

Key points

- I.S.EN 14250:2010 is the harmonised standard covering roof trusses for use in Ireland
- S.R. 70 "Timber in construction – Eurocode 5 - Trussed rafters" gives additional information on roof trusses appropriate to their use in Ireland
- The AVCP level for most roof trusses is 2+ and therefore a Notified Body must be involved with Factory Production Control
- Roof trusses should be designed to I.S.EN 1995-1-1 and the associated loading standards and Irish National Annexes
- A Declaration of Performance (DoP) is required for trusses
- A DoP can be generic and placed on a website
- CE Marking is required for trusses and this must accompany the trusses
- Some of the marking requirements must be placed on the truss
- Truss manufacturers are not required to certify the erection of roof trusses, this can only be done by the erector or by a suitably qualified person engaged to inspect the trusses in-situ
- The accompanying documentation required by EN:14250 contains important information on the trusses much of which is job specific
- A DoP would not normally be used to provide a link between the truss and accompanying information.

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Timber Roof Trusses - General Information

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Introduction

Timber roof trusses (trussed rafters) are pre-fabricated structural timber components designed and manufactured as individual trusses which when erected form the structural framework of the roof.

This information sheet describes the general requirements for timber roof trusses (trussed rafters) in Ireland and is mainly aimed at specifiers, builders and users. The topics covered include specification and standards, structural design, manufacture, marking, certification and documentation as required by European standards and legislation such as the Construction Products Regulations (CPR).

Most product standards have requirements for marking, harmonised standards have additional requirement related to CE marking.

Specification and Standards

The European standard for roof trusses is EN 14250:2010 "Timber structures – Product requirements for prefabricated structural members assembled with punched metal plate fasteners". This is a harmonised standard which means that it applies throughout the European Union (EU) including Ireland. In order to provide for specific national requirements which may differ between EU countries, each country is allowed to produce technical guidance specific to their own country on the design and use of construction products. However, this guidance must be complementary to and not in conflict with European standards. In Ireland the complementary document for trusses is S.R. 70: 2014 'Timber in construction - Eurocode 5 – Trussed rafters'. Such documents are referred to as 'non-contradictory complementary information' or NCCI's.

Construction Products Regulation (CPR)

The Construction Products Regulation (CPR) came into force on 1st July 2013 and required that all construction products for which there are harmonised European Standards (ENs) or European Technical Assessments (ETAs) must:

- be in compliance with the specification for that product (EN 14250 for roof trusses)
- have a Declaration of Performance (DoP), drawn up by the manufacturer, providing the customer with a description of the technical performance char-

acteristics of the product against the essential characteristics listed in the harmonised standard

- be CE marked in accordance with EN 14250

Factory certification of roof trusses

The Construction Products Regulation recognises five different systems related to Factory Production Control and describes the levels of certification for each system. This certification is referred to as the AVCP level (AVCP is short for Assessment and Verification of the Constancy of Performance). The level of AVCP appropriate to most roof trusses is 2+ and a Notified Body (NB) must be involved in the assessment and surveillance of the Factory Production Control.

- The manufacturer must first apply to a Notified Body such as NSAI (National Standards Authority of Ireland) for certification to EN 14250 the roof truss standard
- The NB will evaluate the truss manufacturer's Factory Production Control (FPC) system to ensure that it is in compliance with the requirements of EN 14250
- The manufacturer will then be audited by the NB and if the audit is satisfactory, a 'Certificate of Conformity of the Factory Production Control' will be issued
- This certificate contains a registration number which allows the manufacturer to produce a Declaration of Performance (DoP)
- Once the manufacturer has drawn up a DoP, trusses can be CE marked

Following registration with the Notified Body the manufacturer is then subject to regular surveillance audits to ensure continued compliance with the standard. Non-compliance can lead to suspension or revocation of certification unless satisfactory corrective action has been implemented by the manufacturer and verified by the Notified Body.

The NB in effect certifies the FPC system of a manufacturer. By producing a DoP and CE marking the roof trusses the manufacturer is essentially claiming that the trusses comply with EN 14250 (and therefore is certifying that the trusses comply with that standard).

Note: Ireland has a higher degree of certification requirements than many countries especially with the requirement for buildings to have an Assigned Certifier; there is also a need to provide product information and product certification for the Building Control Management System. Therefore product marking, accompanying commercial documentation, Declaration of Performances and CE marking assume an importance that may not be reflected in other countries. Preservative treatment certificates are referred to in the section 'Marking requirements for trusses'.

Structural design

Roof trusses for use in Ireland should be designed to I.S. EN 1995-1-1 (Eurocode 5) using the appropriate loading standards and National Annexes. S.R. 70:2015 provides complementary information on roof trusses for use in Ireland.

