Deutsches Institut für Bautechnik

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Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

Designated according to Article 29 of Regulation (EU) No 305/2011 and member of EOTA (European Organisation for Technical Assessment)

European Technical Assessment ETA-05/0070 of 11 April 2017

English translation prepared by DIBt - Original version in German language

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	mungo Throughbolt m2, m2-C, m2-CG
Product family to which the construction product belongs	Torque-controlled expansion anchor for use in non-cracked concrete
Manufacturer	Mungo Befestigungstechnik AG Bornfeldstrasse 2 4603 Olten SCHWEIZ
Manufacturing plant	Mungo Werk Olten
This European Technical Assessment contains	12 pages including 3 annexes
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	European Assessment Document EAD 330232-00-0601

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Specific Part

1 Technical description of the product

The mungo m2 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion. According to the size of washer the anchor versions are designated as m2, m2-C and m2-CG.

The product description is given in Annex A.

2 Specification of the intended use in accordance with the applicable European Assessment Document

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 verifications and assessment methods on which this European Technical Assessment is based lead to the assumption of a working life of the anchor of at least 50 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, 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 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance (static and quasi-static loading) and displacements	See Annex C 1 to C 2
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed

3.2 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

4 Assessment and verification of constancy of performance (AVCP) system applied, with reference to its legal base

In accordance with EAD 330232-00-0601 according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011 the applicable European legal act is: [96/582/EC].

The system to be applied is: 1

5 Technical details necessary for the implementation of the AVCP system, as provided for in the applicable European Assessment Document

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at Deutsches Institut für Bautechnik.

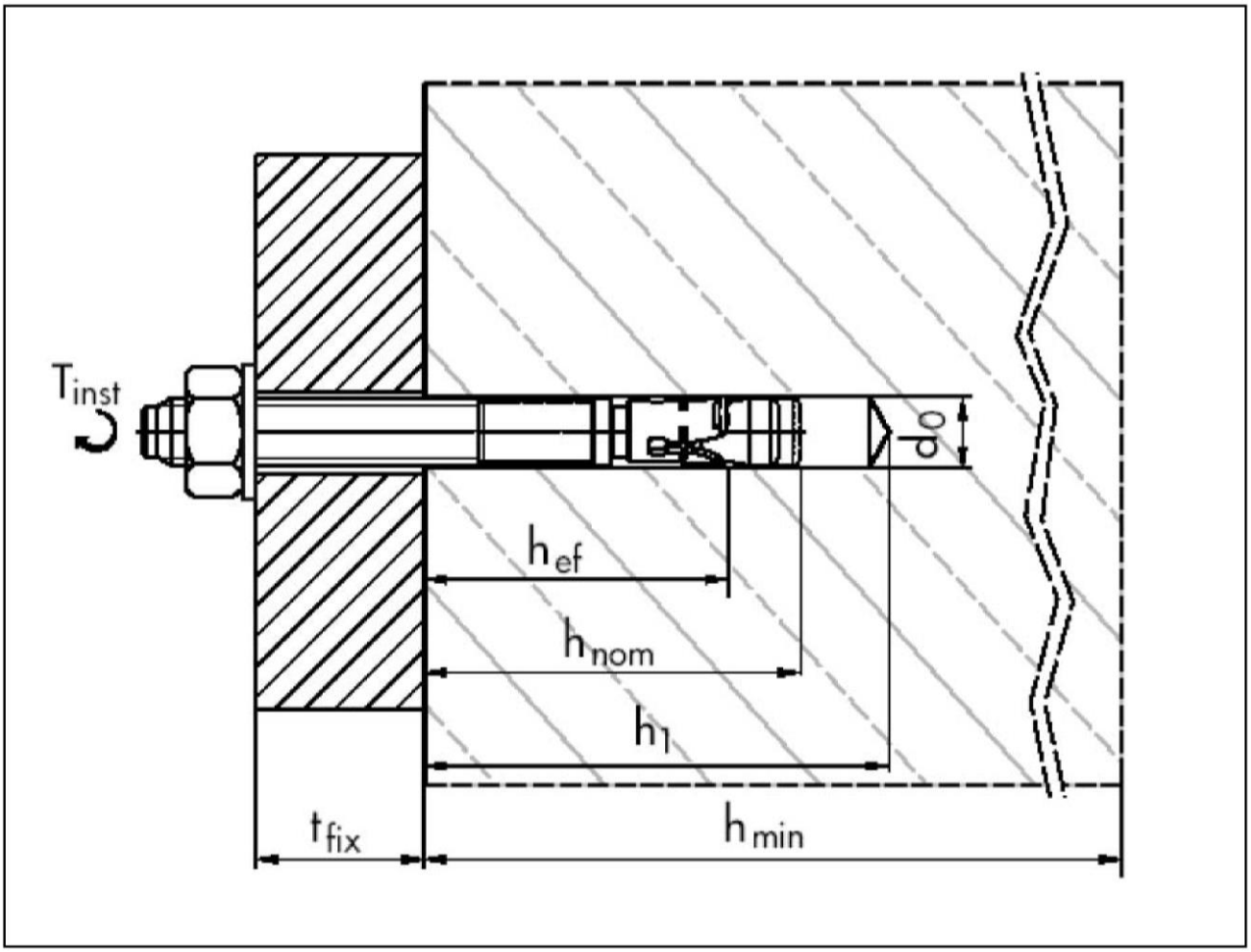
Issued in Berlin on 11 April 2017 by Deutsches Institut für Bautechnik

