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

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European Technical Assessment

ETA-17/0176 of 30/03/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	RDI ANCHOR
Product family to which the construction product belongs	Deformation-controlled expansion anchors for use in non-cracked concrete
Manufacturer	Rex Fastening Systems (HK) Ltd. Unit 2005, 20/F, Enterprise Square 3 39 Wang Chiu Road Kowloon Bay, Hong Kong
Manufacturing plant	Manufacturing Plant no. 3
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	European Assessment Document (EAD) 330232-00-0601 “Mechanical fasteners for use in concrete”

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

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Specific Part

1 Technical description of the product

RDI ANCHOR are deformation-controlled expansion anchors. The anchors RDI ANCHOR are made of zinc plated steel.

The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

The description of the product is given in Annex A.

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

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B.

The performances given in this European Technical Assessment are based on an assumed 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 or the Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance, displacements	See Annexes C1 to C3
Edge distance and spacing	See Annexes C1 to C3

3.1.2 Safety in case of fire (BWR 2)

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

3.2 Methods used for the assessment

The assessment of fitness of the anchors for the declared intended use in relation to the requirements for mechanical resistance and stability and safety in case of fire in the sense of the Basic Requirements 1 and 2 has been made in accordance with the EAD 330232-00-0601 "*Mechanical fasteners for use in concrete*".

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

According to Decision 96/582/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table applies.

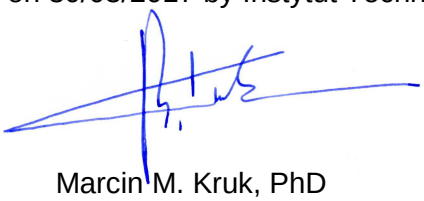
Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete structural elements (which contributes to the stability of the works) or heavy units	–	1

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 30/03/2017 by Instytut Techniki Budowlanej



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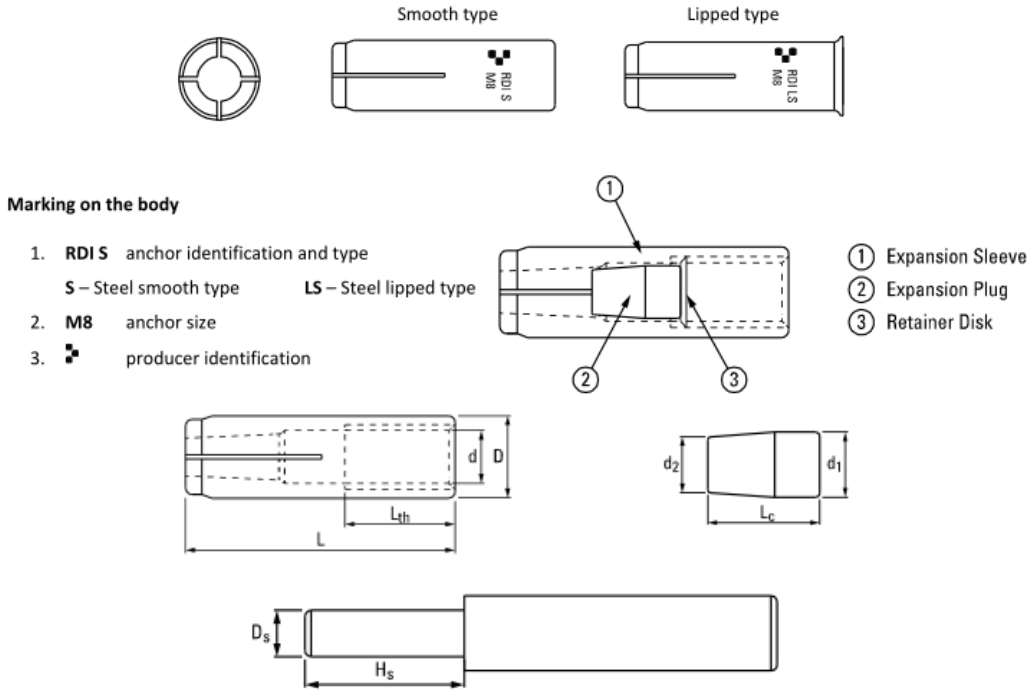


Table A1. RDI ANCHOR – dimensions and materials

Dimensions								
Anchor size			**M8**	**M10**	**M12**	**M12D**	**M16**	**M20**
Expansion sleeve								
Sleeve diameter	D	mm	10	12	15	16	20	25
Sleeve length	L	mm	30	40	50	50	65	80
Thread	d	-	M8	M10	M12	M12	M16	M20
Thread length	L_{th}	mm	13	17	21	21	30	30
Expansion plug								
Plug diameter	d_1	mm	6,5	8	10,1	10,1	13,5	17,3
Plug diameter	d_2	mm	5,5	6,5	8,5	8,5	11,4	16,3
Plug length	L_c	mm	12	15	20	20	27	30
Installation pin								
Setting pin diameter	D_s	mm	6,6	7,8	9,6	9,6	13,5	15,8
Setting pin length	H_s	mm	18	25	30	30	38	50

Materials		
Element	**Material**	**Protection**
Expansion sleeve	Q195 acc. to GB/T 700	zinc coating (≥ 5 µm); electroplated acc. to EN ISO 4042
Expansion plug	Q195 acc. to GB/T 700	

RDI ANCHOR

Product description
Characteristic of the product

Annex A1

of European Technical Assessment ETA-17/0176

SPECIFICATION OF INTENDED USE

Anchorages subject to:

- Static and quasi-static loads.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Non-cracked concrete.

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 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 EOTA Technical Report TR 055.

Installation:

- Anchor installation 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 any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check of concrete being well compacted, e.g. without significant voids.
- 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 in the direction of load application.
- Anchor installation such that the effective anchorage depth is complied with.

RDI ANCHOR	**Annex B1** of European Technical Assessment ETA-17/0176
Intended use Specification	

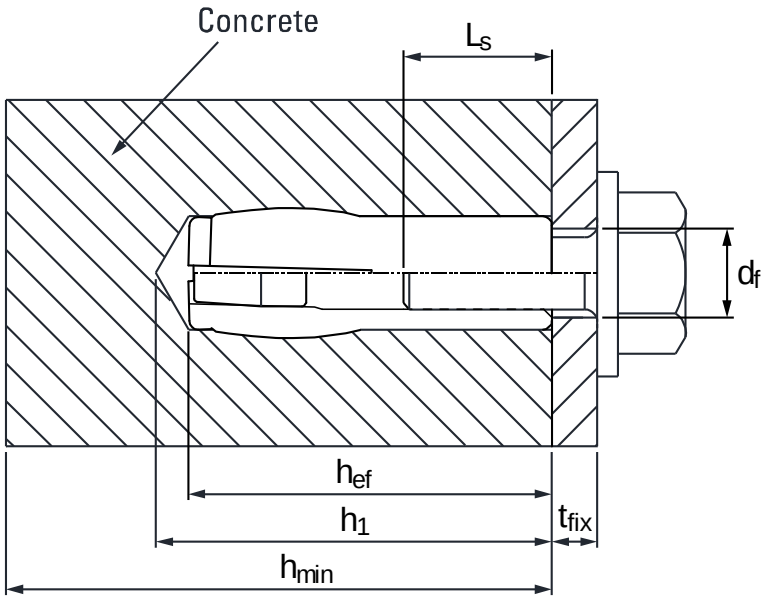


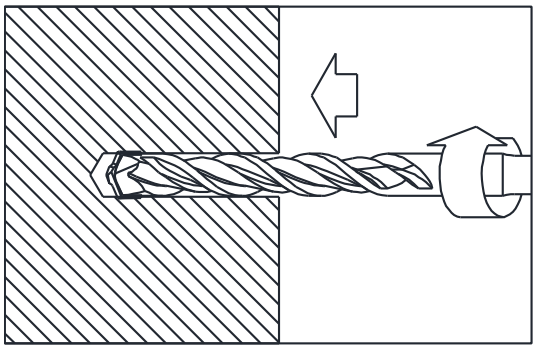
Table B1: Installation parameters

Anchor			**RDI ANCHOR**					
Size			**M8**	**M10**	**M12**	**M12D**	**M16**	**M20**
Effective anchorage depth	h_{ef}	[mm]	30	40	50	50	65	80
Drill hole depth	h_1	[mm]	33	43	54	54	70	85
Drill hole diameter	d_0	[mm]	10	12	15	16	20	25
Installation torque (max)	T_{inst}	[mm]	8	15	35	35	60	120
Thickness of concrete member (min)	h_{min}	[mm]	100	100	100	100	130	160
Screwing depth (min)	$L_{s, min}$	[mm]	8	10	12	12	16	20
Screwing depth (max)	$L_{s, max}$	[mm]	13	17	21	21	30	30
Diameter of clearance hole in the fixture	d_f	[mm]	9	12	14	14	18	22
Spacing (min)	s_{min}	[mm]	41	54	68	68	88	108
Edge distance (min)	c_{min}	[mm]	41	54	68	68	88	108

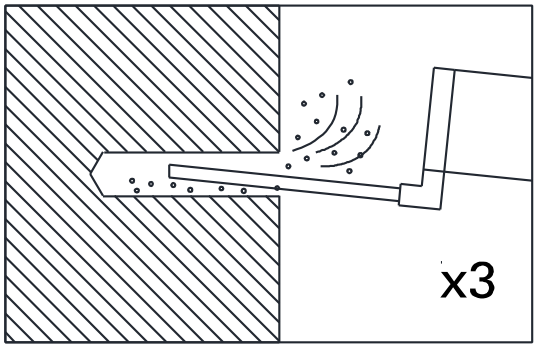
Fastening screws or anchor threaded rods:

Steel, property class 4.6 / 4.8 / 5.8 / 6.8 / 8.8 according to EN-ISO 898-1; thickness of galvanizing ≥ 5 µm

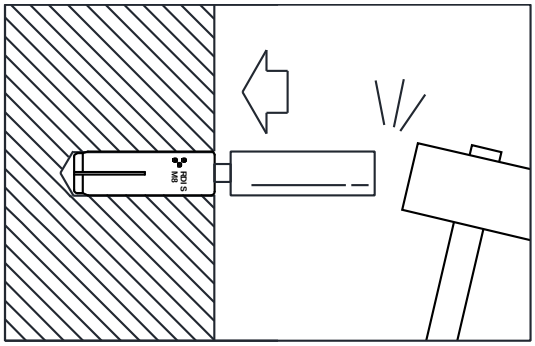
RDI ANCHOR	**Annex B2** of European Technical Assessment ETA-17/0176
Intended use Installation parameters	



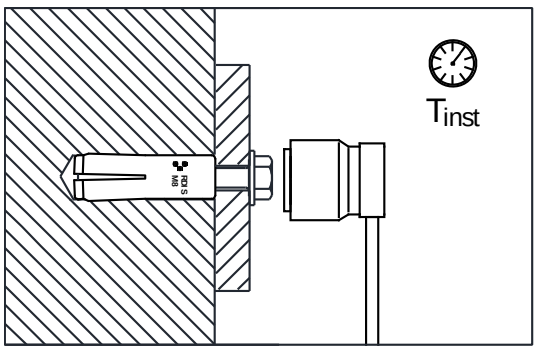
Drill hole with rotary percussive machine. Drill to a required depth.



