



## Technical information

# Timber fasteners for structural use

### Testing and certification

#### 01 Introduction

Timber fasteners for structural use are fixings used to create joints between timbers or to attach other materials to timber. Many transfer loads within structures so their performance has to be consistent and predictable and, where they fall under the scope of a harmonised European Standard (hEN), they should be CE marked for structural use.

Other fixings are used for non-structural applications, such as installing insulation, but they should still be of an appropriate quality.

The most common types of fasteners are dowel-type timber fasteners which include nails, screws, staples, dowels and bolts with nuts.

There is a wide range of fastener profiles, sizes and finishes to choose from, particularly for nails and screws.

When specifying fixings the following must be taken into consideration:

- the properties of the timber or timber-based product to be fixed
- what it is to be fixed to
- how strong the joint has to be
- if the joint is carrying structural loads
- the level of corrosion protection that is appropriate

This information sheet aims to explain the purpose of the tests, the various tests available and the process of CE marking timber fasteners for structural use.

## 02 Why do fasteners need testing?

Within Europe there is a design code that applies to the design of buildings and civil engineering works in timber or wood-based panels which are joined together with adhesives or mechanical fasteners.

For designers to be able to specify products or buyers to purchase the correct product to use in these designs they need to have the characteristic values for the products.

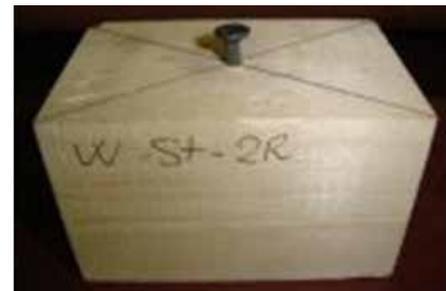
Manufacturers, importers or distributors of these products will therefore need to be able to supply end users with this information, and where there is a harmonised European Standard for the product, it will be a legal requirement to supply this information.

*EN 14592 - Timber structures – Dowel-type fasteners* is the harmonised European Standard that specifies the requirements and test methods of dowel-type fasteners for use in load bearing timber structures and makes CE marking of these products a requirement anywhere in Europe, including the UK.

To enable CE marking of these products the manufacturer / supplier must have had the Initial Type Testing (ITT) and / or Initial Type Calculations (ITC) of the products carried out, most of which must be done by a European based Notified Body (NB) with this testing / calculations in their NB scope, such as BM TRADA.



Pull through test to determine the fastener head resistance in materials.



Sample prior to withdrawal test to determine the fastener resistance within materials.

Characteristic	Fastener type					
	Nails	Staples	Screws	Dowels	Bolts & nuts	
<b>Material</b>						
Tensile strength of wire*	✓	✓				
Specification*			✓	✓	✓	✓
Performance of coating*	✓	✓	✓			
<b>Geometry</b>						
Length and nominal diameter	✓	✓	✓	✓	✓	✓
Inner diameter			✓			
Head cross-sectional area	✓					
Cross-sectional area		✓				
Threaded length	✓		✓			
Head diameter			✓			
For threaded nails - length of the point	✓					
Length of coated type (if applicable)	✓	✓				
Other dimensions (if relevant)	✓	✓			✓	
<b>Mechanical strength and stiffness, as</b>						
Yield moment	✓	✓	✓	✓	✓	✓
Withdrawal	✓	✓	✓			
Head pull-through	✓	✓	✓			
Tensile capacity	✓		✓			
Torsional strength / torsional resistance			✓			
Durability (ie corrosion protection)*	✓	✓	✓	✓	✓	✓

\*Characteristics made on the basis of a manufacturer's / supplier's declaration without testing.

**2.1 How do I achieve the characteristic values required to CE mark my product?**

The table below is a list of the ITT / ITC requirements for fasteners covered by EN 14592. These are also the properties to be declared within the complete CE mark.