Andreas Kummerow
p. p. Head of Department

beglaubigt:
Lange

Deutsches Institut für Bautechnik DIBt

Installed fastener



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

m2, m2-C, m2-CG

Product description
Installed condition

Annex A 1

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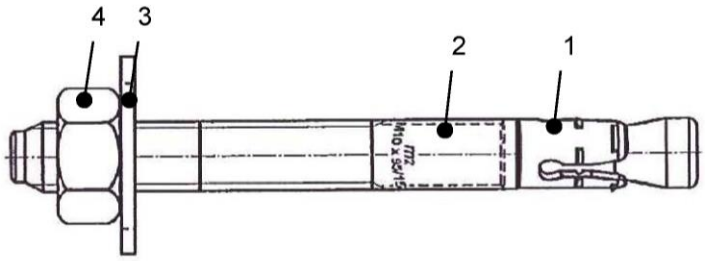
Fastener type



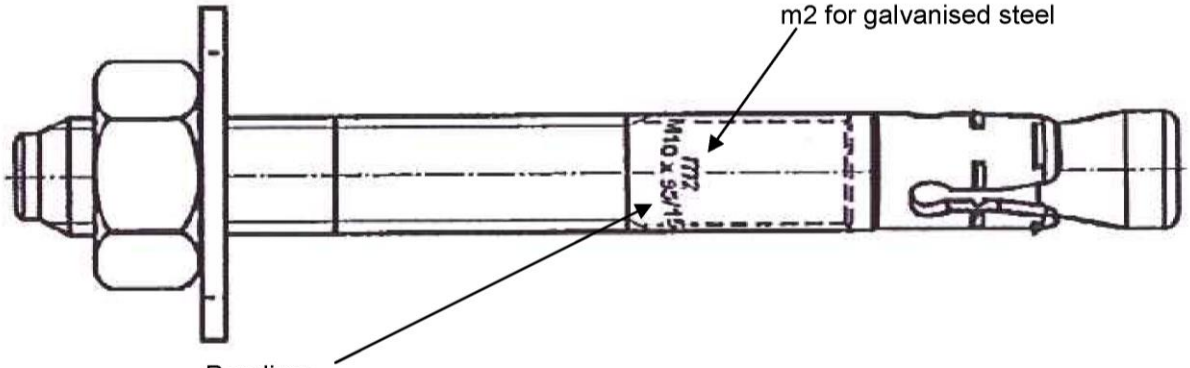
1 expansion element
2 bolt
3 washer
4 hexagonal nut

Shapes of clips:

m2 M6
m2 M16 Typ A
m2 M20

m2 M8
m2 M10
m2 M12

m2 M16 Typ B



Fastener types:

m2 bolt m2 with washer EN ISO 7089:2000 and hexagonal nut DIN 934:1987-10
m2-C bolt m2 with washer EN ISO 7093-1:2000 and hexagonal nut DIN 934:1987-10
m2-CG bolt m2 with washer EN ISO 7094:2000 and hexagonal nut DIN 934:1987-10

m2, m2-C, m2-CG	**Annex A 2**
Product description Marking and denomination	

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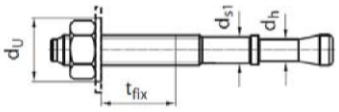
Table A1: Dimensions

