Deutsches Institut für Bautechnik

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

European Technical Assessment

ETA-14/0063 of 28 March 2014

General Part

Technical Assessment Body issuing the European Technical Assessment:	Deutsches Institut für Bautechnik
Trade name of the construction product	Kangaroo Throughbolt m2, m2C
Product family to which the construction product belongs	Torque-controlled expansion anchor for use in non-cracked concrete
Manufacturer	Kangaroo Co. Talstraße 37 63128 Dietzenbach DEUTSCHLAND
Manufacturing plant	Plant 1
This European Technical Assessment contains	11 pages including 3 annexes which form an integral part of this assessment
This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of	Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 2: "Torque controlled expansion anchors", April 2013, used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011.

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Specific Part

1 Technical description of the product

The Kangaroo Throughbolt m2, m2C in the range of M6, M8, M10, M12, M16 and M20 is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

The Illustration and the description of the product are 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 the assumption of 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, 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 for tension loads	See Annex C 1
Characteristic resistance for shear	See Annex C 2
Displacements under tension loads	See Annex C 1
Displacements under shear loads	See Annex C 2

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 determined (NPD)

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European Technical Assessment, there may be requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU-Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

For Basic Works Requirement Safety in use the same criteria are valid as for Basic Works Requirement Mechanical resistance and stability.

3.5 Protection against noise (BWR 5)

Not applicable.

3.6 Energy economy and heat retention (BWR 6)

Not applicable.

3.7 Sustainable use of natural resources (BWR 7)

For the sustainable use of natural resources no performance was investigated for this product.

3.8 General aspects

The verification of durability is part of testing the essential characteristics. Durability is only ensured if the specifications of intended use according to Annex B are taken into account.

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

According to Decision of the Commission of 24 June 1996 (96/582/EC) (OJ L 254 of 08.10.96 p. 62-65), the system of assessment and verification of constancy of performance (see Annex V and Article 65 Paragraph 2 to Regulation (EU) No 305/2011) given in the following table applies.

Product	Intended use	Level or class	System
Metal anchors for use in concrete (heavy-duty type)	For fixing and/or supporting concrete structural elements or heavy units such as cladding and suspended ceilings	—	1

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

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 28 March 2014 by Deutsches Institut für Bautechnik

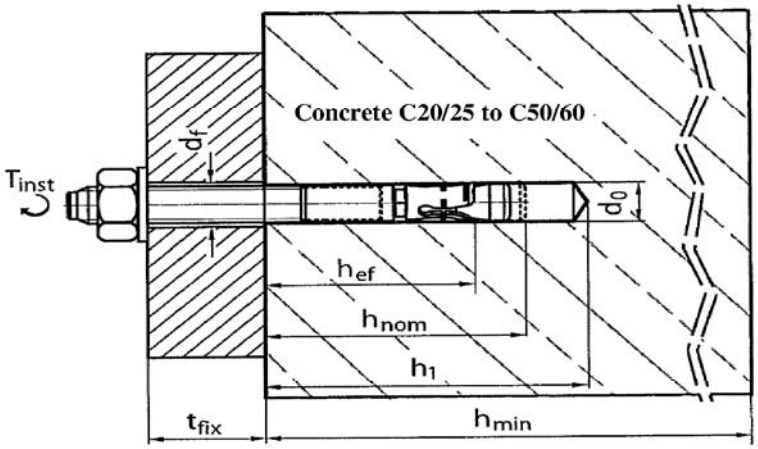
Gerhard Breitschaft
President

Beglaubigt:
Baderschneider

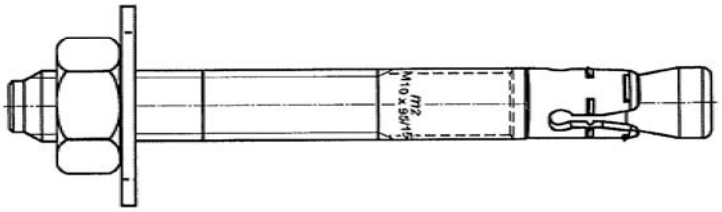
Deutsches Institut für Bautechnik

DIBt

Installation



Throughbolt



	Marking	Designation
m2	m2	m2 Steel galvanised, Washer DIN 125:1990 m2C Steel galvanised, Washer DIN 9021:1990
M10 x 95 /	M6...M20	Nominal diameter
	x 65...440	Length of anchor
	/ 10...325	Maximum fixture thickness