**2.2 I have a wide range of fasteners, how many of them will need testing?**

This is dependent on the number of variations within the product range. The starting point is that at least one length of each diameter should be tested, but this may increase due to product specifications that affect the characteristics, such as:

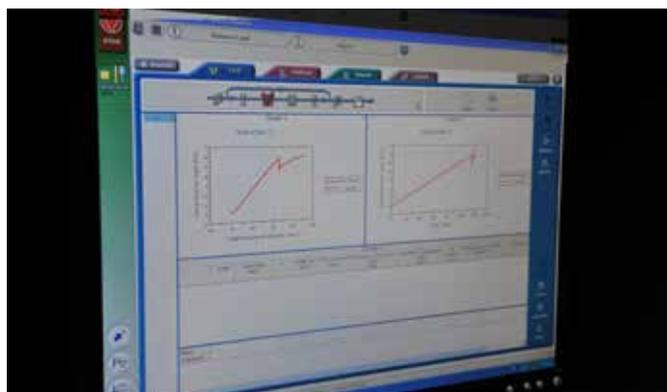
- head shapes / sizes
- raw materials (steel, stainless steel etc)
- profiles (smooth, ring shank, screw, square twist etc)
- finishes that may affect the characteristic values, i.e. galvanising giving a rough finish
- installation methods (hand or tool)

The objective is to provide a test programme to cover the product range being CE marked.



**2.3 Who uses the values?**

A building designer, specifier, architect or erector will need to make sure that the fasteners used in the structure will do the job they were specified to do to enable it to be stable, safe and fit for purpose. These structures will be designed using the new suite of Eurocodes, and these in turn will use the characteristics of the fasteners produced during the ITT / ITC.



**03 CE marking**

Since 1st July 2013 it is illegal to place any construction product covered by a harmonised European Standard on the market without a CE mark and a Declaration of Performance (DoP). This regulation is EU law and applies in all member states including the UK.



CE Mark logo.

A harmonised European Standard (hEN) is one type of harmonised technical specification for construction products. The other type is a European Technical Assessment (ETA). Manufacturers of products that fall within the scope of an ETA must use the ETA if they wish to CE mark their products.

An ETA is written by a Technical Assessment Body (TAB) for a particular family of products in accordance with a European Assessment Document (EAD) where the products fall outside the scope of existing harmonised technical specifications. ETAs are usually issued for individual manufacturers and named production sites.

**3.1 Declaration of Performance (DoP)**

The Manufacturer must make a Declaration of Performance (DoP) of the product before placing that product on the market. The Manufacturer, Authorised Representative or Trader must then take responsibility for the conformity of the construction product.

The DoP must express the performance of the construction product in relation to the essential characteristics as specified in the harmonised Technical Specification(s) and should contain the following information:

- the reference of the product type
- the system or systems of AVCP (system 3 for EN 14592)
- the reference number and date of issue of the hEN or ETA used for the assessment of the product e.g. EN 14592:2008+A1:2012
- the Notified Body (NB) (and the Technical Assessment Body for an ETA)
- where applicable, the reference number of the specific technical documentation used and the requirements with which the manufacturer claims the product complies
- the intended use or uses for the construction product, in accordance with the applicable harmonised Technical Specification, e.g. nails for use in load-bearing timber structures
- the list of essential characteristics, as determined in the harmonised Technical Specification for the declared intended use or uses. The essential characteristics and the performance are normally

presented in a single table

- the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses
- where applicable, the performance of the construction product (by levels or classes, or in a description), if necessary as a result of a calculation in relation to its essential characteristics
- the performance of those essential characteristics of the construction product which are related to the intended use or uses

### 3.2 Your responsibility as a manufacturer

Under the CPR an importer or distributor shall be considered a manufacturer and shall be subject to the obligations of a manufacturer where they place a product on the market under their name, or trademark or modify a construction product already placed on the market in such a way that conformity with the DoP may be affected.

The responsibility for ensuring that a product is correctly CE marked remains with the manufacturer, but the involvement of a third party in the CE marking process varies depending upon how safety critical the product is. The more critical, the greater involvement is required.

Structural fasteners are considered safety critical, but made from a fairly consistent material, and are therefore covered under the Assessment and Verification of Constancy of Performance (AVCP) level 3.

This means the manufacturer is responsible for all stages of the process, including the Declaration of Performance (DoP) and correct application of the CE mark.

The only Notified Body involvement for these structural fasteners is to provide test evidence. In the UK, Notified Test Laboratories must be UKAS accredited.

### 3.3 What test evidence / performance declarations do I need?

Following the completion of the ITT / ITC by a Notified Body the manufacturer / supplier will be issued with test certificates. The characteristic values for the product range are calculated from the test results.

When a manufacturer has the test certificates, and has a working factory production control (FPC) system in place, they must produce a DoP for their products, a template of which can be found in Annex III of the CPR No 305/2011.

### 3.4 What factory production controls do I need?

As well as test evidence to prove product performance claims, CE marking requires manufacturers to maintain a factory production control (FPC) system to demonstrate consistency / control of manufacture and provide a

degree of confidence that the products placed on the market conform to the DoP.

