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Authorised and notified according to Article 10 of the Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products

MEMBER OF EOTA

## European Technical Approval ETA-08/0058

Trade name:

TECFI DSE ANCHOR

Holder of approval:

Tecfi SpA  
Strada Statale Appia, Km. 193  
IT-81050 Pastorano (CE)  
Tel. +39 823 88 33 38  
Fax +39 823 88 32 60

Generic type and use of construction product:

Torque-controlled expansion anchor for use in non-cracked concrete

Valid from:  
to:

2008-04-01  
2013-04-01

Manufacturing plant:

Tecfi SpA  
Strada Statale Appia, Km. 193  
IT-81050 Pastorano (CE)

This European Technical Approval contains:

12 pages including 5 annexes which form an integral part of the document



European Organisation for Technical Approvals

Europæisk Organisation for Tekniske Godkendelser

## **I LEGAL BASIS AND GENERAL CONDITIONS**

1 This European Technical Approval is issued by ETA-Danmark A/S in accordance with:

- Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of Member States relating to construction products<sup>1</sup>, as amended by Council Directive 93/68/EEC of 22 July 1993<sup>2</sup>.
- Bekendtgørelse 559 af 27-06-1994 (afløser bekendtgørelse 480 af 25-06-1991) om ikrafttræden af EF direktiv af 21. december 1988 om indbyrdes tilnærmelse af medlemsstaternes love og administrative bestemmelser om byggevarer.
- Common Procedural Rules for Requesting, Preparing and the Granting of European Technical Approvals set out in the Annex to Commission Decision 94/23/EC<sup>3</sup>.
- ETAG 001 - Guideline for European Technical Approval of metal anchors for use in concrete (June 1997), Comprehension Document to ETAG n°001, final draft, doc N° 602 (September 2005)

2 ETA-Danmark A/S is authorized to check whether the provisions of this European Technical Approval are met. Checking may take place in the manufacturing plant. Nevertheless, the responsibility for the conformity of the products to the European Technical Approval and for their fitness for the intended use remains with the holder of the European Technical Approval.

3 This European Technical Approval is not to be transferred to manufacturers or agents of manufacturers other than those indicated on page 1, or manufacturing plants other than those indicated on page 1 of this European Technical Approval.

4 This European Technical Approval may be withdrawn by ETA-Danmark A/S pursuant to Article 5(1) of Council Directive 89/106/EEC.

5 Reproduction of this European Technical Approval including transmission by electronic means shall be in full. However, partial reproduction can be made with the written consent of ETA-Danmark A/S. In this case partial reproduction has to be designated as such. Texts and drawings of advertising brochures shall not contradict or misuse the European Technical Approval.

6 This European Technical Approval is issued by ETA-Danmark A/S in Danish. This version corresponds fully to the version circulated within EOTA. Translations into other languages have to be designated as such.

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1 Official Journal of the European Communities N° L40, 11 Feb 1989, p 12.

2 Official Journal of the European Communities N° L220, 30 Aug 1993, p 1.

3 Official Journal of the European Communities N° L 17, 20 Jan 1994, p 34.

## **II SPECIAL CONDITIONS OF THE EUROPEAN TECHNICAL APPROVAL**

### **1 Definition of product and intended use**

The TECFI DSE ANCHOR in the range from M6 to M12 is an anchor made of steel, with one expansion cone, which is placed into a drilled hole and anchored by torque-controlled expansion. For the installed anchor see Figure given in Annex 1 to 2.

#### **Intended use**

The anchor is intended to be used for anchorages for which requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 of Council Directive 89/106/EEC 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 classes C 20/25 minimum to C50/60 maximum according to EN 206-1:2000. It may be anchored in non-cracked concrete only, as established in ETAG001 Annex C point 4.

The anchor may only be used in concrete subject to dry internal conditions.

#### **Assumed working life**

The provisions made in this European Technical Approval are based on an assumed intended working life of the anchor of 50 years.

An “assumed intended working life” means that it is expected that, when this working life has elapsed, the real working life may be, in normal use conditions, considerably longer without major degradation affecting the essential requirements.

The indications given as to the working life of the boards cannot be interpreted as a guarantee given by Tecfi SpA or ETA-Danmark A/S.

## **2 Characteristics of product and assessment**

### **2.1 Characteristics of product**

The anchor in the range of M6 to M12 corresponds to the drawings given in the Annex 1. The characteristic material values, dimensions and tolerances of the anchor not indicated in Annexes 2 and 3 shall correspond to the respective values laid down in the technical documentation<sup>4</sup> of this European Technical Approval.