Blow out dust at least 3 times with a hand pump.



Put the anchor into the drill hole, hammering with the installation tool, until the setting pin fully insert into the anchor.



Fix the fixture by screw or threaded rod with max. T_{inst}.

RDI ANCHOR	**Annex B3** of European Technical Assessment ETA-17/0176
Intended use Installation instruction and tools	

Table C1: Characteristic resistance to tension load in non-cracked concrete (static and quasi-static loading)

Anchor				RDI ANCHOR					
Size				**M8**	**M10**	**M12**	**M12D**	**M16**	**M20**
Steel failure									
Steel failure with threaded rod grade 4.6									
Characteristic resistance		$N_{Rk,s}$	[kN]	14,6	23,2	33,7	33,7	62,8	98,0
Partial safety factor		γ_{Ms} 2)	[-]	2,0	2,0	2,0	2,0	2,0	2,0
Steel failure with threaded rod grade 4.8									
Characteristic resistance		$N_{Rk,s}$	[kN]	14,6	23,2	33,7	33,7	62,8	98,0
Partial safety factor		γ_{Ms} 2)	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Steel failure with threaded rod grade 5.8									
Characteristic resistance		$N_{Rk,s}$	[kN]	18,3	29,0	42,2	42,2	78,5	122,5
Partial safety factor		γ_{Ms} 2)	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Steel failure with threaded rod grade 6.8									
Characteristic resistance		$N_{Rk,s}$	[kN]	22,0	34,8	50,6	50,6	94,2	147,0
Partial safety factor		γ_{Ms} 2)	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Steel failure with threaded rod grade 8.8									
Characteristic resistance		$N_{Rk,s}$	[kN]	29,3	46,4	67,4	67,4	125,6	196,0
Partial safety factor		γ_{Ms} 2)	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Pullout failure									
Characteristic resistance in non-cracked concrete C20/25		$N_{Rk,p}$	[kN]	1)	1)	1)	1)	25	30
Installation safety factor		γ_2 3) = γ_{inst} 4) 5)	[-]	1,2	1,2	1,4	1,2	1,2	1,2
Increasing factor	concrete C30/37	ψ_c	[-]	1,22	1,22	1,22	1,22	1,22	1,22
	concrete C40/50		[-]	1,41	1,41	1,41	1,41	1,41	1,41
	concrete C50/60		[-]	1,55	1,55	1,55	1,55	1,55	1,55
Concrete cone failure and splitting failure									
Effective embedment depth		h_{ef}	[mm]	30	40	50	50	65	80
Factor for non-cracked concrete		k_1 3) = k_{ucr} 4)	[-]	10,1	10,1	10,1	10,1	10,1	10,1
Factor for non-cracked concrete		$k_{ucr,N}$ 5)	[-]	11,0	11,0	11,0	11,0	11,0	11,0
Installation safety factor		γ_2 3) = γ_{inst} 4) 5)	[-]	1,2	1,2	1,4	1,2	1,2	1,2
Increasing factor	concrete C30/37	ψ_c	[-]	1,22	1,22	1,22	1,22	1,22	1,22
	concrete C40/50		[-]	1,41	1,41	1,41	1,41	1,41	1,41
	concrete C50/60		[-]	1,55	1,55	1,55	1,55	1,55	1,55
Characteristic resistance to splitting		$N^0_{Rk,sp}$	[kN]	1)	1)	1)	1)	25	30
Characteristic spacing	concrete cone failure	$s_{cr,N}$	[mm]	90	120	150	150	195	240
	splitting failure	$s_{cr,sp}$	[mm]	210	280	350	350	455	560
Characteristic edge distance	concrete cone failure	$c_{cr,N}$	[mm]	45	60	75	75	97	120
	splitting failure	$c_{cr,sp}$	[mm]	105	140	175	175	227	280

RDI ANCHOR

Annex C1

of European Technical Assessment ETA-17/0176

Performances
Characteristic resistance to tension load

Table C2: Characteristic resistance to shear load in non-cracked concrete (static and quasi-static loading)

Anchor			**RDI ANCHOR**					
Size			**M8**	**M10**	**M12**	**M12D**	**M16**	**M20**
Steel failure without lever arm								
Steel failure with threaded rod grade 4.6								
Characteristic resistance	$V_{Rk,s}$ [3)4)] = $V^0_{Rk,s}$ [5)]	[kN]	7,3	11,6	31,4	16,9	31,4	49,0
Factor considering ductility	k [3)] = k_2 [4)] = k_7 [5)]	[-]	0,8	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,67	1,67	1,67	1,67	1,67	1,67
Steel failure with threaded rod grade 4.8								
Characteristic resistance	$V_{Rk,s}$ [3)4)] = $V^0_{Rk,s}$ [5)]	[kN]	7,3	11,6	31,4	16,9	31,4	49,0
Factor considering ductility	k [3)] = k_2 [4)] = k_7 [5)]	[-]	0,8	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 5.8								
Characteristic resistance	$V_{Rk,s}$ [3)4)] = $V^0_{Rk,s}$ [5)]	[kN]	9,2	14,5	39,3	21,1	39,3	61,3
Factor considering ductility	k [3)] = k_2 [4)] = k_7 [5)]	[-]	0,8	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 6.8								
Characteristic resistance	$V_{Rk,s}$ [3)4)] = $V^0_{Rk,s}$ [5)]	[kN]	11,0	17,4	47,1	25,3	47,1	73,5
Factor considering ductility	k [3)] = k_2 [4)] = k_7 [5)]	[-]	0,8	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 8.8								
Characteristic resistance	$V_{Rk,s}$ [3)4)] = $V^0_{Rk,s}$ [5)]	[kN]	14,6	23,2	62,8	33,7	62,8	98,0
Factor considering ductility	k [3)] = k_2 [4)] = k_7 [5)]	[-]	0,8	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with lever arm								
Steel failure with threaded rod grade 4.6								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	15,0	29,9	52,4	52,4	133,3	259,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,67	1,67	1,67	1,67	1,67	1,67
Steel failure with threaded rod grade 4.8								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	15,0	29,9	52,4	52,4	133,3	259,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 5.8								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	18,8	37,4	65,6	65,6	166,6	324,8
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 6.8								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	22,5	44,9	78,7	78,7	199,9	389,7
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25
Steel failure with threaded rod grade 8.8								
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	30,0	59,9	104,9	104,9	266,6	519,7
Partial safety factor	γ_{Ms} [2)]	[-]	1,25	1,25	1,25	1,25	1,25	1,25

RDI ANCHOR

Performances
Characteristic resistance to shear loads

Annex C2

of European Technical Assessment ETA-17/0176

Table C3: Characteristic resistance and displacements (static and quasi-static loading)

Anchor			**RDI ANCHOR**					
Size			**M8**	**M10**	**M12**	**M12D**	**M16**	**M20**
Resistance to pry-out failure								
Factor for non-cracked concrete	$k^{3)} = k_3{}^{4)} = k_8{}^{5)}$	[-]	1,0	1,0	1,0	1,0	2,0	2,0
Partial safety factor	$\gamma_{Ms}{}^{2)}$	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Resistance to concrete edge failure								
Outside diameter of anchor	d_{nom}	[mm]	10	12	15	16	20	25
Effective length of anchor under shear loads	l_f	[mm]	30	40	50	50	65	80
Partial safety factor	$\gamma_{Mc}{}^{2)}$	[-]	1,5	1,5	1,5	1,5	1,5	1,5
Minimum member thickness	h_{min}	[mm]	100	100	100	100	130	160
Minimum edge distance	c_{min}	[mm]	41	54	68	68	88	108
Minimum spacing	s_{min}	[mm]	41	54	68	68	88	108
Displacements under static and quasi-static loading								
Tension and shear load in non-cracked concrete C20/25 to C50/60								
Tension load and shear load	N = V	[kN]	4,44	6,91	6,40	9,92	11,46	23,86
Short term tension displacement	δ_{N0}	[mm]	0,98	3,54	3,06	2,73	1,15	4,26
Long term tension displacement	$\delta_{N\infty}$	[mm]	0,50	0,50	0,38	0,50	0,50	0,50
Short term shear displacement	δ_{V0}	[mm]	0,98	3,54	3,06	2,73	1,15	4,26
Long term shear displacement	$\delta_{V\infty}$	[mm]	0,50	0,50	0,38	0,50	0,50	0,50

1) Pull-out failure mode is not decisive
2) 3) Parameter for design acc. to ETAG 001 Annex C
4) Parameter for design acc. to CEN/TS 1992-4-4:2009
5) Parameter for design acc. to prEN 1992-4:2016

RDI ANCHOR	**Annex C3** of European Technical Assessment ETA-17/0176
Performances Characteristic resistance and displacements	

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European Technical Assessment

ETA-17/0177 of 30/03/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	RDI ANCHOR
Product family to which the construction product belongs	Deformation-controlled expansion anchors for multiple use for non-structural applications in concrete
Manufacturer	Rex Fastening Systems (HK) Ltd. Unit 2005, 20/F, Enterprise Square 3 39 Wang Chiu Road Kowloon Bay, Hong Kong
Manufacturing plant(s)	Manufacturing Plant no. 3
This European Technical Assessment contains	10 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 ETAG 001, Edition April 2013 “Metal anchors for use in concrete – Part 1: Anchors in general and Part 6: Anchors for multiple use for non-structural applications”, used as European Assessment Document (EAD)

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Specific Part

1 Technical description of the product

The RDI ANCHOR are deformation-controlled expansion anchors. The anchors are made of zinc plated steel.

