



CPD Day – Building Control and Modern Methods of Const

**Building Control Officer's
perspective on compliance of
residential Timber Frame Projects**

Wed 31st Jan 2024

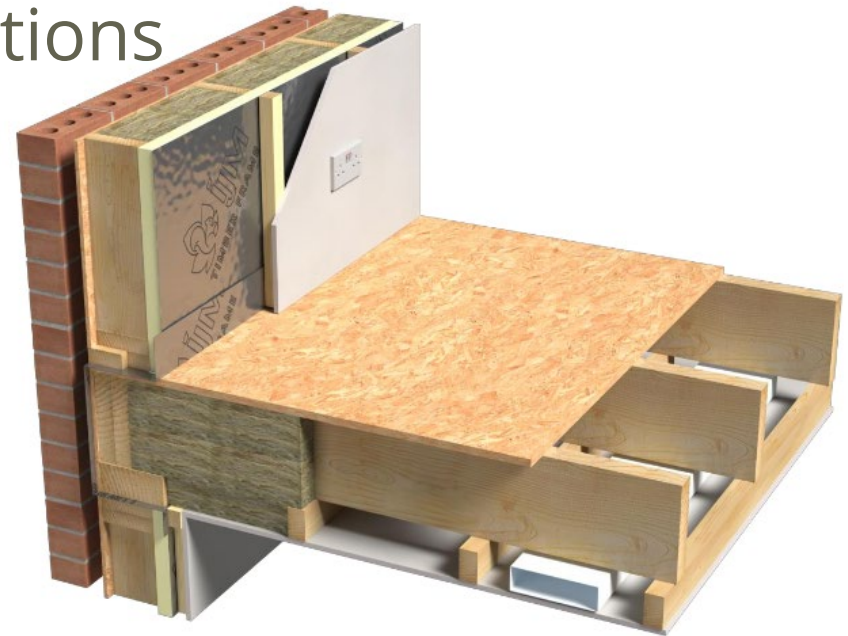


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Compliance with Residential Timber Frame



- TF History
- Timber frame in Ireland
- TF vs Traditional Build
- Big Concerns with Timber Frame
- The Code IS440 and IACs
- BCA issues and observations
- Future of TF
- BCA Top tips

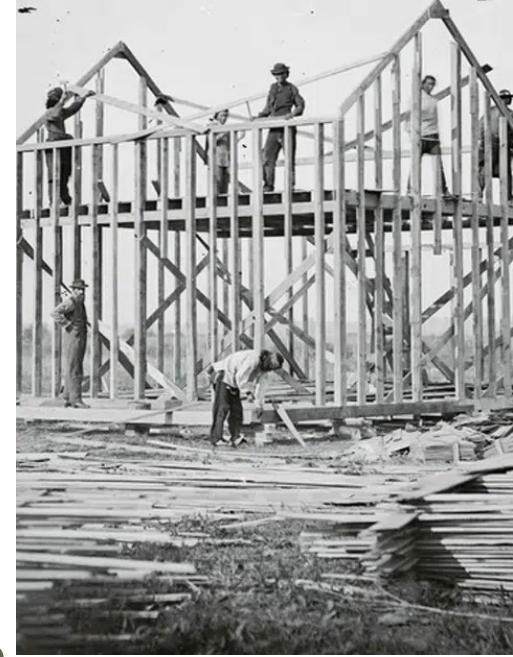


Is Timber Frame new

Timber framing has been popular in building construction for thousands of years and one of the oldest known building methods.

From the end of the Georgian era, timber framing became less popular. Large sections of hardwood timber were in great demand for boatbuilding as the empire expanded.

The Great Fire of London began on September 2, 1666, as a small fire in the bakeshop of Thomas Farynor, Charles II. The fire wiped out nearly the entire timber frame building stock in the centre of London since the great fire. The first timber frame building to be reconstructed in the centre of London since the great fire was the reconstruction of the Globe Theatre, which was completed in 1997.



Timber frame in Ireland

What is Timber Frame:

- Stick-built (built on site)
- Open Panel/Platform
Prefabricated timber frame
- Closed Panel/Platform
Prefabricated timber frame
- Volumetric Frame

Nationally 2020 to 2024 22.71%

FCC 2020 to 2024 25.59%





TF vs Traditional Build

Why Timber Frame?

- Speed of Construction on site
- Less wet trades, cleaner site
- Current Skill shortage, less labour on site
- Off-site Manufacturing – 6 week lead in – BCAR issue?
- High Insulation levels achieved
- Timber is environmentally friendly – lower embodied carbon footprint
- Weatherproofed quickly
- Less site waste
- Factory controlled and erected by trained staff – completely certified for BCAR process.