Regarding the requirements concerning safety in case of fire it is assumed that the anchor meets the requirements of class A1 in relation to reaction to fire in accordance with the stipulations of the Commission decision 96/603/EC, amended by 2000/605/EC.

The characteristic values for the design of anchorages are given in Annexes 4 and 5.

Each anchor is marked on the body with DSE, the commercial name identifying producer and product, the nominal drill bit diameter, the nominal diameter of the screw and the minimum anchorage depth.

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

### **2.2 Methods of verification**

The assessment of fitness of the anchor for the intended use in relation to the requirements for mechanical resistance and stability and safety in use in the sense of the Essential Requirements 1 and 4 has been made in accordance with the « Guideline for European Technical Approval of Metal Anchors for use in Concrete », Part 1 « Anchors in general » and Part 2 « Torque-controlled expansion anchors », on the basis of Option 7.

In addition to the specific clauses relating to dangerous substances contained in this European technical approval, there may be other 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.

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<sup>4</sup> The technical documentation of this European Technical Approval is deposited at ETA-Danmark and, as far as relevant for the tasks of the approved bodies involved in the attestation of conformity procedure, is handed over to the approved bodies

### 3 Attestation of Conformity and CE marking

#### 3.1 Attestation of Conformity system

The system of attestation of conformity 2 (i) (referred to as system 1) according to Council Directive 89/106/EEC Annex III laid down by the European Commission provides:

- a) tasks for the manufacturer:
  1. factory production control,
  2. further testing of samples taken at the factory by the manufacturer in accordance with a prescribed test plan.
- b) tasks for the notified body:
  3. initial type-testing of the product,
  4. initial inspection of factory and of factory production control,
  5. continuous surveillance, assessment and approval of factory production control.

#### 3.2 Responsibilities

##### 3.2.1 Tasks of the manufacturer

###### 3.2.1.1 Factory production control

The manufacturer has a factory production control system in the plant and exercises permanent internal control of production. All the elements, requirements and provisions adopted by the manufacturer are documented in a systematic manner in the form of written policies and procedures. This production control system ensures that the product is in conformity with the European Technical Approval.

The manufacturer shall only use raw materials supplied with the relevant inspection documents as laid down in the prescribed test plan<sup>5</sup>. The incoming raw materials shall be subject to controls and tests by the manufacturer before acceptance. Check of incoming materials such as nuts, washers, wire for bolts and sleeves shall include control of the inspection documents presented by suppliers (comparison with nominal values) by verifying dimension and determining material properties, e.g. tensile strength, hardness, surface finish.

The manufactured components of the anchor shall be subjected to the following tests:

- Dimensions of component parts:
  - Screw (diameters, lengths, thread);
  - Expansion Sleeves (length, thickness, catch sizes and marking);
  - Expansion cone (diameter, length, angle and roughness of the cone, thread);
  - Washer (diameters, thickness).
- Material properties:
  - Screw (ultimate tensile strengths, hardness),
  - Extension (ultimate tensile strengths, roughness)
  - Expansion sleeve (ultimate tensile strengths, hardness, roughness);
  - Expansion cone (yielding and ultimate tensile strengths, hardness, roughness with the cone from M6 to M12);
  - Washer (hardness).
- Thickness of the zinc electroplated treatment of the elements.
- Visual control of correct assembly and of completeness of the anchor.

The frequency of controls and tests conducted during production and on the assembled anchor is laid down in the prescribed test plan taking account of the automated manufacturing process of the anchor.

The results of factory production control are recorded and evaluated. The records include at least the following information:

- designation of the product, basic material and components; type of control or testing;
- date of manufacture of the product and date of testing of the product or basic material and components;
- result of control and testing and, if appropriate, comparison with requirements;
- signature of person responsible for factory production control.

The records shall be presented to the inspection body during the continuous surveillance. On request, they shall be presented to ETA-Danmark

Details of the extent, nature and frequency of testing and controls to be performed within the factory production control shall correspond to the prescribed test plan which is part of the technical documentation of this European Technical Approval.

<sup>5</sup> The prescribed test plan has been deposited at ETA-Danmark and is only made available to the approved bodies involved in the conformity attestation procedure.

