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to Article 29 of the Regulation (EU)  
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Parliament and of the Council of 9  
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MEMBER OF EOTA



## European Technical Assessment ETA-20/0295 of 2020/12/08

### I General Part

**Technical Assessment Body issuing the ETA and designated according to Article 29 of the Regulation (EU) No 305/2011: ETA-Danmark A/S**

**Trade name of the construction product:**

Mungo m1 powerGrip (m1, m1-C, m1r and m1r-C)

**Product family to which the above construction product belongs:**

Torque controlled expansion anchor for use in cracked and non-cracked concrete under static, quasi-static or seismic action (performance category C1)

**Manufacturer:**

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**Manufacturing plant:**

Mungo Befestigungstechnik AG  
Bornfeldstrasse 2  
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**This European Technical Assessment contains:**

12 pages including 7 annexes which form an integral part of the document

**This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of:**

EAD 330232-00-0601; Mechanical fasteners for use in concrete

**This version replaces:**

The ETA with the same number issued on 2020-05-27

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## **II SPECIFIC PART OF THE EUROPEAN TECHNICAL ASSESSMENT**

### **1 Technical description of product**

#### **Technical description of the product**

Mungo m1 powerGrip is a torque controlled expansion anchor made of galvanized steel (m1) or stainless steel (m1r). The anchor is installed in a drilled hole and anchored by torque-controlled expansion.

An illustration of the product is given in Annex A.

The characteristic material values, dimensions and tolerances of the anchors not indicated in Annexes shall correspond to the respective values laid down in the technical documentation of this European Technical Assessment.

The anchors are intended to be used with embedment depth given in Annex B, Table B1. The intended use specifications of the product are detailed in the Annex B1.

### **2 Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)**

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annex B.

The provisions made in this European Technical Assessment are based on an assumed intended working life of the anchor of 50 years.

The indications given on the working life cannot be interpreted as a guarantee given by the producer or Assessment Body, but are to be regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works.

### **3 Performance of the product and references to the methods used for its assessment**

#### **3.1 Characteristics of product**

##### **Mechanical resistance and stability (BWR 1):**

The essential characteristics are detailed in Annex C1 and C2.

##### **Safety in case of fire (BWR 2):**

The essential characteristics are detailed in Annex C3.

##### **Safety in use (BWR4):**

For basic requirement Safety in use the same criteria are valid for Basic Requirement Mechanical resistance and stability (BWR1).

##### **Sustainable use of natural resources (BWR7)**

No performance determined

Other Basic Requirements are not relevant.

#### **3.2 Methods of assessment**

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Works Requirements 1 and 4 has been made in accordance with EAD 330232-00-0601; Mechanical fasteners for use in concrete and EOTA Technical Report 049 Post-installed fasteners in concrete under seismic action .

## **4 Assessment and verification of constancy of performance (AVCP)**

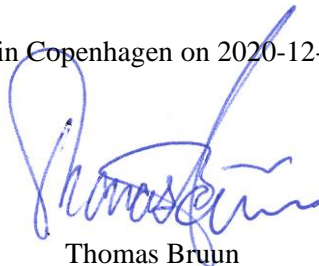
### **4.1 AVCP system**

According to the decision 1996/582/EC of the European Commission, the system(s) of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) is 1.

