

**A CPD Seminar for the specifiers  
of anchors used in construction  
presented on behalf of**





**A company limited by Guarantee  
(non-profit) representing the major  
manufacturers who sell  
construction fixings in the UK.**



**All our activities are aimed at**  
**Ensuring best fixings practice**

**The  
Construction Fixings Association is  
proud to introduce the most  
significant contribution to the safe  
use of Construction Fixings**

**since the advent of  
European Technical Approvals.**

# **BS 8539:2012**

**Code of practice for the selection  
and installation of post-installed  
anchors in concrete and masonry.**

**What?**

**Who?**

**How?**

**When?**

**Why?**

## **What does it cover?**

**Every aspect of the correct use of fixings drilled into concrete and masonry for safety critical applications.**

From selection through supply to installation, testing and certification.

## **Who does it affect?**

**Everyone involved in the use of fixings**

**manufacturer, specifier, distributor,**

**contractor, installer, tester.**



## **How does it affect me?**

**As a specifier of anchors your**

**Role and Responsibilities are set out in the  
code.**

**They are the most onerous of all parties.**

**When was it published?**

**October 2012.**

## Why?

## Fixing failures

There is a history of fixing failures – some of which have caused injury and death.

# Fixing failures

Twelve children were injured when a metal heating duct fell from a ceiling in a school. Sheerness, Kent. 12 May 2009



Milton Keynes scaffolding collapse:



...one worker killed

main contractor pleads guilty

# Fixing failures

Boston Tunnel July 11, 2006

Failure of resin anchors

- Wrong resin used
- Poor installation
- Results of proof tests ignored



Concrete sections collapse

Car crushed,  
passenger killed

In 2002, on a construction site in Dublin, a pre-cast concrete stair collapsed killing one man and seriously injuring two others.

The main cause was the change of specification of an anchor to a different type and, when they hit rebar, a shorter length.

Neither change was approved by the responsible engineer

Secondary issues were found including:-  
Lack of clarity regarding the responsibility  
for the works during the construction  
phase.

As a result of this accident the  
Health and Safety Authority of Ireland  
Published a code of practice.



The Standing Committee on Structural Safety, (SCOSS) have been monitoring fixing failures via their scheme for

Confidential Reporting on Structural Safety (CROSS)

Among other problems they identified 8 collapses of suspended ceilings.

This has been addressed by the publication of

“Best practice Guide to Top Fixings for suspended ceilings.”

Downloadable from [www.the-cfa.co.uk](http://www.the-cfa.co.uk) .

The CFA has also been monitoring failures and has identified the following causes:

Those in black involve Specifiers.

Those in grey involve Contractors  
– they have their own presentation.

## Main contributory factors

Anchors incorrectly selected

Anchors incorrectly installed

Anchor specifications changed without due process

Let's expand those involving Specifiers.

## **Anchors incorrectly selected**

Application parameters not fully identified

Inadequate selection process

Anchors poorly specified once selected

## **Anchors incorrectly installed**

Installers not trained or supervised

Manufacturer's instructions not followed

Correct setting equipment not used

Wrong actions taken when rebar is struck.