The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

The description of the product is given in Annex A.

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

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B.

The performances given in this European Technical Assessment are based on an assumed 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 or the Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for all load directions	See Annex C1
Edge distances and spacing	See Annex C1

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Resistance to fire	See Annex C2

3.1.3 Hygiene, health and the environment (BWR 3)

Regarding the dangerous substances clauses 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 Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.1.4 Safety and accessibility in use (BWR 4)

For Basic Requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability (BWR 1).

3.1.5 Sustainable use of natural resources (BWR 7)

No performance assessed.

3.1.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

3.2 Methods used for the assessment

The assessment of fitness of the anchors for the declared intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 has been made in accordance with the ETAG 001 *"Metal anchors for use in concrete*", Part 1: "*Anchors in general*" and Part 6: "*Anchors for multiple use for non-structural applications*".

The assessment of the anchor for the intended use in relation to the requirements for resistance to fire has been made in accordance with the EOTA Technical Report TR 020 "*Evaluation of anchorages in concrete concerning resistance to fire*".

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

According to Decision 97/161/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V 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 (light-duty type)	For use in redundant systems for fixing and/or supporting to concrete elements such as lightweight suspended ceilings, as well as installations	–	2+

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

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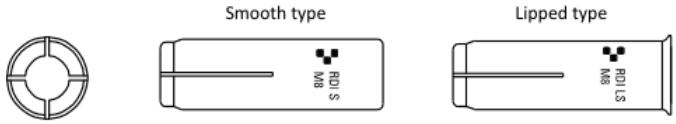
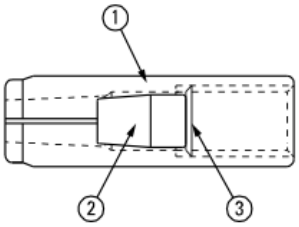
Marcin M. Kruk, PhD
Director of ITB

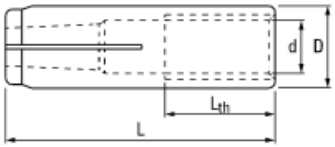


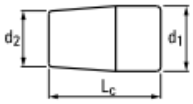
Marking on the body

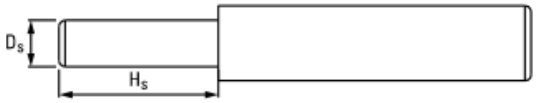
1. **RDI S** anchor identification and type
   S – Steel smooth type **LS** – Steel lipped type
2. **M8** anchor size
3. producer identification



1. Expansion Sleeve
2. Expansion Plug
3. Retainer Disk







Dimensions								
Anchor size			**M6**	**M8**	**M10H**	**M10**	**M12**	**M12D**
Expansion sleeve								
Sleeve diameter	D	[mm]	8	10	12	12	15	16
Sleeve length	L	[mm]	25	30	30	40	50	50
Thread	d	[-]	M6	M8	M10	M10	M12	M12
Thread length	L_{th}	[mm]	11	13	12	17	21	21
Expansion plug								
Plug diameter	d_1	[mm]	5,0	6,5	8,0	8,0	10,1	10,1
Plug diameter	d_2	[mm]	4,0	5,5	6,9	6,5	8,5	8,5
Plug length	L_c	[mm]	10	12	11	15	20	20
Installation pin								
Setting pin diameter	D_s	[mm]	4,8	6,6	7,8	7,8	9,6	9,6
Setting pin length	H_s	[mm]	15	18	18	25	30	30

Materials		
Element	**Material**	**Protection**
Expansion sleeve	Q195 acc. to GB/T 700	zinc coating (≥ 5 µm); electroplated acc. to EN ISO 4042
Expansion plug	Q195 acc. to GB/T 700	

RDI ANCHOR

Product description
Characteristic of the product

Annex A1

of European Technical Assessment ETA-17/0177

SPECIFICATION OF INTENDED USE

Anchorages subject to:

- Multiple use for non-structural applications. The definition of multiple use according to the Member States is given on the informative Annex 1 of ETAG 001, Part 6.
- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Non-cracked and cracked concrete.

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 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 ETAG 001, Annex C, design method B, Edition August 2010.
- The design of anchorages under fire exposure has to consider the conditions given in the EOTA Technical Report TR 020.

Installation:

- Anchor installation 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 any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check of concrete being well compacted, e.g. without significant voids.
- 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 in the direction of load application.
- Anchor installation such that the effective anchorage depth is complied with.

RDI ANCHOR	**Annex B1** of European Technical Assessment ETA-17/0177
Intended use Specification	

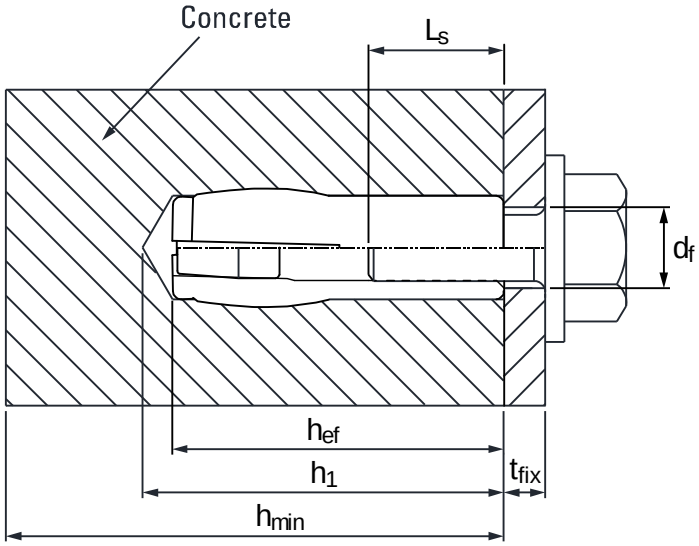


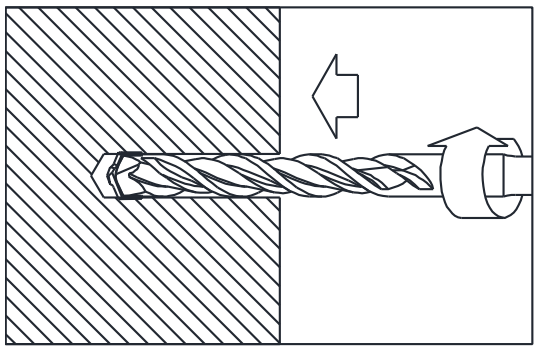
Table B1: Installation parameters

Anchor			**RDI ANCHOR**					
Size			**M6**	**M8**	**M10H**	**M10**	**M12**	**M12D**
Effective anchorage depth	h_{ef}	[mm]	25	30	30	40	50	50
Drill hole depth	h_1	[mm]	28	33	33	43	54	54
Drill hole diameter	d_0	[mm]	8	10	12	12	15	16
Installation torque (max)	T_{inst}	[mm]	4	8	15	15	35	35
Thickness of concrete member (min)	h_{min}	[mm]	80	80	80	80	100	100
Screwing depth (min)	$L_{s, min}$	[mm]	6	8	8	10	12	12
Screwing depth (max)	$L_{s, max}$	[mm]	11	13	12	17	21	21
Diameter of clearance hole in the fixture	d_f	[mm]	7	9	12	12	14	14
Spacing (min)	s_{min}	[mm]	200	200	200	200	200	200
Edge distance (min)	c_{min}	[mm]	150	150	150	150	150	150

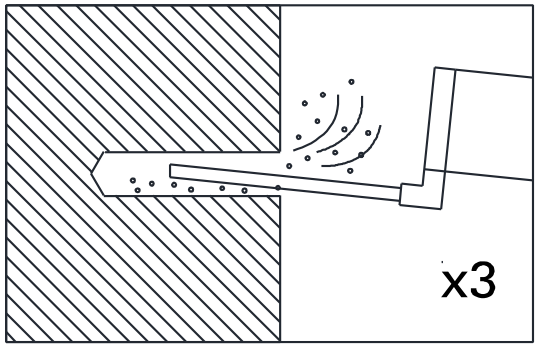
Fastening screws or anchor threaded rods:

Steel, property class 4.6 / 4.8 / 5.8 / 6.8 / 8.8 according to EN-ISO 898-1; thickness of galvanizing ≥ 5 µm

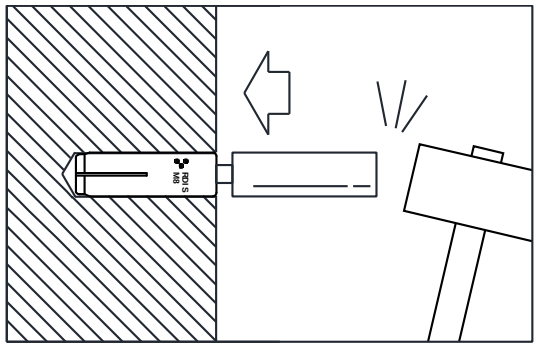
RDI ANCHOR	**Annex B2** of European Technical Assessment ETA-17/0177
Intended use Installation parameters	



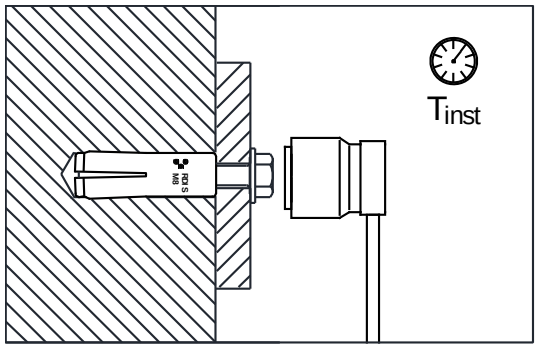
Drill hole with rotary percussive machine. Drill to a required depth.



Blow out dust at least 3 times with a hand pump.



Put the anchor into the drill hole, hammering with the installation tool, until the setting pin fully insert into the anchor.



