Declaration of Performance

1109-CPR-0502

1. Unique identification code of the product-type: Torque-controlled expansion anchor m2r made of stainless steel for use in non-cracked concrete

2. Manufacturer: Mungo Befestigungstechnik AG, Bornfeldstrasse 2, CH-4603 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 206:2013

5. European Assessment Document: ETAG 001 Part 2, April 2013 used as EAD
European Technical Assessment: ETA-05/0199 of 15 February 2016
Technical Assessment Body: DIBt – Deutsches Institut für Bautechnik
Notified body/ies: No 305/2011 (Construction Product Regulation)

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

Essential characteristic	Performance
Characteristic resistance tension and shear loads, Displacements	See appendix, especially Annex C1 to C2

Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Resistance to fire	No performance assessed

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:

Dipl.-Ing. Massimo Pirozzi
Head of Engineering

p.p.a. Massimo Pirozzi

Olten, 2018-26-07

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.

Mungo
Befestigungstechnik AG
Bornfeldstrasse 2
CH-4603 Olten · Switzerland
Phone +41 62 206 75 75
Fax +41 62 206 75 85
mungo@mungo.swiss

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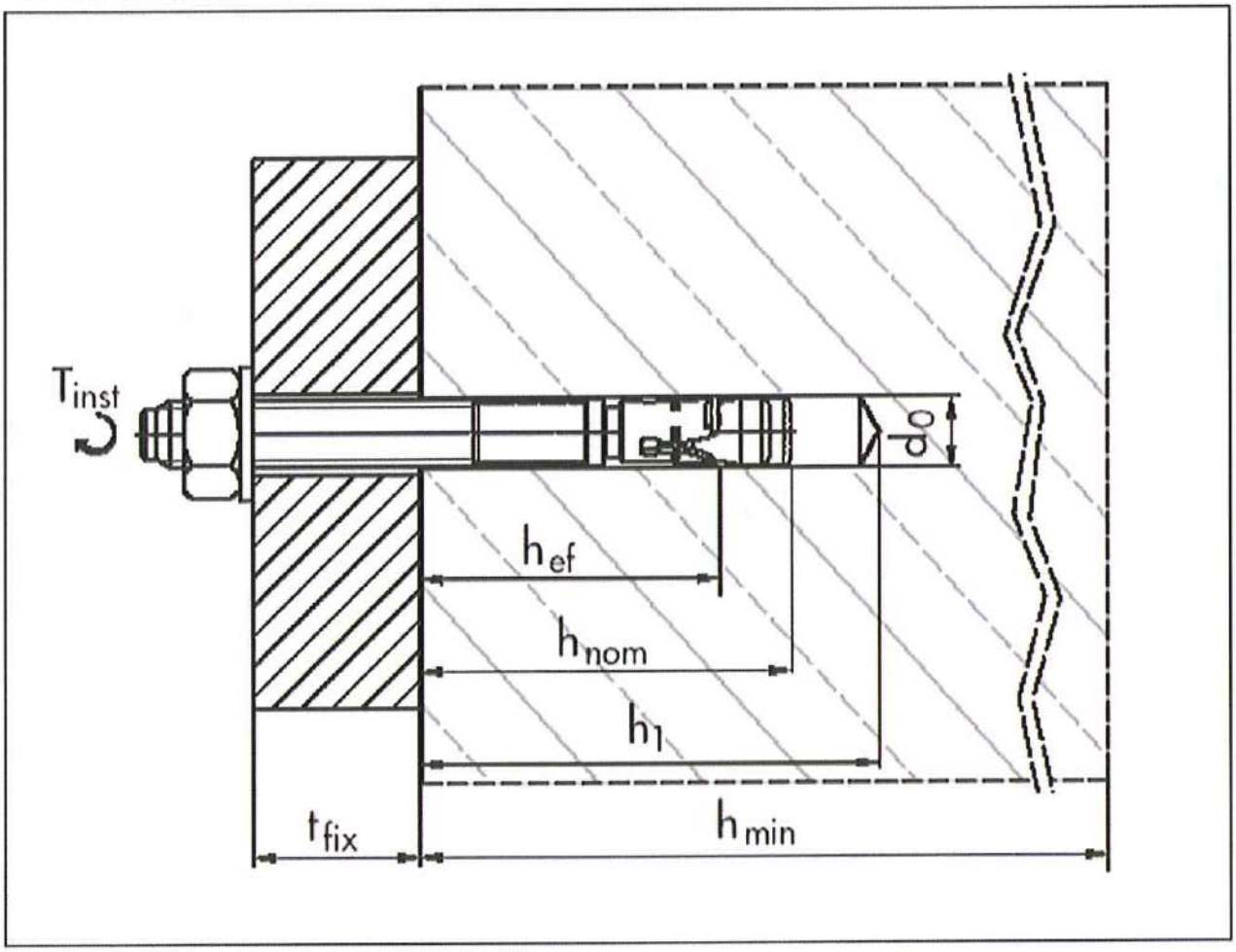
Installed anchor



