Declaration of Performance

2323-CPR-0057

1. Unique identification code of the product-type: Mechanical fastener MEA for use in non-cracked concrete

2. Manufacturer: Mungo Befestigungstechnik AG, Bornfeldstrasse 2, CH-4600 Olten/Switzerland

3. System/s of AVCP: System 1

4. Intended use or use/es:

Product	Intended use
Metal anchor for use in non-cracked concrete	The anchor is to be used for static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength classes C20/25 to C50/60 according to EN 206-1

5. European Assessment Document: EAD 330232-00-0601: Mechanical fasteners for use in concrete
European Technical Assessment: ETA-18/0236 of 03.04.2018
Technical Assessment Body: ETA-Denmark A/S
Notified body/ies: No 305/2011 (Construction Product Regulation)

6. Declared performance:
Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for all load directions	See appendix, especially Annex C1 to C3
Edge distances and spacing	See appendix, especially Annex B2

Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	See appendix, especially Annex C4 (Page 15)
Resistance to fire	See appendix, especially Annex C4 (Page 14)

The performance of the product identified above is in conformity with the set of declared performance/s. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Singed for and on behalf of the manufacturer by:

Robert Klemencic Dipl.-Ing.
Head of Engineering

Olten, 18.11.2019

This DoP Has been prepared in different languages. In case there is a dispute on the interpretation the English version shall always prevail.
The Appendix includes voluntary and complementary information in English language exceeding the (language as neutrally specified) legal requirements.

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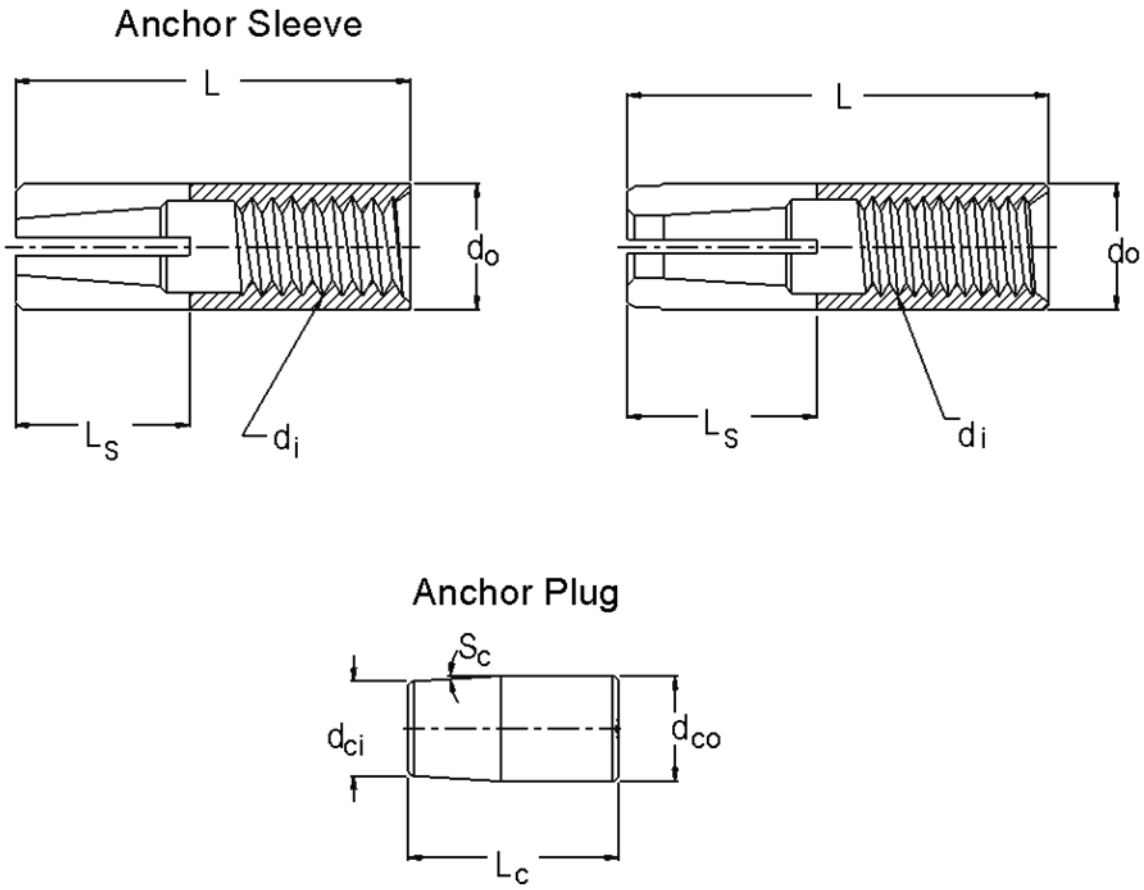
Figure A1 MEA Drop-in anchor



