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CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
INSTITUTO EDUARDO TORROJA

Designated according to Article29 of Regulation (EU) Nº 305/2011

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European Technical Assessment

ETA 15/0905 of 23/09/2016

English translation prepared by IETcc. Original version in Spanish language

General Part

Technical Assessment Body issuing the ETA designated according to Art. 29 of Regulation (EU) 305/2011:	Instituto de Ciencias de la Construcción Eduardo Torroja (IETcc)
Trade name of the construction product	**AnchorMark AMDEX concrete screw**
Product family to which the construction product belongs	Concrete screw of sizes 6, 8, 10 and 14 for use in cracked and non-cracked concrete.
Manufacturer	**AnchorMark Pty Ltd** Unit 1/61 Waterview Close Dandenong VIC 3175 Australia website: www.anchormark.com.au
Manufacturing plant	**AnchorMark plant 1**
This European Technical Assessment contains	11 pages including 4 annexes which form an integral part of this assessment. **Annex E contains confidential information and is not included in the European Technical Assessment when that assessment is publicly available.**
This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of	Guídeline for European Technical Approvals ETAG 001 “Metal anchors for use in concrete” ed. April 2013, Parts 1 and 3, used as European Asessment Document (EAD).
This version replaces:	ETA 15/0905 issued on 12/01/2016

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SPECIFIC PART

1. Technical description of the product

The AnchorMark AMDEX concrete screw is an anchor made of carbon steel. The anchor is made in sizes 6, 8, 10 and 14 (1) and is screwed into a predrilled cylindrical drill hole. The special thread of the anchor cuts an internal thread into the member while setting. The anchorage is characterised by mechanical interlock in the special thread.

The AnchorMark AMDEX concrete screw anchor in the range of 6 to 14 corresponds to the pictures and provisions given in annexes A and B. The characteristic material values, dimensions and tolerances of the anchors not indicated in annexes A and B shall correspond to the respective values laid down in the technical documentations (2) of this European Technical Assessment.

For the installation process see figure given in annex C; for the installed anchor see figure given in annex D.

Each anchor head is marked with company logo, type, outer diameter and length.

The performance of the anchor, including installation data, characteristic anchor values, displacements and fire resistance, for the design of anchorages is given in chapter 3.

The anchor shall only be packaged and supplied as a complete unit.

2. Specification of the intended use in accordance with the applicable EAD.

2.1 Intended use

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability, safety in case of fire and safety and accessibility in use in the sense of the basic requirements 1, 2 and 4 of Construction Product Regulation no 305/2011 shall be fulfilled and failure of anchorages made with these products would compromise the stability of the works, cause risk to human life and/or lead to considerable economic consequences.

The anchor is to be used only for anchorages subject to static or quasi-static loading in reinforced or unreinforced normal weight concrete of strength class C20/25 to C50/60, according to EN 206. It may be anchored in cracked and non-cracked concrete.

The AnchorMark AMDEX concrete screw may only be used in concrete subject to dry internal conditions.

The anchor may be used for anchorages with requirements related to resistance to fire.

The provisions made in this European Technical Assessment are based on an assumed working life of the anchor of 50 years. The assumed working life is the foreseen period of time throughout which the construction product, as installed into the construction work, will keep its performances allowing the construction work, behaving under predictable actions and with normal maintenance, to meet the basic requirements for construction works.

(1) Sizes make reference to the drilled hole diameters, and correspond to respective outer diameters of the thread. See § 3.1. Table Installation parameters
(2) The quality plan has been deposited at Instituto de Ciencias de la Construcción Eduardo Torroja and is only made available to the approved bodies involved in the AVCP procedure.

3. Performance of the product and references to the methods used for its assessment

The identification tests and the assessment for the intended use of this anchor according to the basic work requirements (BWR) were carried out in compliance with the ETAG 001. The characteristics of the components shall correspond to the respective values laid down in the technical documentation of this ETA, checked by IETcc.