Legend:

h_{ef}	=	effective anchorage depth
h_{nom}	=	embedment depth
h_1	=	depth of drill hole
h_{min}	=	minimum thickness of concrete member
d_0	=	nominal diameter of drill bit
t_{fix}	=	thickness of fixture
T_{inst}	=	installation torque

m2r	Annex A 1
Product description Installed condition	

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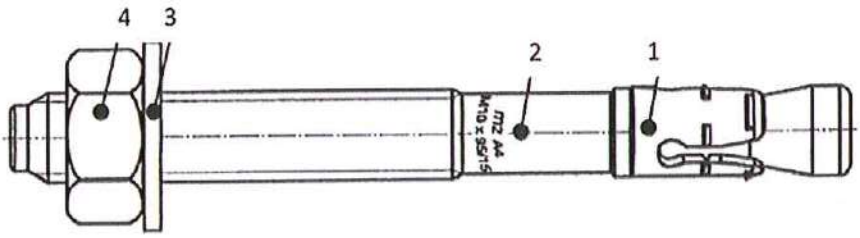
Anchor type

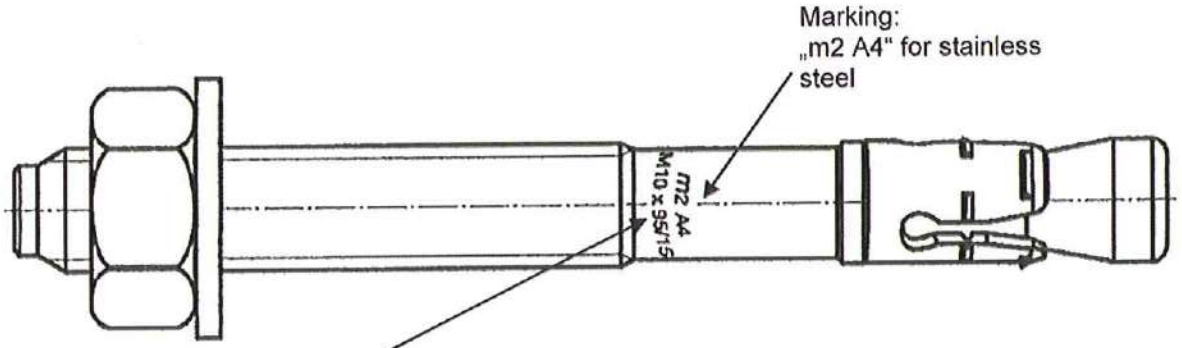


1 expansion element
2 bolt
3 washer
4 hexagonal nut

Design of expansion elements

m2r M6
m2r M16

m2r M8
m2r M10
m2r M12



Anchor types:

m2r bolt m2 with washer EN ISO 7089:2000 and hexagonal nut DIN 934:1987-10

m2r	Annex A 2
Product description Marking and denomination	

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Table A1: Dimensions

Part	Designation				M6	M8	M10	M12	M16
1	Bolt		d_k	[mm]	6	8	10	12	16
			d_h	[mm]	4	5,6	7,2	8,5	11,5
			d_{s1}	[mm]	5,25	7,05	8,9	10,7	14,5
			min l_G	[mm]	32	43	52	62	73
			max l_G	[mm]	62	120	120	120	120
			min L	[mm]	65	80	95	110	130
			max L	[mm]	95	165	180	185	180
2	Expansion element - length		l_s	[mm]	9,5	13,2	15,2	17,5	19,3
3	Washer	EN ISO 7089:2000	d_u	[mm]	12	16	20	24	30
			s	[mm]	1,6	1,6	2	2,5	3
4	Hexagonal nut		SW	[mm]	10	13	17	19	24

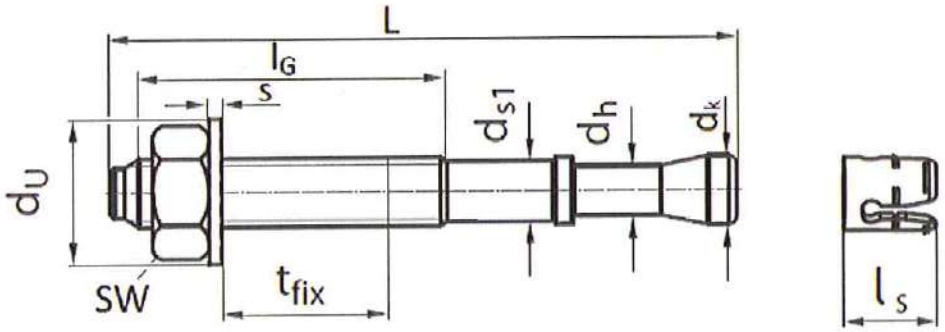

Table A2: Materials

Part	Designation	Material
1	Bolt	Stainless steel according to EN 10088
2	Expansion element	Stainless steel according to EN 10088
3	Washer	Stainless steel according to EN 10088
4	Hexagonal nut	Stainless steel A4 ISO3506, EN 10088

m2r

Product description
Dimensions and materials

Annex A 3

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Specifications of intended use

Anchorages subject to:
- Static and quasi-static loads

Base materials:
- Reinforced or unreinforced normal weight concrete according to EN 206:2013
- Strength classes C20/25 to C50/60 according to EN 206:2013
- Non-cracked concrete

Use conditions:
- Structures subject to dry internal conditions
- Structures subject to external atmospheric exposure (including industrial and marine environment) and to permanently damp internal condition, if no particular aggressive conditions exist.

Design:
- 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 anchored. 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 or quasi-static actions are designed in accordance with ETAG 001, Annex C, design method A, Edition August 2010
- It must be ensured that local spalling of the concrete cover does not occur.

Installation:
- Hole drilling by hammer drilling only
- Anchor installation in accordance with the manufacturer's specifications using the appropriate tools carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Use of the anchor only as supplied by the manufacturer without exchanging the components of an anchor
- Check concrete strength before placing the anchor to ensure that the strength class of the concrete is covered by the product's assessment
- Positioning the drill holes without damaging the reinforcement
- Cleaning the holes
- Edge distances and spacing not less than the specified values without minus tolerances
- Anchor installation such that the effective embedment depth is complied with. This compliance is ensured if the anchor's embedment mark doesn't exceed the concrete surface.
- The anchor may only be set once.
- In case of aborted holes: new drilling at a minimum distance away of twice the depth of the aborted hole or smaller distance if the aborted hole is filled with high strength mortar and if under shear or oblique tension load it isn't in the direction of load application.
- Using a calibrated torque wrench for installation.

m2r	Annex B 1
Intended use Specifications	

Table B1: Installation parameters

Anchor size			M6	M8	M10	M12	M16
Nominal drill hole diameter	d_0	[mm]	6	8	10	12	16
Effective anchorage depth	h_{ef}	[mm]	40	50	58	68	80
Installation torque	T_{inst}	[Nm]	6,5	15	30	50	140
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut} \leq$	[mm]	6,4	8,45	10,45	12,5	16,5
Depth of drill hole	$h_1 \geq$	[mm]	60	65	80	90	110
Diameter of clearance hole in fixture	$d_f \leq$	[mm]	7	9	12	14	18
Minimum fixture thickness	$t_{fix,min}$	[mm]	1	1	1	1	1
Maximum fixture thickness	$t_{fix,max}$	[mm]	10	45	100	90	65