MEA DROP-IN ANCHOR	**Annex A1**
Product description Characteristics of the product	of European Technical Assessment ETA-18/0236

Table A1. Dimensions of the anchor

Diameter inside d_i [mm]	Length L [mm]	Length of spread L_s [mm]	Diameter outside d_o [mm]	Length of cone L_c [mm]	Diameter cone outside d_{co} [mm]	Diameter cone inside d_{ci} [mm]	square s_c [°]
M6	24.90 ± 0.30	11.60 ± 0.60	7.94 ± 0.07	10.00 ± 0.20	5.05 ± 0.05	3.95 ± 0.05	5.00 ± 0.50
M8	29.90 ± 0.30	13.60 ± 0.60	9.94 ± 0.07	11.90 ± 0.30	6.25 ± 0.25	4.50 ± 0.25	6.00 ± 2.00
M10	39.60 ± 0.40	18.35 ± 0.75	11.94 ± 0.07	15.70 ± 0.30	7.85 ± 0.25	6.30 ± 0.30	6.00 ± 2.00
M12	50.50 ± 0.50	22.75 ± 0.75	14.94 ± 0.07	20.70 ± 0.30	10.05 ± 0.25	8.50 ± 0.30	4.00 ± 2.00
M16	65.00 ± 0.50	29.35 ± 0.75	19.80 ± 0.20	28.10 ± 0.30	13.85 ± 0.25	11.70 ± 0.30	3.50 ± 2.00

Diameter inside d_i [mm]	Length L [mm]	Length of spread L_s [mm]	Diameter outside d_o [mm]	Length of cone L_c [mm]	Diameter cone outside d_{co} [mm]	Diameter cone inside d_{ci} [mm]	square s_c [°]
M8x40	39.60 ± 0.40	14.70 ± 0.60	9.94 ± 0.07	11.90 ± 0.30	6.25 ± 0.25	4.50 ± 0.30	6.00 ± 2.00
M10x30	29.60 ± 0.40	15.00 ± 0.60	11.94 ± 0.07	13.60 ± 0.20	7.85 ± 0.05	6.70 ± 0.05	3.50 ± 0.50

Table A2. Materials

Member	Material
Sleeve	Coldformed steel grade C8C in accordance with table 2 in EN 10263-2 or coldformed steel grade 1008 in accordance with table 3 in ASTM A510 . Galvanized
Plug	Coldformed steel grade C8C in accordance with table 2 in EN 10263-2 or coldformed steel grade 1008 in accordance with table 3 in ASTM A510. Galvanized

MEA DROP-IN ANCHOR	**Annex A2** of European Technical Assessment ETA-18/0236
Product description Materials	

Figure A2 - Hand setting tool

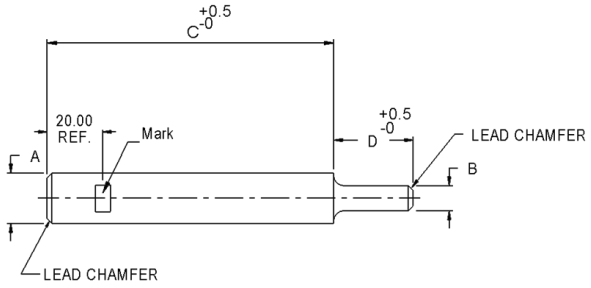


Table A3 Dimensions of hand setting tool

Size	A [mm]	B (REF) [mm]	C [mm]	D [mm]
M6	Ø 10.0	Ø 4.7	114.5	15.0
M8	Ø 10.0	Ø 6.35	94.5	17.9
M10	Ø 13.0	Ø 7.9	100.5	23.8
M12	Ø 16.0	Ø 9.8	107.5	29.7
M16	Ø 22.0	Ø 13.5	114.5	36.8