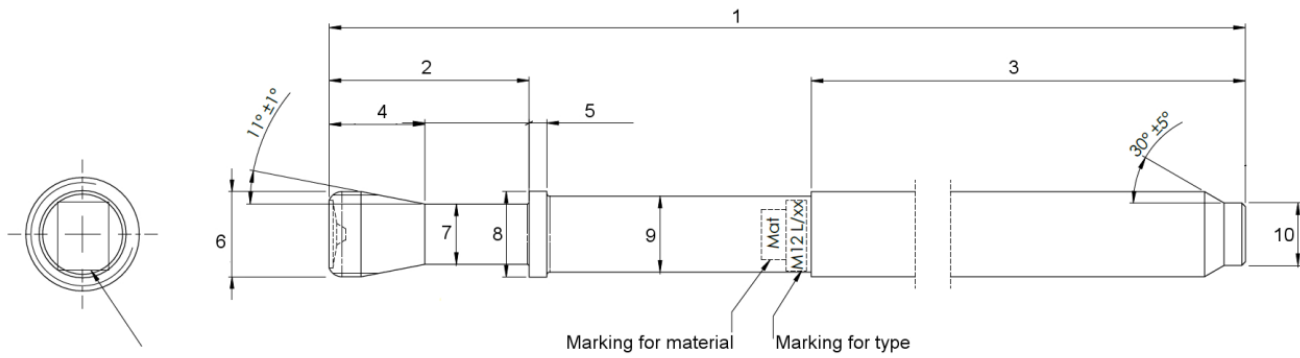
## **5 Technical details necessary for the implementation of the AVCP system, as foreseen in the applicable EAD**

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at ETA-Danmark prior to CE marking

Issued in Copenhagen on 2020-12-08 by



Thomas Bruun  
Managing Director, ETA-Danmark

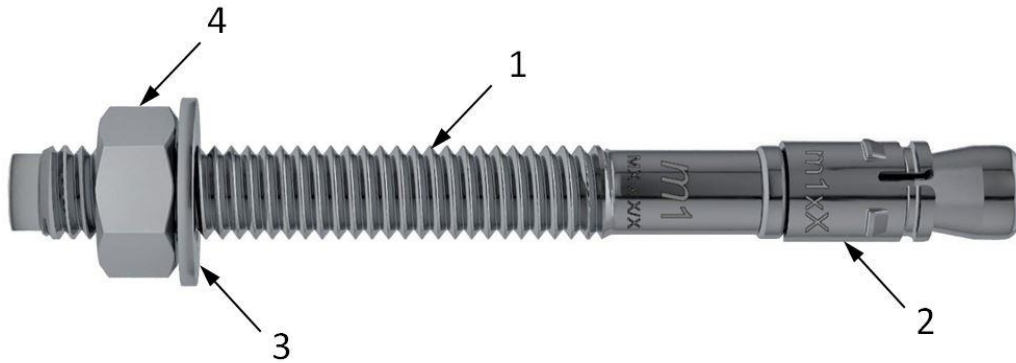
**Figure A1 Mungo m1 powerGrip anchor dimensions and marking****Table A1. Dimensions of the anchor**

Pos.	[mm]									
	1	2	3	4	5	6	7	8	9	10
M8	$L \pm 2$	$20.5 \pm 0.8$	$L1 +1/-0$	9.5	$2.5 \pm 0.2$	$8.1 \pm 0.3$	$5.6 \pm 0.3$	$8.1 +0/-0.2$	$7.05 \pm 0.10$	$6.0 \pm 0.2$
M10	$L \pm 2$	$25.4 \pm 0.8$	$L1 +1/-0$	11.8	$2.5 \pm 0.2$	$10.05 \pm 0.3$	$7.2 \pm 0.3$	$10.1 +0/-0.3$	$8.9 \pm 0.10$	$8.0 \pm 0.2$
M12	$L \pm 2$	$28.2 \pm 0.8$	$L1 +1/-0$	13.5	$2.5 \pm 0.2$	$12.0 +0/-0.2$	$8.5 \pm 0.1$	$12.1 +0/-0.3$	$10.7 \pm 0.15$	$8.8 \pm 0.2$
M16	$L \pm 2$	$35.7 \pm 0.8$	$L1 +1/-0$	18.5	$4.4 \pm 0.2$	$15.9 +0/-0.2$	$11.2 \pm 0.1$	$15.9 +0/-0.3$	$14.5 \pm 0.15$	$12.3 \pm 0.2$

**Mungo m1 powerGrip**Product description  
Characteristics of the product**Annex A1**  
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**Table A2. Materials**