### **3.2.2. Tasks of notified bodies**

#### **3.2.2.1 Initial type testing of the product**

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

#### **3.2.2.2 Initial inspection of factory and of factory production control**

The approved body shall ascertain that, in accordance with the prescribed test plan, the factory and the factory production control are suitable to ensure continuous and orderly manufacturing of the anchor according to the specifications mentioned in 2.1 as well as to the Annexes to the European Technical Approval.

#### **3.2.2.3 Continuous surveillance**

The approved body shall visit the factory at least once a year for regular inspection. It has to be verified that the system of factory production control and the specified automated manufacturing process are maintained taking account of the prescribed test plan.

Continuous surveillance and assessment of factory production control have to be performed according to the prescribed test plan.

The results of product certification and continuous surveillance shall be made available on demand by the certification body or inspection body, respectively, to ETA-Danmark. In cases where the provisions of the European Technical Approval and the prescribed test plan are no longer fulfilled the conformity certificate shall be withdrawn.

### **3.3 CE marking**

The CE marking shall be affixed on each packaging of anchors. The symbol « CE » shall be accompanied by the following information:

- identification number of the certification body;
- name or identifying mark of the - producer and manufacturing plant;
- the last two digits of the year in which the CE-marking was affixed;
- number of the EC certificate of conformity;
- number of the European Technical Approval;
- use category (ETAG 001-1 option 7)
- anchor size

## 4 Assumptions under which the fitness of the product for the intended use was favourably assessed

### 4.1 Manufacturing

The anchor is manufactured in accordance with the provisions of the European Technical Approval using the automated manufacturing process as identified during inspection of the plant by ETA-Danmark and the approved body and laid down in the technical documentation.

### 4.2 Installation

#### 4.2.1 Design of anchorages

The fitness of the anchors for the intended use is given under the following conditions:

The anchorages are designed in accordance with the « Guideline for European Technical Approval of Metal Anchors for Use in Concrete », Annex C, Method A, for torque-controlled expansion anchors under the responsibility of an engineer experienced in the specific field. The choice of partial safety factors is a responsibility of the Designer, taking into account the specific local installation situations and the technical regulations valid in the member States, considering that those fixed in this ETA are minimum values.

Verifiable calculation notes and drawings are prepared taking account of the loads to be anchored.

The position of the anchor is indicated on the design drawings (e.g. position of the anchor relative to reinforcement or to support, etc.).

#### 4.2.2 Installation of anchors

The fitness for use of the anchor can only be assumed if the anchor is installed as follows:

- anchor installation carried out by appropriately qualified personnel and under the supervision of the person responsible for technical matters on 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 prepared for that purpose and using the appropriate tools;
- thickness of the fixture corresponding to the range of required thickness values for the type of anchor;

- checks before placing the anchor to ensure that the strength class of the concrete in which the anchor is to be placed is in the range given and is not lower than that of the concrete to which the characteristic loads apply;
- check of concrete being well compacted, e.g. without significant voids;
- clearing the hole of drilling dust;
- anchor installation ensuring the specified embedment depth: embedment depth control;
- keeping of the edge distance and spacing to the specified values without minus tolerances;
- 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 to the anchor in the direction of load application;
- application of the torque moment given in Annex 2 using a calibrated torque wrench.