Size	A [mm]	B (REF) [mm]	C [mm]	D [mm]
M8x40	Ø 10.0	Ø 6.35	84.7	27.7
M10x30	Ø 13.0	Ø 7.9	108.3	16.0

Figure A3 - Mechanical setting tool

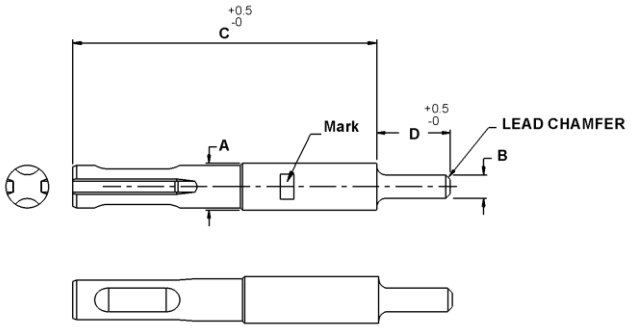


Table A4 – Dimensions of mechanical setting tool

Size	A [mm]	B (REF) [mm]	C [mm]	D [mm]
M6	Ø 10.0	Ø 4.7	114.5	15.0
M8	Ø 10.0	Ø 6.35	94.5	17.9
M10	Ø 13.0	Ø 7.9	100.5	23.8
M12	Ø 16.0	Ø 9.8	107.5	29.7
M16	Ø 22.0	Ø 13.5	114.5	36.8

Size	A [mm]	B (REF) [mm]	C [mm]	D [mm]
M8x40	Ø 10.0	Ø 6.35	84.7	27.7
M10x30	Ø 13.0	Ø 7.9	108.3	16.0

MEA DROP-IN ANCHOR	**Annex A3** of European Technical Assessment ETA-18/0236
Product description Materials	

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 M6, M8, M10, M12 and M16.

Base materials:
- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206-1.
- Non-cracked concrete: sizes M6, M8, M10, M12 and M16.

Temperature range:
The anchors may be used in the following temperature range:
- Normal internal temperature ranges

Use conditions (Environmental conditions):
- The anchors may be used in structures subject to dry internal conditions only.

Installation:
- The anchors may be installed in:
- Dry concrete: sizes M6, 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.
- Hole shall be clear.
- 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 with EN 1992-4.

MEA DROP-IN ANCHOR	**Annex B1** of European Technical Assessment ETA-18/0236
Intended use – Specification	

