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-23/0137 of 12 April 2023

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	TX m2, TX m2-C, TX m2-CG
Product family to which the construction product belongs	Mechanical fastener for use in uncracked concrete
Manufacturer	AS System d.o.o. Obrtniska ulica 14 3240 SMARJE PRI JELSAH SLOWENIEN
Manufacturing plant	AS System d.o.o. Obrtniska ulica 14 3240 SMARJE PRI JELSAH SLOVENIA
This European Technical Assessment contains	12 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	EAD 330232-01-0601, Edition 05/2021

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Specific Part

1 Technical description of the product

The TX m2, TX m2-C, TX m2-CG is an anchor made of galvanised steel which is placed into a drilled hole and anchored by torque-controlled expansion.

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 to tension load (static and quasi static action) Method A	See Annex B 2 and Annex C 1
Characteristic resistance to shear load (static and quasi static action)	See Annex C 2
Displacements	See Annex C 1 and C 2
Characteristic resistance and displacements for seismic performance categories C1 and C2	No performance assessed
Durability	See Annex B 1

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	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 the European Assessment Document EAD 330232-01-0601 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 EAD

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

Issued in Berlin on 12 April 2023 by Deutsches Institut für Bautechnik

Dipl.-Ing. Beatrix Wittstock
Head of Section

beglaubigt:
Ziegler

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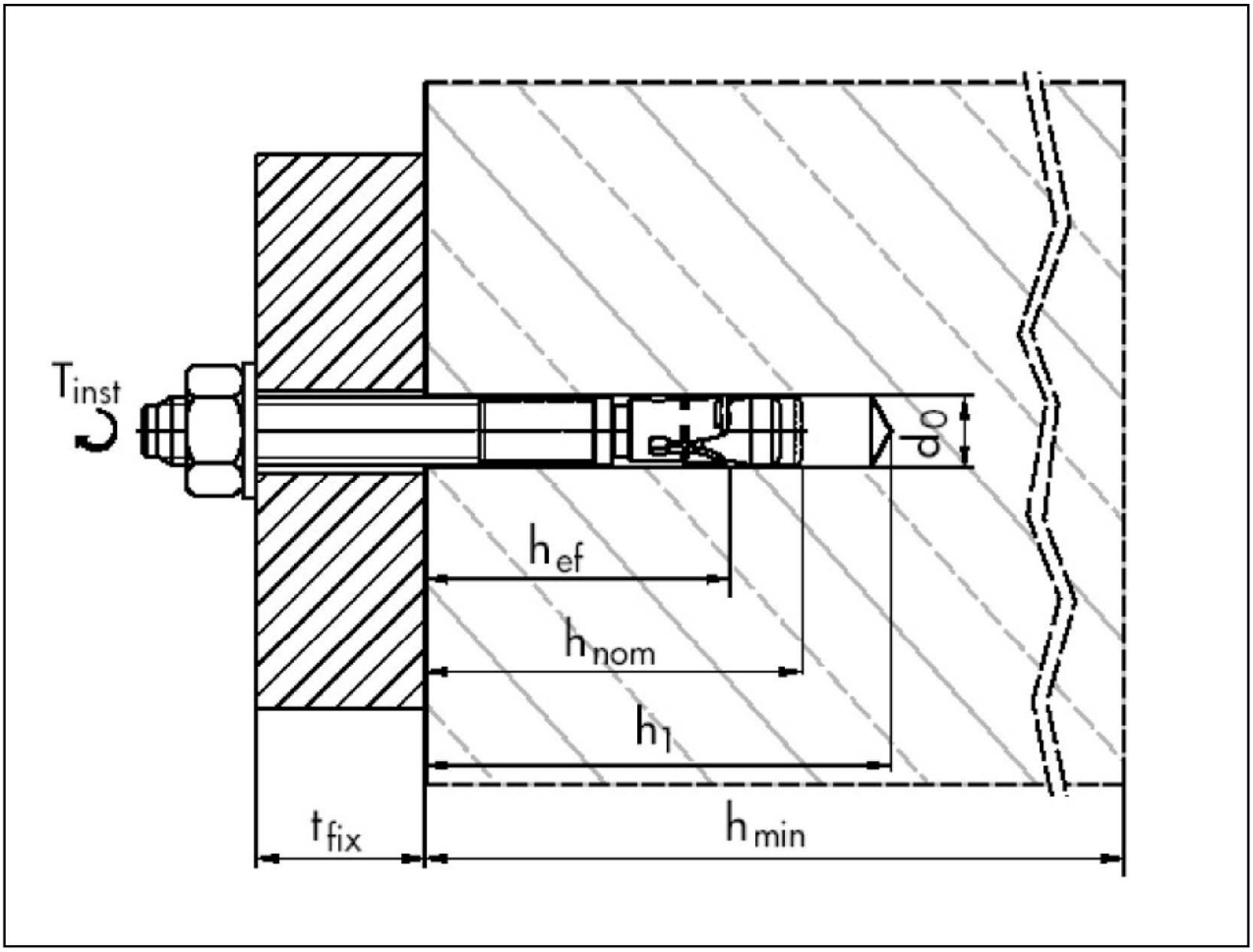
Installed condition