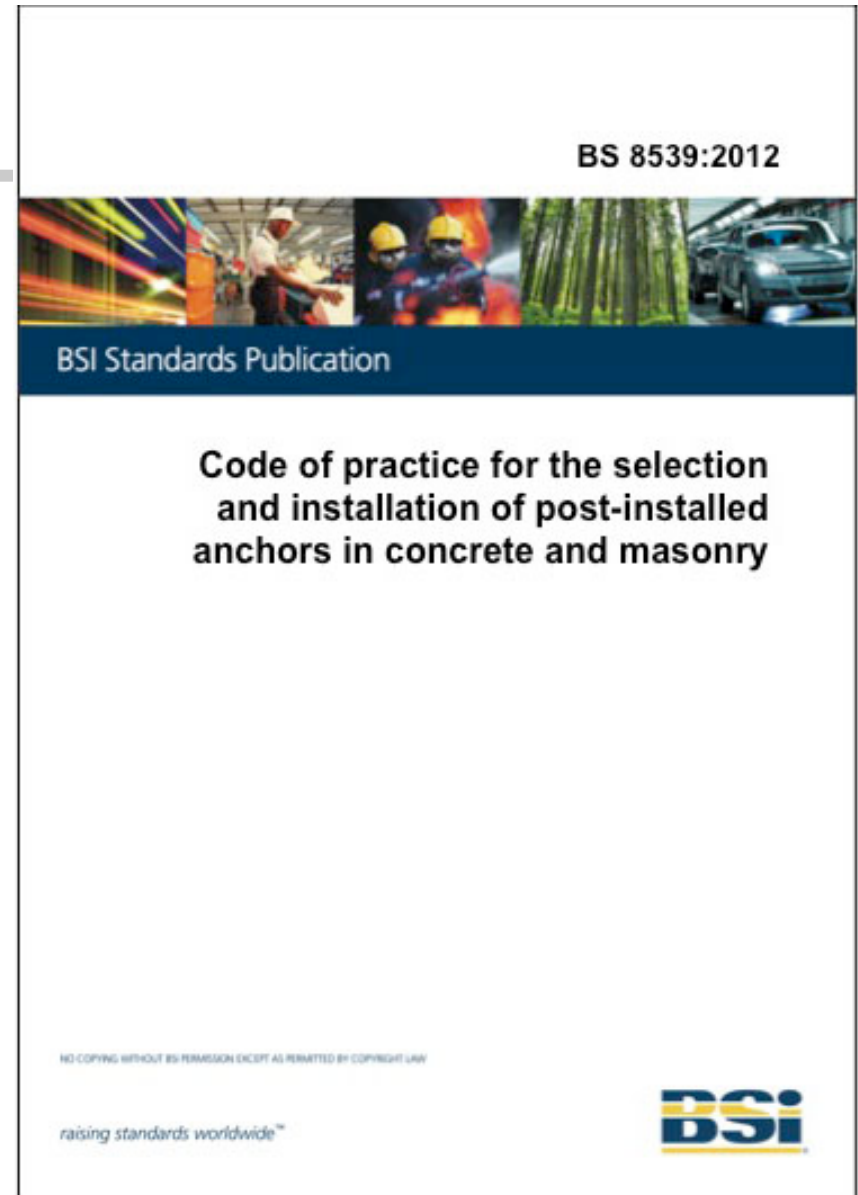
## **Anchor specifications changed without due process**

Contractors change specifications without asking permission of the specifier

Specifiers change anchor specifications without applying the full selection process to the alternative.

The CFA has lead the drafting of the new code.

Here are the key points for all stakeholders.



- ❑ The code recommends the use of anchors qualified with ETA.
- ❑ European Technical Approvals.
  - ❑ Under the Construction Products Regulation (CPR) – since July 2013 - they are being transformed into
- ❑ European Technical Assessments
- ❑ Effectively if there is an anchor on the market with an ETA – that should be used.



- ETApprovals were awarded after tests and assessment according to “ETAGs” European Technical Approval Guidelines.
- Under the Construction Products Regulation they are being transformed into
- European Assessment Documents (EAD)
- ETAssessments will be awarded from them.
- ETApprovals remain valid during their period of validity – up to 5 years from issue.

- ❑ Information to be provided by each stakeholder is identified.
- ❑ New Testing procedures outlined for situations when there is no Recommended load data available.
- ❑ Proof testing required on all projects except those using ETA installed by Competent Installers.

- For other stakeholders to satisfy their obligations manufacturers need to offer anchors with ETA.
- All information needed for selection and installation must be provided.

- The “Designer” is the person responsible for the overall structure, including the anchorage.
- The “Specifier” is responsible for the “Selection” of the anchor.
- They may be the same person.

- “Selection” is the overall process of selecting the type and size of anchor.
- “Design” is the part of the selection process to do with selecting the size of anchor once the type is chosen.
- The “Design Method” is the process recommended by the manufacturer for the design, usually as stated in the ETA.

## Preliminary considerations

### Structural integrity

Can the structure support the required actions?

### Concrete condition

Is it cracked or non-cracked?

### Robustness and redundancy

Is the application statically determinate or indeterminate?

## The selection process:

Factors to do with the *type* of anchor

Base material type and condition,

Concrete – cracked / uncracked

Masonry – solid / hollow

Corrosion –

internal / external / aggressive environment

Temperature – installation and service

Practicalities – thro' fix / immediate loading

## The selection process:

Factors to do with the *size* of anchor

Base material – strength

Actions - magnitude and direction,  
static/non-static

Edge and spacing criteria  
and more . . . . .



