SECTION SP38 METAL ANCHORS FOR USE IN CONCRETE

1 GENERAL

1.1 CONTENTS

OUTLINE: This Section sets out the technical requirements for the manufacture, supply and installation of structural metal anchors, mechanically and chemically set into existing concrete substrate, either non-cracked OR non-cracked and cracked, under static and quasi-static actions (loadings).

[Note: The terms adopted herein are as used throughout the ETAGs and Eurocodes.]

1.2 STANDARDS

EUROPEAN TECHNICAL APPROVALS GUIDELINES (ETAG):

Metal anchors for use in concrete: ETAG 001, Parts 1 to 5 and Annexes A to C.

EOTA TECHNICAL REPORTS: Design of Bonded Anchors: EOTA TR029

[Note: Copies of the ETAGs are available as a free download from www.eota.be for the following anchor types: torque controlled expansion, undercut, deformation-controlled expansion and bonded.]

EUROCODES: EN 1990, EN 1991 and ENV 1992 [superseded by EN 1992].

1.3 BACKGROUND

EOTA: The European Organisation for Technical Approvals (EOTA) comprises the Approved Bodies nominated to issue European Technical Approvals (ETA) by the European Union (EU) Member States and the European Free Trade Association (EFTA) States who have contracted to the European Economic Area Agreement. As an outcome of the Construction Products Directive 89/106/EC (CPD), the role of EOTA is primarily to monitor and progress the drafting of ETA Guidelines (ETAG) and to co-ordinate all activities relating to the issue of ETAs. EOTA Technical Reports are developed as supporting reference documents to the ETAGs.

GENERAL: As the ETAGs have no Australian or ISO Standards equivalents and products from many countries are ETA certified, they can be considered International Standards, and hence aligned with Standards Australia's Policy for the 'Adoption of International Standards'. [Ref: SG-007].

EUROCODES: EN 1990 and EN 1992 form part of a package of Eurocodes to which EOTA Working Groups are seeking full compatibility. The Eurocodes cover the basis for structural design, actions, the main structural materials, geotechnical design and design provisions for earthquakes.

1.4 TERMS & DEFINITIONS

ANCHOR: A manufactured, assembled component for achieving anchorage between the base material (concrete) & the fixture. For a bonded anchor the bonding material is included. [Ref: ETAG 001, Part 1]

ATTESTATION OF CONFORMITY: Provisions and procedures as laid down in the CPD and fixed in accordance with the Directive, aiming to ensure that, with acceptable probability, the specified performance of the product is achieved by the ongoing production. [Ref: ETAG 001, Part 1]

FIXTURE: Component to be fixed to the concrete. [Ref: ETAG 001, Part 1]

NON-CRACKED CONCRETE: Is concrete where the probability is acceptably low that either cracks will form after installation of anchors or the width of any existing cracks will increase significantly during the life of the anchors. [Ref: British Board of Agrément www.bbacert.co.uk]

ACTIONS (LOADINGS): Terms are defined in Clause 1.5.3, EN 1990, including the following:

Static Action: Action that does not cause significant acceleration of the structure or structural members.

Quasi-static Action: Dynamic action represented by an equivalent static action in a static model.

Dynamic Actions: When it is appropriate to consider dynamic actions as quasi-static, the dynamic parts may be considered either by including them in the static values or by applying equivalent dynamic amplification factors to the static actions.

AUSTRALIAN DISTRIBUTOR: An entity (corporation or otherwise) based in Australia, including but not limited to an Australian manufacturer, overseas manufacturers local representative, wholesaler, importer, primary distributor (stockist) or contractor, which has the responsibility for verifying that the fastener properties comply with Section SP38.

PRE Number: An indication of pitting and crevice corrosion resistance is given by the 'Pitting Resistance Equivalent' (PRE) number: PRE = %Cr 3.3%Mo 16%N [Ref: www.nickelinstitute.org]

CONFORMITY: General headings adopted from ISO/IEC Directives Part 2.