It is the manufacturer's responsibility to establish, document and maintain an FPC System:

- **Establish** - the system should cover all aspects of the production process that affect product conformity, including:
  - personnel (e.g. responsibility, competence and training)
  - equipment (e.g. calibration and maintenance)
  - materials and components (e.g. inspection and testing / assessment)
  - product (e.g. inspection, testing / assessment of products and traceability / identification)
- **Document** - keep procedures and records for all of the above
- **Maintain**
  - initial inspection – to check the above
  - ongoing surveillance, inspection, testing / assessment
  - identification of non-conformances and corrective action

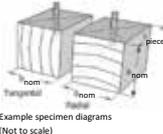
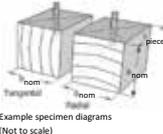
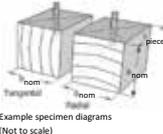
EN1382:1999  
Withdrawal capacity  
of timber fasteners





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TEST CERTIFICATE NO: WDRAWFXXX13QXRA603241365

Client Name AnyCo				Job Code: TT// FXXX13																																											
Client Address AnyWhere																																															
Project Name Testing for CE Marking				Leader RS		Operator IG																																									
Test Start 01/04/13	Finish 09/04/13	Test Batch QXRA6032		°C / % RH 18/55																																											
Fastener Type Nail	Surface Treatment Electro Galvanised	Yield strength (N/mm <sup>2</sup> ) 600																																													
Nominal Fastener Dimensions	l <sub>nom</sub> (mm) 60.0	d <sub>nom</sub> (mm) 3.2	Staple Crown (mm) 0.0																																												
Test Piece Material Material	Nominal Density (kg/m <sup>3</sup> ) 310	l <sub>p</sub> (mm) 40.0	l <sub>s</sub> (mm) 20.0																																												
Nominal Test Piece Dimensions	h <sub>nom</sub> (mm) 80	b <sub>nom</sub> (mm) 80	l <sub>piece</sub> (mm) 80																																												
Insertion Method Nail gun	Orientation Perpendicular (R & T)		Further Fixing details 0																																												
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Results Summary</th> <th>l (mm)</th> <th>l<sub>p</sub> (mm)</th> <th>d (mm)</th> <th>F<sub>ax</sub> (N/mm<sup>2</sup>)</th> <th>F<sub>max</sub> (N)</th> <th colspan="2"></th> </tr> </thead> <tbody> <tr> <td>Mean</td> <td>60.0</td> <td>40.0</td> <td>3.2</td> <td>6.2</td> <td>795.5</td> <td colspan="2" rowspan="5">  <p>Example specimen diagrams (Not to scale)</p> </td> </tr> <tr> <td>Standard Deviation</td> <td>0.15</td> <td>0.35</td> <td>0.03</td> <td>0.27</td> <td>33.39</td> </tr> <tr> <td>Minimum</td> <td>59.7</td> <td>39.4</td> <td>3.2</td> <td>5.9</td> <td>750.1</td> </tr> <tr> <td>Maximum</td> <td>60.2</td> <td>40.6</td> <td>3.2</td> <td>6.7</td> <td>843.5</td> </tr> <tr> <td>Test count</td> <td>20</td> <td>20</td> <td>20</td> <td>20</td> <td>20</td> </tr> </tbody> </table>								Results Summary	l (mm)	l <sub>p</sub> (mm)	d (mm)	F <sub>ax</sub> (N/mm <sup>2</sup> )	F <sub>max</sub> (N)			Mean	60.0	40.0	3.2	6.2	795.5	 <p>Example specimen diagrams (Not to scale)</p>		Standard Deviation	0.15	0.35	0.03	0.27	33.39	Minimum	59.7	39.4	3.2	5.9	750.1	Maximum	60.2	40.6	3.2	6.7	843.5	Test count	20	20	20	20	20
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Test count	20	20	20	20	20																																										
Uncertainty of measurement				±0.062																																											
<p>Calibration Statement: The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k = 2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.</p>																																															

**General Notes:**  
 Sampling procedure was random from two coils  
 Before fabrication, test material was conditioned at 20°C 65% RH  
 After fabrication and before testing, test specimens were conditioned at 20°C 65% RH  
 TRADA Technology Ltd Test Procedure TP027 was followed for the testing.  
 Moisture content and density results are presented on a separate certificate  
 Drawing Ref: AnyDrawing

Issued by:		Signature:		Date:	
Job Title:					
Authorised by:		Signature:		Date:	
Job Title:					

TRADA Technology  
 Registered Office: Oldham House, Stalling Lane, High Wycombe, Bucks HP12 4JZ, UK  
 Registered in England No. 20021487

An example of a typical test certificate

In many cases manufacturers will already be operating to ISO 9001 or an existing quality management system that may meet all of the above requirements. If not, then the manufacturer will need to put a system in place that meets the above requirements.