EN 14250 requires the mechanical resistance of the trusses to be declared to one of the four methods given in the standard, method 3b is the most common method used in Ireland; this is where manufacturers both design and fabricate trusses and is the method mainly covered by this information sheet.

Individual trusses are usually designed by the truss manufacturer using software provided under licence from the manufacturer of the metal connector plates used to form the joints of the trusses. The plate manufacturer is normally referred to as the 'system owner' and is responsible for the correctness of the design software but not the design input. The roof as a single performing structure is not necessarily designed by the truss manufacturer but it does still need to be designed and specified usually by the building designer.

EN 14250 specifies the structural design information to be provided and for Method 3b this includes the European design codes used to verify the design as well as the calculation results (generally a copy of the computer calculations are provided).

Roof design responsibilities

The building designer, not the truss designer, is normally responsible for ensuring that the overall design of the entire building including the roof structure is in compliance with design codes and building regulation requirements. The building designer is also responsible for providing adequate information to the truss designer to design the trusses.

The truss designer is then responsible for providing the customer and/or building designer with drawings, instructions and structural design documentation as part of a complete set of product documents enabling the trusses to be erected correctly and in accordance with their design. These documents are specified in EN 14250 and should include:

- Roof plan/s showing the location of all the trusses
- Design print out giving details of each truss type and their identification codes
- The loadings and calculations relating to the trusses and roof structure
- Information on internal bracing
- Fixing details for each truss type and for assembly of compound or multi-ply trusses
- Details for erection and fixing of hip-end roofs

- Truss drawings should include amongst others; timber sizes, tolerance classes, punched metal plate sizes, plate orientation and position
- Location of support areas as well as information on supports, brackets, hangers and shoes

Note: The information provided should provide for and enable:

- The trusses to be erected and braced on site in full accordance with the design requirements
- On-site inspection of the trusses (e.g. by an Engineer / Assigned certifier / Ancillary certifier) as required by current Building Control Regulations.

General marking requirements for trusses

The general marking requirements to appear on the trusses (CE marking has also some requirements) are set out in section 8 of EN 14250 and are:

- The identification of the truss manufacturer
- I.S.EN 14250:2010
- The job and batch identification

Additional information on the truss or in accompanying documentation includes;

- The location of support areas and internal bracing
- If the timber is not treated the Use Class (see EN335)
- If members are preservative treated then the Use Class along with the critical retention value and penetration class in accordance with EN 15228

EN 335 does not directly give the Use Class for specific building components, the most useful document for this is BS 8417 and a typical domestic pitched roof is usually considered to be Use Class 1 (covered, dry) and therefore does not normally require treatment unless the timber could be vulnerable to insect attack. However, the specification for the project may require treatment and/or may specify a different Use Class (usually Use Class 2 – covered, occasionally wet). Treatment is often specified as an insurance against costs of repair or insect attack.

EN 15228 “Structural timber – Structural timber preservative treated against biological attack” requires the timber treater to supply information on the treatment method, the preservative, the specification complying with national provisions, the penetration class, the retention value including the units, the charge number (usually relating to the charge sheet) and year of treatment, the target biological agents and the identification of the treater. This may result in a change to treatment certificates currently issued by treaters and may

result in the need for companies to be able to demonstrate a link between the treatment and the timber used in trusses and/or supplied as part of the roof package.

Declaration of Performance – DOP

In each harmonised standard including EN14250 for roof trusses there is an Annex ZA which details requirements for CE marking and also contains a list of the *essential characteristics* which need to be referenced in the DoP document.

Both the DoP and CE mark are purely the responsibility of the manufacturer; the Notified Body has no responsibility for the contents of the DoP or CE mark. A typical DoP as set out in the CPR (as amended February 2014, Commission Delegated Regulation (EU) No 574/2014) should contain;

1. The unique identification code of the product type (this is a manufacturers’ code unique to their product)
2. The intended use (e.g. in buildings or in building roofs)
3. The name, registered trade name or trade mark and contact address of the manufacturer
4. The authorised representative (if appropriate)
5. System/s of AVCP (generally without any enhancement for fire performance this will be 2+)
6. (a) Details of the harmonised standard (EN 14250:2010) and notified body or
(b) Details of the European Technical Document, European Technical Assessment, Technical Assessment Body and Notified body where appropriate
7. Declared performances
8. Appropriate Technical Documents and/or Specific Technical Documentation

The declared performance/s for trusses would typically refer to the essential characteristics as set out in EN 14250; these are:

- Mechanical resistance (load bearing capacity and stiffness or deflection)
- Dimensional stability
- Reaction to fire
- Fire resistance where required
- Release of dangerous substances
- Durability (i.e. resistance to biological organisms)

The DoP should have a unique number (so that it can be referenced by other documentation and can help to serve as a link between different documents) and it also needs to have a name, signature, date and the locations of where the DoP was signed. A DoP can cover roof trusses in general rather than those for a specific job and may be placed on a website. It is the CE mark and especially the accompanying docu-

mentation that would usually connect the DoP and trusses together and to a specific job. A hard copy of the DoP should be available if requested.