3.1 Mechanical resistance and stability (BWR 1)

Mechanical resistance and stability has been assessed according to ETAG 001 “Metal anchors to be used in concrete”, parts 1 and 2.

Installation parameters			**Performance**			
			6	**8**	**10**	**14**
d_0	Nominal diameter of drill bit:	[mm]	6	8	10	14
d_f	Diameter of clearance hole in fixture:	[mm]	9	12	14	18
d_s	Outer diameter of the thread	[mm]	7.5	10.5	12.5	16.5
L_{min}	Total length of the anchor	[mm]	60	65	75	115
L_{max}		[mm]	400	400	400	400
h_{min}	Minimum thickness of concrete member:	[mm]	100	100	105	175
h_1	Depth of drilled hole:	[mm]	65	70	85	130
h_{nom}	Overall anchor embedment depth in the concrete:	[mm]	55	60	70	110
h_{ef}	Effective anchorage depth:	[mm]	42	45	52	86
T_{ins}	Installation torque	[Nm]	20	50	80	120
t_{fix}	Thickness of fixture	[mm]	L-55	L-60	L-70	L-110
s_{min}	Minimum allowable spacing:	[mm]	45	50	60	100
c_{min}	Minimum allowable edge distance:	[mm]	45	50	60	100

Characteristic values of resistance to tension loads of design method A			**Performance**			
			6	**8**	**10**	**14**
Tension loads: steel failure						
$N_{Rk,s}$	Tension steel characteristic resistance:	[kN]	18.7	32.7	51.2	115.9
γ_{Ms}	Partial safety factor: *)	[-]	1.5	1.5	1.5	1.5
Tension loads: pull-out failure in concrete						
$N_{Rk,p,\ ucr}$	Tension characteristic resistance in C20/25 uncracked concrete:	[kN]	9	12	20	40
$\psi_{c,ucr}$	C30/37	[-]	1,22	1,08	1,04	1,04
$\psi_{c,ucr}$	C40/50	[-]	1,41	1,15	1,07	1,07
$\psi_{c,ucr}$	C50/60	[-]	1,55	1,19	1,09	1,09
$N_{Rk,p,cr}$	Tension characteristic resistance in C20/25 cracked concrete:	[kN]	6	9	12	30
$\psi_{c,cr}$	C30/37	[-]	1,22	1,22	1,22	1,12
$\psi_{c,cr}$	C40/45	[-]	1,41	1,41	1,41	1,23
$\psi_{c,cr}$	C50/60	[-]	1,55	1,55	1,55	1,30
γ_{Mp}	Partial safety factor: *)	[-]	1.8	1.8	1.8	1.5
Tension loads: concrete cone and splitting failure						
h_{ef}	Effective embedment depth:	[mm]	42	45	52	86
γ_{Mc}	Partial safety factor: *)	[-]	1.8	1.8	1.8	1.5
$s_{cr,N}$	Critical spacing:	[mm]	126	135	156	258
$c_{cr,N}$	Critical edge distance:	[mm]	63	67	78	129
$s_{cr,sp}$	Critical spacing (splitting):	[mm]	126	135	177	292
$c_{cr,sp}$	Critical edge distance (splitting):	[mm]	63	67	88	146
γ_{Msp}	Partial safety factor: *)	[-]	1.8	1.8	1.8	1.5

*) In absence of other national regulations

Displacements under tension loads in uncracked concrete			Performance			
			6	8	10	14
N	Service tension load in uncracked concrete C20/25 to C50/60:	[kN]	3.6	4.8	9.5	19.0
δ_{N0}	Short term displacement under tension loads:	[mm]	0.4	0.4	0.4	0.9
$\delta_{N\infty}$	Long term displacement under tension loads:	[mm]	1.0	1.1	1.4	1.4