Part	Designation				M6	M8	M10x60	M10	M12	M16	M20
1	Bolt		d_k	[mm]	6	8	10	10	12	16	20
			d_h	[mm]	4	5,6	7,2	7,2	8,5	11,5	15,2
			d_{s1}	[mm]	5,25	7,05	8,9	8,9	10,7	14,5	-
			d_{s2}	[mm]	-	-	-	-	12	16	20
			min l_G	[mm]	19	43	23	23	32	33	70
			max l_G	[mm]	62	120	120	120	120	120	120
			min L	[mm]	50	80	60	95	80	90	130
			max L	[mm]	95	165	180	180	360	440	270
2	Expansion element	type A	l_s	[mm]	9,5	13,2	15,2	15,2	17,5	19,3	21,6
		type B			-	-	-	-	-	19,7	-
3	Washer	EN ISO 7089:2000	d_u	[mm]	12	16	20	20	24	30	37
			s	[mm]	1,6	1,6	2	2	2,5	3	3
		EN ISO 7093-1:2000	d_u	[mm]	18	24	30	30	37	50	60
			s	[mm]	1,6	2	2,5	2,5	3	3	4
		EN ISO 7094:2000	d_u	[mm]	22	28	34	34	44	56	72
			s	[mm]	2	3	3	3	4	5	6
4	Hexagonal nut		SW	[mm]	10	13	17	17	19	24	30

m2, m2-C, m2-CG



m2, m2-C, m2-CG L>185 mm (M12 to M20)

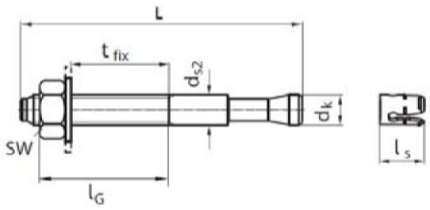


Table A2: Materials

Part	Designation		Material
1	Bolt	L ≤ 185 mm	cold forged steel EN10263-2:2001, electroplated ≥ 5 µm
		L > 185 mm[1)]	free-cutting steel EN 10087:1998, electroplated ≥ 5 µm
2	Expansion element	L ≤ 185 mm	cold rolled steel strip EN10139:1997, electroplated ≥ 5 µm
		L > 185 mm[1)]	cold rolled stainless steel strip EN10088-2:2014, no coating
3	Washer		cold rolled steel strip EN10139:1997, electroplated ≥ 5 µm
4	Hexagonal nut		steel, property class 8, DIN 934:1987-10, electroplated ≥ 5 µm

[1)] valid for sizes M12 and M16, valid for size M20 independent of length

m2, m2-C, m2-CG

Product description
Dimensions and materials

Annex A 3

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Specifications of intended use

Anchorages subject to:
- Static and quasi-static loading

Base materials:
- Non-cracked concrete according to EN 206-1:2000
- Strength classes C20/25 to C50/60 according to EN 206-1:2000

Use conditions:
- Structures subject to dry internal conditions (zinc coated steel)

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.
- Anchorages under static or quasi-static actions are designed in accordance with EN 1992-4:2017.

Installation:
- Hole drilling by hammer drilling only.
- Fastener installation in accordance with the manufacturer's specifications using the appropriate tools carried out by appropriately qualified personnel.
- Cleaning the holes.
- The fastener may only be set once.

m2, m2-C, m2-CG	**Annex B 1**
Intended use Specifications	

Deutsches Institut für Bautechnik DIBt

Table B1: Installation parameters

Fastener size			M6	M8	M10x60	M10	M12	M16	M20
Nominal drill hole diameter	d_0	[mm]	6	8	10		12	16	20
Effective embedment depth	h_{ef}	[mm]	40	50	33	58	68	80	100
Installation torque	T_{inst}	[Nm]	5	15	30		50	100	200
Cutting diameter at the upper tolerance limit (maximum diameter bit)	$d_{cut,max}$	[mm]	6,4	8,45	10,45		12,5	16,5	20,55
Depth of drill hole	h_1	[mm]	60	70	50	80	90	110	130
Diameter of clearance hole in fixture	d_f	[mm]	7	9	12		14	18	22
Minimum fixture thickness	$t_{fix,min}$	[mm]	1	1	1		1	1	1
Maximum fixture thickness	$t_{fix,max}$	[mm]	25	95	130		265	325	140

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

Size			M6	M8	M10x60	M10	M12		M16		M20
Fastener length	L	[mm]					≤ 185	> 185	≤ 185	> 185	
Minimum thickness of concrete member	h_{min}	[mm]	100	100	120	120	140		160		200
Minimum spacing	s_{min}	[mm]	40	45	50	50	75	110	100	120	200
for edge distance	c	[mm]	70	45	50	50	80	200	190	320	400
Minimum edge distance	c_{min}	[mm]	40	-	-	-	-	150	130	240	300
for spacing	s	[mm]	80					210	190	240	350

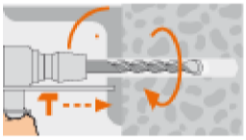
m2, m2-C, m2-CG

Intended use
Installation parameters
Minimum thickness of concrete member, minimum spacing and edge distances