Table B2: Minimum thickness of concrete member, minimum spacing and edge distances

Size			M6	M8	M10	M12	M16
Minimum thickness of concrete member	h_{min}	[mm]	100	100	120	140	160
Minimum spacing	s_{min}	[mm]	40	45	55	75	100
for edge distance	c	[mm]	70	45	55	75	190
Minimum edge distance	c_{min}	[mm]	40	-	-	-	130
for spacing	s	[mm]	80	-	-	-	190

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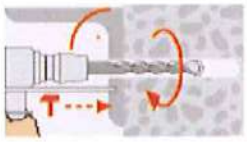
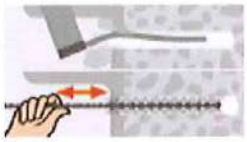
Installation instructions

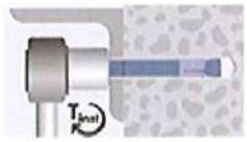


Drilling the hole



Cleaning the hole

Fixing plug and building material



Tightening with torque wrench and predetermined value of T_{inst} (see Table B2)

Tightened fixation

m2r	Annex B 3
Intended use Installation instructions	

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Table C1: Design method A, characteristic values under tension load

Anchor size			M6	M8	M10	M12	M16
Installation safety factor	γ_2	[-]	1,0				
Steel failure							
Characteristic resistance	$N_{Rk,s}$	[kN]	10	19	33	46	82
Partial safety factor	γ_{Ms} [1)]	[-]	1,6				
Pull-out failure							
Characteristic resistance	$N_{Rk,p}$	[kN]	7,5	12,0	16,0	25,0	30,0
Increasing factor for $N_{Rk,p}$	ψ_C	C30/37	1,17				
		C40/50	1,32				
		C50/60	1,42				
Concrete cone failure							
Effective anchorage depth	h_{ef}	[mm]	40	50	58	68	80
Spacing	$s_{cr,N}$	[mm]	$3\ h_{ef}$				
Edge distance	$c_{cr,N}$	[mm]	$1,5\ h_{ef}$				
Concrete splitting failure							
Spacing	$s_{cr,sp}$	[mm]	$6\ h_{ef}$			$5\ h_{ef}$	
Edge distance	$c_{cr,sp}$	[mm]	$3\ h_{ef}$			$2,5\ h_{ef}$	

[1)] In absence of other national regulations.

Table C2: Displacements under tension load

Anchor size			M6	M8	M10	M12	M16
Tension load	N	[kN]	3,6	5,7	7,6	9,9	11,9
Displacement	δ_{N0}	[mm]	0,3				
	$\delta_{N\infty}$	[mm]	1,3				

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Table C3: Design method A, characteristic values under shear load

Anchor size			M6	M8	M10	M12	M16
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$	[kN]	7	13	21	30	56
Partial safety factor	γ_{Ms} [1)]	[-]	1,33				
Steel failure with lever arm							
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12	30	60	105	266
Partial safety factor	γ_{Ms} [1)]	[-]	1,33				
Concrete pryout failure							
Factor in equation (5.6) of ETAG Annex C 5.2.3.3	k	[-]	1,0		2,0		
Concrete edge failure							
Effective anchor length under shear load	l_f	[mm]	40	50	58	68	80
external anchor diameter	d_{nom}	[mm]	6	8	10	12	16

[1)] In absence of other national regulations.

Table C4: Displacements under shear load

Anchor size			M6	M8	M10	M12	M16
Shear load		[kN]	3,9	7,1	11,2	16,3	30,3
Displacement	δ_{V0}	[mm]	1,5	1,9	2,3	3,1	3,9
	$\delta_{V\infty}$	[mm]	2,3	2,9	3,5	4,7	5,9