Fix the fixture by screw or threaded rod with max. T_{inst}

RDI ANCHOR	**Annex B3**
Intended use Installation instruction and tools	of European Technical Assessment ETA-17/0177

Table C1: Characteristic resistance in concrete C20/25 to C50/60 (design acc. to ETAG 001, Annex C, method B)

Anchor			**RDI ANCHOR**					
Size			**M6**	**M8**	**M10H**	**M10**	**M12**	**M12D**
All load directions (fastening screw or threaded rod property class ≥ 4.6)								
Characteristic resistance in concrete C20/25 to C50/60	F_{Rk}	[kN]	1,5	2,0	3,0	3,0	4,0	5,0
Partial (installation) safety factor	γ_2	[-]	1,4	1,4	1,4	1,4	1,4	1,4
Spacing	s_{cr}	[mm]	200	200	200	200	200	200
Edge distance	c_{cr}	[mm]	150	150	150	150	150	150
Minimum member thickness	h_{min}	[mm]	80	80	80	80	100	100
Shear load: steel failure with lever arm								
Characteristic bending moment: screw class 4.6	$M^0_{Rk,S}$	[Nm]	6,1	15,0	29,9	29,9	52,4	52,4
Characteristic bending moment: screw class 4.8	$M^0_{Rk,S}$	[Nm]	6,1	15,0	29,9	29,9	52,4	52,4
Characteristic bending moment: screw class 5.8	$M^0_{Rk,S}$	[Nm]	7,6	18,8	37,4	37,4	65,6	65,6
Characteristic bending moment: screw class 6.8	$M^0_{Rk,S}$	[Nm]	9,2	22,5	44,9	44,9	78,7	78,7
Characteristic bending moment: screw class 8.8	$M^0_{Rk,S}$	[Nm]	12,2	30,0	59,9	59,9	104,9	104,9

Table C2: Characteristic resistance under fire exposure in concrete C20/25 to C50/60 (design acc. to ETAG 001, Annex C, method B)

Anchor			**RDI ANCHOR**					
Size			**M6**	**M8**	**M10H**	**M10**	**M12**	**M12D**
Fire resistance class (fastening screw or threaded rod property class ≥ 4.6)								
R30	Characteristic resistance $F_{Rk,fi}$ [1)]	[kN]	0,2	0,5	0,8	0,8	1,0	1,3
R60		[kN]	0,2	0,5	0,8	0,8	1,0	1,3
R90		[kN]	0,1	0,4	0,8	0,8	1,0	1,1
R120		[kN]	0,1	0,3	0,6	0,6	0,8	0,8
Spacing	$s_{cr,fi}$	[mm]	$4 \times h_{ef}$					
Edge distance	$c_{cr,fi}$	[mm]	$2 \times h_{ef}$					

The design method covers anchors with a fire attack from one side only. In case of fire attack from more than one side, the edge distance shall be ≥ 300 mm.

[1)] in the absence of other national regulations a partial safety factor $\gamma_{m,fi} = 1,0$ is recommended

RDI ANCHOR	**Annex C2** of European Technical Assessment ETA-17/0177
Performances Characteristic resistance under fire exposure	

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European Technical Assessment

ETA-17/0325 of 10/04/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	CMH ANCHOR
Product family to which the construction product belongs	Deformation-controlled expansion anchor made of galvanized steel for multiple use for non-structural applications in concrete
Manufacturer	Construction Anchors Co., Ltd. 9F, No. 21, Sec. 3, Xinsheng S.Rd., Da'an Dist, Taipei City 106 Taiwan R.O.C.Hong Kong
Manufacturing plant	Manufacturing Plant no. 4
This European Technical Assessment contains	9 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 ETAG 001, Edition April 2013 "Metal anchors for use in concrete – Part 1: Anchors in general and Part 6: Anchors for multiple use for non-structural applications", used as European Assessment Document (EAD)

Specific Part

1 Technical description of the product

CMH ANCHOR of size Ø6 is deformation-controlled expansion anchor. CMH ANCHOR is made of galvanized steel. The anchor is installed in a drilled hole and anchored by deformation-controlled expansion.

An illustration of the product is given in Annex A1.

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

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B1 and B2.

The performances given in this European Technical Assessment are based on an assumed 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 or the Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic resistance for all load directions	See Annex C1
Edge distances and spacing	See Annex C1

3.1.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchors satisfy requirements for Class A1
Characteristic resistance under fire exposure	See Annex C2

3.1.3 Hygiene, health and the environment (BWR 3)

Regarding the dangerous substances 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 Construction Products Regulation, these requirements need also to be complied with, when and where they apply.

3.1.4 Safety and accessibility in use (BWR 4)

For Basic Requirement Safety in use the same criteria are valid as for Basic Requirement Mechanical resistance and stability (BWR 1).

3.1.5 Sustainable use of natural resources (BWR 7)

No performance assessed.

3.1.6 General aspects relating to fitness for use

Durability and serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

3.2 Methods used for the assessment

The assessment of fitness of the anchors for declared intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Basic Requirements 1 and 4 has been made in accordance with the ETAG 001 *"Metal anchors for use in concrete*", Part 1: "*Anchors in general*" and Part 6: "*Anchors for multiple use for non-structural applications*".

The assessment of the anchor for the intended use in relation to the requirements for resistance to fire has been made in accordance with the EOTA Technical Report TR 020 "*Evaluation of anchorages in concrete concerning resistance to fire*".

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

According to Decision 97/161/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V 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 (light-duty type)	For use in redundant systems for fixing and/or supporting to concrete elements such as lightweight suspended ceilings, as well as installations	–	2+

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

Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

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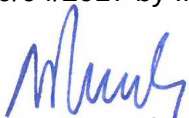
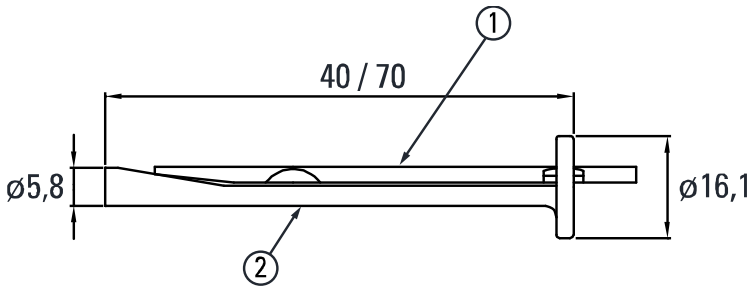
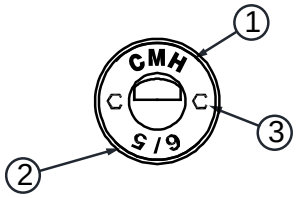


Anna Panek, MSc
Deputy Director of ITB



① Wedge
② Body



Marking on the body

1. **CMH** anchor identification
2. **6/5** anchor size / maximum fixture thickness
3. C producer identification

Table A1. CMH ANCHOR – dimensions and materials

CMH ANCHOR		**CMH 6/5**	**CMH 6/35**
Anchor nominal size		6	
Length of wedge	mm	43	73
Length of shank	mm	40	70
Diameter	mm	5,8	
Materials	wedge	steel 45 (GB/T 699) / C45 / 1.0503 acc. to EN 10277-2 (tensile strength f_{uk} = 600 N/mm^2) zinc coated	
	shank	steel ML08Al (GB/T 6478) / C8C / 1.0213 acc. to EN 10263-2 (tensile strength f_{uk} = 420 N/mm^2) zinc coated	

CMH ANCHOR	**Annex A1** of European Technical Assessment ETA-17/0325
Product description Characteristic of the product	

SPECIFICATION OF INTENDED USE

Anchorages subject to:

- Multiple use for non-structural applications.
- Static and quasi-static loads.
- Anchorages with requirements related to resistance to fire.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Cracked and non-cracked concrete.

Use conditions (environmental conditions):

- 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 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 ETAG 001, Annex C, design method C, Edition August 2010.
- The design of anchorages under fire exposure has to consider the conditions given in the EOTA Technical Report TR 020.
- Fasteners are only to be used for multiple use for non-structural applications acc. to ETAG 001, Part 6, Edition August 2010.

Installation:

- 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.
- Edge distance and spacing not less than the specified values without minus tolerances.
- 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.
- 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.
- Anchor can only be set once.

CMH ANCHOR	**Annex B1** of European Technical Assessment ETA-17/0325
Intended use Intended use	

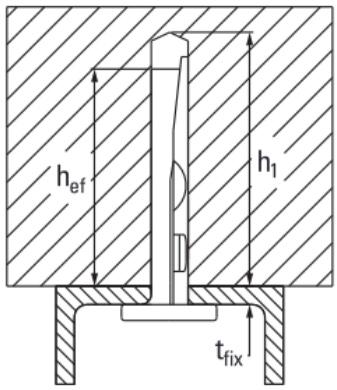
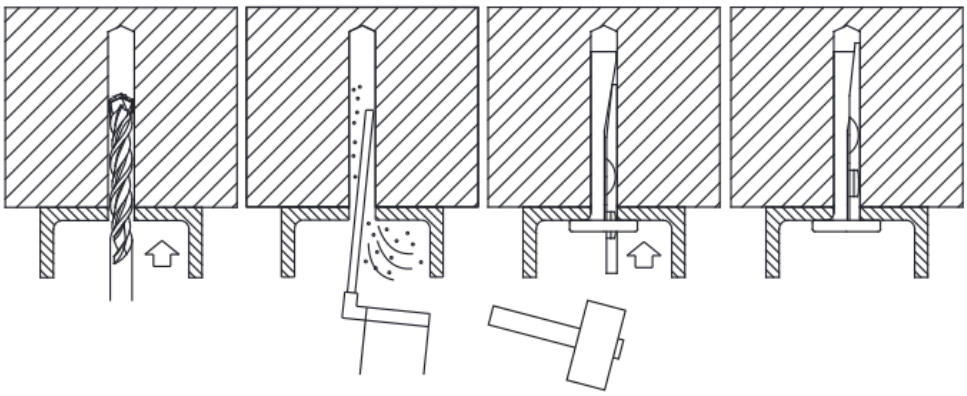


Table B1: Installation parameters

CMH ANCHOR			**CMH 6/5**	**CMH 6/35**
Diameter of drill hole	d_0	mm	6	
Cutting diameter of drill bit	d_{cut}	mm	≤ 6,4	
Depth of drill hole	$h_1 \geq$	mm	40	
Effective anchorage depth	h_{ef}	mm	32	
Minimum thickness of concrete member	h_{min}	mm	80	
Maximum thickness of the fixture	t_{fix}	mm	5	35
Spacing	s_{cr}	mm	200	
Edge distance	c_{cr}	mm	150	