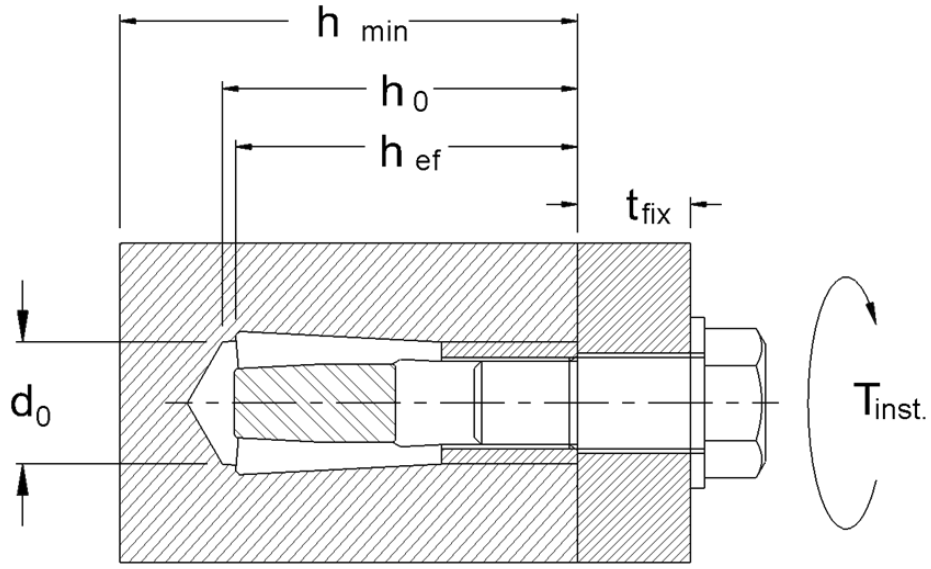


Table B1. Installation parameters

Installation parameters				M6	M8	M10	M12	M16
Nom. drill hole diameter	Ø d_0	[mm]	=	8	10	12	16	20
Max. Cutting diameter of drill bit	Ø d_{cut}	[mm]	≤	8,45	10,45	12,45	16,45	20,50
Depth of drill hole	h_1	[mm]	≥	25	30	40	50	65
Effective anchorage depth	h_{ef}	[mm]	≥	25	30	40	50	65
Installation moment	T_{inst}	[Nm]	=	4	8	15	35	60

Installation parameters				M8x40	M10x30
Nom. drill hole diameter	Ø d_0	[mm]	=	10	12
Max. Cutting diameter of drill bit	Ø d_{cut}	[mm]	≤	10,45	12,45
Depth of drill hole	h_1	[mm]	≥	40	30
Effective anchorage depth	h_{ef}	[mm]	≥	40	30
Installation moment	T_{inst}	[Nm]	=	15	15

		M6	M8	M10	M12	M16
Minimum thickness of member	h_{min} [mm] =	100	100	120	140	160
Minimum edge distance	c_{min} [mm] =	90	120	140	175	120
Minimum spacing	s_{min} [mm] =	120	90	120	150	200

		M8x40	M10x30
Minimum thickness of member	h_{min} [mm] =	100	100
Minimum edge distance	c_{min} [mm] =	80	90
Minimum spacing	s_{min} [mm] =	120	150

MEA DROP-IN ANCHOR	**Annex B2** of European Technical Assessment ETA-18/0236
Intended use – installation parameters	

Table C1: Design method A, characteristic tension load values

			M6	M8	M10	M12	M16
Steel failure							
Resistance to steel failure	$N_{Rk,s}$	[kN]	9,92	14,13	15,24	30,92	49,90
Partial safety factor under tension load	γ_{Ms}	[-]	1.40	1.40	1.40	1.40	1.40
Pull-out failure							
Resistance to pull-out failure in non-cracked concrete C20/25	$N_{Rk,ucr}$	[kN]	5.0	3.5	7.0	10.0	12.0
Increase factors for cracked and non-cracked concrete	Ψ_c		1,55	1,53	1,55	1,55	1,55
Concrete cone failure							
Partial safety factor in cracked concrete	$k_{cr,N}$	[-]	7.7				
Partial safety factor in non-cracked concrete	$k_{ucr,N}$	[-]	11.0				
Effective embedment depth	h_{ef}	[mm]	25	30	40	50	65
Edge distance	$c_{cr,N}$	[mm]	1.5xhef				
Spacing	$s_{cr,N}$	[mm]	3xhef				
Partial safety factor	$\gamma_{Mp} = \gamma_{Mc}$	[-]	1.8	1.5	1.8	1.8	1.5
Robustness							
Installation safety factor	γ_{inst}	[-]	1.2	1.0	1.2	1.2	1.0
Minimum edge distance and spacing							
Minimum edge distance	c_{min}	[mm]	90	120	140	175	120
Minimum spacing distance	s_{min}	[mm]	120	90	120	150	200
Min. thickness of the concrete member	h_{min}	[mm]	100	100	120	140	160
Edge distance to prevent splitting under load							
	$N^0_{Rk,sp}$	[kN]	4.5	3.0	6.5	9.5	11.0
Appropriate edge distance	$c_{cr,sp}$	[mm]	90	120	140	175	120
Displacements under static and quasi-static loading							
Short time tension displacement	δ_{N0}	**[mm]**	0.09	0.07	0.17	0.16	0.02
Long-time tension displacement	$\delta_{N\infty}$	**[mm]**	0.18				

