

Statement on fire safety

– Translation –

Document number: MPABS-2500264 – CM dated 05/03/2025

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

Order date: 04/02/2025

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Subject: Assessment with regard to fire safety of loaded BZ3 A4 /
HCR wedge anchors installed in solid structural elements
(reinforced concrete) under one-side exposure to fire along
the tunnel-furnace curve in accordance with ZTV-ING
Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)

Basis for assessment: See Section 1

This statement on fire safety consists of 6 pages including cover sheet, and 3 annexes.

This statement on fire safety replaces Letter No. (2102/792/20) – CM dated 12/11/2020.

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1 General

With letter of 04/02/2025, MKT Metall-Kunststoff-Technik GmbH & Co. KG placed an order for the preparation of a fire-safety-related statement for BZ3 A4 / HCR wedge anchors in conjunction with solid structural elements (reinforced concrete) under one-side exposure to fire.

The statement on fire safety for the constructions to be assessed is made on the basis of the following documents:

- [1] DIN 4102-2 : 1977-09, Fire Behaviour of Building Materials and Building Components; Building Components; Definitions, Requirements and Tests;
- [2] ZTV-ING Part 7, issue 2023/12,
- [3] Test Report No. 2102/400/19 dated 13/10/2020, issued by MPA Braunschweig;
- [4] Technical data sheets for BZ3 wedge anchors (e.g., ETA-19/0619 dated 12/06/2024 and mounting instructions), from MKT Metall-Kunststoff-Technik GmbH & Co. KG

The assessment for BZ3 A4 / HCR wedge anchors was conducted on the basis of the fire tests carried out when installed in solid structural elements (reinforced concrete undergrounds) in accordance with ZTV-ING Part 7. According to MKT Metall-Kunststoff-Technik GmbH & Co. KG, there is currently no building authority certificate for BZ3 A4 / HCR wedge anchors combined with reinforced concrete that lays down the regulations to be met by the construction described here in the event of fire in accordance with ZTV-ING Part 7.

2 Description of the construction

BZ3 A4 / HCR wedge anchors are made of stainless or highly corrosion-resistant steel. They are installed in a borehole and anchored by force-controlled expansion. The loads are applied via the anchor into the anchoring base.

For the standard purpose of use, the related technical specifications for BZ3 A4 / HCR wedge anchors can be taken from the technical data sheets [4].

The fire-safety-related assessment is limited to mainly static loads combined with reinforced-concrete structural elements, which must have also been proven for a fire load along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Fig. 7.1.4).

The table below and the annexes summarize the design details (manufacturer data [4]) for BZ3 A4 / HCR wedge anchors. For further information on the wedge anchors, reference is made to the technical data sheets [4] from MKT Metall-Kunststoff-Technik GmbH & Co. KG.

Table 1: Wedge anchor BZ3 A4 / HCR

Wedge anchor BZ3 A4 / HCR	Dimension	Minimum embedment depth $h_{ef \min}$ [mm]	Material
Wedge anchor BZ3 A4 with nut and washer	M8	35	Stainless steel (material number 1.4401)
	M10	40	
	M12	50	
	M16	65	
	M20	90	Stainless steel (material number 1.4578)
Wedge anchor BZ3 HCR with nut and washer	M8	35	High corrosion-resistant steel (material number 1.4529)
	M10	40	
	M12	50	
	M16	65	
	M20	90	

For a more detailed description of the construction, reference is made to the annexes and the technical data sheets [4] for BZ3 A4 / HCR wedge anchors.

3 Assessment of the wedge anchors combined with solid structural elements

The subject matter of this fire-safety-related assessment is the load-bearing behaviour of BZ3 A4 / HCR wedge anchors combined with reinforced-concrete undergrounds (strength class $\geq C20/25$ $\leq C50/60$) under exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4).

If, for normal purposes of use according to [4], smaller loads apply, these shall be binding. Regardless of the fire-safety-related assessment, the suitability of the anchors for the underground and type of application must also be proved for the cold as-installed condition.

With regard to the load-bearing capacity under exposure to fire, steel failure and underground failure can be distinguished.

For the anchors assessed here, the failure of the BZ3 A4 / HCR wedge anchors (steel failure) was relevant. This means that with regard to fire safety, it can be assumed with reasonable certainty that a failure of the underground examined here will not be relevant in the event of fire.

The spacing that is relevant for the BZ3 A4 / HCR wedge anchors under one-side exposure to fire must be the distance ($a \geq 5h_{ef \text{ min}}$ acc. to Table 1; however, min. 250 mm) where a failure of the underground can be excluded and where a steel failure of the fasteners will thus be relevant. In addition, the spacing required for the cold as-installed condition (see also [4]) must be adhered to in any case. Further parameters, like geometry, moisture, shell spalling, eccentricity, position within the structural element, and other influencing variables, will have to be considered separately, if required.

The load-bearing capacity (steel failure) of the systems described above under exposure to fire was determined on the basis of the fire tests performed with solid structural elements (reinforced concrete).

$F_{ZTV\text{-fire}}$ $\Rightarrow$ Maximum load under one-side exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)

The load applied onto the anchors can be applied as centric tensile load (N), shear load (V), or as a combination of both (oblique tensile load).

The design proposals for BZ3 A4 / HCR wedge anchors under tensile load and one-side exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4) can be taken from Annexes 2 and 3.