	Designation	Material	
		<b>m1</b>	<b>m1r</b>
1	Bolt	Cold formed steel Surface Treatment 1: zinc plated (GreenTec) $\geq 5 \mu\text{m}$ Surface Treatment 2: Lubricating	Cold formed stainless steel (A4/316)
2	Clip	1.4404 SSTL, surface finish 2B	
3	Washer	Zinc plated (GreenTec) $\geq 5 \mu\text{m}$	Stainless steel (A4/316)
		DIN125A (for type m1 and m1r), DIN9021 (for type m1-C and m1r-C)	
4	Hex-nut	Surface Treatment 1: zinc plated (GreenTec) $\geq 5 \mu\text{m}$ , DIN EN ISO 4032:2013-04	A4 acc. DIN EN ISO 4032:2013-04



**Mungo m1 powerGrip**

Product description  
Materials

**Annex A2**  
of European  
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**Use:**

The anchors are intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 of Regulation 305/2011 (EU) shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

**Anchors subject to:**

- Static and quasi-static loads: sizes M8, M10, M12 and M16.
- Seismic loads performance category C1: sizes from M8 to M16
- Resistance to fire

**Base materials:**

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Cracked and Non-cracked concrete: sizes M8, M10, M12 and M16.

**Temperature range:**

- The covered temperature range of the anchorage base concrete during the working life is within the range -40 °C to +80 °C

**Use conditions (Environmental conditions):**

- The m1 and m1-C anchors may be used in structures subject to dry internal conditions only.
- The m1r and m1r-C anchors may be used in structures subject to external atmospheric exposure (including industrial and marine environment) and to permanent damp internal conditions if no particular aggressive conditions exist

**Installation:**

- The anchors may be installed in:
  - Dry concrete: sizes M8, M10, M12 and M16.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check before placing the anchor to ensure that the strength class of the concrete, in which the anchor is to be placed, is identical with the values which the characteristic loads apply.
- Check of concrete being well compacted, e.g. without significant voids.
- Edge distances and spacings not less than the specified values without minus tolerances.
- Positioning of the drill holes without damaging the reinforcement.
- In case of aborted hole: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted drill hole is filled with high strength mortar and if under shear or oblique tension load it is not the direction of load application.
- Cleaning of the hole of drilling dust
- Anchor installation such that the effective anchorage depth is complied with; the compliance is ensured if the thickness of the fixture is not larger than the maximum values given in Annex B2.
- Anchor expansion by impact on the wedge of the anchor; the anchor is properly set if the wedge is fully dropped in.

**Proposed design methods:**

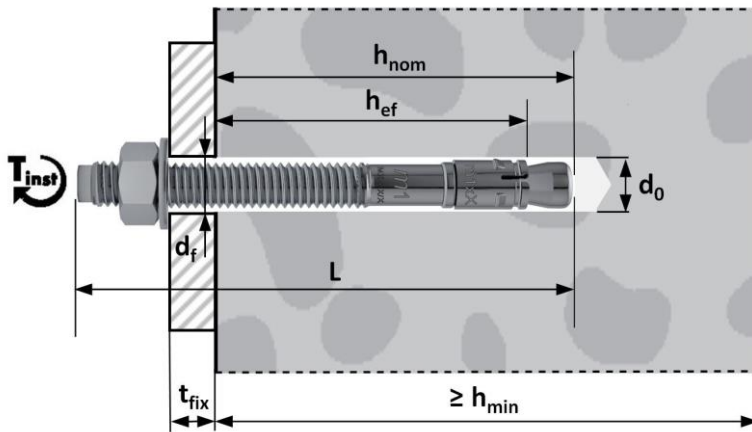
- Anchorages are designed under the responsibility of an engineer experienced in anchorages and concrete work.
- Verifiable calculation notes and drawings are prepared taking account of the loads to be transmitted. The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to supports, etc.).
- Anchorages under static and quasi-static loads are designed in accordance EN 1992-4

