**Project Number:** 170019_32en  

**Purpose:** Assessment of resistance under fire exposure of the B+B Tec Injection system BIS-PE 3:1  

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Table of contents

1. General 3
2. References 3
3. Product Description 3
4. Evaluation Scope 3
5. Fire Resistances 4
1. General

The Technische Universität Kaiserslautern had been authorized by B+BTec to evaluate the fire resistance of the B+BTec Injection system BIS-PE 3:1. This report is based on the test reports of MPA Braunschweig [3]. The fire tests and their evaluation were executed according to DIN EN 1363-1:2012 [2] and [1].

The fire resistances (listed in Table. 1) are based on the results of a fire exposure on a one side non-cracked concrete slab. The evaluation in this report is based on TR 020 [1].

2. References

[3] Test Report (3290/0966)-NB dd. 06/03/2008 ; iBMB Braunschweig; deposited at the TU Kaiserslautern

3. Product Description

The Product is described in [4].

4. Evaluation Scope

The fire resistance evaluation of B+BTec Injection system BIS-PE 3:1 is based on the executed fire tests. The anchors were installed upside down to simulate the real situation of a ceiling and put under the uniform temperature curve fire test (UTC) according to [2]. In all tests, a fixture was used based on TR020 [1], therefore the following fire resistance evaluation applies only for anchors which are protected (in a comparable manner to the used fixture in the fire test) against the temperature increase during a fire case.

The fire tests were executed on a non-cracked concrete slab.

The evaluation was executed depending on TR020 [1].

Nut failures, rips in the anchor rod and pull-out failures occurred in the tests.
5. Fire Resistances

The following tables show the decisive fire resistances $N_{Rk,fi}$ of a fire exposure on a one side non-cracked concrete with tensile loading (minimum strength class C20/25). The given fire resistances $N_{Rk,fi}$ apply for a single anchor under tensile load with an edge distance greater than $c_{cr}=2\ h_{ef}$ and a spacing of at least $s = 2\ c_{cr} = 4\ h_{ef}$, between the neighbouring anchor. By keeping the mentioned edge distances and spacing, a concrete cone failure is not relevant. The given values apply for anchor rods with a strength class of at least 5.8 (EN 1993-1-8:2005+AC:2009). The same fire resistances can be assumed for threaded rods of stainless steel and high corrosion resistant steel with a strength class of 70 (EN ISO 3506-1:2009).

If the edge distance $c$ is chosen in a way, that steel failure / pull-out is determined in the fire design, the following load values can be also applied on anchors under shear load.

Table 1: Fire resistance $N_{Rk,fi}$ of B+B Tec Injection system BIS-PE 3:1 in non-cracked concrete slab

<table>
<thead>
<tr>
<th>Fire resistance $N_{Rk,fi}$ in [kN]</th>
<th>Anchors Sizes</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
<th>M16</th>
<th>M20</th>
<th>M24</th>
<th>M27</th>
<th>M30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum embedment depth $h_{ef,\min}$ [mm]</td>
<td>≥ 80</td>
<td>≥ 90</td>
<td>≥ 110</td>
<td>≥ 125</td>
<td>≥ 170</td>
<td>≥ 210</td>
<td>≥ 250</td>
<td>≥ 280</td>
<td></td>
</tr>
<tr>
<td>Fire resistance duration $t_c$ [min]</td>
<td>30</td>
<td>0,5</td>
<td>1,5</td>
<td>3,2</td>
<td>8,0</td>
<td>15,6</td>
<td>22,5</td>
<td>29,2</td>
<td>35,7</td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>0,4</td>
<td>1,1</td>
<td>2,3</td>
<td>5,9</td>
<td>11,7</td>
<td>16,9</td>
<td>21,9</td>
<td>26,8</td>
</tr>
<tr>
<td></td>
<td>90</td>
<td>0,2</td>
<td>0,6</td>
<td>1,4</td>
<td>3,8</td>
<td>7,8</td>
<td>11,3</td>
<td>14,7</td>
<td>17,9</td>
</tr>
<tr>
<td></td>
<td>120</td>
<td>0,1</td>
<td>0,4</td>
<td>0,9</td>
<td>2,7</td>
<td>5,9</td>
<td>8,5</td>
<td>11,0</td>
<td>13,5</td>
</tr>
</tbody>
</table>