Displacements under tension loads in cracked concrete			Performance			
			6	8	10	14
N	Service tension load in cracked concrete C20/25 to C50/60:	[kN]	2.4	3.6	5.7	11.9
δ_{N0}	Short term displacement under tension loads:	[mm]	0.6	0.7	0.5	0.6
$\delta_{N\infty}$	Long term displacement under tension loads:	[mm]	1.4	1.2	1.4	1.2

Characteristic values of resistance to shear loads of design method A			Performance			
			6	8	10	14
Shear loads: steel failure without lever arm						
$V_{Rk,s}$	Shear steel characteristic resistance:	[kN]	7.5	16.3	35.6	57.9
γ_{Ms}	Partial safety factor: *)	[-]	1.25	1.25	1.25	1.25
Shear loads: steel failure with lever arm						
$M^0_{Rk,s}$	Characteristic bending moment:	[Nm]	15.2	35.3	69.3	235.9
γ_{Ms}	Partial safety factor: *)	[-]	1.25	1.25	1.25	1.25
Shear loads: concrete pryout failure						
K	K factor:	[-]	1	1	1	2
γ_{Mpr}	Partial safety factor: *)	[-]	1.5	1.5	1.5	1.5
Shear loads: concrete edge failure						
l_f	Effective anchorage depth under shear loads:	[mm]	42	45	52	86
d_{nom}	Outside anchor diameter:	[mm]	7.5	10.5	12.5	16.5
γ_{Mc}	Partial safety factor: *)	[-]	1.5	1.5	1.5	1.5

*) In absence of other national regulations

Displacements under shear loads			Perfomances			
			6	8	10	14
V	Service shear load in cracked and uncracked concrete C20/25 to C50/60:	[kN]	3.0	6.5	12.2	27.6
δ_{V0}	Short term displacement under shear loads:	[mm]	1.3	1.4	1.8	2.3
$\delta_{V\infty}$	Long term displacement under shear loads:	[mm]	2.0	2.1	2.7	3.5

Information for design of anchorages under shear loads:
In general the conditions given in ETAG 001, Annex C, section 4.2.2.1 a) and 4.2.2.2. b) are not fulfilled because the diameter of the clearance hole in the fixture (see "Installation parameters" table) is greater than the values given in Annex C table 4.1 for the corresponding diameter of the anchor. For anchor groups with n > 1 the characteristic load resistance $V^g_{Rk,s}$ should be limited to max 2 $V_{Rk,s}$ However for each specific anchor length the manufacturer may specify the thickness of fixture for which these conditions are fulfilled.

3.2 Safety in case of fire (BWR 2)

Reaction to fire has been assessed according to Commission Decision 96/603/EC, amended by 2000/605/EC. See class in table below:

Reaction to fire		6	8	10	14
Reaction to fire AnchorMark AMDEX concrete screw	[--]	Class A1			

Resistance to fire has been assessed according to Technical Report 020: "Evaluation of anchorages in concrete concerning resistance to fire".

Fire resistance duration = 30 minutes		6	8	10	14
Tension loads, steel failure					
$N_{Rk,s,fi,30}$ Characteristic resistance	[kN]	0.23	0.61	1.28	2.90
Pull-out failure					
$N_{Rk,p,fi,30}$ Character. resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,30}$ Character. resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads steel failure without lever arm					
$V_{Rk,s,fi,30}$ Characteristic resistance	[kN]	0.23	0.61	1.28	2.90
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,30}$ Characteristic bending resistance	[Nm]	0.19	0.66	1.73	5.90

Fire resistance duration = 60 minutes		6	8	10	14
Tension loads, steel failure					
$N_{Rk,s,fi,60}$ Characteristic resistance	[kN]	0.21	0.53	0.96	2.17
Pull-out failure					
$N_{Rk,p,fi,60}$ Character. resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,60}$ Character. resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,60}$ Characteristic resistance	[kN]	0.21	0.53	0.96	2.17
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,60}$ Characteristic bending resistance	[Nm]	0.17	0.57	1.30	4.42