CMH ANCHOR	**Annex B2** of European Technical Assessment ETA-17/0325
Intended use Installation parameters and installation instruction	

Table C1: Characteristic resistance (design acc. to ETAG 001, Annex C, method C)

CMH ANCHOR			**CMH-6/5 CMH-6/35**	
All load directions (tension and shear)				
Characteristic resistance in cracked or non-cracked concrete C20/25 to C50/60	F_{Rk}	kN	**4,0**	
Partial safety factor	γ_2	-	1,0	
Shear load with lever arm				
Characteristic bending moment	$M^0_{Rk,s}$	[Nm]	**6,97**	
Partial safety factor	γ_M	[-]	1,25	
Displacements in cracked or non-cracked concrete C20/25 to C50/60			**Tension**	**Shear**
Applied loads	F	[kN]	1,90	1,79
Displacements	δ_{N0}	[mm]	1,85	0,22
	$\delta_{N\infty}$	[mm]	0,13	0,32

Table C2: Characteristic resistance under fire exposure in concrete C20/25 to C50/60 – CMH ANCHOR (design acc. to ETAG 001, Annex C, method C)

CMH ANCHOR			**CMH-6/5 CMH-6/35**			
All load directions						
Fire resistance class			**R30**	**R60**	**R90**	**R120**
Characteristic resistance	$F_{Rk,fi}$	[kN]	0,21	0,19	0,14	0,10
Spacing	$s_{cr,fi}$	[mm]	200			
Edge distance	$c_{cr,fi}$	[mm]	150			
The design method covers anchors with a fire attack from one side only. In case of fire attack from more than one side, the edge distance shall be ≥ 300 mm.						

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European Technical Assessment

ETA-17/0595 of 29/06/2017

General Part

Technical Assessment Body issuing the European Technical Assessment	Instytut Techniki Budowlanej
Trade name of the construction product	CT BOLT 7
Product family to which the construction product belongs	Torque controlled expansion anchor of sizes M6, M8, M10, M12 and M16 for use in non-cracked concrete
Manufacturer	Construction Anchors Co., Ltd. 9F, No. 21, Sec. 3, Xinsheng S.Rd., Da'an Dist, Taipei City 106 Taiwan R.O.C.
Manufacturing plant	Plant 2
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	European Assessment Document (EAD) 330232-00-0601 "Mechanical fasteners for use in concrete"

This European Technical Assessment is issued by the Technical Assessment Body in its official language. Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Specific Part

1 Technical description of the product

The anchor CT BOLT 7 in the sizes of M6, M8, M10, M12 and M16 is an anchor made of galvanized steel which is placed into a drill hole and anchored by torque-controlled expansion.

The description of the product is given in Annex A1 to A2.

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

The performances given in Section 3 are only valid if the anchors are used in compliance with the specifications and conditions given in Annex B1 to B3.

The performances given in this European Technical Assessment are based on an assumed 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 or the Technical Assessment Body, 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 Performance of the product

3.1.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic tension resistance (static and quasi-static loading) and displacements	See Annex C1
Characteristic shear resistance (static and quasi-static loading) and displacements	See Annex C2

3.1.2 Safety in case of fire (BWR 2)

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

3.2 Methods used for the assessment

The assessment of fitness of the anchors for the declared intended use in relation to the requirements for mechanical resistance and stability and safety in case of fire in the sense of the Basic Requirements 1 and 2 has been made in accordance with the EAD 330232-00-0601.

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

According to Decision 96/582/EC of the European Commission the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

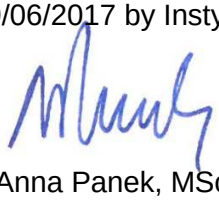
Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete structural elements (which contributes to the stability of the works) or heavy units	–	1

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

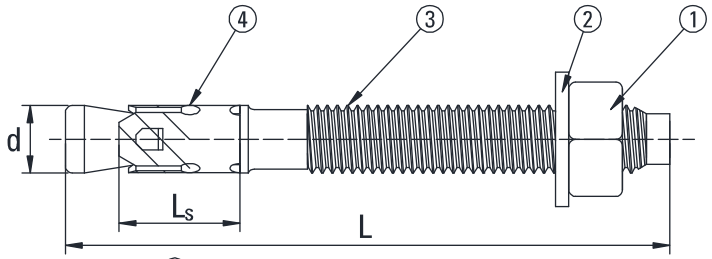
Technical details necessary for the implementation of the AVCP system are laid down in the control plan which is deposited at Instytut Techniki Budowlanej.

For type testing the results of the tests performed as part of the assessment for the European Technical Assessment shall be used unless there are changes in the production line or plant. In such cases the necessary type testing has to be agreed between Instytut Techniki Budowlanej and the notified body.

Issued in Warsaw on 29/06/2017 by Instytut Techniki Budowlanej

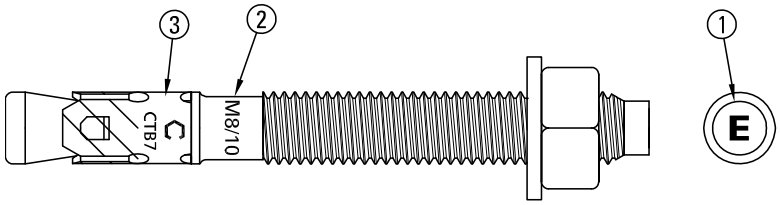


Anna Panek, MSc
Deputy Director of ITB



① Hexagon Nut
② Washer
③ Cold formed cone bolt
④ Expansion sleeve

Example of the product marking:



1. Marking on bolt head

Length of anchor (mm):

Code	A	B	C	D	E	F	G	H	I	J	K	L	M
≥	-	50	60	70	80	90	100	110	120	130	140	150	160
<	50	60	70	80	90	100	110	120	130	140	150	160	170
Code	**N**	**O**	**P**	**Q**	**R**	**S**	**T**	**U**	**V**	**W**	**X**	**Y**	**Z**
≥	170	180	190	200	220	240	260	280	300	320	340	360	380
<	180	190	200	220	240	260	280	300	320	340	360	380	400

2. Marking on cone bolt

M8 thread size

10 maximum fixture thickness

3. Marking on expansion sleeve

Ↄ producer identification

CTB7 anchor identification

CT BOLT 7	**Annex A1**
Product description Characteristic of the product	of European Technical Assessment ETA-17/0595

Table A1: Dimensions

Anchor size			M6	M8	M10	M12	M16
Total Length	Min.	L [mm]	55	65	75	95	120
	Max.		200	210	230	250	250
Thickness of the fixture	Min.	t_{fix} [mm]	1	1	1	1	1
	Max.		145	145	155	155	130
Length Expansion Sleeve		L_s [mm]	11,5	14,5	18	22	24
Thread Diameter		d_{th}	6	8	10	12	16
Width Torque Wrench		SW [mm]	10	13	17	19	24

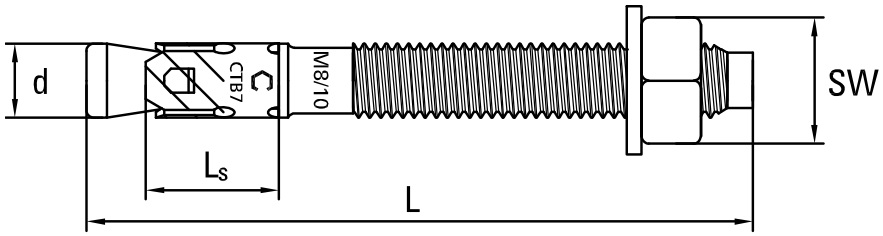


Table A2: Materials

Designation	Material	Protection
Threaded bolt	Carbon steel EN ISO 898-1 class 5.8	Zinc plated ≥ 5 µm EN ISO 4042
Expansion sleeve	Carbon steel	Zinc plated ≥ 5 µm EN ISO 4042
Hexagonal nut	Carbon steel DIN 934 class 8	Zinc plated ≥ 5 µm EN ISO 4042
Washer	Carbon steel DIN 125 or EN ISO 7089 DIN 9021 or EN ISO 7083 DIN 440	Zinc plated ≥ 5 µm EN ISO 4042

CT BOLT 7	**Annex A2** of European Technical Assessment ETA-17/0595
Product description Dimensions and materials	

SPECIFICATION OF INTENDED USE

Anchorages subject to:

Static and quasi-static loads: sizes from M6 to M16.

Base material:

- Reinforced or unreinforced normal weight concrete of strength class C20/25 at minimum to C50/60 at maximum according to EN 206.
- Non cracked concrete: sizes from M6 to M16.

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 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 EOTA Technical Report TR 055 (ETAG 001 Annex C, CEN/TS 1992-4-4:2009 and prEN 1992-4:2016).

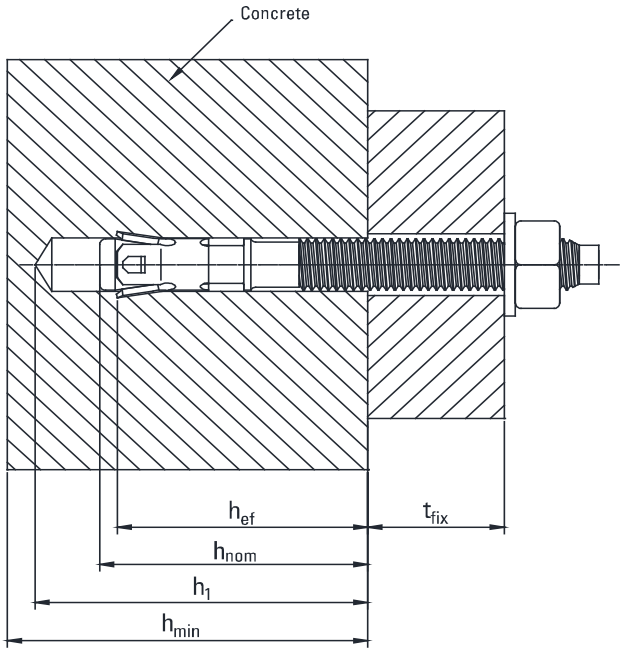
Installation:

- Anchor installation 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 any component of the anchor.
- Anchor installation in accordance with the manufacturer's specifications and drawings and using the appropriate tools.
- Check of concrete being well compacted, e.g. without significant voids.
- 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 in the direction of load application.
- Cleaning of the hole of drilling dust.
- Anchor installation such that the effective anchorage depth is complied with.
- Application of the torque moment given in Annex B2 using a calibrated torque wrench.

