



INTRODUCTION

This information sheet describes the route to UKCA marking for dowel type fasteners that fall within the scope of BS EN 14592. It gives details of the legal requirements, the various responsibilities of the Approved Laboratory and the fastener manufacturer, as well as the specific tests and measurements carried out by the Laboratory.

THE LEGAL REQUIREMENT FOR UKCA MARKING

Fasteners and connectors for structural timber are steel fixings used to create joints between timber components or to attach other materials to timber. Fixings that transfer structural loads within structures are safety critical, so their performance has to be consistent and predictable for the whole of their service life. The performance of construction fixings that are used for non-structural applications, such as installing insulation, is less safety critical but they should still be of an appropriate quality.

Dowel-type fasteners form a particular group of timber fixings comprising nails, screws, staples, dowels and bolts with nuts. There is a wide range of dowel type fastener profiles, sizes and finishes to choose from, particularly for nails and screws and many of them are intended for structural use.

Most dowel-type fasteners intended for structural use fall within the scope of BS EN 14592, which is a UK Designated Standard. As such, from 1 January 2023, there is a legal requirement for companies that place these fasteners on the UK market to carry out the tasks assigned to the manufacturer by the standard and to affix the UKCA marking. In particular, the manufacturer must arrange for an Assessment of Performance by an Approved Laboratory based in the UK and

listed on the appropriate DLUHC (Department for Levelling Up, Housing and Communities) website. It should be noted that even if these fasteners have been tested since 2013 in an EU Notified Laboratory outside the UK, they will still need to be tested again in a UK Approved Laboratory to support UKCA marking.

Products may be placed on the UK market with either CE or UKCA marking before 1 January 2023 but from then on the UK Government has advised that only UKCA marking will be accepted. As a Designated Standard BS EN 14592 is the UK equivalent to the EU Harmonised Standard EN 14592 which will be familiar to many manufacturers and there is no difference between the standards in the tasks and the allocation of responsibilities.

WHY DO FASTENERS NEED AN ASSESSMENT OF PERFORMANCE?

Within the UK, as in mainland Europe, the principal design code for buildings and civil engineering works in timber is Eurocode 5. It covers structures made with solid timber, timber composites such as glued laminated timber and fabricated timber components, such as trussed rafters, as well as the connections between them. Eurocode 5 does not contain any of the material properties necessary for design, but relies on product manufacturers to provide them in the appropriate format.

Manufacturers have a responsibility to openly declare the performance of their product so that it can be specified by structural engineers and designers with confidence. This Declaration of Performance should contain the information required by the UK Construction Products Regulation and the Designated Standard. It is useful both to users and regulators of the product in the UK market and provides the basis for manufacturers to affix the UKCA marking.

For products that carry structural loads the mechanical properties are declared as characteristic values, which are safe values that take account of the likely variation in the properties. For dowel-type fasteners the Assessment of Performance by the Approved Laboratory forms the basis of the manufacturer's Declaration of Performance.

WHAT DOES THE ASSESSMENT OF PERFORMANCE CONSIST OF?

The Assessment of Performance in BS EN 14592 specifies a range of test methods, calculation methods and geometry measurements of dowel-type fasteners to establish the characteristic values and to ensure the fasteners match the manufacturer's descriptions. Manufacturers should engage an Approved Laboratory to undertake the testing and provide it with samples of fasteners for testing that are representative of their normal production.

For properties that are assessed by calculation only, the manufacturer should provide the Approved Laboratory with the specification of the steel used to manufacture the fasteners.

The corrosion resistance of the fastener is not assessed by the Approved Laboratory, but is declared by the manufacturer, as is the specification of the parent material.

The table below outlines the measurement and testing requirements for dowel type fasteners covered by BS EN 14592:

| Fastener type | Nails | Staples | Screws | Dowels | Bolts and nuts |
|--|-------|---------|--------|--------|----------------|
| Characteristic | | | | | |
| Geometry | | | | | |
| Length and nominal diameter | ✓ | ✓ | ✓ | ✓ | ✓ |
| Head cross-sectional area | ✓ | | | | |
| Cross-sectional area | | ✓ | | | |
| Threaded length | ✓ | | ✓ | | |
| Head diameter | | | ✓ | | |
| For threaded nails: length of the point | ✓ | | | | |
| Length of coating (if applicable) | ✓ | ✓ | | | |
| Other dimensions (if relevant) | ✓ | ✓ | | ✓ | |
| Mechanical strength and stiffness, as | | | | | |
| Yield moment | ✓ | ✓ | ✓ | ✓ | ✓ |
| Withdrawal | ✓ | ✓ | ✓ | | |
| Head pull-through | ✓ | ✓ | ✓ | | |
| Tensile capacity | ✓ | | ✓ | | |
| Torsional strength | | | ✓ | | |
| Torsional resistance | | | ✓ | | |

Geometry measurements are required by the standard for dimensions that affect the strength of the fastener joint. The measurements should demonstrate that the fastener's geometry and dimensions fits with the advertised product description and specification.