1.5 PACKAGING, STORAGE AND TRANSPORT

REQUIREMENT: See ETAG 001, Part 1, Clause 7.2.

2 CONFORMITY

2.1 PRODUCT CONFORMITY

MANUFACTURER: To provide one of the following, all written in the English language.

Option (A): Product certification.

- ETA 3rd party certification certificate.

Option (B): Sampling and testing plan.

- Test certificates of anchor attributes (ie: mechanical, chemical, etc.), as listed in ETAG 001.
- Identification of manufacturing lot trace numbers.

AUSTRALIAN DISTRIBUTOR: To provide the following:

- Verification of attribute by test certificate.
- Identification of distributor trace numbers (ie: for Option B).
- Signed and dated approval by a verifying officer, including position, company and contact details.

2.2 CONFORMITY ASSESSMENT

REQUIREMENT: All anchors included in the Project Specifics to have ETA certification.

Verification: Manufacturing plant, country of origin and confirmation of the ETA, to be verified through the EOTA website by the application design engineer.

LABORATORY COMPETENCE: Accredited by NATA, or other internationally recognised accreditation body (ie: signatory to ILAC or APLAC), to AS ISO/IEC 17025 for the relevant sampling and testing. (ILAC & APLAC: International & Asia Pacific Laboratory Accreditation Cooperation)

AUDITOR COMPETENCE: Further to HB18.65 (AS ISO/IEC Guide 65), the minimum criteria for competence of personnel to include all the following:

- Qualified auditor with tertiary qualifications in a relevant field.
- At least ten years in the manufacturing environment, with demonstrated competence in this particular product area, or particular product Standard/referenced standard.
- Demonstrated experience in auditing quality management systems, or quality plans, for these products.
- At least one year actively involved in product assessment of this or similar product, either in a laboratory or in production inspection.

2.3 INSTALLATION

DESIGN: To the requirements of ETAG 001, Part 1, Clause 2.5.

Design Competence: Design office to be certified to ISO 9001, and the designer a product specialist or a Chartered Professional Engineer (CPEng) or other person providing equivalent evidence that they have the necessary qualifications and experience to comply with ETAG 001, Part 1, Clause 2.5.

Installer Competence: The knowledge and skills, acquired through training, qualification, or experience, or a combination of these, enabling that person to perform the task required. [Ref: AS 1873, Part 1]

SUBSTRATE VERIFICATION: Anchor designer to confirm strength values used in the calculations.

INSITU TESTING: Additional testing may be included in the Project Specifics.

2.4 NON-COMPLIANCE

GENERAL Document and refer all alleged non-complying product to the Australian Distributor for further investigation and any necessary corrective action.

3 MATERIALS

3.1 CONCRETE

CLASSES: Inclusive to the following range of compressive strength classes and for normal weight concrete of ENV 206 [superseded by EN 206, see Table 7, partially reproduced below]:

ETAG Test Strengths	Compressive Strength Class	Min Characteristic Cylinder Strength (MPa)	Min Characteristic Cube Strength (MPa)
Low strength	C20/25	20	25
Intermediate strengths ***(Note: Not included in the ETAG, but inserted here for interpolation use)***	C25/30	25	30
	C30/37	30	37
	C40/50	40	50
	C45/55	45	55
High strength	C50/60	50	60

3.2 ANCHORS

GENERAL: To ETAG 001, Part 1, Clause 2.1.2.

3.3 BONDED ANCHORS

BONDING MATERIAL: To ETAG 001, Part 5 requirements, and anchor manufacturer's written instructions.

4 MANUFACTURE

4.1 ANCHORS

GENERAL: To the details provided by the manufacturer of each product supplied to the approval body, for attestation of conformity, in compliance with ETAG 001, Part 1, Section 3.

5 APPLICATION DESIGN

5.1 GENERAL

REQUIREMENT: The design of the anchorage and specification to utilise load data from the published ETA, and the design application to be limited to static and quasi-static loadings in compliance with ETAG 001, Annex C.