CT BOLT 7	**Annex B1** of European Technical Assessment ETA-17/0595
Intended use Intended use	

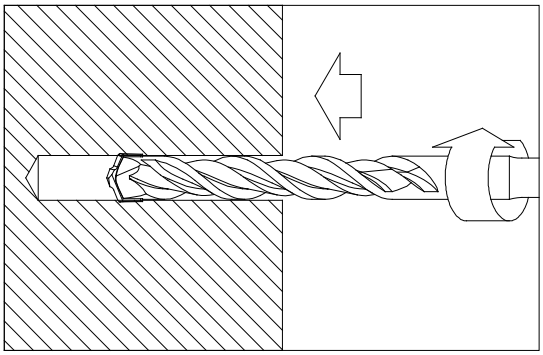
Table B1: Installation parameters

Anchor size		**M6**	**M8**	**M10**	**M12**	**M16**
Nominal drill hole diameter	d_o [mm]	6	8	10	12	16
Depth of drill hole	$h_1 \geq$ [mm]	55	65	70	90	110
Embedment depth in concrete	h_{nom} [mm]	46	53	60	77	97
Effective anchorage depth	h_{ef} [mm]	40	45	51	66	80
Diameter of clearance hole in the fixture	$d_f \leq$ [mm]	7	9	12	14	18
Installation torque moment	T_{inst} [Nm]	5	15	25	45	100
Minimum thickness of base material	h_{min} [mm]	100	100	105	135	160
Minimum spacing	s_{min} [mm]	60	67,5	76,5	99	120
Minimum edge distance	c_{min} [mm]	60	67,5	76,5	99	120

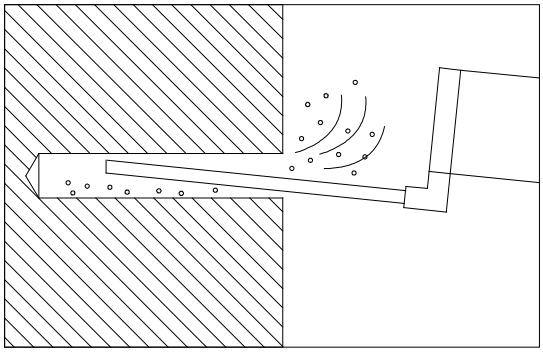


CT BOLT 7	**Annex B2** of European Technical Assessment ETA-17/0595
Intended use Installation parameters	

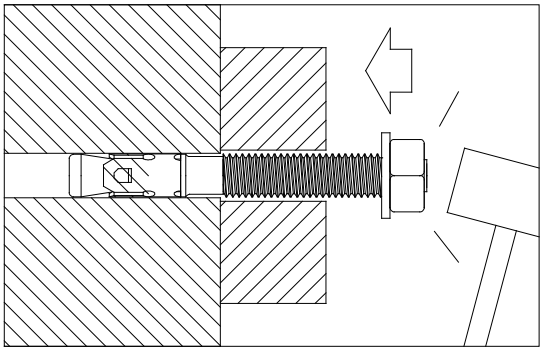
Step 1



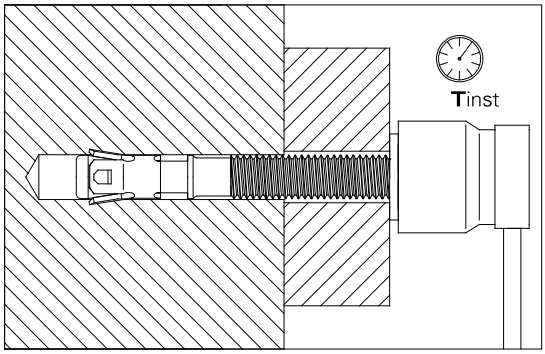
Step 2



Step 3



Step 4



CT BOLT 7	**Annex B3** of European Technical Assessment ETA-17/0595
Intended use Installation instruction	

Table C1: Performance under tension loads in non-cracked concrete (static and quasi static loading)

Anchor				**CT BOLT 7**				
Diameter				**RCW M6**	**RCW M8**	**RCW M10**	**RCW M12**	**RCW M16**
Steel failure								
Characteristic resistance		$N_{Rk,s}$	[kN]	6,9	14,1	21,5	33,2	62,3
Partial safety factor		γ_{Ms} [1)]	[-]	1,50	1,50	1,50	1,50	1,50
Pullout failure								
Characteristic resistance in non-cracked concrete C20/25		$N_{Rk,p}$	[kN]	4	9	12	16	30
Installation safety factor		γ_2 [2)] = γ_{inst} [3)4)]	[-]	1,0	1,0	1,0	1,2	1,2
Increasing factor	concrete C30/37	ψ_c	[-]	1,08	1,08	1,08	1,08	1,08
	concrete C40/50		[-]	1,15	1,15	1,15	1,15	1,15
	concrete C50/60		[-]	1,19	1,19	1,19	1,19	1,19
Concrete cone failure and splitting failure								
Effective embedment depth		h_{ef}	[mm]	40	45	51	66	80
Factor for non-cracked concrete		k_1 [2)] = k_{ucr} [3)]	[-]	10,1	10,1	10,1	10,1	10,1
Factor for non-cracked concrete		$k_{ucr,N}$ [4)]	[-]	11,0	11,0	11,0	11,0	11,0
Installation safety factor		γ_2 [2)] = γ_{inst} [3)4)]	[-]	1,0	1,0	1,0	1,2	1,2
Increasing factor	concrete C30/37	ψ_c	[-]	1,08	1,08	1,08	1,08	1,08
	concrete C40/50		[-]	1,15	1,15	1,15	1,15	1,15
	concrete C50/60		[-]	1,19	1,19	1,19	1,19	1,19
Characteristic resistance for splitting concrete		$N^0_{Rk,sp}$	[kN]	4	9	12	16	30
Characteristic spacing	concrete cone failure	$s_{cr,N}$	[mm]	120	135	155	200	240
	splitting failure	$s_{cr,sp}$	[mm]	200	225	306	330	480
Characteristic edge distance	concrete cone failure	$c_{cr,N}$	[mm]	60	70	80	100	120
	splitting failure	$c_{cr,sp}$	[mm]	100	113	153	165	240
Displacements under tension load								
Tension load in non-cracked concrete C20/25 to C50/60								
Tension load		N	[kN]	2,7	6,5	8,0	8,1	15,8
Short term tension displacement		δ_{N0}	[mm]	0,4	0,5	0,7	0,4	0,6
Long term tension displacement		$\delta_{N\infty}$	[mm]	0,9	0,9	0,9	0,9	0,9

[1)] In the absence of other national regulations

[2)] Parameter for design acc. ETAG 001 Annex C

[3)] Parameter for design acc. CEN/TS 1992-4-4:2009

[4)] Parameter for design acc. prEN 1992-4:2016

CT BOLT 7

Performances
Characteristic resistance under tension loads. Displacements

Annex C1

of European Technical Assessment ETA-17/0595

Table C2: Performance under shear loads in non-cracked concrete (static and quasi static loading)

Anchor			**CT BOLT 7**				
Diameter			**RCW M6**	**RCW M8**	**RCW M10**	**RCW M12**	**RCW M16**
Steel failure without lever arm							
Characteristic resistance	$V_{Rk,s}$	[kN]	4,0	7,3	11,6	16,9	31,4
Factor considering ductility	k [2] $= k_2$ [3] $= k_7$ [4]	[-]	0,8	0,8	0,8	0,8	0,8
Partial safety factor	γ_{Ms} [1]	[-]	1,25	1,25	1,25	1,25	1,25
Steel failure with lever arm							
Characteristic bending resistance	$M^0_{Rk,s}$	[Nm]	6,1	15,0	29,9	52,4	133,2
Partial safety factor	γ_{Ms} [1]	[-]	1,25	1,25	1,25	1,25	1,25
Concrete pry-out failure							
Factor for non-cracked concrete	k [2] $= k_3$ [3] $= k_8$ [4]	[-]	1,0	1,0	1,0	2,0	2,0
Partial safety factor	γ_{Mc} [1]	[-]	1,5	1,5	1,5	1,5	1,5
Concrete edge failure							
Outside diameter on anchor	d_{nom}	[mm]	6	8	10	12	16
Effective length of anchor under shear loads	l_f	[mm]	40	45	51	66	80
Partial safety factor	γ_{Mc} [1]	[-]	1,5	1,5	1,5	1,5	1,5
Minimum member thickness	h_{min}	[mm]	100	100	105	135	160
Minimum edge distance	c_{min}	[mm]	60	67,5	76,5	99	120
Minimum spacing	s_{min}	[mm]	60	67,5	76,5	99	120
Displacements under shear load							
Shear load in non-cracked concrete C20/25 to C50/60							
Shear load	V	[kN]	3,3	6,0	7,3	8,0	15,0
Short term tension displacement	δ_{V0}	[mm]	0,8	1,8	1,8	2,0	2,0
Long term tension displacement	$\delta_{V\infty}$	[mm]	1,2	2,7	2,7	3,0	3,0

[1] In the absence of other national regulations

[2] Parameter for design acc. ETAG 001 Annex C

[3] Parameter for design acc. CEN/TS 1992-4-4:2009

[4] Parameter for design acc. prEN 1992-4:2016

CT BOLT 7

Performances
Characteristic resistance under shear loads. Displacements

Annex C2

of European Technical Assessment ETA-17/0595

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Designated according to Article 29 of Regulation (EU) No 305/2011

Member of EOTA
www.eota.eu

European Technical Assessment

ETA-16/0573 dated 20/09/2017

English translation prepared by CSTB - Original version in French language

General Part

Nom commercial *Trade name*	**CT Bolt 1**
Famille de produit *Product family*	**Cheville métallique à expansion par vissage à couple contrôlé, de fixation dans le béton fissuré et non fissuré diamètres M8, M10, M12 et M16** ***Torque-controlled expansion anchor for use in cracked and uncracked concrete: sizes M8, M10, M12 and M16***
Titulaire *Manufacturer*	Construction Anchors Co. Ltd. 9F, No.21, Sec. 3, Xinsheng S. Rd., Da'an Dist, Taipei City 106, Taiwan. R.O.C.
Usine de fabrication *Manufacturing plants*	Plant 1
Cette evaluation contient: *This Assessment contains*	13 pages incluant 10 pages d'annexes qui font partie intégrante de cette évaluation 13 *pages including* 10 *pages of annexes which form an integral part of this assessment*
Base de l'ETE *Basis of ETA*	EAD 330232-00-0601, "Ancrages mécaniques dans le béton" *EAD 330232-00-0601, "Mechanical fasteners for use in concrete"*
Cette évaluation remplace: *This Assessment replaces*	ETE-16/0573 délivrée le 01/08/2016 *ETA*-16/0573 issued o*n 01/08/2016*

Specific Part

1 Technical description of the product

The CT Bolt 1 anchor is an anchor made of zinc electroplated steel which is placed into a drilled hole and anchored by torque-controlled expansion.
The anchor is placed into a drilled hole and anchored by torque-controlled expansion.
The illustration and the description of the product are given in Annexes A.