Alongside the geometry, the Approved Laboratory may also 'test' the yield moment of the fastener by static calculations based on the yield strength of the steel the fastener is fabricated from. Bolts and dowels are examples of dowel type fasteners that will require no mechanical testing.

Nails and staples, on the other hand, whether loose or collated for use with nail guns, will undergo both geometry measurements and mechanical testing. BS EN 14592 refers to various supporting standards for the test methods including:

- BS EN 1382 for withdrawal resistance (also known as a pull-out test), which indicates how much force it takes to pull the nail or staple from the timber for a certain length of point-side penetration
- BS EN 1383 for resistance to head pull-through. This test is similar to the withdrawal testing, but it shows how much force is required to pull the head of a nail or staple through the head-side timber
- BS EN 1383 for resistance to head pull-off. This test is essentially the same as the head pull-through test, but a steel plate is used instead of the head-side timber. This causes the fastener to fail so that its tensile capacity is determined
- BS EN 409 for yield moment testing of those fasteners where static calculation is not an option. This is a mechanical test that determines the resistance of the fastener to bending

For screws, while testing is very similar, there are a few key additions:

- BS EN 15737 for torsional resistance to driving in of screws. This test determines how much turning force is required to drive the screw into a selected substrate
- BS EN ISO 10666 for the torsional strength of the screw itself. This test determines how much torque can be applied to the screw head before the screw snaps. The result should be significantly higher than that of the driving in test

The two torsional tests for screws are combined to determine the torsional ratio which should demonstrate that the force required to twist the head of the screw is greater than the force to drive the screw by a safe margin.

Usually, C16 grade softwood timber conditioned at constant humidity and temperature will be used for withdrawal, head pull through and torque resistance testing. The laboratory will measure the density and moisture content of the timber as part of the test. Other substrates may be appropriate; for OSB/3 may be the best choice for head pull-through tests on fasteners used to fix sheathing in timber frame construction.



HOW MANY FASTENERS FROM A PRODUCT RANGE 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 will require testing, but this may increase due to product specifications that affect the characteristics, such as:

- Head shapes/sizes – round, clipped and different diameters
- Raw materials – different steel alloys, including stainless steel
- Profiles – for nails, smooth, ring shank, square twist or other threaded profiles; for screws, different thread designs
- Finishes that may affect the characteristic values; for instance hot dip galvanising may give a rough finish and might affect the strength
- Application methods – fasteners are fixed in the test substrate in the way the manufacturer specifies, either by hand or by a tool such as the specified nail gun
- Range of lengths – for a wide range of lengths more than one length should be tested
- Manufacturing location – if the same fastener is fabricated at more than one location, samples from each location should be tested

For geometry measurements a sample of five fasteners is measured for each parameter, while for mechanical tests at least ten valid results are required for each parameter.

MANUFACTURER'S RESPONSIBILITIES

The manufacturer of a fastener is the organisation that places the fastener on the UK market under its own branding. As well as the general responsibility to ensure that its fasteners are tested in accordance with BS EN 14592, a manufacturer has some other responsibilities.

RESPONSIBILITY FOR SAMPLING

Although the Approved Laboratory can give advice, the manufacturer has the final responsibility to choose fasteners for testing to ensure the product range being UKCA marked is fully tested. The manufacturer should provide the Approved Laboratory with fasteners that are representative of normal production.

RESPONSIBILITY FOR AFFIXING THE UKCA MARK



When testing is complete, the manufacturer can draw up the Declaration of Performance and affix the UKCA mark to the product. Since it is impractical to apply the mark directly to the fastener, it is usually applied to the packaging. The mark is not just the logo, but also the parameters required by BS EN 14592, which vary slightly

depending on the fastener type.

RESPONSIBILITY FOR FACTORY PRODUCTION CONTROL

As well as test evidence to prove product performance claims, UKCA 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 i.e. procedures and records for all of the above
- Maintain i.e.
 - Initial inspection – to check the above
 - Ongoing inspection, testing / assessment
 - Identification of non-conformances and corrective action

In many cases, manufacturers will already be operating to ISO 9001 or an existing system that meets all of the above requirements.

For fasteners to BS EN 14592, there is no requirement for audits by a product certification body. Nevertheless the manufacturer has a responsibility to maintain the performance of the product in line with the Declaration of Performance.

GET IN TOUCH

Contact us for more information about fastener testing

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