## The selection process:

More factors to do with the *size* of anchor

The Design Method

Partial Safety Factor approach –  
anchors with ETA

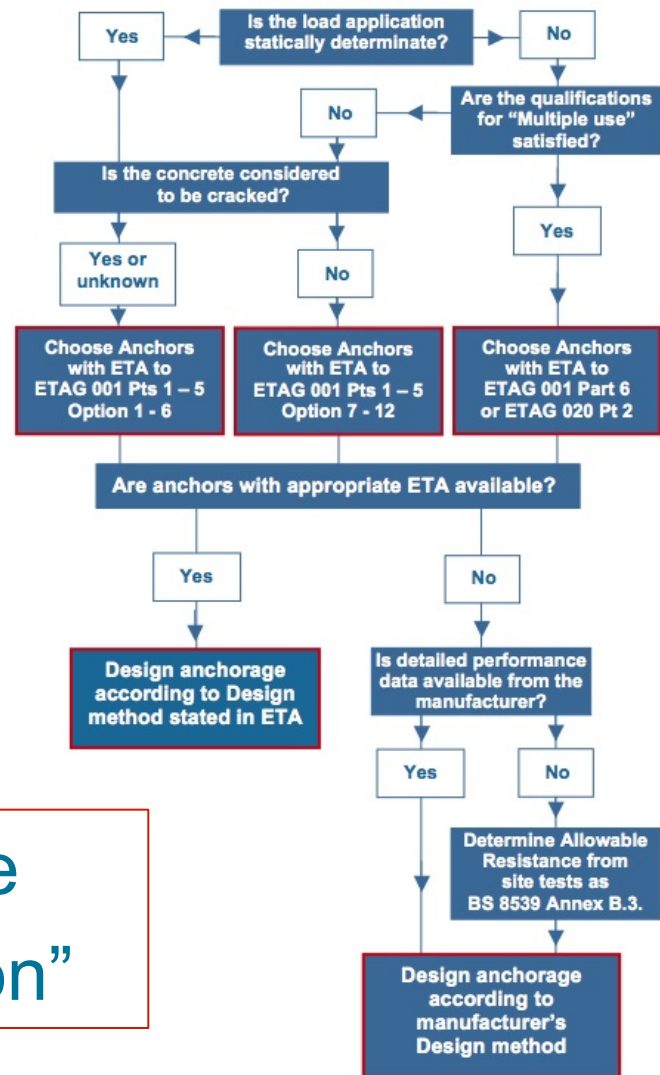
Global Safety Factor approach –  
anchors without ETA

- Flow diagrams are included to help decide which ETAG is required

This one is for concrete

There is another for masonry

Available to download from the CFA website – “Anchor selection”



- ❑ More on ETAGs:
- ❑ There are several ETAGs for different types of anchors in different applications.
  - ETAG 001 Metal anchors for use in Concrete
  - ETAG 014 Plastic anchors for fixing of external thermal insulation composite systems with rendering.
  - ETAG 020 Plastic anchors for multiple use in concrete or masonry for non-structural applications
  - ETAG 029 Metal injection anchors for use in masonry

- ❑ Of these ETAG 001 is the most used:  
Metal anchors for use in Concrete
- ❑ It has 6 parts:
  - Part 1 General requirements
  - Part 2 Torque controlled anchors
  - Part 3 Undercut anchors
  - Part 4 Deformation controlled anchors
  - Part 5 Bonded anchors
  - Part 6 Anchors for multiple use in non-structural applications

- and 12 options:
  - Options 1 – 6 for Cracked and non-cracked concrete
  - Options 7 – 12 for non-cracked concrete only.

In case of doubt assume Cracked concrete

- The different options allow greater flexibility of design for:
  - different concrete strengths,
  - tension and shear
  - closer spacings and closer edge distances.
- The lower the number the greater the flexibility.
- Option 1 allows the most flexible design.

For more detail go to [www.the-cfa.co.uk](http://www.the-cfa.co.uk) and see CFA Guidance Note “ETA and design methods...”

- Once the anchor is selected it must be “Specified”.
- i.e. enough detail must be written into the project for the contractor to buy the correct anchor and the installer to install it correctly.
- The CFA has designed a form to help with this.
- It’s part of the CFA 8539 Toolkit.



