



## **WOOD TECHNOLOGY IRELAND**

WTI was set up by Bill Robinson and Bob Davis to provide technical information to the timber industry, the construction industry and timber users including individuals.

WTI is supported by the Department of Agriculture, Food and the Marine.

WTI is represented on a number of Irish and European standard committees. Bill Robinson is the convenor of NSAI TC08, the main standards committee advising NSAI.

WTI uses a number of other timber experts where necessary including Gordon Knaggs and Malcolm Jacobs.

WTI has also supported and used the services of CREST (Technological University Dublin) and NUIG.

WTI advice has included amongst others:

- Information on standards applicable in Ireland
- I.S. 440 – Timber frame standard
- Irish Building Regulations (IBR)
- Technical Guidance Documents to the Irish Building Regulations
- CPR
- CE Marking and Declaration of Performance (DoP) of materials
- Material testing, including sampling
- Factory Production Control and Quality System documentation

- Factory and site inspections
- Reviewing the second generation timber Eurocodes, mainly EN 1995-1-1, EN 1995-1-2 and EN 1995-3

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## I.S. 440 – A BRIEF HISTORY

- A timber frame study which was undertaken by the Timber Frame Housing 2002 Consortium. TRADA were the main project consultant in the consortium. The results were really a confirmation of how TF was built in the UK.
- The department and the timber frame industry co-funded BRE to undertake preparatory work on a draft for a timber frame standard.

## I.S. 440 – A BRIEF HISTORY

- A draft was submitted to NSAI and a working group eventually produced I.S. 440 which was first published in 2009. The Standard covered;
  - Responsibilities
  - Materials
  - Design
  - Manufacture
  - Construction details
  - Site Work

- ❑ Services and
- ❑ Differential movement

Title: TIMBER FRAME DWELLINGS but apartments were also covered.

Committee members included DEHLG, ITFMA, HomeBond and NSAI

As well as a number of consulting engineers and 3 timber frame companies and a roof truss company.

# I.S. 440 – A BRIEF HISTORY

## SCOPE:

Platform TF method (although it could apply to other methods)

Max 60 minutes FR

Max 4 storeys, height to upper one Max 10m

Drained and ventilated cavity

Outer external leaf masonry or timber cladding

Mechanical fixings

The standard did not cover on-site fabrication



## I.S. 440 – A BRIEF HISTORY

- The main structural design standards used in I.S. 440:2009 were BS 5268-6 .1: 1996 (mainly for racking design and with a minor amendment in 2007) and BS 5268-4.2:1990 for fire (resistance) design.
- The equivalent European standards referenced were I.S.EN 1995-1-1 and for fire I.S.EN 1995-1-2 (both dated 2004).
- All national standards conflicting with European Standards (EN) had to be withdrawn by 2010. However, national standards continued to be used in Ireland, the UK and further afield.

## I.S. 440 – A BRIEF HISTORY

- The European Standards were not really used for design until about 2013 or so.
- I.S. 440 was limited amended in 2014 to remove references to any conflicting national standards, leaving European standards as the only 'valid' standards.
- The withdrawn standards were primarily BS 5268 (all parts), BS 476 (fire testing) and BS 6399 (loading), a number of Irish standards were also withdrawn.

## I.S. 440 – A BRIEF HISTORY

- S.R. 70 (roof trusses) and S.R.71 (mainly load span tables to EC5) were published in 2015 to replace some of the withdrawn standards. They were to have come out earlier as Swift documents but as they had not gone out for public comment they were opposed by the DECLG.
- These were essentially Codes of Practice unlike I.S. 440 which is a full standard.
- These 3 standards are non-contradictory complimentary information (NCCI) to the Eurocodes.

## I.S. 440 – A BRIEF HISTORY

- It had been recognised that I.S.440 needed a larger revision than that carried out and work on this started not long after 2014. It is still ongoing.
- The CPR required compulsory CE marking (and the provision of a DoP) in 2013 and this had to be addressed as the industry came to a better understanding of these requirements.
- PIR insulation behind the internal plasterboard wall lining had started to be used. The DHPCLG requested that this construction be fire tested; it could not be designed by calculation to I.S. EN 1995-1-2.

## I.S. 440 – A BRIEF HISTORY

- Work on the standard was delayed while the fire tests were carried out. The tests commenced in August 2017.
- With DHPCLG encouragement the fire tests were extended to cover a range of timber constructions, some of which could have been designed by calculation to I.S. EN 1995-1-2.
- The DHPCLG published TGD B Volume 2 in 2017 and in 2020 published the supplementary guidance document to TGD B V2 based on the fire tests

## **I.S. 440 – A BRIEF HISTORY**

The 2020 supplementary guidance document was based on the extensive fire tests carried out by the timber frame industry, mainly the ITFMA. It collected together a number of earlier circulars and guidance documents based on the fire tests.