**Mungo m1 powerGrip**

Intended use – Specification

**Annex B1**  
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**Table B1. Installation parameters**

		M8	M10 <sub>hnom,1</sub>	M10 <sub>hnom,2</sub>	M12	M16
Nom. drill hole diameter	$\varnothing d_0$ [mm] =	8	10	10	12	16
Max. cutting diameter of drill bit	$\varnothing d_{cut}$ [mm] ≤	8,45	10,45	10,45	12,50	16,50
Depth of length of bolt in drill hole	$h_{nom}$ [mm] ≥	55	50	70	81	98
Effective anchorage depth	$h_{ef}$ [mm] ≥	48	40	60	70	80
Diameter of clearance hole for in-place installation	$d_f$ [mm] ≤	9	12	12	14	18
Installation moment	$T_{inst}$ [Nm] =	20	45	45	60	80
Torque wrench socket size	SW [mm] =	13	17	17	19	24

**Table B2. Minimum thickness of member, minimum edge distance and minimum spacing**

		m1				m1r			
		M8	M10 <sub>hnom,1</sub> / M10 <sub>hnom,2</sub>	M12	M16	M8	M10 <sub>hnom,1</sub> / M10 <sub>hnom,2</sub>	M12	M16
Minimum thickness of member	$h_{min}$ [mm] =	110	120	140	160	100	120	140	160
Minimum edge distance	$c_{min}$ [mm] =	70	55	60	90	50	65	60	70
Minimum spacing	$s_{min}$ [mm] =	60	80	110	130	50	80	100	120

Mungo m1 powerGrip

Intended use – installation parameters

Annex B2

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**Table C1: Characteristic resistance to tension load (static and quasi-static loading) according to EN 1992-4**

			m1					m1r				
			M8	M10 <sub>h<sub>nom,1</sub></sub>	M10 <sub>h<sub>nom,2</sub></sub>	M12	M16	M8	M10 <sub>h<sub>nom,1</sub></sub>	M10 <sub>h<sub>nom,2</sub></sub>	M12	M16
<b>Steel failure</b>												
Resistance to steel failure	$N_{Rk,s}$	[kN]	19	33	33	43	77	19	33	33	46	82
Partial safety factor under tension load	$\gamma_{Ms}^{1)}$	[-]	1,40					1,60				
<b>Pull-out failure</b>												
Resistance to pull-out failure in non-cracked concrete C20/25	$N_{Rk,p,ucr}$	[kN]	9,00	7,50	15,00	18,00	26,00	12,00	7,50	20,00	24,00	26,00
Increase factors for non-cracked concrete in C50/60	$\Psi_c$	[-]	1,41	1,27	1,42	1,58	1,33	1,41	1,29	1,38	1,48	1,58
Resistance to pull-out failure in cracked concrete C20/25	$N_{Rk,p,cr}$	[kN]	3,50	4,50	7,50	14,00	20,00	4,00	4,00	9,00	15,00	24,00
Increase factors for cracked concrete in C50/60	$\Psi_c$	[-]	1,44	1,36	1,58	1,47	1,52	1,58	1,58	1,58	1,58	1,51
<b>Concrete cone failure</b>												
Effective embedment depth	$h_{ef}$	[mm]	48	40	60	70	80	48	40	60	70	80
Faktor for cracked concrete	$k_{cr}$	[-]	7,7									
Faktor for non-cracked concrete	$k_{ucr}$	[-]	11,0									
Edge distance	$c_{cr,N}$	[mm]	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>	1,5xh <sub>ef</sub>
Spacing	$s_{cr,N}$	[mm]	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>	3xh <sub>ef</sub>
<b>Robustness</b>												
Installation safety factor	$\gamma_{inst}$	[-]	1,0					1,0				
<b>Minimum edge distance and spacing</b>												
Minimum edge distance	$s \geq$	[mm]	70	55	55	60	90	50	65	65	60	70
Minimum spacing distance	$c \geq$	[mm]	60	80	80	110	130	50	80	80	100	120
Min. thickness of the concrete member	$h_{min}$	[mm]	110	120	120	140	160	100	120	120	140	160
<b>Edge distance to prevent splitting under load</b>												
Characteristic edge distance	$c_{cr,sp}$	[mm]	96	120	120	140	140	96	120	120	140	160
Characteristic spacing	$s_{cr,sp}$	[mm]	192	240	240	280	280	192	240	240	280	320
<b>Displacements under static and quasi-static loading</b>												
Tension load	$N$	[kN]	4,29	3,57	7,14	8,57	12,38	5,71	3,57	9,52	11,43	12,38
Short time tension displacement	$\delta_{N0}$	[mm]	0,01	0,12	0,01	0,26	0,41	0,09	0,14	0,21	0,39	0,16
Long-time tension displacement	$\delta_{N\infty}$	[mm]	0,96	0,65	1,03	1,01	1,49	1,01	0,69	1,63	1,30	1,39