Fire resistance duration = 90 minutes		6	8	10	14
Tension loads, steel failure					
$N_{Rk,s,fi,90}$ Characteristic resistance	[kN]	0.16	0.41	0.83	1.88
Pull-out failure					
$N_{Rk,p,fi,90}$ Character. resistance in concrete C20/25 to C50/60	[kN]	1.50	2.25	3.00	7.50
Concrete cone failure **)					
$N_{Rk,c,fi,90}$ Character. resistance in concrete C20/25 to C50/60	[kN]	2.06	2.45	3.51	12.35
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,90}$ Characteristic resistance	[kN]	0.16	0.41	0.83	1.88
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,90}$ Characteristic bending resistance	[Nm]	0.13	0.44	1.13	3.83

Fire resistance duration = 120 minutes		6	8	10	14
Tension loads, steel failure					
$N_{Rk,s,fi,120}$ Characteristic resistance	[kN]	0.12	0.33	0.64	1.45
Pull-out failure					
$N_{Rk,p,fi,120}$ Character. resistance in concrete C20/25 to C50/60	[kN]	1,20	1.80	2.40	6.00
Concrete cone failure **)					
$N_{Rk,c,fi,120}$ Character. resistance in concrete C20/25 to C50/60	[kN]	1.65	1.96	2.81	9.88
Shear loads, steel failure without lever arm					
$V_{Rk,s,fi,120}$ Characteristic resistance	[kN]	0.12	0.33	0.64	1.45
Shear loads, steel failure with lever arm					
$M_{Rk,s,fi,120}$ Characteristic bending resistance	[Nm]	0.10	0.35	0.87	2.95

Spacing and edge distances			6	8	10	14
$S_{cr,N}$	Spacing	[mm]	168	180	208	344
S_{min}	Minimum spacing	[mm]	45	50	60	100
$C_{cr,N}$	Edge distance	[mm]	84	90	104	172
C_{min}	Minimum edge distance (one side fire)	[mm]	84	90	104	172
C_{min}	Minimum edge distance (two sides fire)	[mm]	300	300	300	300
γ_{Msp}	Partial safety factor*)	[-]	1.0	1.0	1.0	1.0

*) In absence of other national regulations
**) As a rule, splitting failure can be neglected when cracked concrete and reinforcement is assumed.

Concrete pry-out failure	6	8	10	14
K factor [--]	1	1	1	2
In Eq. (5.6) of ETAG 001 Annex C, 5.2.2.3, these values of k factor and the relevant values of $N_{Rk,c,fi}$ given in the above tables have to be considered in the design.				

Concrete edge failure
The characteristic resistance $V^0_{RK,c,fi}$ in C20/25 to C50/60 concrete is determined by: $V^0_{RK,c,fi} = 0,25 \times V^0_{RK,c}$ (≤ R90) and $V^0_{RK,c,fi} = 0,20 \times V^0_{RK,c}$ (R120) With $V^0_{RK,c}$ initial value of the characteristic resistance in cracked concrete C20/25 under normal temperature according to ETAG 001, Annex C, 5.2.3.4.

3.3 Hygiene, health and the environment (BWR 3)

This requirement is not relevant for the anchor.

3.4 Safety in use (BWR 4)

Requirements with respect to the safety in use are not included in this Essential Requirement but are treated under the Essential Requirement Mechanical Resistance and Stability (see section 3.1).

3.5 Protection against noise (BWR 5)

This requirement is not relevant for the anchor.

3.6 Energy economy and heat retention (BWR 6)

This requirement is not relevant for the anchor.

3.7 Sustainable use of natural resources (BWR 7)

No Performance Determined.