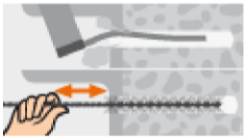
Annex B 2

Deutsches Institut für Bautechnik DIBt

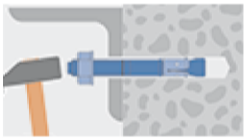
Installation instructions



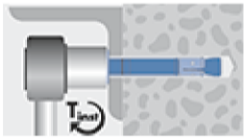
Drilling the hole



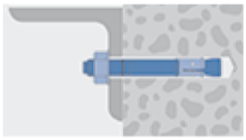
Cleaning the hole



Fixing plug and building material



Tightening with torque wrench and predetermined value of T_{inst}



Tightened fixation

m2, m2-C, m2-CG	**Annex B 3**
Intended use Installation instructions	

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

Fastener size			**M6**	**M8**[2]	**M10x60**[3]	**M10**[2]	**M12**[2]		**M16**	**M20**
Fastener length	L	[mm]					≤ 185	> 185		
Installation safety factor	γ_{inst}	[-]	1,0				1,2			
Steel failure										
Characteristic resistance	$N_{Rk,s}$	[kN]	10	19	33	33	43	43	77	124
Partial safety factor	γ_{Ms}[1]	[-]	1,4							
Pull-out failure										
Characteristic resistance	$N_{Rk,p}$	[kN]	7,5	12	n.d.[4]	16	24	24	30	50
Increasing factor for $N_{Rk,p}$	ψ_c	C30/37	1,17		1,22	1,17				
		C40/50	1,32		1,41	1,32				
		C50/60	1,42		1,55	1,42				
Concrete cone failure										
Effective embedment depth	h_{ef}	[mm]	40	50	33	58	68		80	100
Factor uncracked concrete	$k_1=k_{ucr,N}$	[-]	11,0							
Spacing	$s_{cr,N}$	[mm]	120	150	100	175	205		240	300
Edge distance	$c_{cr,N}$	[mm]	60	75	50	87	102		120	150
Concrete splitting failure										
Spacing	$s_{cr,sp}$	[mm]	200	250	165	290	340		400	500
Edge distance	$c_{cr,sp}$	[mm]	100	125	82,5	145	170		200	250

[1] In absence of other national regulations.
[2] Valid for clip in annex A2
[3] Only for application with statically indeterminate structural components.
[4] Pull-out failure not decisive.

Table C2: Displacements under tension load

Fastener size			**M6**	**M8**	**M10x60**	**M10**	**M12**	**M16**	**M20**
Tension load	N	[kN]	3,6	5,7	4,6	7,6	9,9	11,9	19,8
Displacement	δ_{N0}	[mm]	0,3		0,14	0,3			
	$\delta_{N\infty}$	[mm]	1,3						

m2, m2-C, m2-CG

Performances
Design method A, characteristic values under tension load
Displacements under tension load

Annex C 1

Deutsches Institut für Bautechnik DIBt

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

Fastener size			**M6**	**M8**[2]	**M10x60**[2),3)]	**M10**[2]	**M12**[2]		**M16**	**M20**
Fastener length	L	[mm]					≤ 185	> 185		
Steel failure without lever arm										
Characteristic resistance	$V_{Rk,s}$	[kN]	4,5	11	18	18	24	28	33	51
Partial safety factor	γ_{Ms}[1]	[-]	1,5	1,29	1,27	1,27	1,25	1,33	1,5	
Steel failure with lever arm										
Characteristic resistance	$M^0_{Rk,s}$	[Nm]	12,0	27	56,8	56,8	91,6	104,7	249	486,2
Partial safety factor	γ_{Ms}[1]	[-]	1,5	1,29	1,27	1,27	1,25	1,33	1,5	
Concrete pryout failure										
Factor	k_8	[-]	1,0				2,0			
Concrete edge failure										
Effective fastener length under shear load	l_f	[mm]	40	50	33	58	68		80	100
external fastener diameter	d_{nom}	[mm]	6	8	10	10	12		16	20

[1] In absence of other national regulations.
[2] valid for clip in annex A2
[3] Only for application with statically indeterminate structural components.

Table C4: Displacements under shear load

Fastener size			**M6**	**M8**	**M10x60**	**M10**	**M12**	**M16**	**M20**
Shear load		[kN]	1,9	3,5	4,6	5,5	7,5	14	21,9
Displacement	δ_{VO}	[mm]	1,6	2,2	2,1	2,4	2,7	3,3	3,8
	$\delta_{V\infty}$	[mm]	2,4	3,2	3,2	3,6	4,1	4,9	5,7

m2, m2-C, m2-CG

Performances
Design method A, characteristic values under shear load
Displacements under shear load

Annex C 2