<sup>1)</sup> In absence of other national regulation

**Mungo m1 powerGrip**

Performance for static and quasi-static loads: Resistances

**Annex C1**  
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**Table C2: Characteristic resistance to shear load (static and quasi-static loading) according to EN 1992-4**

		m1					m1r				
		M8	M10 <sub>nom,1</sub>	M10 <sub>nom,2</sub>	M12	M16	M8	M10 <sub>nom,1</sub>	M10 <sub>nom,2</sub>	M12	M16
<b>Resistance to steel failure under shear load</b>											
Resistance to shear load without lever arm	$V_{Rk,s}^0$ [kN]	9,15	9,10	14,50	21,08	34,00	9,15	11,42	14,50	21,08	39,25
Partial safety factor under shear load	$\gamma_{Ms}^{1)}$ [-]	1,50					1,33				
Resistance to shear load with lever arm	$M_{Rk,s}^0$ [kN]	30,16	58,90	58,90	101,79	241,27	30,16	58,90	58,90	101,79	241,27
Partial safety factor under shear load	$\gamma_{Ms}^{1)}$ [-]	1,50					1,33				
<b>Resistance to pry-out failure</b>											
Factor for pry-out failure	$k_s$ [-]	1,0	1,0	2,0	2,0	2,0	1,0	1,0	2,0	2,0	2,0
<b>Resistance to concrete edge failure</b>											
Outside diameter of the fastener relevant for shear loading	$d_{nom}$ [mm]	8,00	10,00	10,00	12,00	16,00	8,00	10,00	10,00	12,00	16,00
Effective length of the fastener for transfer of shear load	$l_f$ [mm]	48	40	60	70	80	48	40	60	70	80
<b>Displacements under static and quasi-static loading</b>											
Shear load	$V$ [kN]	4,36	4,33	6,90	10,04	16,19	4,36	6,53	6,90	10,04	18,69
Short time shear displacement	$\delta_{v0}$ [mm]	0,89	0,85	1,37	1,74	1,76	1,35	2,01	0,79	1,63	2,14
Long-time shear displacement	$\delta_{v\infty}$ [mm]	1,33	1,28	2,05	2,61	2,64	2,02	3,02	1,19	2,44	3,20

<sup>1)</sup> In absence of other national regulation

**Table C3: Characteristic resistance to seismic performance category C1 acc. TR 049**

		m1				m1r			
		M8	M10 <sub>nom,2</sub>	M12	M16	M8	M10 <sub>nom,2</sub>	M12	M16
<b>Tension steel failure</b>									
Characteristic steel failure	$N_{Rk,s,C1}$ [kN]	15,88	26,92	39,90	73,49	8,82	14,96	22,17	40,83
Partial safety factor	$\gamma_{MsN,seis}^{1)}$ [-]	1,4				1,4			
<b>Pull-out failure mode</b>									
Characteristic pull-out failure in C20/25	$N_{Rk,p,C1}$ [kN]	3,00	7,00	12,00	19,00	4,50	11,00	13,00	22,00
Partial safety factor	$\gamma_{Mp,seis}^{1)}$ [-]	1,5				1,5			
<b>Shear steel failure</b>									
Characteristic shear steel failure	$V_{Rk,s,C1}$ [kN]	9,15	14,50	21,08	34,00	9,15	14,50	21,08	39,25
Partial safety factor	$\gamma_{MsV,seis}^{1)}$ [-]	1,5				1,25			