2 Specification of the intended use

The performances given in Section 3 are only valid if the anchor is used in compliance with the specifications and conditions given in Annexes B.

The provisions made in this European technical assessment are based on an assumed 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

3.1 Mechanical resistance and stability (BWR 1)

Essential characteristic	Performance
Characteristic tension resistance	See Annex C1
Characteristic shear resistance	See Annex C2
Displacements	See Annex C5
Characteristic resistance under seismic action	See Annex C6

3.2 Safety in case of fire (BWR 2)

Essential characteristic	Performance
Reaction to fire	Anchorages satisfy requirements for Class A1
Characteristic tension resistance under fire	See Annex C3
Characteristic shear resistance under fire	See Annex C4

3.3 Hygiene, health and the environment (BWR 3)

Regarding dangerous substances contained in this European technical approval, 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 Construction Products Directive, these requirements need also to be complied with, when and where they apply.

3.4 Safety in use (BWR 4)

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

3.5 Protection against noise (BWR 5)

Not relevant.

3.6 Energy economy and heat retention (BWR 6)

Not relevant.

3.7 Sustainable use of natural resources ((BWR 7)

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

3.8 General aspects relating to fitness for use

Durability and Serviceability are only ensured if the specifications of intended use according to Annex B1 are kept.

4 Assessment and verification of constancy of performance (AVCP)

According to the Decision 96/582/EC of the European Commission[1], as amended, the system of assessment and verification of constancy of performance (see Annex V to Regulation (EU) No 305/2011) given in the following table apply.

Product	Intended use	Level or class	System
Metal anchors for use in concrete	For fixing and/or supporting to concrete, structural elements (which contributes to the stability of the works) or heavy units	—	1

5 Technical details necessary for the implementation of the AVCP system

Technical details necessary for the implementation of the Assessment and verification of constancy of performance (AVCP) system are laid down in the control plan deposited at Centre Scientifique et Technique du Bâtiment.

The manufacturer shall, on the basis of a contract, involve a notified body approved in the field of anchors for issuing the certificate of conformity CE based on the control plan.

The original French version is signed by

Charles Baloche
Technical Director

[1] Official Journal of the European Communities L 254 of 08.10.1996

Hex head version:

Marking on the bolt:

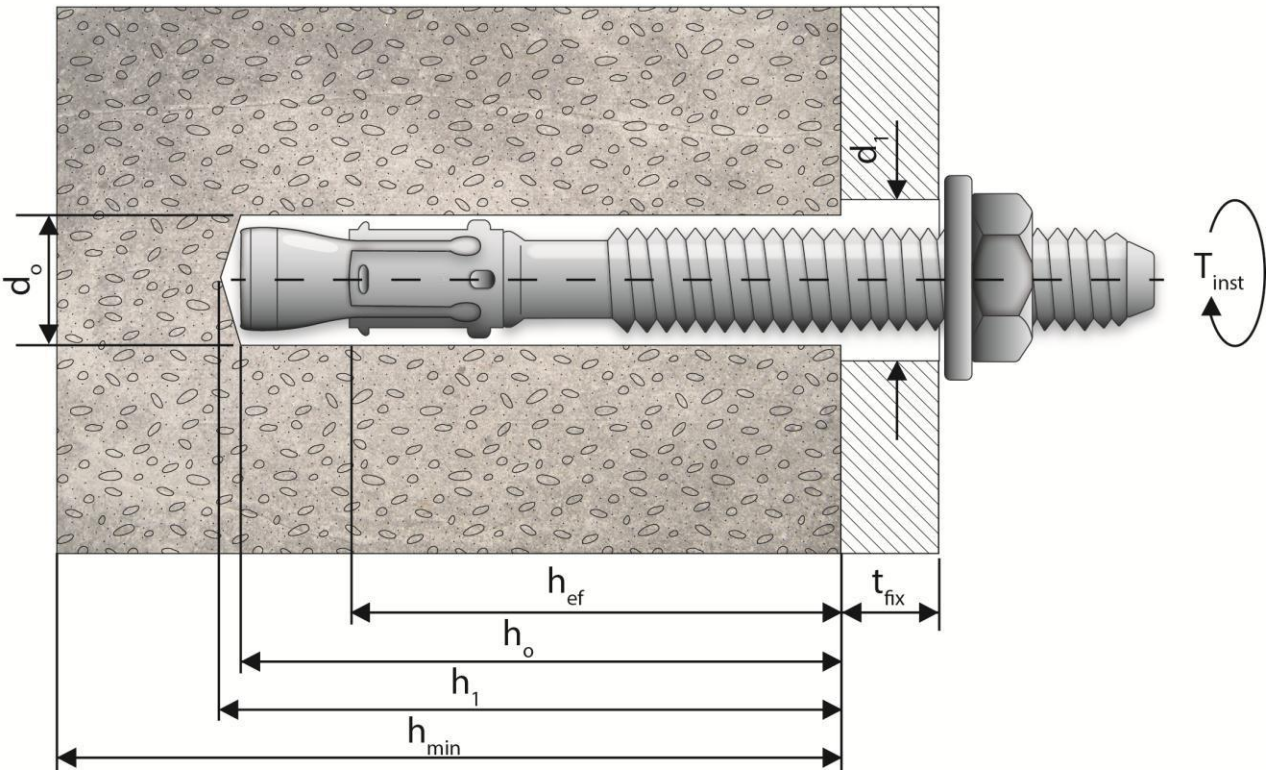
MX/L, where:

MX = thread diameter
L = total lengh

Marking on the clip:

CT1 **C**

Intended use:



Intended use:

Use in cracked or uncracked concrete in dry internal conditions

CT Bolt 1	**Annex A1**
Product description Installation conditions	

Different parts of the anchor:

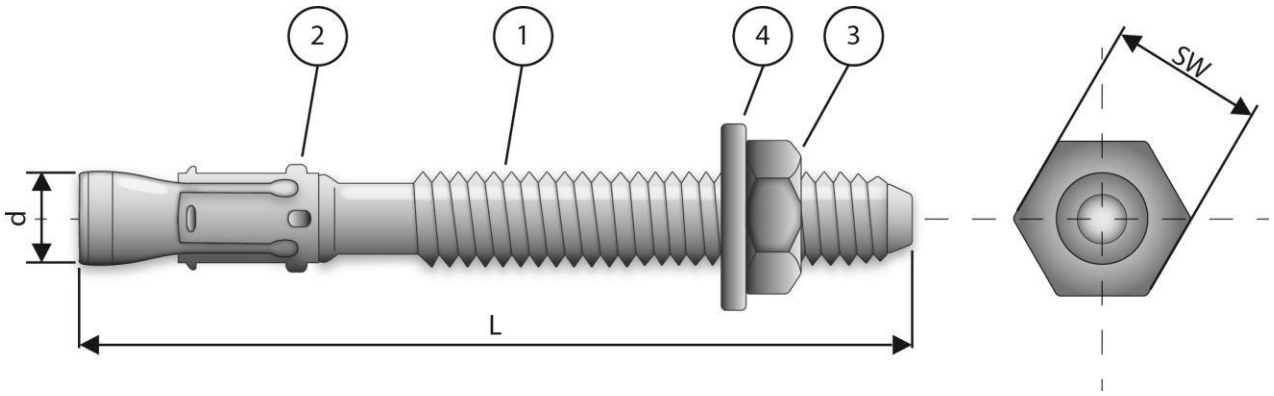


Table 1: Materials

Part	Designation	Material	Protection
1	Thread bolt	Coldform steel, grade C-1035	Zinc plated 5 μm
2	Expansion clip	Stainless steel	-
3	Washer	DIN 125 or EN ISO 7089 DIN 9021 or DIN 440 or D IN EN ISO 7093	Zinc plated
4	Hexagonal nut	DIN 934 Grade 8 acc. to DIN 267-4	Zinc plated

Specifications of intended use

Anchorages subject to:

- Static, quasi-static and fire.

Base materials:

- Cracked concrete and non-cracked concrete
- Reinforced or unreinforced normal weight concrete of strength classes C 20/25 at least to C50/60 at most according to EN 206: 2000-12.

Use conditions (Environmental conditions):

- Structures subject to dry internal conditions.

Design:

- The anchorages are designed in accordance with the ETAG001 Annex C “Design Method for Anchorages” or CEN/TS 1992-4-4 " Design of fastenings for use in concrete” under the responsibility of an engineer experienced in anchorages and concrete work.
- For application with resistance under fire exposure the anchorages are designed in accordance with method given in TR020 “Evaluation of Anchorage in Concrete concerning Resistance to Fire”.
- 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.

Installation:

- Anchor installation 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.
- Anchor installation in accordance with the manufacturer’s specifications and drawings and using the appropriate tools.
- Effective anchorage depth, edge distances and spacing not less than the specified values without minus tolerances.
- Hole drilling by hammer drill.
- Cleaning of the hole of drilling dust.
- Application of specified torque moment using a calibrated torque wrench.
- In case of aborted hole, drilling of new hole at a minimum distance of twice the depth of the aborted hole, or smaller distance provided the aborted drill hole is filled with high strength mortar and no shear or oblique tension loads in the direction of aborted hole.