The revision of I.S. 440 restarted in earnest around 2019 before Covid disrupted the committee work on the standard.

NSAI tries to get consensus in its committees and if this is not possible then either a clause might not be changed or NSAI will make a decision.

## **CURRENT REVISION of I.S. 440**

The issues discussed by the committee included (so far);

A proposal that the standard be amended to support the supplementary guidance document (SGD) rather than the Irish Building Regulations. The committee could not agree on this partly because the fire tests were not in the public domain. I.S. 440 will probably only acknowledge the existence of the SGD and refer mainly to the Building Regulations. The SGD caused a lot of difficulties for the committee.

The substantial fire tests undertaken could help fire design in Europe and Ireland, it would be interesting to compare the fire tests with calculations to I.S. EN 1995-1-2.

## **CURRENT REVISION of I.S. 440**

The figures in the 2014 version on plasterboard linings were amended to give typical details, largely without information on plasterboard thickness and type or fixings.

Fire design by calculation to I.S. EN 1995-1-2 is reinforced in the current working draft. I.S. EN 1995-1-2 allows fire resistance to be demonstrated by calculation, fire test or a combination of the two; the standard reflects this

Additional information will be given on fire testing in relation to fire test loads.



## **CURRENT REVISION of I.S. 440**

The committee considered in greater detail environmental issues; it is intended that the standard will reference Environmental Product Declarations and panel recycling and reuse.

More information is given on manufacture especially factory production control.

A large number of new diagrams have been drafted.

Section 8 was entitled Construction Details it is now 'Execution' as it is a term that will come into use in the 2<sup>nd</sup> generation Eurocodes (I.S. EN 1995-3).

## CURRENT REVISION of I.S. 440

The term 'Execution' refers to more than the construction details and it will affect some of the other sections of I.S. 440 to some degree.

'Execution' is defined from EN 1995-3 and I.S. 440 as:

*All activities carried out for the physical completion of the work including procurement, the inspection and documentation thereof.*

*NOTE The term covers work on site; it may also signify the fabrication of components off site and their subsequent erection on site.*

## **CURRENT REVISION of I.S. 440**

The section on durability has been improved. It was suggested that the mandatory preservative treatment of timber framing be removed.

Soleplates, timber cavity barriers, ground floor joists and external wall battens would still be required to be treated.

BS 8417 (a CoP) gives guidance on the need for preservative treatment and is commonly used in Ireland and is referenced in I.S. 440 (and SR 70 and SR 82); it effectively recommends treatment for timber framing.

## **CURRENT REVISION of I.S. 440**

There may be some cases where the risk of decay in timber framing is low enough to permit the mandatory requirement to be removed, but these would have to be specified in detail and subject to the building designer's agreement.

The committee failed to agree on the need for mandatory treatment. To address this and to progress the standards it was suggested that Ireland should have its own version of BS 8417 especially as we have no say in any revision.

A separate meeting was held to discuss this but so far nothing has been proposed.

## **CURRENT REVISION of I.S. 440**

It has been proposed that cladding using cement boards be specifically addressed in the standard. This will probably happen.

It is intended that the standard will require timber frame separating walls to be made with the fire lining fixed in the factory.

It is expected that a draft will shortly be prepared for TC 08/WG23 members for a full review.

NSAI hope that the standard will be able to go out for public comment in the first half of 2024.

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It is intended that the standard will require timber frame separating walls to be made with the fire lining fixed in the factory.

There is no proposal to include specific checklists and the general list in Annex B of I.S.440 will probably remain largely unchanged.

NSAI hope that the standard will be able to go out for public comment in the first half of 2024.

## **CURRENT REVISION OF I.S. 440**

There are at least 3 representatives of Building Control on the timber committees.

BC Officers should review the draft standard and to speed the publication of I.S. 440 it would probably be better to submit their comments under BC rather than individuals. Discussions within BC should help this.

It is likely that work on I.S. 440 might continue even after its publication in preparation for the second generation Eurocodes.

# TIMBER IN CONSTRUCTION

As part of the Housing for All initiative, the increased use of timber is seen as a way to increase the rate of house construction and help meet Ireland's commitments to reducing CO2 output.

- Mass timber products such as timber frame, Glulam and CLT are seen as MMC.
- Timber frame is covered by I.S. 440, there is a draft prEN (14732-1) for TF panels but it has been a draft for a very long time.
- A timber frame manufacturer could CE mark their panels using e.g. EAD 340308-00-0203 Timber frame building kits, but this would not necessarily cover everything in I.S. 440.



## TIMBER IN CONSTRUCTION

Glulam has a *harmonised specification* I.S. EN 14080. Glulam is a product used in buildings. As it is CE marked and has a DoP it would probably be inappropriate for it to be required to have additional certification.

Glulam design, construction detailing etc. would not therefore be the responsibility of the manufacturer.