1) The recommended partial safety factors under seismic action ( $\gamma_{M,seis}$ ) are the same as for static loading

### Mungo m1 powerGrip

Performance for static, quasi-static and seismic loads: Resistances

**Annex C2**  
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**Table C4: Resistance to fire****Characteristic values for tension load under fire exposure according to EOTA TR 020****Steel failure:**

		<b>m1</b>				<b>m1r</b>			
		M8	M10 <sub>hnom,2</sub>	M12	M16	M8	M10 <sub>hnom,2</sub>	M12	M16
$h_{ef} \geq$ [mm]		48	60	70	80	48	60	70	80
$N_{Rk,s,fi}$ [kN]	R30	0,50	1,18	2,26	4,02	1,01	1,96	3,39	6,03
	R60	0,45	1,02	1,70	3,02	0,80	1,57	2,83	5,03
	R90	0,35	0,79	1,47	2,61	0,60	1,26	2,26	4,02
	R120	0,25	0,63	1,13	2,01	0,50	1,10	1,81	3,22

**Pullout failure (cracked and non-cracked concrete)**

		<b>m1</b>				<b>m1r</b>			
		M8	M10 <sub>hnom,2</sub>	M12	M16	M8	M10 <sub>hnom,2</sub>	M12	M16
$h_{ef} \geq$ [mm]		48	60	70	80	48	60	70	80
$N_{Rk,p,fi}$ [kN]	R30								
	R60	2,40	3,94	4,86	6,77	3,14	5,11	6,01	6,46
	R90								
	R120	1,92	3,15	3,89	5,42	2,51	4,09	4,81	5,17

**Characteristic values for shear load under fire exposure according to EOTA TR 020****Steel failure without lever arm**

		<b>m1</b>				<b>m1r</b>			
		M8	M10 <sub>hnom,2</sub>	M12	M16	M8	M10 <sub>hnom,2</sub>	M12	M16
$h_{ef} \geq$ [mm]		48	60	70	80	48	60	70	80
$V_{Rk,s,fi}$ [kN]	R30	0,50	1,18	2,26	4,02	1,01	1,96	3,39	6,03
	R60	0,45	1,02	1,70	3,02	0,80	1,57	2,83	5,03
	R90	0,35	0,79	1,47	2,61	0,60	1,26	2,26	4,02
	R120	0,25	0,63	1,13	2,01	0,50	1,10	1,81	3,22

**Characteristic values for shear load under fire exposure according to EOTA TR 020****Steel failure with lever arm**

		<b>m1</b>				<b>m1r</b>			
		M8	M10 <sub>hnom,2</sub>	M12	M16	M8	M10 <sub>hnom,2</sub>	M12	M16
$h_{ef} \geq$ [mm]		48	60	70	80	48	60	70	80
$M^0_{Rk,s,fi}$ [Nm]	R30	0,60	1,77	4,07	9,65	1,21	2,95	6,11	14,48
	R60	0,54	1,53	3,05	7,24	0,97	2,36	5,09	12,06
	R90	0,42	1,18	2,65	6,27	0,72	1,88	4,07	9,65
	R120	0,30	0,94	2,04	4,83	0,60	1,65	3,26	7,72

The recommended partial safety factors under fire are  $\gamma_{M,fi} = 1,0$  and  $\gamma_{inst} = 1,0$

**Table C5: Reaction to fire**

The anchors are made from steel and is classified as reaction to fire Class A1 as provided for in the Delegated Regulation 2016/364/EC and EN 13501-1

**Mungo m1 powerGrip**

Performance for exposure to fire

**Annex C3**  
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