4. System of assessment and verification of constancy of performance

According to the decision 96/582/EC of the European Commission [(3)] 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
AnchorMark AMDEX concrete screw	To be used for fixing and/or supporting structural elements	All / any	1

(3) Published in the Official Journal of the European Union (OJEU) L254 of 24.06.1996 (See www.new.eur-lex.europa.eu/oj/direct-access.html).

The system 1 referred above is described in Construction Products Regulation (EU) no. 305/211 Annex V §. 1.3 as follows:

a) The manufacturer shall carry out:

   (i.) Factory production control.

   (ii.) Further testing of samples taken at the factory by the manufacturer in accordance with the prescribed quality plan;

b) The notified production control certification body shall issue the certificate of constancy of performance on the basis of:

   (i.) Determination of the product-type on the basis of type testing (including sampling) calculation, tabulated values of descriptive documentation of the product.

   (ii.) Initial inspection of factory and of factory production control.

   (iii.) Continuous surveillance, assessment and evaluation of factory production.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

The ETA is issued for these anchors on the basis of agreed data/information which identifies the product that has been assessed and judged. Detailed description and conditions of the manufacturing process of the anchors, and all the relevant design and installation criteria of these anchors are specified in the manufacturer's technical documentation deposited with the IETcc. The main aspects of this information are specified in the following sections. It is the manufacturer's responsibility to make sure that all those who use the anchors are appropriately informed of specific conditions according to sections 1, 2, 4 and 5 including the annexes of this ETA.

5.1 **Tasks of the manufacturer**

5.1.1 Factory production control

The manufacturer has a factory production control system and shall exercise permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures, including records of results performed. This production control system shall ensure that the product is in conformity with this ETA.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the quality plan. [(4)] The incoming raw materials shall be subjected to controls by the manufacturer before acceptance. Check of materials shall include control of the inspection documents presented by suppliers by verifying dimension and material properties, e.g. chemical composition, mechanical properties etc. The manufactured components are checked visually, for dimensions and properties, where appropriate.

The quality plan which is part of the Technical Documentation of this ETA, includes details of the extent, nature and frequency of testing and controls to be performed within the factory production control and has been agreed between the assessment holder and IETcc. The results of factory production control shall be recorded and evaluated in accordance with the provisions of the quality plan. The records include at least the following information:

- Designation of the product, the basic materials and components;

[(4)] The quality plan has been deposited at IETcc and is only made available to the approval bodies involved in the ACVP procedure.

- Type of control or testing and minimum frequencies of them;
- Date of manufacture of the product and date testing of the product or basic material and components;
- Results of controls and testing and, if appropriate, comparison with requirements;
- Signature of person responsible for factory production control.

The records shall be presented to the notified body involved in the continuous surveillance. On request, they shall be presented to the IETcc.

5.2 Tasks of notified bodies

5.2.1 Determination of the product-type on the basis of type testing

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 the ETA holder and the notified body.

5.2.2 Initial inspection of factory and of factory production control

The notified body shall ascertain that, in accordance with the quality plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the product according to the specifications mentioned in Annexes of this European Technical Assessment.

5.2.3 Continuous surveillance, assessment and evaluation of factory production control

The notified body shall visit the factory at least once a year for regular inspection.

This continuous surveillance and assessment of factory production control have to be performed according to the quality plan. The system of factory production control and the specified manufacturing process have to be verified that they are maintained as the quality plan defined. The results of product certification and continuous surveillance shall be made available on demand by the product certification body or factory production control body, respectively, to IETcc. In cases where the provisions of the European Technical Assessment and the quality plan are no longer fulfilled the certificate of constancy of performance shall be withdrawn.

