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DEVELOPMENT  
UK**

## Build

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# Loft Conversions with Timber

Converting a loft into an active living space needs careful consideration due to modification of structural timbers and increased loads. But utilising timber improves performance thanks to its thermal and acoustic insulation properties.



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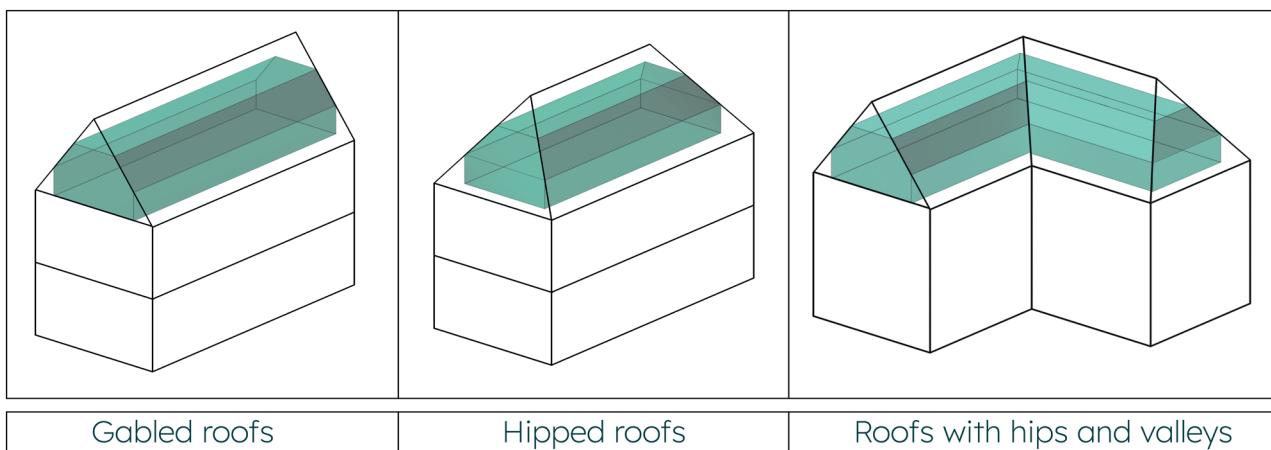
# Loft Conversions with Timber

Loft conversions offer an effective means of extending habitable areas in a building. However, it is a complex process requiring multiple considerations for a successful project that complies with Planning and Building Regulations

## Building Assessment and Survey

Loft conversions change how an attic space is occupied, and thus the process of alteration requires structural modifications to load-bearing elements, such as walls, rafters or floor joists. It is important to seek professional advice from a structural engineer, surveyor, or an architect.

A qualified and competent professional with relevant experience and knowledge should conduct the building survey. This procedure starts with an assessment of the current condition of the existing structure to ensure the loft is suitable for conversion and can meet all necessary in-service requirements.



**IMAGE:** Main types of roof

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The feasibility of loft conversion is determined by the type of existing roof and three-dimensional space it occupies.

The existing roof space's shape and size can restrict design parameters, making it important to assess whether appropriate floor plan and means of escape are provided. If not, the entire roof structure should be replaced if the conversion is to go ahead.

Another consideration during the initial survey is whether the existing structure can support additional loads, especially load bearing walls and floors that were not originally designed to withstand an additional imposed load from the attic space. Stability of the structure should also be checked if existing structural elements are to be modified or removed (such as walls, rafters, and chimneys).

## Planning and Approval

During the planning stage of a loft conversion, careful consideration should be given to any modification made to the load bearing timber members, such as rafters and floor joists. Relevant national Building Regulations must be followed and obtaining planning permission might also be required.

An architect or engineer will be able to determine whether proposed works will require a building warrant or planning permission or both. Necessary documentation will have to be prepared and submitted to the local planning office (for planning permission) or to the local building control service (for building control approval. or a building warrant in Scotland).