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

TX m2, TX m2-C, TX m2-CG	**Annex A 1**
Product description Installed condition	

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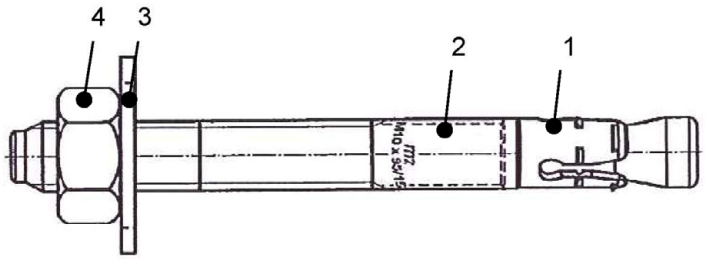
Anchor type



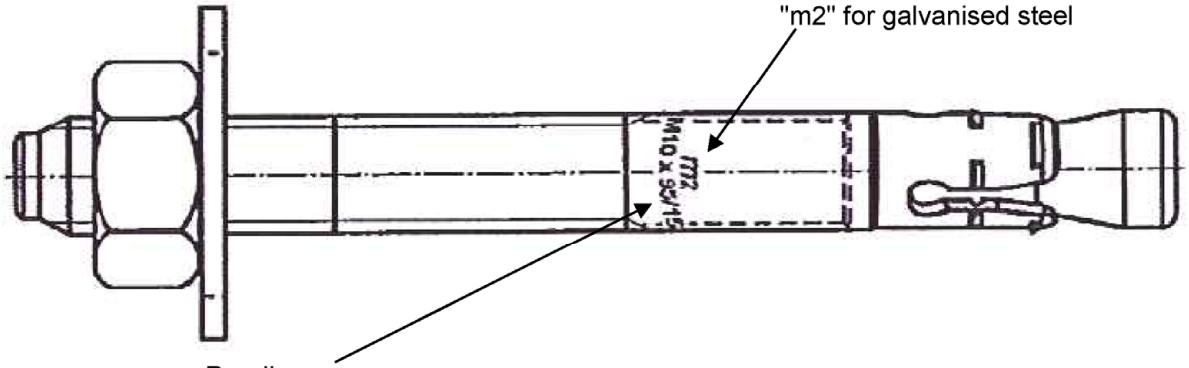
1 expansion element
2 bolt
3 washer
4 hexagonal nut

Shapes of clips:

TX m2 M6
TX m2 M16 Typ A
TX m2 M20

TX m2 M8
TX m2 M10
TX m2 M12

TX m2 M16 Typ B



Reading:
Nominal diameter (e.g. M10) x fastener length (e.g. 95) x max. member thickness (e.g.15)

Anchor types:

TX m2	bolt m2 with washer EN ISO 7089:2000 and hexagonal nut EN ISO 4032:2012
TX m2-C	bolt m2 with washer EN ISO 7093-1:2000 and hexagonal nut EN ISO 4032:2012
TX m2-CG	bolt m2 with washer EN ISO 7094:2000 and hexagonal nut EN ISO 4032:2012

