# Options in ETAG Certifications and what they mean

GABRIEL TERS *B.Eng (Structural) UTS*

**EOTA is the European Organisation for Technical Assessment** in the area of construction products. EOTA publishes ETAG's (similar to our Australian and New Zealand Standards) for products used in the construction environment through the EU (European Union).

ETAG's outline the requirements for the publication of ETA's (European Technical Assessment).

An ETA is a verification document that is product specific. Manufacturers essentially use this document to quantify their product range of capabilities. An example would be pull out capacities of a particular anchor embedded to a range of depths in concrete having a range of cylinder strengths.

There are many service conditions that can affect the usage of an anchor.

Anchors in concrete, for example, are influenced by a variety of factors, including:

- Type of anchor (expansion, undercut, bonded, etc.)
- Design and material specification of the anchor (embedment depth, diameter of drill hole, cross-section of metal, strength of anchor material, etc.)
- Direction of loading of the anchor (tension, oblique tension, shear)
- Condition of concrete member (cracked, non-cracked)
- Concrete strength class
- Arrangement of anchor(s) within concrete member (distance between anchors, edge distance, etc.).

These factors above will contribute to the way a particular anchor behaves in-situ. For instance, its modes of failure relative to the conditions it is used in. If every combination of influencing factors was tested, the results would be infinite. Thus an ETA can publish a limited number of behavioural results the manufacturer wants to verify to their customer for a specific range of applications under a limited range of conditions...This is where options come in.

EOTA allows ETA's to offer different **options** for testing and verification. Options are a range of service conditions that a product is tested to. For example, Option 1 in ETAG 001 is a test regime for safety critical anchors to be used in ceilings under cracked or non-cracked conditions. Option 7, on the other hand is developed for anchors that are to be used in a non-cracked vertical wall. ETA's must offer at least one option for qualification.

The ETAG must show (after a test programme is completed) the expected behaviour of the product for each combination of the factors it has been tested, for the range of specific applications of its intended use.

The following table is from ETAG 001 - GUIDELINE FOR EUROPEAN TECHNICAL APPROVAL OF METAL ANCHORS FOR USE IN CONCRETE. It outlines the various options that can be chosen to be used for the determination of a specific product ETA.

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## Table 5.3 Assessment options covered by this Guideline

| Option N° (European Technical Approval) | Concrete | | Load quoted for | | | | Reduced Edge and Spacing | Design Method according to Annex C |
|---|---|---|---|---|---|---|---|---|
| | Cracked | Non-cracked | *C20/25 only | *C20/25 to C50/60 | One value any direction | Tensile and Shear Values | | |
| 1 | ✓ | ✓ | | ✓ | | ✓ | ✓ | A |
| 2 | ✓ | ✓ | ✓ | | | ✓ | ✓ | |
| 3 | ✓ | ✓ | | ✓ | ✓ | | ✓ | B |
| 4 | ✓ | ✓ | ✓ | | ✓ | | ✓ | |
| 5 | ✓ | ✓ | | ✓ | ✓ | | | C |
| 6 | ✓ | ✓ | ✓ | | ✓ | | | |
| 7 | | ✓ | | ✓ | | ✓ | ✓ | A |
| 8 | | ✓ | ✓ | | | ✓ | ✓ | |
| 9 | | ✓ | | ✓ | ✓ | | ✓ | B |
| 10 | | ✓ | ✓ | | ✓ | | ✓ | |
| 11 | | ✓ | | ✓ | ✓ | | | C |
| 12 | | ✓ | ✓ | | ✓ | | | |

*The two international methods for measuring the strength grade of concrete are cylinder and cube strength.
EOTA publish both values-Example C20/25 (Concrete Cylinder/Concrete Cube).
Cylinder is always stated first and is the reference used in Australian standards for concrete hardness shown in MPa.
**For this example C20/25-would be shown as 20MPa in Australia.**