MEA DROP-IN ANCHOR	**Annex C1** of European Technical Assessment ETA-18/0236
Performance for static and quasi-static loads: Resistances	

Table C1A: Design method A, characteristic tension load values

			M8x40	M10x30
Steel failure				
Resistance to steel failure	$N_{Rk,s}$	[kN]	14,13	15,24
Partial safety factor under tension load	γ_{Ms}	[-]	1.40	1.40
Pull-out failure				
Resistance to pull-out failure in non-cracked concrete C20/25	$N_{Rk,ucr}$	[kN]	6.0	5.5
Increase factors for cracked and non-cracked concrete	Ψ_c		1.41	1.00
Concrete cone failure				
Partial safety factor in non-cracked concrete	$k_{ucr,N}$	[-]	11.0	
Effective embedment depth	h_{ef}	[mm]	40	30
Edge distance	$c_{cr,N}$	[mm]	1.5xhef	
Spacing	$s_{cr,N}$	[mm]	3xhef	
Partial safety factor	$\gamma_{Mp} = \gamma_{Mc}$	[-]	1.5	2.1
Robustness				
Installation safety factor	γ_{inst}	[-]	1.0	1.4
Minimum edge distance and spacing				
Minimum edge distance	c_{min}	[mm]	80	90
Minimum spacing distance	s_{min}	[mm]	120	150
Min. thickness of the concrete member	h_{min}	[mm]	100	100
Edge distance to prevent splitting under load				
	$N^0_{Rk,sp}$	[kN]	6.0	5.5
Appropriate edge distance	$c_{cr,sp}$	[mm]	80	90
Displacements under static and quasi-static loading				
Short time tension displacement	δ_{N0}	**[mm]**	0.04	0.04
Long-time tension displacement	$\delta_{N\infty}$	**[mm]**	0.07	0.07

Table C2: Design method A, Characteristic shear load values

			M6	M8	M10	M12	M16
Resistance to steel failure under shear load							
Resistance to shear load without lever arm	$V^0_{Rk,s}$	[kN]	2.5	5.5	7.0	7.5	18.0
Resistance to shear load with lever arm	$M^0_{Rk,s}$	[Nm]	18.0	34.0	46.0	110.0	240.0
Factor for group fasteners	k_7	[-]	1.0	1.0	1.0	1.0	1.0
Resistance to pry-out failure							
Factor for pry-out failure	k_8	[-]	1.0	1.0	1.0	1.0	2.0
Resistance to concrete edge failure							
Outside diameter of the fastener relevant for shear loading	d_{nom}	[mm]	8	10	12	15	20
Effective length of the fastener for transfer of shear load	l_f	[mm]	25	30	40	50	65
Displacements under static and quasi-static loading							
Short time shear displacement	δ_{V0}	**[mm]**	0.51	0.71	0.64	0.23	0.57
Long-time shear displacement	$\delta_{V\infty}$	**[mm]**	0.77	1.07	0.96	0.35	0.86

			M8x40	M10x30
Resistance to steel failure under shear load				
Resistance to shear load without lever arm	$V^0_{Rk,s}$	[kN]	5.5	6.5
Resistance to shear load with lever arm	$M^0_{Rk,s}$	[Nm]	34.72	46.45
Factor for group fasteners	k_7	[-]	1.0	1.0
Resistance to pry-out failure				
Factor for pry-out failure	k_8	[-]	1.0	1.0
Resistance to concrete edge failure				
Outside diameter of the fastener relevant for shear loading	d_{nom}	[mm]		
Effective length of the fastener for transfer of shear load	l_f	[mm]	40	30
Displacements under static and quasi-static loading				
Short time shear displacement	δ_{V0}	**[mm]**	0.80	1.37
Long-time shear displacement	$\delta_{V\infty}$	**[mm]**	1.20	2.06