#### 4.2.3 Responsibility of the manufacturer

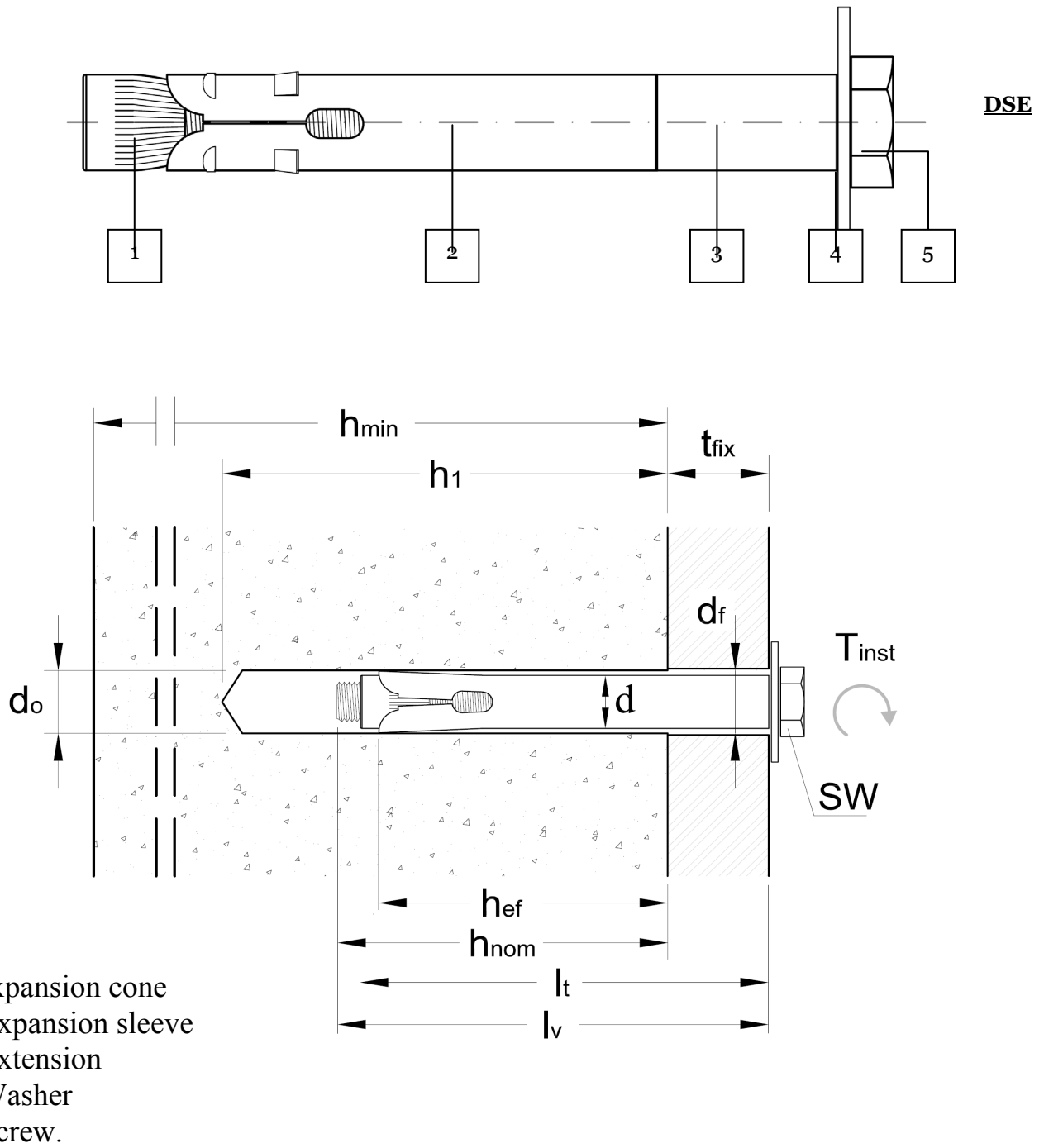
It is the manufacturer's responsibility to ensure that the information on the specific conditions according to 1 and 2 including Annexes referred to in 4.2.1. and 4.2.2. is given to those who are concerned. This information may be made by reproduction of the respective parts of the European Technical Approval. In addition all installation data shall be shown clearly on the package and/or on an enclosed instruction sheet, preferably using illustration(s).

The minimum data required are:

- drill bit diameter,
- thread diameter,
- maximum thickness of the fixture,
- minimum installation depth, minimum hole depth,
- required torque moment,
- information on the installation procedure, including cleaning of the hole, preferably by means of an illustration,
- reference to any special installation equipment needed,
- identification of the manufacturing batch.

All data shall be presented in a clear and explicit form.

**Scheme of the anchor in use**



TECFI DSE ANCHOR torque-controlled expansion anchor	Annex 1
<b>Product and intended use</b>	of European Technical Approval ETA-08/0058

**Dimensions and data for the installation of the anchors**

			<b>M6-Ø8</b>	<b>M8-Ø10</b>	<b>M10-Ø12</b>	<b>M10-Ø14</b>	<b>M12-Ø16</b>
External Diameter	d <sub>o</sub>	[mm]	8	10	12	14	16
Screw Diameter	d	[mm]	6	8	10	10	12
Screw Length	L	[mm]	60-80-100-120	80-100-120-140	80-100-120-150	85-100-120-150	110-130-150
Effective length	h <sub>ef</sub>	[mm]	45	60	60	70	90
Fixture thickness	T <sub>fix</sub>	[mm]	5-25-45-65	10-30-50-70	10-30-50-80	5-20-40-70	10-30-50
DSE Screw body steel	Threaded section	[mm <sup>2</sup> ]	20.1	36.6	58.0	58.0	84.3
	f <sub>uk</sub>	[N/mm <sup>2</sup> ]	800	800	800	800	800
	f <sub>yk</sub>	[N/mm <sup>2</sup> ]	640	640	640	640	640
Minimum distances	s <sub>min</sub>	[mm]	90	120	120	140	180
	c <sub>min</sub>	[mm]	67.5	90	90	105	135
	h <sub>min</sub>	[mm]	100	120	120	140	180