4 Special notes

- 4.1 This Statement on Fire Safety is not subject to notification and is no substitute for a classification report.
- 4.2 This Statement on Fire Safety is no proof of usability for use in a building control procedure. The statement on fire safety can be used, for example, for general preliminary planning or to support in the assessment of the principles of execution / the construction. The manufacturer/erector of the construction is obliged to furnish the respective proof
- 4.3 When applying for a project-related construction technique permit (vBG), the preparation of a project-related expert opinion will be required, taking the individually prevailing boundary conditions for planning into account.
- 4.4 This Statement on Fire Safety applies only in conjunction with the documents and basics listed

in Section 2; it cannot be transferred to other constructions without further verification.

- 4.5 This Statement on Fire Safety applies only in terms of fire protection. Further requirements may result from the technical building regulations applicable for the assessed construction and the individual state building code and regulations for special constructions, e.g., with regard to building physics, statics, electrical engineering, ventilation engineering, and similar.
- 4.6 The above assessment applies only for the wedge anchors under consideration of the boundary conditions according to the technical data sheets [4] from MKT Metall-Kunststoff-Technik GmbH & Co. KG.
- 4.7 The above assessment applies for BZ3 A4 / HCR wedge anchors fastened in reinforced concrete elements under one-side exposure to fire along the “Tunnel-Brandraumkurve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4). The underground must have the corresponding fire resistance under exposure to fire in accordance with ZTV-ING Part 7, Issue 2023/12.
- 4.8 Modifications of and supplements to design details (derived from this Statement on Fire Safety) shall only be possible after consultation with MPA Braunschweig.
- 4.9 The executing companies shall be exclusively responsible for the proper execution.
- 4.10 The design details as shown in the annexes shall be binding for the above assessment. Only the details relevant for the statement on fire safety have been verified.
- 4.11 The validity of Statement on Fire Safety No. MPABS-2500264 – CM dated 05/03/2025 ends on 05/03/2030 at the latest. The validity can be extended as a function of the state of the art.

This document is the translated version of Brandschutztechnische Aussagen Nr. MPABS-2500264 – CM dated 05/03/2025. The legally binding text is the aforementioned German Brandschutztechnische Aussage.

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Technical data of the wedge anchor¹⁾



Table 2: Material data¹⁾

Model		Material
BZ3 A4 with hexagon nut and washer	M8 M10 M12 M16	Stainless steel (material number 1.4401), fracture elongation $A_5 \geq 8\%$
	M20	Stainless steel (material number 1.4578), fracture elongation $A_5 \geq 8\%$
BZ3 HCR with hexagon nut and washer		M8 M10 M12 M16 M20 High corrosion resistant steel (material number 1.4529), fracture elongation $A_5 \geq 8\%$

Table 3: installation parameters of the wedge anchor¹⁾

Wedge anchor			Reinforced concrete (strength class $\geq C20/25 \leq C50/60$) ²⁾				
Size			M8 A4	M10 A4	M12 A4	M16 A4	M20 A4
			M8 HCR	M10 HCR	M12 HCR	M16 HCR	M20 HCR
Bore diameter	d_0	[mm]	8	10	12	16	20
Borehole depth	$h_1 \geq$	[mm]	45	51	63	82	107
Effective anchoring depth	$h_{\text{hef}} \geq$	[mm]	35	40	50	65	90
Installation torque	T_{inst}	[Nm]	15	40	55	100	200

¹⁾ Manufacturer data

²⁾ The anchors must be fastened in a loadbearing underground. When installing the wedge anchors, attention shall be paid that the boundary conditions according to [4] and Table 3 are complied with.

Design proposal for BZ3 A4 wedge anchors under one-side exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)

Table 4: Maximum load under exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4) for BZ3 A4 wedge anchors in reinforced-concrete undergrounds (strength class $\geq C20/25 \leq C50/60$)

Designation	Maximum load under exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)
Wedge anchor BZ3 A4	$F_{ZTV-fire}^{1)2)}$ [kN]
M8 A4	0.40
M10 A4	0.55
M12 A4	0.90
M16 A4	3.40
M20 A4	5.15

- 1) If, for normal purposes of use according to [4], lower loads apply, these shall be binding. Regardless of the fire-safety-related assessment, the suitability of the anchors for the underground and type of application must also be proved for the cold as-installed condition.
- 2) The load applied onto the anchors can be applied as centric tensile load (N), shear load (V), or as a combination of both (oblique tensile load).

Design proposal for BZ3 HCR wedge anchors under one-side exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)

Table 5: Maximum load under exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4) for BZ3 HCR wedge anchors in reinforced-concrete undergrounds (strength class $\geq C20/25 \leq C50/60$)

Designation	Maximum load under exposure to fire along the tunnel-furnace curve in accordance with ZTV-ING Part 7, Section 10.1 (Paragraph 1, Figure 7.1.4)
Wedge anchor BZ3 HCR	$F_{ZTV-fire}^{1)2)}$ [kN]
M8 HCR	0.60
M10 HCR	0.85
M12 HCR	1.35
M16 HCR	5.50
M20 HCR	8.40

- 1) If, for normal purposes of use according to [4], lower loads apply, these shall be binding. Regardless of the fire-safety-related assessment, the suitability of the anchors for the underground and type of application must also be proved for the cold as-installed condition.
- 2) The load applied onto the anchors can be applied as centric tensile load (N), shear load (V), or as a combination of both (oblique tensile load).