Planning permission will be required if the loft conversion:

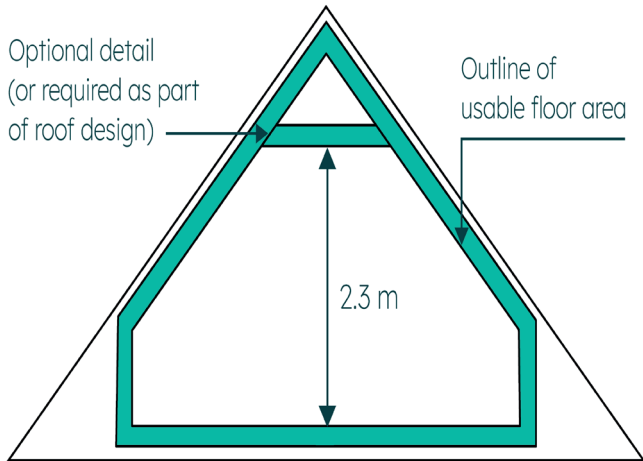
- Alters the slope of the roof (roof pitch)
- Changes the height of the roof
- Includes dormer windows
- Exceeds 40m<sup>3</sup> (terraced property) or 50m<sup>3</sup> (detached or semi-detached property)
- Uses visible materials that are different from the existing property
- Includes raised platforms, verandas, or balconies
- If the property is located in a conservation area, national park, world heritage site, or area of outstanding natural beauty.

In case of building regulations, loft conversion will require building control approval or a building warrant in Scotland if:

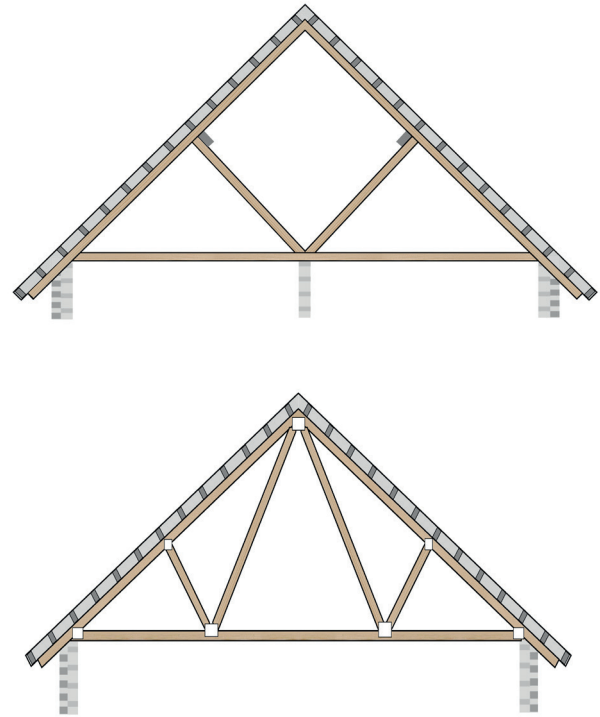
- It is to provide extra living accommodation
- Roof windows will be installed
- It is to form a permanently accessible, floored storage area
- Structural elements are to be altered or removed.

A building warrant will not be required in cases where the intention of the loft conversion is to create lightweight storage accessed by a retractable or removable ladder.

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**IMAGE:** Minimum ceiling height for loft conversion



**IMAGE:** Traditional (top) and Trussed Rafter (bottom) roof types

## Proposed Structure

A viable loft conversion needs to ensure a usable floor area in the loft is achievable that will increase the size of the dwelling.

The 2.3m preferred minimum ceiling height in a loft refers only to the central portion of the room and does not have to be kept throughout the entire loft conversion; lower levels are acceptable where the roof slopes. This dimension also refers to ‘finished’ height of the room, making it advisable to add between 250-300mm to the measured ceiling height to account for new floor and insulation installed as part of the conversion process.

Roofs in existing homes can be divided into two categories – traditional roofs and trussed rafter roofs.

**Traditional roofs** are constructed in a series of rafters and purlins. The latter spans between gable walls and provides additional support to the rafters. Traditional roofs provide greater head room and are less complicated to convert compared to trussed rafter roofs. During conversion, it is important to provide appropriate supports to the purlins and the new floor structure; possibly adding new padstones, lintels, and structural elements.

**Trussed rafter roofs** are more common in buildings constructed after 1970. These types of roofs are more complex and more challenging to convert. The obstacles in creating usable floor space are web elements supporting rafters and ceiling joists (i.e., the top and bottom chords, respectively). These elements are critical and cannot be removed without provision of additional structural supports for floors and rafters.