<b>Anchor Size</b>	<b>d<sub>o</sub></b> (mm)	<b>h<sub>1</sub></b> (mm)	<b>h<sub>min</sub></b> (mm)	<b>h<sub>nom</sub></b> (mm)	<b>h<sub>ef</sub></b> (mm)	<b>d<sub>f</sub></b> (mm)	<b>T<sub>inst</sub></b> (Nm)	<b>SW</b> (mm)
<b>M6-Ø8</b>	8	70	100	55	45	9	20	10
<b>M8-Ø10</b>	10	90	120	70	60	12	30	13
<b>M10-Ø12</b>	12	90	120	70	60	14	50	17
<b>M10-Ø14</b>	14	95	140	80	70	16	60	17
<b>M12-Ø16</b>	16	125	180	100	90	18	100	19

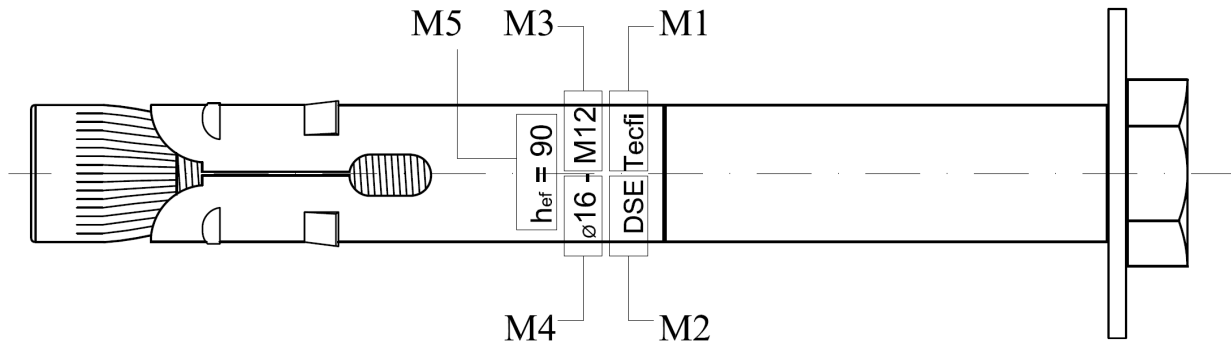
TECFI DSE ANCHOR torque-controlled expansion anchor

**Anchor dimensions and parameter of installation**

Annex 2

of European Technical Approval  
ETA-08/0058

## Marking system



<b>Marking 1</b> (On the top of the expansion sleeve)	Tecfi	Name of the company
<b>Marking 2</b> (On the top of the expansion sleeve)	DSE	Name of the anchor
<b>Marking 3</b> (On the top of the expansion sleeve)	M12	Nominal thread diameter
<b>Marking 4</b> (On the top of the expansion cone):	Ø16	Nominal external diameter of the anchor
<b>Marking 5</b> (On the top of the expansion sleeve)	hef = 90	Minimum anchorage depth

## Materials

Component	Manufacturing process	Standard	Steel class	Coating
Expansion sleeve	Cold forming M6, M8, M10, M12	UNI EN 10130	DC 03	UNI ISO 2081 Zinc Plated Cr III
Expansion cone	Machined	EN 10263-2	C8C	UNI ISO 2081 Zinc Plated Cr III
Washer	Cold forming	EN 10025 ISO 7093-1	S235 JRG1 8.8	UNI ISO 2081 Zinc Plated Cr III
Extension	Cuttet	EN 10263-2	C10C	UNI ISO 2081 Zinc Plated Cr III
Screw	Cold forming	EN 10263-4	20MnB4 (8.8)	UNI ISO 2081 Zinc Plated Cr III

TECFI DSE ANCHOR torque-controlled expansion anchor	Annex 3
<b>Marking and materials</b>	of European Technical Approval ETA-08/0058