Table 2: Anchor dimensions

				M8	M10	M12	M16
Length of the anchor	**Min.**	**L**	**[mm]**	60	85	90	115
	Max.		**[mm]**	240	220	220	220
Fixture thickness	**Min.**	t_{fix}	**[mm]**	1	1	1	1
	Max.		**[mm]**	185	140	130	100
Length expansion sleeve		l_{clip}	**[mm]**	14	18	22	26
Width torque wrench		**SW**	**[mm]**	13	17	19	24

Table 3: Installation data

			M8	M10	M12	M16
Drill hole diameter	d_{cut}	**[mm]**	≤ 8,45	≤ 10,45	≤ 12,5	≤ 16,5
Drill hole depth	h_1	**[mm]**	55	75	75	100
Embedment depth	h_{ef}	**[mm]**	40	60	60	80
Installation torque	T_{inst}	**[Nm]**	30	50	70	130
Diameter through hole fixture	d_f	**[mm]**	9	12	14	18
Min. member thickness	h_{min}	**[mm]**	100	120	120	160
Minimum edge distance	c_{min}	**[mm]**	65	60	80	85
Minimum spacing	s_{min}	**[mm]**	65	150	80	85

CT Bolt 1

Annex B2

Intended Use
Installation parameters

Table 4: Characteristic values for tension loads in case of static and quasi static loading for design method A

				M8	M10	M12	M16
Steel failure							
Char. resistance		$N_{Rk,s}$	[kN]	22,2	31,6	43,4	75,4
Partial safety factor		γ_{Ms} [1)]	[-]	1,88			
Pullout failure $N_{Rk,p} = \Psi_c \times N^0_{Rk,p}$							
Char. resistance in concrete C20/25	cracked	$N^0_{Rk,p}$	[kN]	3	9	12	12
	non-cracked	$N^0_{Rk,p}$	[kN]	6	12	12	35
Partial safety factor for cracked or non-cracked concrete		$\gamma_2 = \gamma_{inst}$	[-]	1,2		1,4	
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22			
	concrete C40/50		[-]	1,41			
	concrete C50/60		[-]	1,55			
Concrete cone failure and splitting failure							
Effective embedment depth		h_{ef}	[mm]	40	60	60	80
Factor for determination of the resistance to concrete cone failure		$k_1=k_{cr}$	[-]	Values are given in TR055 depending of the design guide			
		$k_1=k_{ucr}$	[-]				
Partial safety factor for craked or non-cracked concrete		$\gamma_2 = \gamma_{inst}$	[-]	1,2		1,4	
Increasing factor for N_{RK}	concrete C30/37	Ψ_c	[-]	1,22			
	concrete C40/50		[-]	1,41			
	concrete C50/60		[-]	1,55			
Char. spacing	concrete cone failure	$s_{cr,N}$	[mm]	120	180	180	240
	splitting failure	$s_{cr,sp}$	[mm]	200	300	360	400
Char. edge distance	concrete cone failure	$c_{cr,N}$	[mm]	60	90	90	120
	splitting failure	$c_{cr,sp}$	[mm]	100	150	180	200

[1)] In absence of other national regulations

Table 5: Characteristic values for shear loads in case of static and quasi static loading for design method A

			M8	M10	M12	M16
Steel failure without lever arm						
Char. resistance	$V_{Rk,s}$	[kN]	8,1	17,6	24,7	45,9
Partial safety factor	γ_{Ms} 1)	[-]	1,25			
Steel failure with lever arm						
Char. bending resistance	$M^0_{Rk,s}$	[Nm]	22,8	45,5	76,6	194,8
Partial safety factor	γ_{Ms} 1)	[-]	1,25			
Concrete pry-out failure						
Factor for determination of resistance to pry-out failure	$k_3=k_8$	[-]	1,0	2,0	2,0	2,0
Partial safety factor	$\gamma_2 = \gamma_{inst}$ 1)	[-]	1,0			
Concrete edge failure						
Effective length of anchor under shear loading	l_f	[mm]	40	60	60	80
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16
Partial safety factor	$\gamma_2 = \gamma_{inst}$ 1)	[-]	1,0			

1) In absence of other national regulations

Table 6: Characteristic tension resistance in cracked and non-cracked concrete under fire exposure for design method A acc. TR020

			M8	M10	M12	M16
Steel failure						
Characteristic resistance	R30 $N_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60 $N_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90 $N_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120 $N_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Pullout failure (cracked and non-cracked concrete)						
Char. resistance in concrete ≥ C20/25	R30 $N_{Rk,p,fi}$	[kN]	0,8	2,3	3,0	4,0
	R60 $N_{Rk,p,fi}$	[kN]	0,8	2,3	3,0	4,0
	R90 $N_{Rk,p,fi}$	[kN]	0,8	2,3	3,0	4,0
	R120 $N_{Rk,p,fi}$	[kN]	0,6	1,8	2,4	3,2
Concrete cone and splitting failure[2] (cracked and non-cracked concrete)						
Char. resistance in concrete ≥ C20/25	R30 $N^0_{Rk,c,fi}$	[kN]	1,8	5,0	5,0	10,3
	R60 $N^0_{Rk,c,fi}$	[kN]	1,8	5,0	5,0	10,3
	R90 $N^0_{Rk,c,fi}$	[kN]	1,8	5,0	5,0	10,3
	R120 $N^0_{Rk,c,fi}$	[kN]	1,5	4,0	4,0	8,2
Characteristic spacing	$s_{cr,N,fi}$	[mm]	160	240	240	320
Characteristic edge distance	$c_{cr,N,fi}$	[mm]	80	120	120	160

[1] Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.1.
[2] As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \cdot h_{ef}$.

In absence of national regulation, the partial safety factor $\gamma_{Ms} = 1,0$ is recommended in fire situation

Table 7: Characteristic shear resistance in cracked and non-cracked concrete under fire exposure for design method A acc. TR020

			M8	M10	M12	M16
Steel failure without lever arm						
Characteristic resistance	R30 $V_{Rk,s,fi}$	[kN]	0,4	0,9	1,7	3,1
	R60 $V_{Rk,s,fi}$	[kN]	0,3	0,8	1,3	2,4
	R90 $V_{Rk,s,fi}$	[kN]	0,3	0,6	1,1	2,0
	R120 $V_{Rk,s,fi}$	[kN]	0,2	0,5	0,8	1,6
Steel failure with lever arm						
Characteristic bending moment	R30 $M^0_{Rk,s,fi}$	[Nm]	0,4	1,1	2,6	6,7
	R60 $M^0_{Rk,s,fi}$	[Nm]	0,3	1,0	2,0	5,0
	R90 $M^0_{Rk,s,fi}$	[Nm]	0,3	0,7	1,7	4,3
	R120 $M^0_{Rk,s,fi}$	[Nm]	0,2	0,6	1,3	3,3
Concrete pry-out failure						
Factor for determination of resistance to pry-out failure	$k_3=k_8$	[-]	1,0	2,0	2,0	2,0
Characteristic resistance	R30 $V_{Rk,cp,fi}$	[kN]	1,8	10,0	10,0	20,6
	R60 $V_{Rk,\ cp,fi}$	[kN]	1,8	10,0	10,0	20,6
	R90 $V_{Rk,\ cp,fi}$	[kN]	1,8	10,0	10,0	20,6
	R120 $V_{Rk,\ cp,fi}$	[kN]	1,5	8,0	8,0	16,5
Concrete edge failure						
Eff. length of anchor under shear loading	l_f	[mm]	40	60	60	80
Outside diameter of anchor	d_{nom}	[mm]	8	10	12	16

[1] Design under fire exposure is performed according to the design method given in TR 020. Under fire exposure usually cracked concrete is assumed. The design equations are given in TR 020, Section 2.2.2.

TR 020 covers design for fire exposure from one side. For fire attack from more than one side the edge distance must be increased to $c_{min} \geq 300$ mm and $\geq 2 \cdot h_{ef}$.

CT Bolt 1

Design according to Technical Report TR020
Characteristic tension resistance under fire exposure

Annex C4

Table 8: Displacements under tension loading

			M8	M10	M12	M16
Tension load in non-cracked concrete C20/25 [kN]			2,38	4,76	5,44	11,90
Displacement	δ_{N0}	[mm]	0,05	0,10	0,06	0,30
	$\delta_{N\infty}$	[mm]	0,65	1,17	1,53	0,65
Tension load in non-cracked concrete C50/60 [kN]			3,69	9,92	10,20	18,45
Displacement	δ_{N0}	[mm]	0,05	0,24	0,10	0,10
	$\delta_{N\infty}$	[mm]	0,65	1,17	1,53	0,65
Tension load in cracked concrete C20/25 [kN]			1,19	4,76	4,08	4,08
Displacement	δ_{N0}	[mm]	0,05	0,83	1,04	0,40
	$\delta_{N\infty}$	[mm]	1,15	1,17	1,53	1,14
Tension load in cracked concrete C50/60 [kN]			1,85	4,76	10,20	6,33
Displacement	δ_{N0}	[mm]	2,95	0,94	1,89	3,43
	$\delta_{N\infty}$	[mm]	2,95	1,17	1,53	3,43

Tableau 9: Displacements under shear loading

			M8	M10	M12	M16
Shear load in cracked and non-cracked concrete C20/25 to C50/60		**[kN]**	4,63	9,14	9,52	26,23
Displacement	δ_{V0}	[mm]	5,50	5,26	5,84	3,60
	$\delta_{V\infty}$	[mm]	8,25	7,89	8,76	5,40

Additional displacement due to anular gap between anchor and fixture is to be taken into account.

Table 10: Characteristic values of resistance under tension loads in case of seismic performance category C1 for design acc. to TR045

			M12	M16
Steel failure				
Char. resistance	$N_{Rk,s,seis}$	[kN]	43,4	75,4
Partial safety factor	$\gamma_{Ms,seis}$	[-]	1,88[1)]	
Pullout failure				
Characteristic resistance	$N_{Rk,p,seis}$	[kN]	12	12
Partial safety factor	$\gamma_2 = \gamma_{inst}$	[-]	1,4	

[1)] In absence of other national regulations

Table 11: Characteristic values of resistance under shear loads in case of seismic performance category C1 for design acc. to TR045

			M12	M16
Steel failure without lever arm				
Characteristic resistance	$V_{Rk,s,seis}$	[kN]	13,6	24,8
Partial safety factor	$\gamma_{Ms,seis}$	[-]	1,25[1)]	

[1)] In absence of other national regulations