The **CLT** standard I.S. EN 16351 was harmonised but was delinked from the CPR. This was probably a mistake but it could be CE marked through the use of an EAD.

## TIMBER IN CONSTRUCTION

- I.S. EN 16351 gives requirements for manufacture and design of CLT.
- CLT has no equivalent national technical specification similar to I.S. 440.
- The second generation Eurocodes cover CLT design for normal temperature and fire.
- Any national technical specification for CLT would probably be similar to I.S. 440 except manufacture would be covered by the EN.

# TIMBER IN CONSTRUCTION

A product with an ETA means that it has to be CE marked. Roof trusses (including the metal plates) and engineered joists (e.g. steel web) have ETAs but no longer have Agrément certificates – the information relevant to the Building Regulations is provided by the ETA owners.

TGD B refers to it applying to ‘common non-complex buildings’ while Agrément Certification refers to ‘new and innovative products and processes in building and materials technology.’ The TGDs are more than guidance; they can also contain national ‘requirements’; it is the national requirements (sound, fire resistance times, reaction to fire performances etc.) that should apply.

# TIMBER IN CONSTRUCTION

Many ETAs do not cover all aspects of the Building Regulations but this also applies to some other certifications.

Some products that have an ETA should probably have an Agrément certificate or an assessment by a technical assessment body. For example the ITW Truss Frame (a wall system) probably needs additional certification how is this decision made?

Smaller LAs probably need support in this area and this applies to the need for fire testing as well.

## TIMBER IN CONSTRUCTION

The Building Regulations are national regulations.

The TGDs are national guidance.

But they are not interpreted the same across the country, even within the same LA.

There have been cases of companies being told to get Agrément certs or fire tests, even when they might not strictly be needed.

Smaller LAs especially probably need support in this area and this applies to the need for fire testing as well.

# TIMBER IN CONSTRUCTION

## TGD B V2 (0.1.8 Alternative Solutions )

*The detailed provisions set out in this Document are intended to provide guidance for some of the more common building situations. In other situations, alternative ways of achieving compliance with the requirements of Part B of the Second Schedule to the Building Regulations may be appropriate. There is no obligation to adopt any particular solution contained herein. Cont...*

# TIMBER IN CONSTRUCTION

## TGD B V2 (0.1.8 Alternative Solutions )

....

*The use of alternative design solutions, standards, systems or methods of fire protection to those outlined in this document are acceptable, provided the level of fire safety achieved is adequate to satisfy the requirements of the Building Regulations.*

Alternative solutions is important for new building systems.

## Supplementary Guidance Document

The Supplementary Guidance Document to TGD B V2 does not mention *alternative solutions* and the draft for TGD B V1 barely mentioned it.

*Alternative solutions* must be kept in the TGDs with the same current prominence and in the Supplementary Guidance Document (if kept) - even though it is in the Building Regulations.

The Supplementary Guidance Document requires fire testing and appears to overrule TGD B V2, effectively ignoring demonstration of fire resistance by calculation and therefore implies calculations would not be acceptable.



TGD B V2 (A5) states:

*Information on tested elements is frequently given in literature available from manufacturers and trade associations. Any reference used to substantiate the fire resistance rating of a construction should be carefully checked to ensure that it is suitable, adequate and applicable to the construction to be used. Small differences in detail (such as fixing method, joints, dimensions, etc.) may significantly affect the rating.*

TGD B V2 (A5) is eminently sensible.

- Certifiers and designers cannot check the fire test reports.
- The department has approved constructions and materials and this presumably responsibility for these now rests with the department.
- The plasterboard manufacturer would appear to be absolved of any responsibility as well for fire performance provided they comply with EN 520.

- The fire tests on which the SGD is based are not in the public domain, if they were WG 23 would have considered them.
- As such the SGD meant that the construction details in the draft had to be typical without the detail that currently exists in I.S. 440.
- I.S. 440 will allow fire resistance to be demonstrated by calculation unlike the SGD.
- FR calculations have been accepted since the 1980s, it would appear that they might now not be acceptable to BC.

- A plasterboard manufacturer could have their product fire tested to EN 13381-7 and this would allow accurate design by calculation.
- The number of fire tests on a construction affects the declared fire resistance.
- EN 16755 “Durability of reaction to fire performance – classes of fire-retardant treated wood products in interior and exterior end use applications” could have an important influence on the use of CLT and similar mass timber products.

## Second Generation Eurocodes

- The timber Eurocodes are due to signed off in about a year, design to the new codes would reflect the 'state of the art'.
- The second generation of the Eurocodes should be published in 2027 with the current standards being withdrawn in 2028.
- Work on the National Annexes for the new Eurocodes should progress during 2024.
- Eurocodes (and therefore fire testing) will have to comply with EN 1990 . EN 1995-1-2 is probably conservative and probably safer compared to fire testing.