## Design Method A: Characteristic strength value and safety coefficients for tension loads

			M6-Ø8	M8-Ø10	M10-Ø12	M10-Ø14	M12-Ø16
Steel failure	$N_{Rk,s}$	[kN]	16	29	46	46	67
	$\gamma_{MS}^{(1)}$	-	1.5	1.5	1.5	1.5	1.5
	$N_{Rk,s}/\gamma_{MS}$	[kN]	10.7	19.5	30.9	30.9	45.0
Pull-out failure	$N_{Rk,P}$ C20/25	[kN]	3	12	16	25	30
	$\gamma_2$	-	1.2	1.2	1.2	1.2	1.2
	$\gamma_{MP}^{(2)}$	-	1.8	1.8	1.8	1.8	1.8
	$N_{Rk,P}/\gamma_{MP}$	[kN]	2.0	6.7	8.9	13.9	16.7
	$\Psi_c$ C30	-	1,22				
	$\Psi_c$ C40	-	1,41				
	$\Psi_c$ C50	-	1,55				
Critical distances	$s_{cr,N}$	[mm]	180	240	240	280	360
	$c_{cr,N}$	[mm]	135	180	180	210	270
	$s_{cr,sp}$	[mm]	180	240	240	280	360
	$c_{cr,sp}$	[mm]	135	180	180	210	270
Tension load	$N^{(3)}$	[kN]	1.4	4.8	6.3	9.9	11.9
Displacements	$\delta_{N_0}$	[mm]	0.14	0.32	0.40	0.62	0.70
	$\delta_{N_\infty}$	[mm]	-	-	1.95	-	-
<p><sup>(1)</sup> In absence of national regulations</p> <p><sup>(2)</sup> In absence of national regulations <math>\gamma_{MC} = \gamma_c * \gamma_1 * \gamma_2</math> with: <math>\gamma_1 = 1.0</math> and <math>\gamma_c = 1.5</math></p> <p><sup>(3)</sup> The load N is evaluated according to point 6.1.2.2.8 ETAG 001 - part 1</p>							

TECFI DSE ANCHOR torque-controlled expansion anchor	Annex 4
<b>Design Method A, characteristic values for tension loads and displacements</b>	of European Technical Approval ETA-08/0058

**Design Method A:**  
**Characteristic strength value and safety coefficients for shear loads**

			<b>M6-Ø8</b>	<b>M8-Ø10</b>	<b>M10-Ø12</b>	<b>M10-Ø14</b>	<b>M12-Ø16</b>
Steel failure without lever arm	$V_{Rk,s}$	[kN]	8.0	14.6	23.2	23.2	33.7
	$\gamma_{MS}^{(1)}$	-	1.25	1.25	1.25	1.25	1.25
	$V_{Rk,s}/\gamma_{MS}$	[kN]	6.4	11.7	18.6	18.6	27.0
Steel failure with lever arm	$M_{Rk,s}^0$	[Nm]	12	30	60	60	105
	$\gamma_{MS}^{(1)}$	-	1.25	1.25	1.25	1.25	1.25
	$M_{Rk,s}/\gamma_{MS}$	[Nm]	9.6	24.0	48.0	48.0	84.0
Concrete edge failure	$l_f$	[mm]	45	60	60	70	90
	$d_{nom}$	[mm]	6	8	10	10	12
	$\gamma_{Mc}^{(2)}$	-	1.5	1.5	1.5	1.5	1.5
Pry-out failure	$k$	-	1	2	2	2	2
	$\gamma_{Mc}^{(2)}$	-	1.5	1.5	1.5	1.5	1.5
Shear load	$V^{(3)}$	[kN]	4.6	8.4	13.3	13.3	19.3
Displacements	$\delta_{V_0}$	[mm]	2.3	3.7	3.8	4.0	4.1
	$\delta_{V_\infty}$	[mm]	3.5	5.6	5.7	6.0	6.2
<sup>(1)</sup> In absence of national regulations <sup>(2)</sup> In absence of national regulations $\gamma_{MC} = \gamma_c * \gamma_1 * \gamma_2$ with: $\gamma_1 = 1.0$ and $\gamma_c = 1.5$ <sup>(3)</sup> The load V is evaluated according to point 6.1.2.2.8 ETAG 001 - part 1							

TECFI DSE ANCHOR torque-controlled expansion anchor	Annex 5
<b>Design Method A, characteristic values for shear loads and displacements</b>	of European Technical Approval ETA-08/0058