FATIGUE: To EN 1990, Clause 4.1.4 for representation of fatigue actions and EN 1991 for models for fatigue action. [Note: An EOTA technical report for fatigue is planned.]

BONDED ANCHORS: To include the additional requirement of EOTA TR029.

6 INSTALLATION

6.1 GENERAL

REQUIREMENT: Anchors to be installed by competent personnel working under supervision, in accordance with ETAG 001, Part 1, Clause 2.5.

7 SCHEDULES

7.1 REFERENCED DOCUMENTS

ETA GUIDELINES (ETAG):

ETAG 001 - Metal Anchors for use in Concrete
.1 - Anchors in general
.2 - Torque-controlled expansion anchors
.3 - Undercut anchors
.4 - Deformation-controlled expansion anchors
.5 - Bonded anchors
Annex A - Details of test
Annex B - Tests for admissible service conditions detailed information
Annex C - Design methods for anchorages

EOTA TECHNICAL REPORTS:

EOTA TR029 - Design of Bonded Anchors

EUROCODES:

EN 1990 - Eurocode: Basis of structural design

EN 1991 - Eurocode 1: Actions on structures

EN 1992 - Eurocode 2: Design of concrete structures

OTHER DOCUMENTS:

AS/NZS 1873 - Power actuated (PA) hand-held fastening tools
.1 - Selection, operation and maintenance

AS ISO/IEC 17025 - General requirement for the competence of testing and calibration laboratories

BBA - British Board of Agrément, Use of anchors with European Technical Approvals UK Guidance – Distinction between cracked and non-cracked concrete

EN 206 - Concrete
.1 - Specification, performance, production and conformity

HB 18.65 - AS ISO/IEC GUIDE 65 – General requirements for bodies operating product certification systems (ISO/IEC GUIDE 65)

ISO/IEC Directives - Part 2, Rules for the structure and drafting of International Standards (5th ed), 2004

SG-007 - Standards Australia Standardization Guide – 007, Adoption of International Standards

7.2 COMPONENT SUPPLY

REQUIREMENT: All assembly components to be sourced from the same supplier.

BONDED ANCHORS: Bonding material and embedded metal part to be supplied together as a system.

7.3 PROJECT SPECIFICS

[Note: Select from, add to, or modify the following, and insert in project specs and/or purchase orders.]

REQUIREMENT: Supply and install the nominated anchors in compliance with Section SP38.

ITEM	PROJECT REQUIREMENTS
Application [eg: tilt-up slab bracing anchors, column footings, suspended ceiling hangers]	
Project stage [ie: in design, under construction, existing structure]	
Anchor type [eg: torque controlled expansion, or undercut, or deformation-controlled expansion, or bonded]	
Diameters of hole in fixture & drill hole	
Fixture thickness (mm) plus any packing material	
Fixture assembly details: spacing of anchors	
Concrete member: thickness & edge distance [see ETAG 001, Annex C, Fig 2.1]	
Type of fixing installation [ie: flush, through, or stand-off]	
Concrete condition [ie: assume cracked or non-cracked]	
Concrete strength (MPa)	
Load: size (kN), type (static, quasi-static), direction (tensile or shear)	
Corrosion protection: [eg: electroplated zinc galv, hot dipped galv, stainless steel grades: PRE number]	
Additional insitu testing [if required]	
Installation procedure	Manufacturer to supply
On-site training [if required]	Australian Distributor to supply
ETA certificate(s), including load data	Manufacturer to supply [see Clause 2.2]
Manufacturer's compliance certificates	Australian Distributor to supply [see Clause 2.2]
Australian Distributor's compliance certificates	Australian Distributor to supply [see Clause 2.2]

7.4 AGENCY PRACTICES

Agency	Item	Requirement
RTA		
Qld DTMR		
VicRoads		
Landcom		
RailCorp		
HWC		
NSW Public Works		