TX m2, TX m2-C, TX m2-CG

Product description
Marking and denomination

Annex A 2

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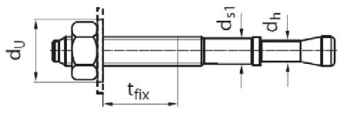
Table A1: Dimensions

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

TX m2, TX m2-C, TX m2-CG



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

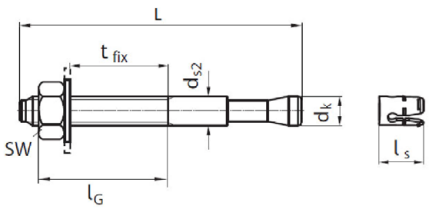


Table A2: Materials

Part	Designation		Material
1	Bolt	L ≤ 185 mm	cold forged steel EN 10263-2:2017, electroplated ≥ 5 µm
		L > 185 mm[1)]	free-cutting steel EN ISO 683-4:2018, electroplated ≥ 5 µm
2	Expansion element	L ≤ 185 mm	cold rolled steel strip EN 10139:2016+A1:2020, electroplated ≥ 5 µm
		L > 185 mm[1)]	cold rolled stainless steel strip EN 10088-2:2014, no coating
3	Washer		cold rolled steel strip EN 10139:2016+A1:2020, electroplated ≥ 5 µm
4	Hexagonal nut		steel, property class 8, EN ISO 4032:2012, electroplated ≥ 5 µm

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

TX m2, TX m2-C, TX 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:
- Compacted reinforced or unreinforced normal weight concrete without fibres according to EN 206-1:2013 + A1:2016.
- Strength classes C20/25 to C50/60 according to EN 206-1:2013 + A1:2016.
- Uncracked concrete

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. 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:
  EN 1992-4:2018 and EOTA Technical Report TR 055, 12/2016

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 under the supervision of the person responsible for technical matters of the site
- Cleaning the holes.
- The anchor may only be set once.

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

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Table B1: Installation parameters

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)	$d_{cut} \leq$	[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
Anchor 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

TX m2, TX m2-C, TX m2-CG

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

Annex B 2

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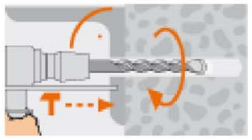
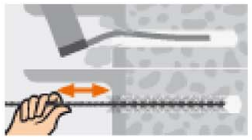
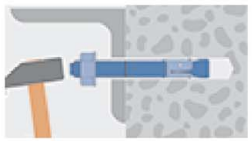
Installation instructions



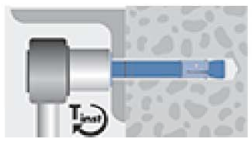
Drilling the hole



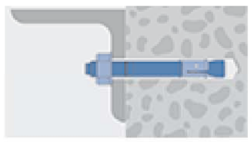
Cleaning the hole



Fixing plug and building material



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



Tightened fixation
Check of correct effective embedment depth:
The marking of embedment depth should not be visible above the concrete surface

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

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

Size			**M6**	**M8**[2]	**M10x60**[3]	**M10**[2]	**M12**[2]		**M16**	**M20**
Anchor length	L	[mm]					≤ 185	> 185		
Installation safety factor	γ_{inst}	[-]	1,0				1,2			
Steel failure										
Characteristic tension 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 tension resistance	$N_{Rk,p}$	[kN]	7,5	12	-[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										
Characteristic resistance in uncracked concrete C20/25	$N^0_{Rk,sp}$	[kN]	Min ($N_{Rk,p}$; $N^0_{Rk,c}$ [5])							
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] No performance assessed
[5] $N^0_{Rk,c}$ according to EN 1992-4:2018

Table C2: Displacements under tension load

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						

TX m2, TX m2-C, TX m2-CG

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

Annex C 1

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

Size			M6	M8[2]	M10x60[2),3)]	M10[2]	M12[2]		M16	M20
Anchor length	L	[mm]					≤ 185	> 185		
Steel failure without lever arm										
Characteristic resistance	$V^0_{Rk,s}$	[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	
Ductility factor	k_7	[-]	1,0							
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										
Pryout-Factor	k_8	[-]	1,0				2,0			
Concrete edge failure										
Effective anchor 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

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_{V0}	[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