Big Concerns with Timber Frame



Structure

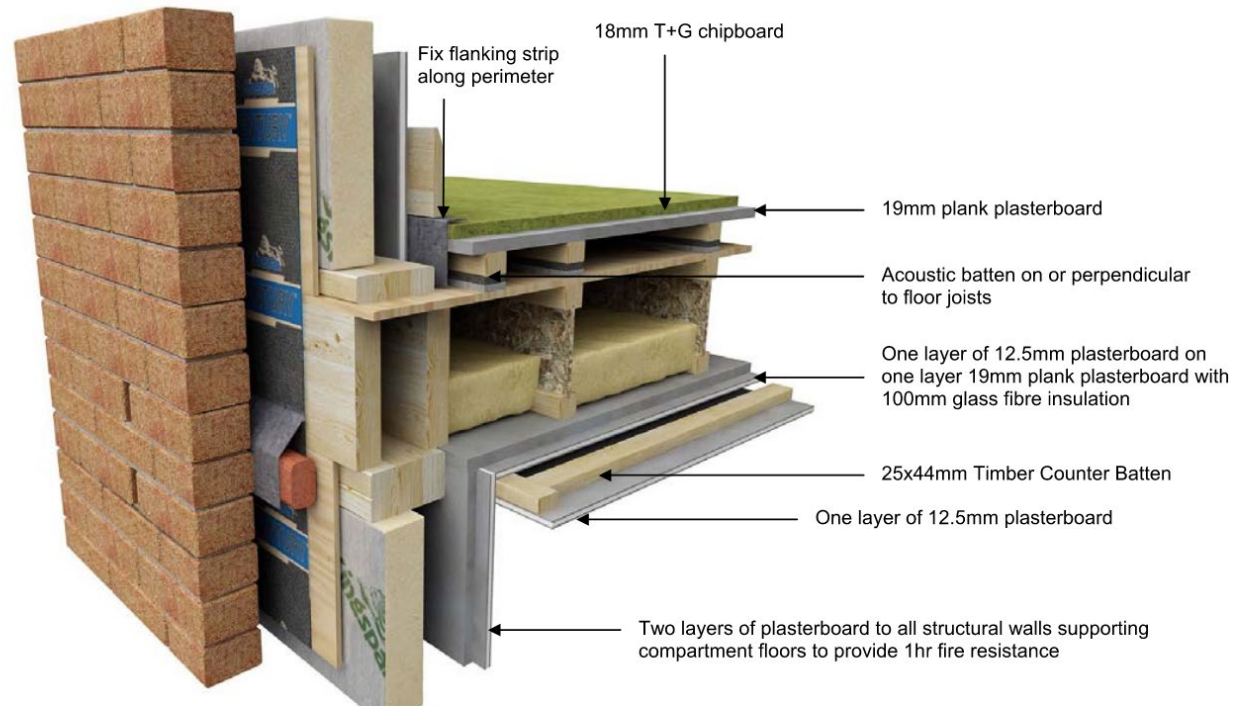
Fire

Damp

Sound

Complicated

Construction System





The Codes

Building Regulations, Parts A to M

Timber Construction is referred:

- Part A
- Part B
- Part E
- Part L

IS440

Irish Agreement Certs

Building Regulations, Parts A to M



TGD Part A (Structure):

Structural work of timber

- Eurocode 5: Design of Timber Structures I.S. EN 1995-1-1: 2005
- For the design of timber frame dwellings refer to I.S. 440 Timber frame construction, dwellings and other buildings

Building Regulations, Parts A to M



TGD Part B (Fire Safety):

Volume 2 deals solely with dwelling houses, but where very large or unusual dwelling houses (over 15m in height) Volume 1 can supplement.

1.3.3 Four Storey dwellings (2floor>4.5m) - Where a dwelling house is constructed using timber frame construction, an automatic sprinkler system should be installed

3.5.4.3 Separating walls in timber framed construction – exception to the requirement for non-combustible materials, must comply with IS440

3.5.4.4 No services through separating walls - Timber Frame to have service cavity external to Fire resistant lining as per IS440

Supplemental guidance - In the case of all separating walls the build-up, including linings must be carried out in the factory, weather protected and delivered to site. Jointing strips may be fixed on site where butt joints (Horizontal or vertical) occur.

Building Regulations, Parts A to M



TGD Part B (Fire Safety):

3.5.4.6 Junction of separating wall and roof – all dwellings not more than 15m high if timber batten (<25mm) is carried over the separating wall it must be bedded in Fire Stop material.