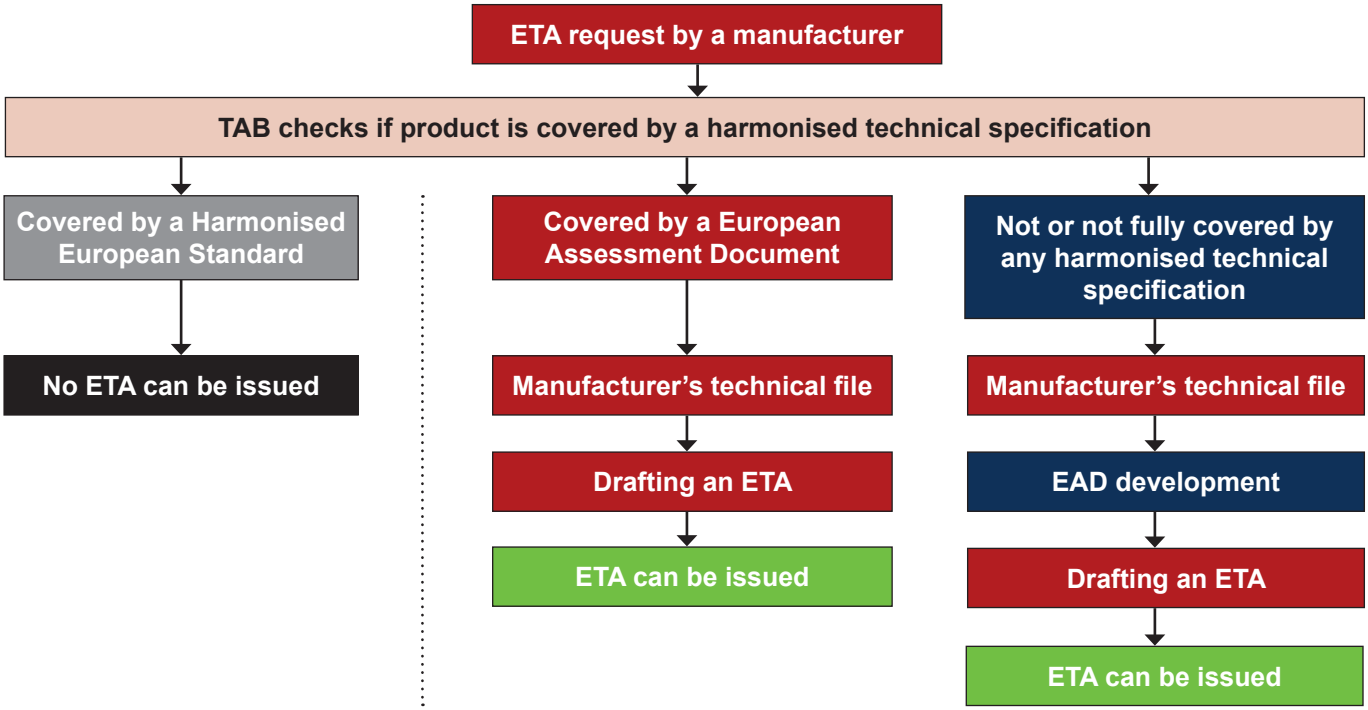
| | |
|---|---|
| Option 1<br>Option 7 | The most common options you find in most published ETA's are **Option 1** (cracked and non-cracked concrete with a range of concrete strengths loaded in various directions) and **Option 7** (non-cracked concrete with a range of concrete strengths loaded in various directions). |
| Teil/Part 6 | EOTA also published a separate ETAG, namely **ETAG 001 – Part 6**: ANCHORS FOR MULTIPLE USE FOR NON-STRUCTURAL APPLICATIONS. This ETAG is designed to take advantage of multiple anchors acting together where if one anchor slips excessively or fails the load can be transferred to other neighbouring anchors from the same group. |

Under each option there is a set of physical tests that must be completed to satisfy the requirements of the relevant ETAG. These tests are generally very comprehensive…and therefore quite expensive.