Kangaroo throughbolt m2, m2C

Product description
Installed condition
Throughbolt

Annex A 1

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Table A1: Dimensions

					M6	M8	M10	M12	M16	M20
Bolt		d_k	[mm]		6	8	10	12	16	20
		d_h	[mm]		4	5.6	7.3	8.7	11.5	15.2
		d_{s1}	[mm]		5.25	7.05	8.9	10.7	14.5	-
		d_{s2}	[mm]		-	-	-	12	16	20
		min t_{fix}	[mm]		10	10	15	15	15	30
		max t_{fix}	[mm]		40	95	100	265	325	140
		min l_G	[mm]		32	43	52	62	73	100
		max l_G	[mm]		62	120	120	120	120	120
		min l	[mm]		65	80	95	110	130	160
		max l	[mm]		95	165	180	360	440	270
Expansion sleeve	Type A	l_s	[mm]		9.5	12	14.2	16.8	19.3	21.6
	Type B				-	-	-	-	19.7	-
Washer	m2	d_u	[mm]		12	16	20	24	30	37
	m2C	d_u	[mm]		18	24	30	37	50	60
Hexagonal nut		SW	[mm]		10	13	17	19	24	30

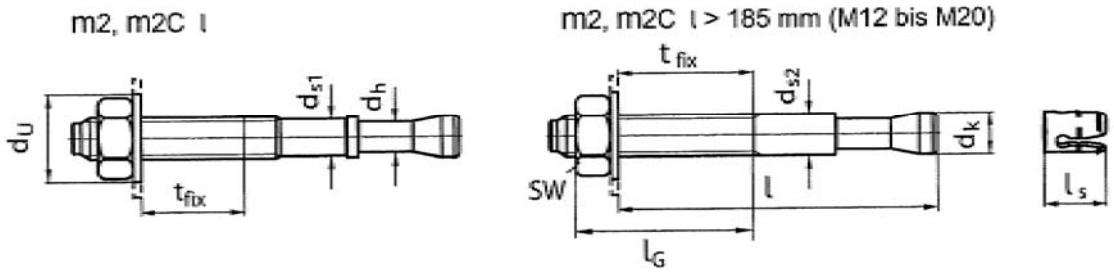

Table A2: Materials

Part	Designation		Material	
1	Bolt		Cold formed or machined steel	galvanized ≥ 5 µm DIN 50961:2012-04
2a)	Expansion sleeve		Steel 1.4016 according to EN10088-1:2005	(Type A; M6 to M20)
2b)			Steel 1.4401, 1.4404, 1.4016 according to EN 10088-1:2005	(Type B; M16)
3	Washer	m2	Steel according to DIN DIN 125:1990	galvanised zinc plated ≥ 5 µm ISO 4042:1999
		m2C	Steel according to DIN 9021:1990	galvanised zinc plated ≥ 5 µm ISO 4042:1999
4	Hexagonal nut		Steel strength grade 8 according to EN ISO 898-2:2012	galvanised zinc plated ≥ 5 µm ISO 4042:1999

Kangaroo throughbolt m2, m2C

Product description
Dimensions and Materials

Annex A 2

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

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.

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 are designed in accordance with ETAG 001, Annex C, design method A, Edition August 2010

Installation:

- Hole drilling by hammer drill mode only.
- Anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters of the site.
- Anchor installation such that the effective anchorage depth is complied with. This compliance is ensured when the embedment mark of the anchor does no more exceed the concrete surface.
- 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 in the direction of load application.