3.6.2 Provision of Cavity Barriers

Cavity barriers should be provided in accordance with the following:

- (a) At the top of an external cavity wall (masonry or framed construction) including any gable wall.
- (b) Vertically at the junction of separating wall and any such wall with an external cavity wall (Diagram 12).
- (c) Above the enclosures to a protected stairway (see Diagram 11).
- (d) Around all openings (windows, doors, vents, service boxes etc.) in framed construction.

V1 only: 3.2.5.2 Compartment floors in high buildings – height of the top storey is 10 m or more, any compartment floor with a fire resistance of 60 minutes should be constructed of non-combustible materials.

Building Regulations, Parts A to M



TGD Part E (Sound):

3.1.2.5 Wall Type 4 (WT 4) – Timber framed walls with absorbent material. The resistance to airborne sound depends on the mass per unit area of the leaves, the isolation of the timber frames, and the absorption in the cavity between the frames

3.6.3 Key junctions and flanking details

3.6.3.1 Details of key junctions in the construction of WT 4A and WT 4B and details to limit flanking transmission are described in Diagrams 18 to 27.

Table 3A Minimum frequency of testing per group or sub-group type (Par. 2.2.3)	
Number of attached dwellings	'Sets of tests' required
4 or less	At least 1 ¹
Greater than 4 but less than or equal to 20	At least 2
Greater than 20 but less than or equal to 40	At least 2 + 10% x No. of attached dwellings greater than 20
Greater than 40 but less than or equal to 100	At least 4 + 5% x No. of attached dwellings greater than 40
More than 100	At least 7 + 5% x No. of attached dwellings greater than 100

NOTES:

1. This also satisfies the initial testing requirements (see paragraph 2.2.2).
2. Refer to Table 2 for number of individual tests required in a 'set of tests'.
3. Round up to the nearest whole number.
4. Refer to paragraph 2.3 where constructions other than those detailed in Section 3 and 4 are used.

Building Regulations, Parts A to M



TGD Part L (Conservation of Energy):

2.1.4 Air Permeability

Sealing vapour control membranes in timber-frame constructions;

STRUCTURE WITH BRIDGED LAYER(S) A2.2

The percentage of timber bridging the insulation layer as a repeating thermal bridge can be calculated when the size and frequency of the timber members is known. Alternatively, the figures given in Table A2 can be used.

IS440 Timber frame construction, dwellings and other buildings



SCOPE

- Buildings where the maximum number of storeys is four and the maximum height from the external ground level to the top floor level is 10 m;
- Buildings where the maximum fire resistance is 60 minutes
- Buildings that have an outer leaf of masonry or timber cladding with a drained and ventilated cavity behind the outer leaf.

Building Construction

Provision of a certificate stating that the timber frame structure has been completed in accordance with the timber frame manufacturer's instructions and the requirements of this Standard.



Irish Agreement Certificates

Anything not covered in B Regs or IS440

Volumetric Timber Frame

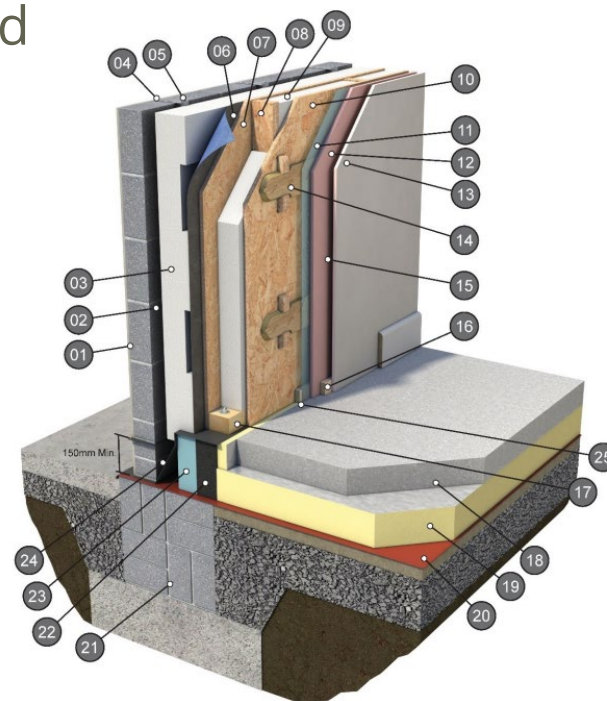
- Modular 3D fully assembled System is a factory manufactured structural building system comprising of pre-assembled timber framed modules.

NON IS440 Timber Frame

- Manufacture and installation of structural timber-based buildings. The structure is designed and supplied and erected by approved installers.