It is the accompanying documentation required by I.S.EN 14250 rather than the DoP that provides much of the important information in relation to the works being undertaken.

All the essential characteristics should be listed in a DoP but not all essential characteristics need to be declared; the NPD (no performance determined) option may be used e.g. where there is no regulatory requirement for an essential characteristic in the member state of use. The performance of at least one essential characteristic should be declared, however, in Ireland it would generally be expected that the performances of all the essential characteristics would be declared.

The declaration of the durability of the timber should be taken from the timber manufacturer's DoP and CE mark; this will depend on whether the timber is treated with a preservative or not and who treated the timber. Durability should also be declared for the metal fixings and connector plates through e.g. the level of galvanising and by reference to the appropriate standards. The level of corrosion resistance should be appropriate to where the product (truss) is to be used or the level of corrosion resistance specified by the client. In general the durability of the fixings would be taken from their manufacturer's DoP.

The essential characteristics are referenced in both the DoP and the CE marking and they should be declared identically.

An example of a possible DoP is given at the end of this information sheet but the truss manufacturer has the sole responsibility for the DoP which may very well differ from the example given.

CE Marking

With EN 14250 some of the 'general marking' requirements referred to earlier are also required by CE marking.

The requirements for CE marking are divided between those that should be on the truss and those in the accompanying documentation. The accompanying documentation should also include the information that has been placed on the truss; i.e. it should be the complete CE mark along with any commercial documentation such as the calculations, truss drawings, truss layout etc.

EN 14250 requires the following information to be marked on a truss (including the CE symbol):

- a) identification number of the notified certification body
- b) name or identifying mark of the manufacturer;

- c) the last two digits of the year in which the manufacturer was certified by the Notified body
- d) number of the certificate of conformity of the factory production control issued by the NB
- e) reference to this European Standard and the year of its publication (i.e. EN 14250:2010)
- f) short description of the structural member and its intended use
 - 1) generic name and its intended use: "Prefabricated structural timber member assembled with punched metal plate fasteners used in buildings" (relevant in ZA.3.3 provisions only);
 - 2) identification number, which identifies/links the truss to the accompanying documents

An example of a typical mark on truss/product is given below; this is based on section 8 of the standard (marking) and ZA.3.2 (CE marking on the prefabricated structural member). Usually this information is on a plastic tag attached to the truss. The tag may be generic but must be linked to the accompanying documents; this seems a difficult task but one method of achieving this is suggested in the mark below.

Trusses are usually also marked to allow identification of where the truss is positioned in a building and this could link the truss to the accompanying documentation. This code will become part of the CE mark (f2 above) and must be unique in the context of the job. However, where there are multi units on a site (e.g. a housing estate) then this code should identify each unit type as often truss codes are repeated in different units.

Example of mark on truss	Comments
CE	CE symbol required by Annex ZA
NBxxxx	Notified body number, required by Annex ZA
Any Rooftruss Fabricators Ltd	Name of truss manufacture
14	Year when the CE mark was first affixed
Certificate of conformity no: 01234-CPR-00234	This is supplied by the notified body.
EN 14250:2010	Harmonised standard with year
Roof truss	This is optional under f1 above, a shortened description is given
ART 641/2016	This is an identification number which identifies the member/s to the accompanying documentation.

The Job number and truss type marked on the truss for the purpose of locating it in a building could be used as an identification code (provided it is visible, permanent and legible and the location is shown on a plan). The truss mark is usually a

tag printed out by the manufacturer often along with a date; therefore it may be possible to use the tag printing system to show this identification number for specific jobs if necessary.

CE marking in accompanying documents

ZA.3.3 in EN 14250 also refers to CE marking in the accompanying documents (generally the complete CE mark); this includes information on the relevant essential characteristics listed in Table ZA.1 with values declared or “NPD” where appropriate.

The standard requires information on design to accompany the truss and this is part of the accompanying commercial document which would include the CE mark and a link to the DoP. The full CE mark would include the CE mark information on the truss as well as performance declarations of the essential characteristics; the CE mark should only contain the same information on the essential characteristics as the DoP. The CE symbol should be included in the accompanying documentation.