- ❑ **Hitting rebar! An awkward issue!**
- ❑ Specifiers should consider the likelihood of rebar being struck during drilling and set out the action to be taken by the installer when that happens.
- ❑ The installer may be instructed to:
  - drill through the rebar – IF this will have no deleterious effect on the structure.
  - move the location of drilled holes – see below
  - refer back to the specifier – not a preferred option

- If rebar may not be drilled through and holes must be relocated:
- There is guidance in the Code regarding relocation (and in each ETA!).
- It may mean base plates and bracketry need to be designed with alternative hole positions. This may allow for the use of rebar detection systems before drilling starts or for the need to relocate anchors when rebar is struck.
- *Anchor performance will need to be checked for each alternative.*



- All parties involved in the fixings chain will have the opportunity to understand exactly how they should discharge their responsibilities.
- Anchors for all safety critical applications will be correctly selected, supplied and installed.

**They should therefore be much safer.**

- To help all stakeholders understand and implement the recommendations of the BS the CFA has assembled



**CONSTRUCTION FIXINGS**  
association

**8539**  
**TOOLKIT**



- How to .... Guides
- CFA 8539 Forms
- Relevant Guidance Notes
- ETAG selectors

On the CFA website under  
Publications and Downloads



## □ How to Guides:

- How to **select** anchors in accordance with BS 8539
- How to **supply** anchors in accordance with BS 8539
- How to **install** anchors in accordance with BS 8539
- How to **test** anchors in accordance with BS 8539

An introduction to the roles and responsibilities of each key stakeholder.



## □ CFA 8539 Forms:

### ○ CFA Form 8539/01 Design Information

Prompts the gathering of the data required for selection and design

### ○ CFA Form 8539/02a Anchor Specification

Full details of the anchor so the right one is acquired and correctly installed

### ○ CFA Form 8539/02b Anchor Recommendation

A supplier can recommend an anchor for the specifier to consider

### ○ CFA Form 8539/03 Installation Certificate

The contractor's supervisor certifies the right anchor was correctly installed

### ○ CFA Form 8539/04 Test Request

Enough detail to help the tester meet the test objectives

### ○ CFA Form 8539/05 Compliance checklist

A checklist of all key stages for use by Clerks of Works etc.



□ **Guidance Notes:**

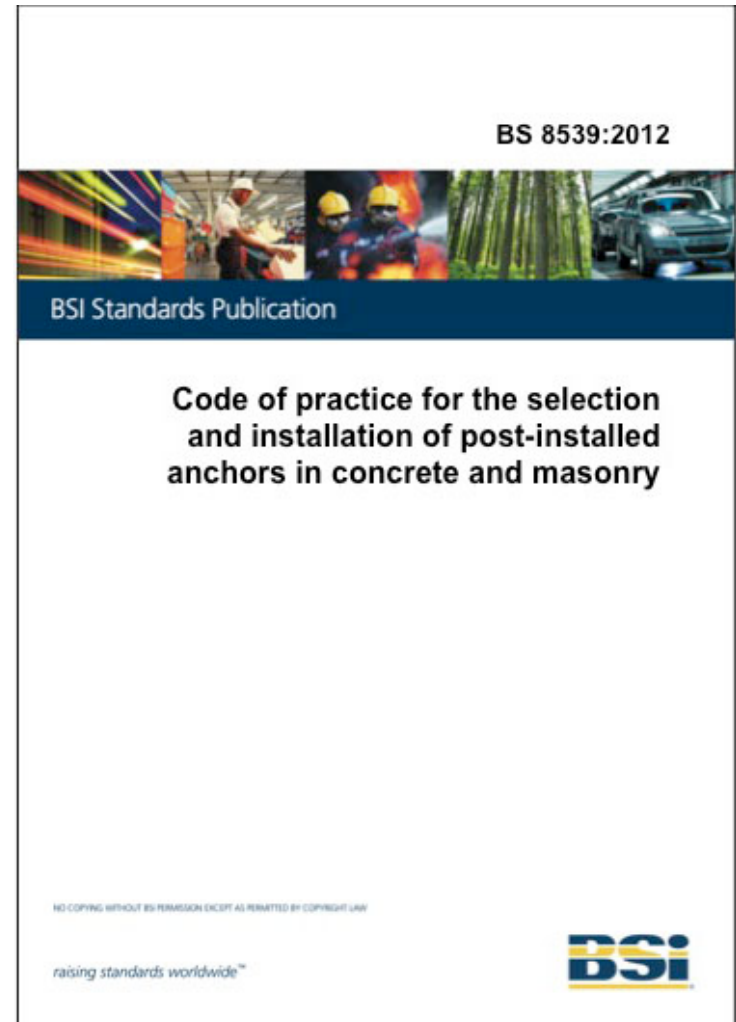
- **ETAs and Design Methods for anchors used in construction. (recently revised)**
- **Anchor Terminology and Notation**
- **Procedure for site testing construction fixings - 2012**