Not all options have to be determined but at least one must be chosen to be published. Generally, the manufacturer will undergo a rigorous test regime to determine the results to be used for publication.

A TAB (Technical Assessment Body) defines an assessment programme for the manufacturer (or a recognised testing facility) to determine the essential characteristics of the product. Below is a diagram of the pathways ETA's are created.

## ETA Pathway




Australian Standards have adopted ETAG 001 as AS5216 – 2018 - Design of post-installed and cast-in fastenings in concrete. The use of options is found in APPENDIX A - TESTING AND ASSESSMENT OF FASTENERS, Table A1.1.

Design software such as **Mungo Design*** use the information from these ETA's to create parameters needed for the design of their anchors. The output values from the software are based on actual tests undergone in laboratory conditions.

Manufacturers such as Mungo have ETA's published for a multitude of their fastening products.

The European Technical Assessment, ETA-17/0128 of 20 February 2017, for this product (parts of which are shown below) can be found on their web site via the Hobson website.

Deutsches Institut für Bautechnik DIBt

Member of EOTA www.eota.eu

Approval body for construction products and types of construction

Bautechnisches Prüfamt

An institution established by the Federal and Laender Governments

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

**European Technical Assessment** **ETA-17/0128 of 20 February 2017**

English translation prepared by DIBt - Original version in German language

**General Part**

| | |
|---|---|
| Technical Assessment Body issuing the European Technical Assessment: | Deutsches Institut für Bautechnik |
| Trade name of the construction product | Mungo Injection system MIT-Hybrid for concrete |
| Product family to which the construction product belongs | Bonded anchor for use in concrete |
| Manufacturer | Mungo Befestigungstechnik AG<br>Bornfeldstrasse 2<br>4603 OLTEN<br>SCHWEIZ |
| Manufacturing plant | Werk 13 / Plant 13 |
| This European Technical Assessment contains | 24 pages including 3 annexes which form an integral part of this assessment |
| This European Technical Assessment is issued in accordance with Regulation (EU) No 305/2011, on the basis of | Guideline for European technical approval of "Metal anchors for use in concrete", ETAG 001 Part 5: "Bonded anchors", April 2013,<br>used as European Assessment Document (EAD) according to Article 66 Paragraph 3 of Regulation (EU) No 305/2011. |

Deutsches Institut für Bautechnik
Kolonnenstraße 30 B | 10829 Berlin | GERMANY | Phone: +49 30 78730-0 | Fax: +49 30 78730-320 | Email: dibt@dibt.de | www.dibt.de