Typical example of CE marking information (in addition to that on the truss above)

Essential characteristics:

- a) Mechanical resistance:
Declared by Method 3b, calculated according to I.S.EN 1990, I.S.EN 1991 and I.S.EN 1995-1-1
Structural timber C24, Tolerance Class 2 and complies with EN 14081-1
Finger jointed timber complies with EN 15497
Punched metal plates comply with EN 14545
Other member's characteristics NPD
- b) Dimensional stability:
Calculated according to I.S.EN 1995-1-1
- c) Reaction to fire: class (including smoke and droplets) or, when tested, according to EN 13501-1: D-s2,d0 CWFT
- d) Fire resistance:
Calculated to I.S.EN 1995-1-2 and classed according to EN 13501-2 where required.
- e) Release of dangerous substances where applicable:
NPD (No performance determined)
- f) Durability of the timber used for the structural member:
Durability class 4-5 for fungal attack according to EN 350

Note: Durability of fasteners which comply with EN 14545 can be referred to “Pass”. EN 14545 should be consulted for more information. The declaration of the durability of the timber depends on whether it is treated not and may have been declared on the original timber DoP.

If preservative treated timber is used then the following is an example of the information required (subject to the treatment manufacturer's information):

- Name of preservative treatment
- Critical retention value x,y kg/m³
- Penetration class NP1

As the CE mark, like the DoP, is the sole responsibility of the truss manufacturer there may be different versions supplied by different manufacturers.

The truss manufacturer by applying the CE mark takes responsibility for the other CE marks on the truss components; timber marks should be present and the components DoP and CE mark along with the accompanying information may be required to be provided if requested; the truss DoP and CE mark and accompanying information should be provided as a matter of course.

S.R. 70:2015 Timber in construction – Eurocode 5 - Trussed rafters

Where trusses are designed for use in Ireland this document provides non-contradictory complimentary information (NCCI) when designed to I.S. EN 1995 parts 1 and 2 (i.e. Eurocode 5). The UK has a similar NCCI in their PD 6693-1 which applies only to the UK; other member states may have similar documents.

S.R. 70 contains information on materials, assessment of structural adequacy, design assumptions, roof truss design, limitations on truss spans and sizes, fabrication (mainly by referring to EN 14250, guidance on information for design and manufacture, handling and storage and site work. There is also some reference on records, future alterations (including re-roofing) and openings. S.R. 70 also includes information on bracing, checklists and the erection of roof trusses on site; there are also some figures to indicate various aspects of truss use on site. S.R. 70 should be consulted for further information and consideration should be given to its inclusion in a contract or any technical specification of works.

Site related certification

There is no requirement for a truss manufacturer to certify trusses as erected on site unless they have been engaged to do so. Truss manufacturers should however provide all the necessary information to enable the correct erection, installation, inspection and certification of their roof trusses by a third party. They may be requested to certify the design and fabrication although these could be considered to be covered by the DoP and CE mark and the accompanying documentation, but this should not prove a difficulty for a manufacturer. There are a number of ancillary certificates that have been endorsed by bodies such as RIAI and Engineers Ireland; the manufacturer may be asked to use such a form and they should decide on their use after appropriate consideration.

Truss manufacturers should be aware of the high level of certification required in Ireland and the corresponding need to provide adequate product information and certification. Failure to comply with the requirements of EN 14250 and the CPR risks the trusses being rejected for use on site.

Example of generic DoP

DECLARATION OF PERFORMANCE

No.15XX/XXXx

1 The unique identification code of the product type:

Prefabricated structural timber member assembled with punched metal plate fasteners

2 The intended use/s:

Roof trusses for incorporation into buildings

3 The name, registered trade name or trade mark and contact address of the manufacturer

Any Rooftruss Fabricators Ltd, Newtown, Ireland

4 The authorised representative (if appropriate)

Not appropriate

5 System/s of AVCP

2+

6 (a) Harmonised standard

EN 14250:2010

(b) Notified body/ies

TimberCert NB xxxx

7 Declared performance/s

Mechanical Resistance	Method 3b, calculated according to I.S.EN 1990, I.S.EN 1991 and I.S.EN 1995-1-1
Structural timber	Complies with EN 14081-1. Strength class as marked on truss and/or product drawings
Finger jointed timber	Complies with EN 15497
Punched metal plate fasteners	Complies with EN 14545
Other member characteristics	NPD
Reaction to fire	D-s2,d0 CWFT
Fire resistance	NPD, to be calculated according to EN 1995-1-2
Release of dangerous substances	NPD
Durability	Timber durability class 5 according to EN 350 Fasteners declared as 'Pass' according to EN 14545

8 Appropriate Technical Documentation and/or Specific Technical Documentation

Product documents include drawings and calculations, other documents are referenced in CE mark.

The performance of the product identified above is in conformity with the declared performances. This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer by:

[Name]

At [place]

on [date of issue]

[Signature]

Note that No.15XX/XXXx, if unique, above could be used to link the DoP with the product and other documentation but it is likely some other code would be used in the accompanying documentation to provide a link with the truss and that the CE mark would refer to this DoP number.

Note: The essential characteristics are listed in 7 above. Other essential characteristics could have NPD declared for their performances but at least one performance level must be declared. As DoP's can be generic, this means that the CE mark and accompanying documentation often provide critical information specific to the site.

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