Kangaroo throughbolt m2, m2C	**Annex B 1**
Intended Use Specifications	

Deutsches Institut für Bautechnik DIBt

Table B1: Installation data

			M6	M8	M10	M12	M16	M20
Nominal drill hole diameter	d_0	[mm]	6	8	10	12	16	20
Cutting diameter of drill bit	d_{cut}	[mm]	6,4	8.45	10.45	12.5	16.5	20.55
Torque moment	T_{inst}	[Nm]	5	15	30	50	100	200
Depth of drill hole	h_1	[mm]	60	65	80	90	110	130
Anchor embedment depth	h_{nom}	[mm]	46.9	58.5	68.8	79.6	96.4	118
Effective anchorage depth	h_{ef}	[mm]	40	50	58	68	80	100
Diameter of clearance hole in the fixture	d_f	[mm]	7	9	12	14	18	22

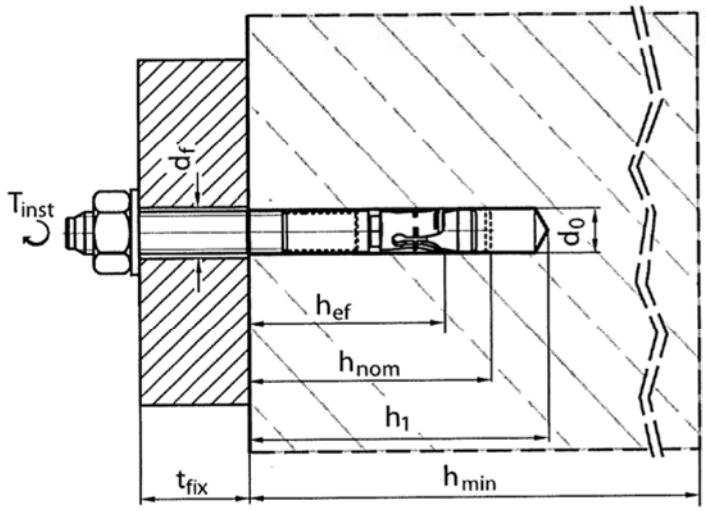

Table B2: Minimum thickness of concrete member, minimum spacing and minimum edge distance

Non-cracked concrete only			M6	M8	M10	M12[1)]	M16[1)]	M20
Minimum member thickness	h_{min}	[mm]	100	100	120	140	160	200
Minimum spacing	s_{min}	[mm]	40	50	60	75 (110)	100 (120)	200
	for c	[mm]	70	90	115	150 (200)	190 (320)	400
Minimum edge distance	c_{min}	[mm]	40	50	60	100 (150)	130 (240)	300
	for s	[mm]	80	100	120	150 (210)	190 (240)	350

[1)] The values in parentheses are valid for anchor length l > 185 mm.

Kangaroo throughbolt m2, m2C

Intended Use
Installation data
Minimum thickness of member, minimum spacing and edge distances

Annex B 2

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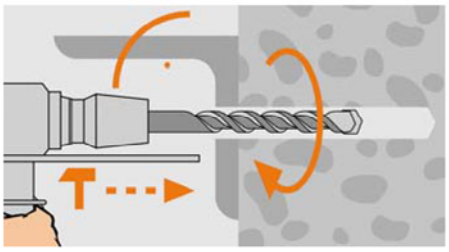
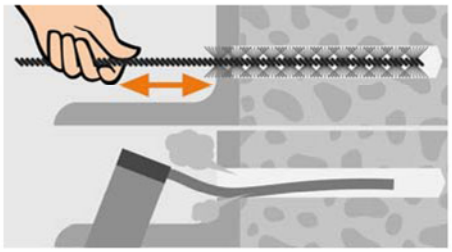
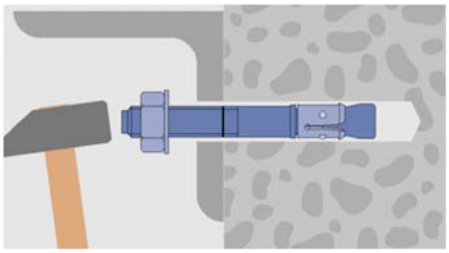
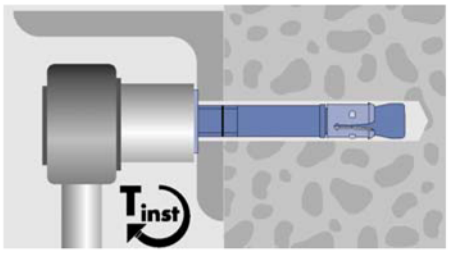
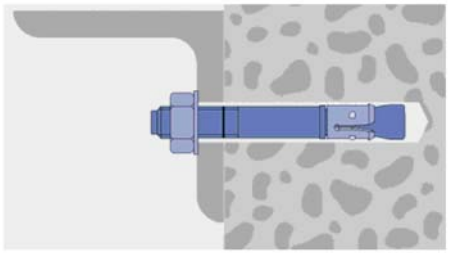
Installation Instructions

