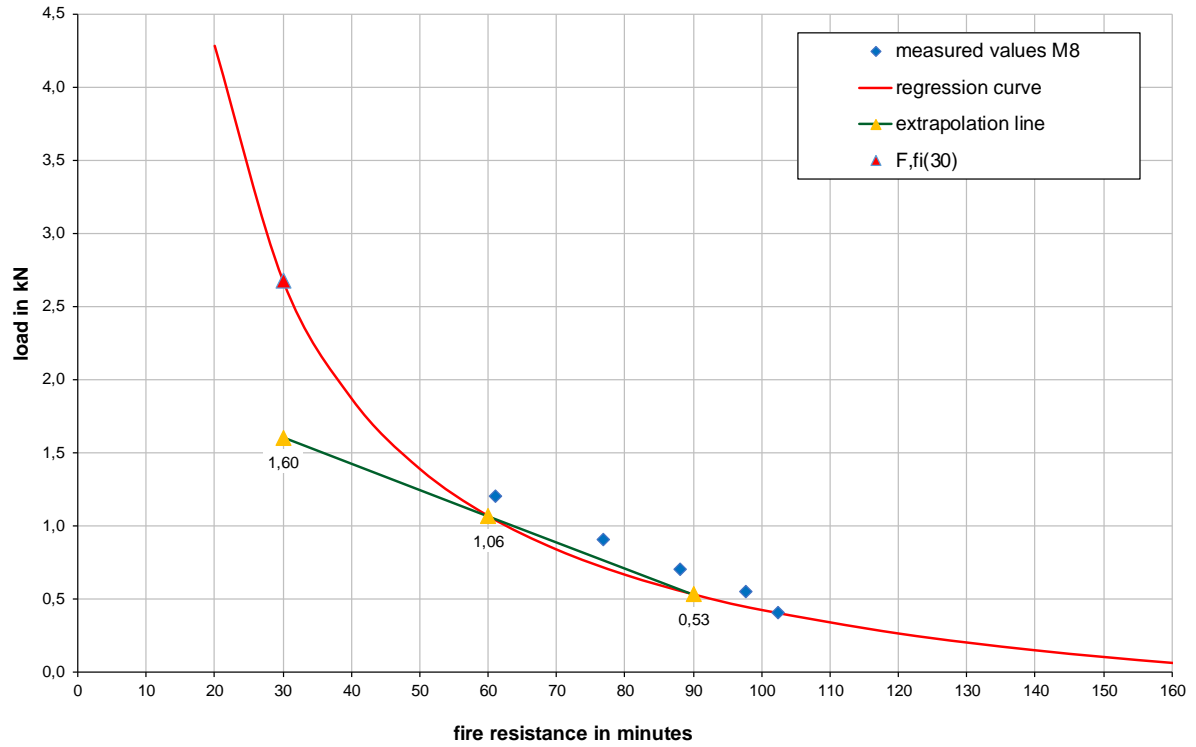


Diagram A2.2 Graphical evaluation of the Injection system RAMSET Chemset 801 Xtrem / RAMSET Chemset 800 Xtrem in size 12 with threaded rod made of galvanized steel ( $\geq 8.8$ )