Figure 1: Modules being loaded for delivery





Fingal BCA concerns and observations

A Repeat of the Timber Frame legacy issues from the Celtic tiger era.

Certification

- The NSAI Timber Frame Manufacturers Approval Scheme assesses and inspects for compliance with the scheme's requirements with IS440
- Irish Agreement Certificate for non IS440
- Building Regulation vs Certification

Who does what?

- Supplier manufactures and erects
- Supplier manufactures and Builder erects
- Supplier manufactures and erects part, Builder finishes.

Practical vs Theoretical

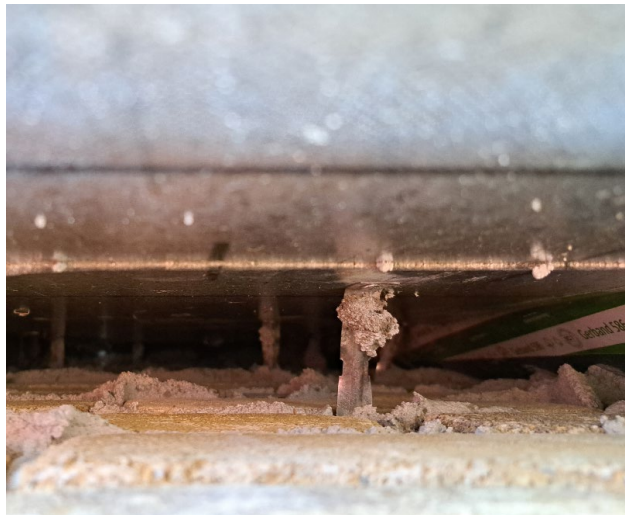
Fungal BCA concerns and observations

B Reg Part A

- Anchor Straps – these are very important
- Wall Ties – tie the timber structs to the external surface. IS EN845-1
- Open web/Posi Joists



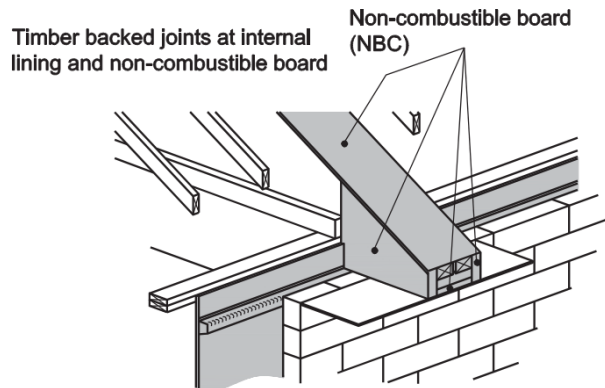
Anchor straps fixed into studs and a minimum of 50 mm into mortar. Typically at corners, on either side of openings and spaced at no more than 1.6 m or 1.8 m



Fingal BCA concerns and observations

B Reg Part B

- Whose installing fire protection – Builder or Erector
- Cavity barrier missing or not in compression
- Fire stopping
- Holes in fire resistant walls/floors - damaged
- Eaves box
- Separating wall



Fill eaves box with rock fibre or similar

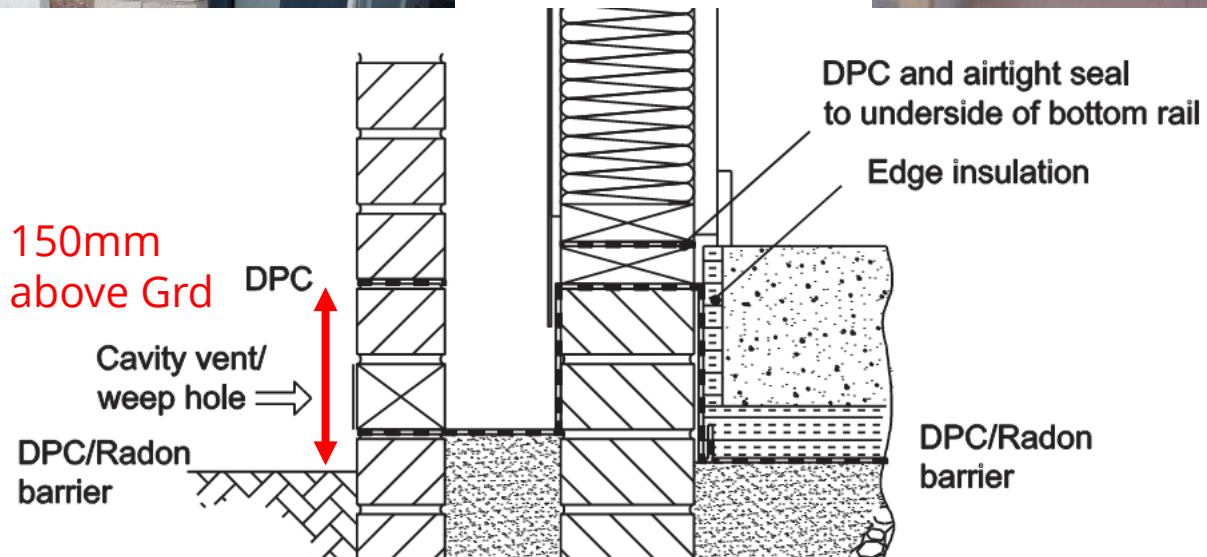
Gaps between NBC and tilting fillet filled with rock fibre