	1. Hole drilling by hammer drill mode.
	2. Brush the hole and blow out dust.
	3. Drive in throuhgbolt.
	4. Apply installation torque moment T_{inst}, according Table B1, by using torque wrench.
	5. finished installation.

Kangaroo throughbolt m2, m2C

Intended Use
Installation Instructions

Annex B 3

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Table C1: Characteristic values of resistance under tension loads

			M6	M8	M10	M12	M16	M20
Steel failure								
Characteristic resistance	$N_{Rk,s}$	[kN]	9.6	19.0	32.6	43.6	76.6	123.8
Partial safety factor	γ_2	[-]	1.4					
Pull-out failure								
Characteristic resistance in non-cracked concrete C20/25	$N_{Rk,p}$	[kN]	7.5	12	16	25	30	50
Increasing factors for non-cracked concrete ψ_c	C30/37	[-]	1.17					
	C40/50	[-]	1.32					
	C50/60	[-]	1.42					
Installation safety factor	γ_2	[-]	1.0			1.2		
Concrete cone failure and splitting failure								
Effective anchorage depth	h_{ef}	[mm]	40	50	58	68	80	100
Spacing	$s_{cr,N}$	[mm]	120	150	174	204	240	300
	$s_{cr,sp}$	[mm]	200	250	290	340	400	500
Edge distances	$c_{cr,N}$	[mm]	60	75	87	102	120	150
	$c_{cr,sp}$	[mm]	100	125	145	170	200	250
Installation safety factor	γ_2	[-]	1.0			1.2		

Table C2: Displacements under tension loads

			M6	M8	M10	M12	M16	M20
Tension load in non-cracked concrete C20/25 to C50/60		[kN]	3.6	5.7	7.6	9.9	11.9	19.8
Displacement	δ_{NO}	[mm]	0.3					
	δ_N	[mm]	1.3					

Kangaroo throughbolt m2, m2C

Performances
Characteristic values of resistance under tension loads
Displacements under tension loads

Annex C 1

Deutsches Institut für Bautechnik DIBt

Table C3: Characteristic values of resistance under shear loads

			M6	M8	M10	M12	M16	M20
Steel failure without lever arm								
Characteristic resistance	$N_{Rk,s}$	[kN]	4.5	8.2	13.0	17.7	32.9	51.4
Steel failure with lever arm								
Characteristic resistance	$M_{Rk,s}$	[Nm]	12.2	30.0	59.8	98.2	249	486.2
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 length of anchor in shear loading	l_f	[mm]	40	50	58	68	80	100
Diameter of anchor	d_{nom}	[mm]	6	8	10	12	16	20

Table C4: Displacements under shear load

			M6	M8	M10	M12	M16	M20
Shear load in non-cracked concrete C20/25 to C50/60		[kN]	1.9	3.5	5.5	7.5	14.0	21.9
Displacement	δ_{V0}	[mm]	1.6	2.2	2.4	2.7	3.3	3.8
	δ_V	[mm]	2.4	3.2	3.6	4.1	4.9	5.7

Kangaroo throughbolt m2, m2C

Performances
Characteristic values of resistance under shear loads
Displacements under shear loads

Annex C 1