**Table C1: Characteristic values for steel tension resistance and steel shear resistance of threaded rods**

| Size | | | M 8 | M 10 | M 12 | M 16 | M 20 | M24 | M 27 | M 30 |
|---|---|---|---|---|---|---|---|---|---|---|
| **Characteristic tension resistance, Steel failure** | | | | | | | | | | |
| Steel, Property class 4.6 and 4.8 | $N_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Steel, Property class 5.6 and 5.8 | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 78 | 122 | 176 | 230 | 280 |
| Steel, Property class 8.8 | $N_{Rk,s}$ | [kN] | 29 | 46 | 67 | 125 | 196 | 282 | 368 | 449 |
| Nichtrostender Stahl A4 and HCR, Property class 50 | $N_{Rk,s}$ | [kN] | 18 | 29 | 42 | 79 | 123 | 177 | 230 | 281 |
| Nichtrostender Stahl A4 and HCR, Property class 70 | $N_{Rk,s}$ | [kN] | 26 | 41 | 59 | 110 | 171 | 247 | - | - |
| **Characteristic tension resistance, Partial safety factor** | | | | | | | | | | |
| Steel, Property class 4.6 | $\gamma_{Ms,N}$ [1] | [-] | 2,0 | | | | | | | |
| Steel, Property class 4.8 | $\gamma_{Ms,N}$ [1] | [-] | 1,5 | | | | | | | |
| Steel, Property class 5.6 | $\gamma_{Ms,N}$ [1] | [-] | 2,0 | | | | | | | |
| Steel, Property class 5.8 | $\gamma_{Ms,N}$ [1] | [-] | 1,5 | | | | | | | |
| Steel, Property class 8.8 | $\gamma_{Ms,N}$ [1] | [-] | 1,5 | | | | | | | |
| Stainless steel A4 and HCR, Property class 50 | $\gamma_{Ms,N}$ [1] | [-] | 2,86 | | | | | | | |
| Stainless steel A4 and HCR, Property class 70 | $\gamma_{Ms,N}$ [1] | [-] | 1,87 | | | | | | | |
| **Characteristic shear resistance, Steel failure** | | | | | | | | | | |
| Without lever arm: Steel, Property class 4.6 and 4.8 | $V_{Rk,s}$ | [kN] | 7 | 12 | 17 | 31 | 49 | 71 | 92 | 112 |
| Steel, Property class 5.6 and 5.8 | $V_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Steel, Property class 8.8 | $V_{Rk,s}$ | [kN] | 15 | 23 | 34 | 63 | 98 | 141 | 184 | 224 |
| Stainless steel A4 and HCR, Property class 50 | $V_{Rk,s}$ | [kN] | 9 | 15 | 21 | 39 | 61 | 88 | 115 | 140 |
| Stainless steel A4 and HCR, Property class 70 | $V_{Rk,s}$ | [kN] | 13 | 20 | 30 | 55 | 86 | 124 | - | - |
| With lever arm: Steel, Property class 4.6 and 4.8 | $M_{Rk,s}$ | [Nm] | 15 | 30 | 52 | 133 | 260 | 449 | 666 | 900 |
| Steel, Property class 5.6 and 5.8 | $M_{Rk,s}$ | [Nm] | 19 | 37 | 65 | 166 | 324 | 560 | 833 | 1123 |
| Steel, Property class 8.8 | $M_{Rk,s}$ | [Nm] | 30 | 60 | 105 | 266 | 519 | 896 | 1333 | 1797 |
| Stainless steel A4 and HCR, Property class 50 | $M_{Rk,s}$ | [Nm] | 19 | 37 | 66 | 167 | 325 | 561 | 832 | 1125 |
| Stainless steel A4 and HCR, Property class 70 | $M_{Rk,s}$ | [Nm] | 26 | 52 | 92 | 232 | 454 | 784 | - | - |
| **Characteristic shear resistance, Partial safety factor** | | | | | | | | | | |
| Steel, Property class 4.6 | $\gamma_{Ms,V}$ [1] | [-] | 1,67 | | | | | | | |
| Steel, Property class 4.8 | $\gamma_{Ms,V}$ [1] | [-] | 1,25 | | | | | | | |
| Steel, Property class 5.6 | $\gamma_{Ms,V}$ [1] | [-] | 1;67 | | | | | | | |
| Steel, Property class 5.8 | $\gamma_{Ms,V}$ [1] | [-] | 1,25 | | | | | | | |
| Steel, Property class 8.8 | $\gamma_{Ms,V}$ [1] | [-] | 1,25 | | | | | | | |
| Stainless steel A4 and HCR, Property class 50 | $\gamma_{Ms,V}$ [1] | [-] | 2,38 | | | | | | | |
| Stainless steel A4 and HCR, Property class 70 | $\gamma_{Ms,V}$ [1] | [-] | 1,56 | | | | | | | |

[1] in absence of national regulation

**Mungo Injection system MIT-Hybrid for concrete**

**Performances**
Characteristic values for steel tension resistance and steel shear resistance of threaded rods

**Annex C 1**