Fingal BCA concerns and observa

B Reg Part C

- Correct Storage
- Weep Holes
- DPM/DPC Installation & Threshold design





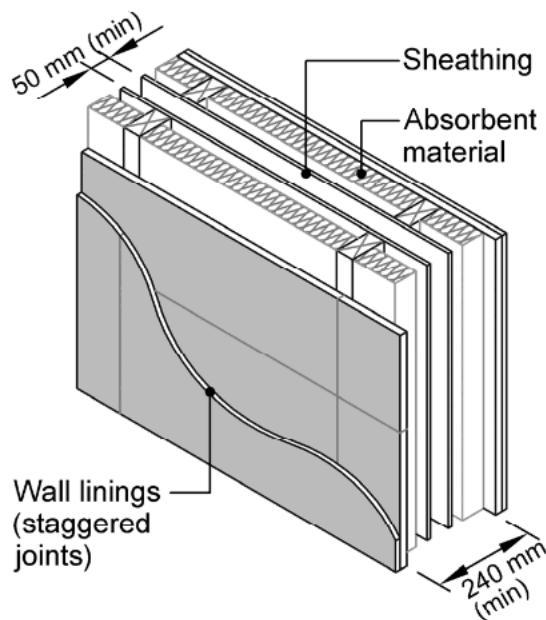
Fingal BCA concerns and observations

B Reg Part E

- Sound tests minimum number with approved design

- Wall Type 4

(WT 4)



B) WT 4B - Twin leaf timber frame with sheathing

Specification

Wall width: 240 mm (min) between inner faces of the wall linings. 50 mm (min) gap between inner sheathing faces. (Twin leaves must not be bridged by diagonal bracing).

Wall lining: two or more layers of gypsum based board with staggered joints (total nominal mass per unit area 22 kg/m² (min) both sides).

Absorbent material: 60mm (min) mineral wool batts/ quilt (paper faced, unfaced or wire reinforced) both sides (density 10-60 kg/m³).

Ties: Ties between frames (no more than 40 mm x 3 mm) at 1200 mm (min) c/c horizontally, one tie per storey height vertically.

Key Points to Watch

Timber frame dwellings should comply with the requirements of I.S. 440 Timber frame construction, dwellings and other buildings.



Fingal BCA concerns and observations

B Reg Part L

- Missing Insulation – who was supposed to install



Fabric Elements	Walls
Area-weighted Average Elemental U-value (U_m)	0.18
Average Elemental U-value – individual element or section of element	0.6

The Future of Timber Frame

Whats Next?

- Cross-laminated timber (CLT) - engineered wood
- Nail-laminated timber (NLT),
- Dowel-laminated timber (DLT),
- Glue-laminated timber (glulam or GLT), and some types of structural composite lumber (SCL).
- SIPs - (structural insulated panels) cover the timber-frame. They are composed of two layers of wood filled with a highly dense insulat foam.
- Light Gauge Steel Framing (LGS)

Fingal County Council





Timber Frames big weaknesses are fire and moisture.

- IS440 is a good standard and worth having
- Two worlds collide – the more that is fitted in factory conditions the better. Design drawings produced by Manufacturer for Site works.
- On-site the installer/erector must be competent and ideally fits all the key parts of the building (Cavity barrier, Fire stopping, etc)
- Cavity Barrier - top of an external cavity wall, Vertically at the junction of separating wall, Above the enclosures to a protected stairway and Around all openings (windows, doors, vents, service boxes etc.) in framed construction.
- Watch for damaged panels – broken VCL could lead to major issues.
- Product supplied to dimensions given, cant be altered on site.
- DPM and DPC are critical – timber cant make contact with concrete. DPM under sole plate and then DPC under Timber frame.
- Water must be allowed to get away from cavity – NB Separating wall
- Timber Frame must have moisture content less than 18%

Final Thoughts