□ **ETAG selectors:**

- **Sequence diagram to choose the most appropriate ETAG for anchors used in Concrete**
  
- **Sequence diagram to choose the most appropriate ETAG for anchors used in Masonry**

- **BS 8539:2012 costs £218**
  - **The CFA is a BSI distributor**
  - **Copies of fixings related standards can be supplied at 20% discount**
  - **Use the “Contact us” form on the website**





- ❑ To find out more about the new code or the CPR go to
  - [www.the-cfa.co.uk](http://www.the-cfa.co.uk)

- ❑ look for the 8539 toolkit



- ❑ look for items specially selected for
- ❑ Feel free to “Contact us”

**Specifiers**

- Quarterly newsletter.

## INSIGHT

- Varied topics for Specifiers, and Contractors

- To get your copy emailed automatically tick the box on the form requesting your certificate of attendance at this seminar.

OR go online to [www.the-cfa.co.uk](http://www.the-cfa.co.uk)  
Newsletter sign-up

THE CONSTRUCTION FIXINGS ASSOCIATION ENSURING BEST FIXINGS PRACTICE

**CONSTRUCTION FIXINGS INSIGHT**  
association

Tel: 01664 823687  
Website: [www.the-cfa.co.uk](http://www.the-cfa.co.uk) Issue 1

**BS 8539: What is it and what is the purpose?**  
Ensuring best practice - saving lives

The recently published BS 8539 is the first British Standard that provides recommendations for the safe selection and installation of anchors for use in concrete and masonry. The intention is to provide practical guidance for designers, specifiers, manufacturers, suppliers, contractors, installers and testers of anchors. BS 8539 is also linked to the relevant European regulations, especially with respect to selecting products with the correct ETA's for the application.

BS 8539 is restricted to the use of anchors inserted into concrete and masonry drilled holes and it is intended to facilitate all stakeholders involved in the design, selection and use of anchors to achieve the security required.



Recommendations for the safe selection and installation of anchors for use in concrete and masonry

**Main causes of fixing failures:**

- Wrong fixing being selected, or fixing not designed
- Specified fixing being changed without proper care
- Poor installation

**Who does it affect?**  
The code is aimed at everyone involved in the use of the fixings:

- Contractors
- Distributors
- Manufacturers
- Installers
- Site Testers
- Designers
- Specifiers

**EVERYONE**

**What does BS 8539 mean for...**

**Contractors**



The contractor should ensure that the specification is followed and the installer is capable of correctly installing the anchor. If any party proposes an alternative anchor to that specified, the contractor should ensure that the change management procedure outlined in Clause 10 is followed.

If the contractor is aware of any changes to the assumptions made by the specifier in designing / selecting the specified anchor (for example changes in the strength of the base material) he should inform the specifier and email instructions.

Installation is certified in CFA Form 8539-03, available from CFA website.

**Distributors and Manufacturers**

The anchor distributor / manufacturer should provide sufficient information to allow the specifier and installer to ensure the safe selection, specification, installation, use, maintenance, cleaning, dismantling or disposal of the anchor without risk to safety or health.

For example:

- Designation of anchor including size and type
- Performance data including:
  - Characteristic resistance
  - Design resistance (or partial safety factor for the material to allow calculation)
  - Recommended resistance (or appropriate safety factor to allow calculation)
- Siting details including min. thickness of base material, edge and spacing criteria
- Installation instructions and equipment needed.

1 CFA FIXINGS INSIGHT - ISSUE 1

## An introduction to Scaffold anchoring in accordance with TG4:11 and BS 8539:2012

TG4:11 is published jointly by:



and



**APPROACH TO ENSURE SAFE FIXINGS**

Check structure will support required loads

**Choose an anchor suitable for the base material**

**Know the Applied Load**

**Concrete**

**Masonry**

**Check Applied Load is lower than Recommended Load**

**Do Preliminary Tests as required in section 4.1**

**Chosen anchor to be installed by Competent Fixings Installer**

**Sample of anchors on every job to be Proof Tested by Competent Fixings Supervisor as section 4.2.**

# Will the structure take the load?

- This should be determined by someone qualified to make this decision.
  - Concrete structures will normally be OK.
  - Solid brick walls that are load bearing may well do.
  - Cavity walls? Parapet walls?

**Load tests will not help!**