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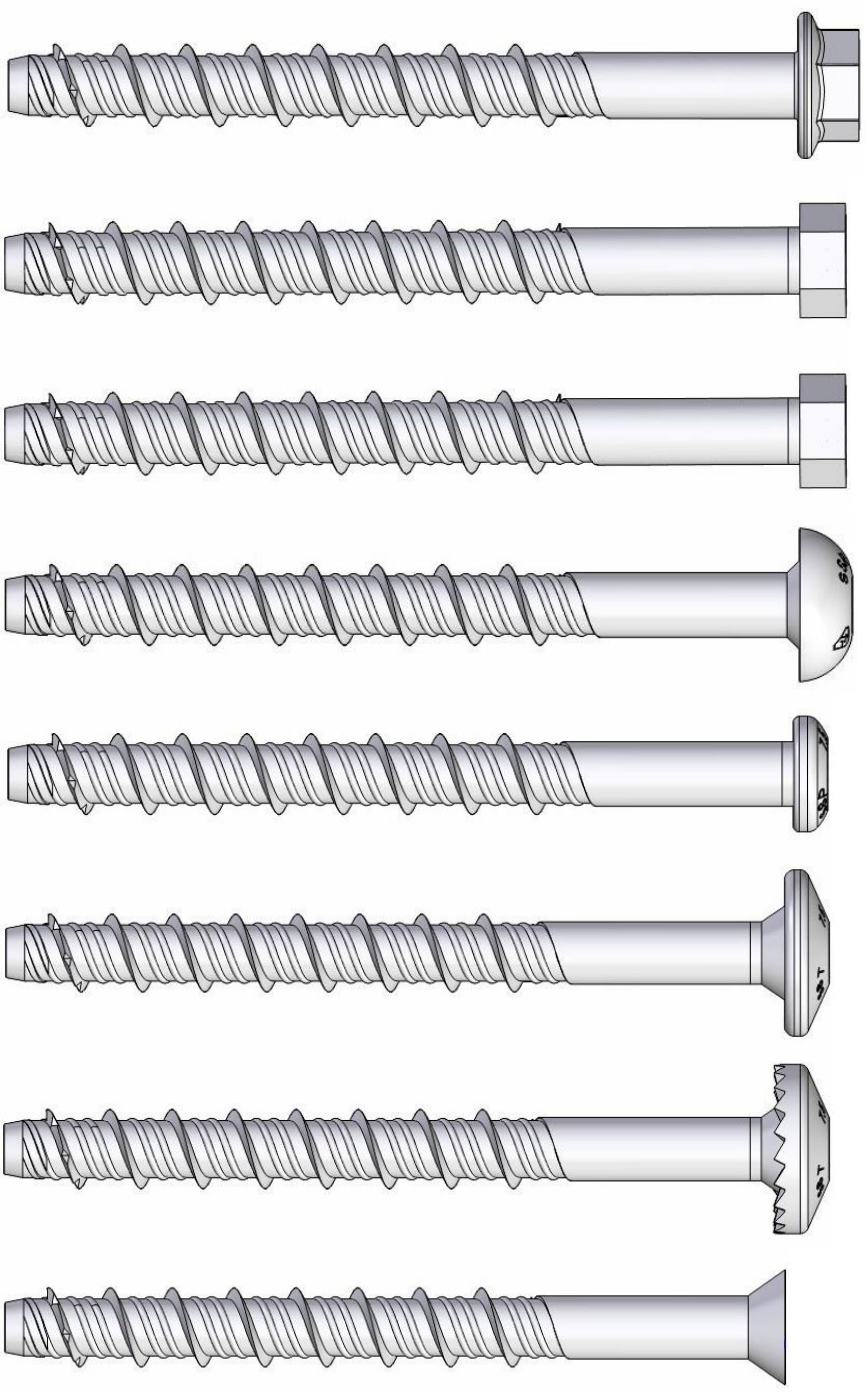
On behalf of the Instituto de Ciencias de la Construcción Eduardo Torroja
Madrid, 23th of September 2016

Marta Mª Castellote Armero
Director

INDEX OF ANNEXES

Annex A: Anchor



AMDEX

AMHEX

AMTEX

AMRND

AMPAN

AMTRU

AMURI

AMDAV

Identification on anchor head:

- Company logo
- Anchor type:
  - Hex head with washer: AMDEX
  - Hex head: AMHEX

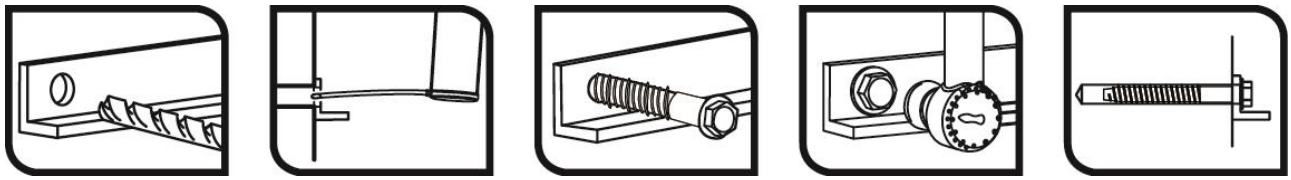
- Hex head, hexalobular recess: AMTEX
- Round head: AMRND
- Pan head: AMPAN
- Truss head: AMTRU
- Truss head with underhead ribs: AMURI
- Countersunk head: AMDAV

- Drilled hole diameter
- Length

Annex B. Materials

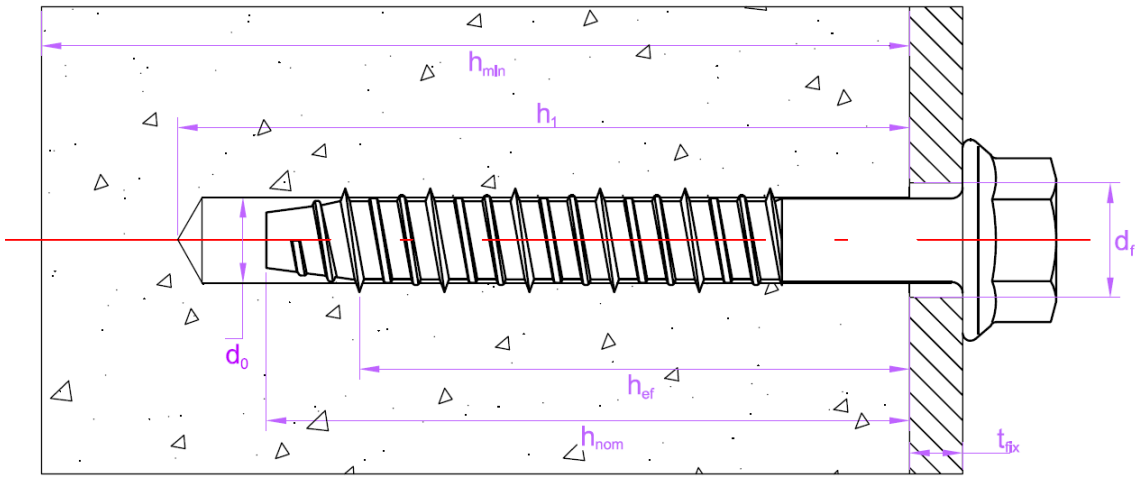
Item	Designation	AMDEX concrete screw
1	Anchor Body	Carbon steel wire rod cold forged. Allowed coatings: • Zinc plated ISO 4042 • Silver ruspert • Zinc flake EN 10683

Annex C. Installation process



Anchor shall be installed using a torque wrench or an electrical impact driver; power input: 500 W; torque: 50-250 Nm. (e.g: Bosch GDS 18E)

Annex D. Schema of the anchor in use



h_{ef}: Effective anchorage depth
h_1: Depth of drilled hole
h_{nom}: Overall anchor embedment depth in the concrete
h_{min}: Minimum thickness of concrete member
t_{fix}: Thickness of fixture
d_0: Nominal diameter of drill bit
d_f: Diameter of clearance hole in fixture