### 3.5 How do I make a Declaration of Performance (DoP)?

The CPR requires that the manufacturer makes a formal DoP for each of the products or product families that they place on the market. The purpose of the DoP is to enable easy comparison of performance. It should list all of the relevant essential characteristics, including declared performance for mandatory characteristics and No Performance Determined (NPD) or declared performance for any other characteristics, as per the CPR template.

### 3.6 How / where do I apply the CE mark?

The manufacturer is responsible for creating a CE mark and applying it to their product. It must be affixed visibly, legibly and indelibly on one or more of the following locations: the product, attached label, packaging or on the accompanying documentation.

For fasteners to EN 14592, if only the minimum CE mark is applied to the packaging, the complete CE mark must be provided in the accompanying documents.

### 3.7 CE marking checklist

- Define your product
- Check it falls within the scope of the hEN or ETA
- Review Annex ZA within the product standard
- Identify the essential characteristics.  
What performance do you need to claim?  
What additional performance do you want to claim?
- Identify the Assessment and Verification of Constancy of Performance (AVCP) level
- Determine your / NB's responsibility
- Undertake the necessary testing / calculations – gather test evidence and classify your products
- Set up Factory Production Control – document the system to meet the requirements of the product standard
- Achieve certification if required
- Produce a Declaration of Performance – organise your paperwork in a technical file
- Affix CE marking – mark the product with a CE, list performance on the packaging; make full details available in the accompanying paper work.

	
AnyCo Ltd	
08	
<b>EN 14592:2008</b> Round cross-sectional plain shank nails for structural timber products	
<b>Dimensions:</b> Diameter = 4mm, Head area 28mm <sup>2</sup> Length = 50mm	
<b>Material:</b>	
<ul style="list-style-type: none"> <li>• Non alloy steel rods according to EN 10016-2</li> <li>• Characteristic tensile strength of wire (<math>f_t</math>) in acc. with EN 10218-1, minimum 600 N/mm<sup>2</sup></li> </ul>	
<b>MECHANICAL STRENGTH AND STIFFNESS:</b>	
• Characteristic yield movement	$M_{y,k} = 6610 \text{ Nmm}$
• Characteristic withdrawal parameter in timber with characteristic density $P_k = 350\text{kg/m}^3$ , coating type 1,2 or 3	$f_{ax,k} = 2,45 \text{ N/mm}^2$
• Characteristic head pull through parameter in timber with charact. density $P_k = 350\text{kg/m}^3$	$f_{head,k} = 8,57 \text{ N/mm}^2$
• Characteristic tensile capacity	$f_{tens,k} = \text{NPD}$
<b>DURABILITY (i.e. corrosion protection):</b>	
• Z275 Hot dip zinc coating (Service Class 2 acc. EN 1995-1-1)	

Example of the complete CE marking in the commercial documents, accompanying the package for round cross-sectional plain shank nails

## 04 My structural fasteners are outside the scope of EN 14592. What should I do to CE mark them?

If your fasteners are outside the scope of EN 14592 they must be covered by an ETA for BM TRADA to provide CE marking services.

If the fasteners fall within the scope of a European Assessment Document (EAD), but the European Technical Approval (ETA) has not been written, BM TRADA can assess the product and write the ETA. If there is no EAD for the product, BM TRADA can work with other members of the European Organisation for Technical Assessment (EOTA) to draft an EAD, then assess the product and write the ETA.

## 05 Further information

BM TRADA is a Notified Body (NB) and a Technical Assessment Body (TAB) for the Construction Products Regulation (CPR) and can provide CE certification services where required.

BM TRADA operates a range of Q-Mark third party certification schemes, including:

- Building insulation products
- Building systems
- Engineered floor systems
- Engineered wood products
- Timber frame elements
- Wood based panels
- Wood flooring

BM TRADA also provides management certification for quality (ISO 9001), Health and Safety (OHAS 18001) and Environmental (ISO 14001).

**BM TRADA provides independent certification, testing, inspection, training, technical services and information around the world. We help customers large and small to prove their business and product credentials and to improve performance and compliance.**



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