Table C3: Resistance to fire

Characteristic values for tension load under fire exposure in accordance to EOTA TR020											
Steel failure				M6x25	M8x30	M8x40	M10x25	M10x30	M10x40	M12x50	M16x65
Characteristic resistance	R30	$N_{Rk,s,fi}$	[kN]	0,21	0,27	0,27	0,50	0,50	0,50	1,24	2,14
	R60			0,19	0,25	0,25	0,43	0,43	0,43	0,93	1,60
	R90			0,15	0,19	0,19	0,33	0,33	0,33	0,81	1,39
	R120			0,11	0,14	0,14	0,27	0,27	0,27	0,62	1,07
Pullout failure											
Characteristic resistance in concrete ≥ C20/25	R30 / R60 / R90	$N_{Rk,p,fi}$	[kN]	1,25	0,88	1,50	0,38	1,38	1,75	2,50	3,00
	R120			1,00	0,70	1,20	0,30	1,10	1,40	2,00	2,40
Concrete cone failure											
Characteristic resistance in concrete ≥ C20/25	R30 / R60 / R90	$N°_{Rk,c,fi}$	[kN]	0,56	0,89	1,82	0,56	0,89	1,82	3,18	6,13
	R120			0,45	0,71	1,46	0,45	0,71	1,46	2,55	4,91
Spacing		$s_{cr,fi}$	[mm]	$4*h_{ef}$							
		s_{min}		100	90	120	110	150	160	200	260
Edge distance		$c_{cr,fi}$	[mm]	$2*h_{ef}$							
		c_{min}		Fire attack from one side: $2*h_{ef}$ Fire attack from more than 1 side: ≥ 300							

Characteristic values for shear load under fire exposure in accordance to EOTA TR020											
Steel failure without lever arm				M6x25	M8x30	M8x40	M10x25	M10x30	M10x40	M12x50	M16x65
Characteristic resistance	R30	$V_{Rk,s,fi}$	[kN]	0,21	0,27	0,27	0,50	0,50	0,50	1,24	2,14
	R60			0,19	0,25	0,25	0,43	0,43	0,43	0,93	1,60
	R90			0,15	0,19	0,19	0,33	0,33	0,33	0,81	1,39
	R120			0,11	0,14	0,14	0,27	0,27	0,27	0,62	1,07
Steel failure with lever arm											
Characteristic resistance	R30	$M°_{Rk,s,fi}$	[Nm]	0,40	0,67	0,67	1,53	1,53	1,53	4,59	10,49
	R60			0,36	0,60	0,60	1,32	1,32	1,32	3,44	7,87
	R90			0,28	0,47	0,47	1,02	1,02	1,02	2,98	6,82
	R120			0,20	0,34	0,34	0,81	0,81	0,81	2,29	5,25
Pryout failure											
k-factor		$k=k_3$	[-]	1,00	1,00	1,00	1,00	1,00	1,00	1,00	2,00
Characteristic resistance in concrete ≥ C20/25	R30 / R60 / R90	$V°_{Rk,cp,fi}$	[kN]	0,56	0,89	1,82	0,56	0,89	1,82	3,18	12,26
	R120			0,45	0,71	1,46	0,45	0,71	1,46	2,55	9,81
Concrete edge failure											
The initial value $V^0_{Rk,c,fi}$ of the characteristic resistance in concrete C20/25 to C50/60 under fire exposure may be determined by: $V^0_{Rk,c,fi} = 0,25 \times V^0_{Rk,c}$ (≤ R90) $V^0_{Rk,c,fi} = 0,20 \times V^0_{Rk,c}$ (≤ R120)											

Table C4: Reaction to fire

HARMONIZED TECHNICAL SPECIFICATION: ETAG 001 PART 1 PARAGRAPH 5.2.1	
ESSENTIAL CHARACTERISTICS	**PERFORMANCE**
Reaction to fire	In the final application, the thickness of the mortar layer is about 1 to 2 mm and most of the mortar is material classified class A1 according to EC Decision 96/603/EC. Therefore, it may be assumed that the bonding material (synthetic mortar or a mixture of synthetic mortar and cementitious mortar) in connection with the metal anchor in the end use application do not contribute to fire growth or to the fully developed fire and they have no influence to the smoke hazard.