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Furthermore, early types of trussed rafter roofs tend to have a shallow pitch, making loft conversion impossible without the addition of dormers or all-new roof construction above the level of the eaves.

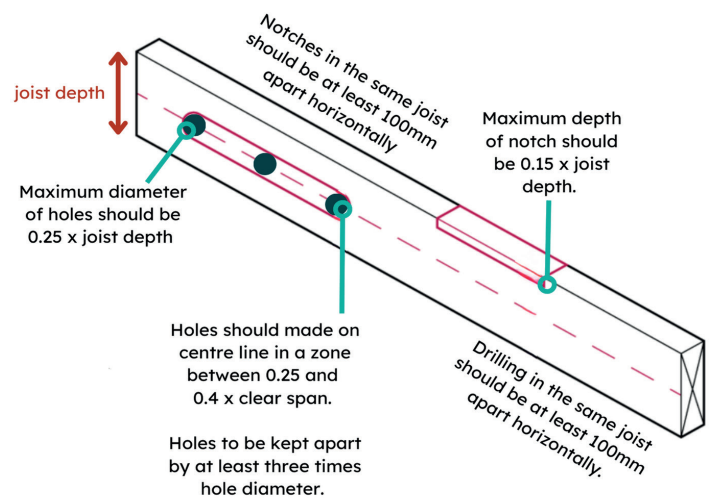
Structural engineering advice is necessary if the loft conversion requires modification or removal of existing load-bearing elements such as rafters, purlins, or any of the trussed rafter components. Any timber members used for load-bearing applications must be strength graded. Strength graded timbers are widely available and can be recognized by the stamp, which should be visible on each piece. The usual timber strength classes used for structural applications include C16, C24 or TR26. Timbers graded to C16 are usually used for framing, whilst C24 and TR26 for beams and trussed rafter components.

Another important aspect that affects the overall roof structure is potential damage to structural timber members during installation of wiring and pipework for electrical, heating, and lighting as part of the conversion.

Any notching or drilling should avoid compromising the load-bearing capabilities of structural elements. Guidance for maximum limits is set out in national standards.

In some cases, loft conversion might involve the construction of party or separating walls between semi-detached or terraced houses. In these circumstances, the new partition wall may fall within the scope of obligations under **The Party Wall etc. Act 1996** and advice from a qualified building professional should be sought to check how the requirements contained in the Act affect the loft conversion.

## Notes for Notching and Drilling



NOT TO SCALE

### LIMITATIONS

- Joist must be at least 150mm deep.
- Holes to be no greater than 30mm diameter.
- Holes to be drilled along centre line of joist.
- Holes to be at least three times the diameter of the largest hole apart.
- Maximum of 8 x 30mm holes can be accommodated in each zone.

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## Stairs, Windows, and Doors

An inevitable aspect of any loft conversion is the installation of permanent stairs leading to the converted space. The type and position of stairs is important as it dictates the position and size of the rooms created. Moreover, minimum headroom height of 2m on stairs and landing spaces is needed to allow appropriate access between two levels that will meet Building Regulations requirements.

There are four types of stairs suitable for loft conversions:

- **Conventional stairs**

The preferred solution for any loft conversion if available space allows installation. Care must be taken to ensure that stairs are constructed in line with Building Regulations and criteria such as headroom, pitch, rise, and going must be fulfilled.

- **Spiral and helical stairs**

Spiral steps are very space efficient as they wind around a central pole, taking relatively little space. The handrail in this type of stairs is installed on the outer side only.

- **Alternating tread stairs**

Alternating steps are often used where there is insufficient space for the full run length of conventional stairs. In this type of stairs treads alternate between for each foot: one step is wider on the left side and next step is wider on the right side.

- **Fixed ladders**

This is the last resort for when the floor area is insufficient to install conventional, spiral or alternating stairs.

and safety issues that should be addressed by the designer, such as the height that a person can fall from or the practicality of carrying objects and furniture up and down the stairs.

The creation of new doors and windows must also be carefully considered. New openings can be provided in existing gable walls, dormers, or in the roof plane (roof windows). For windows, it is important to consider sill height, window size, means of escape, safety glazing, cleanability, and protection from falling. Newly installed windows must satisfy appropriate energy ratings, with windows in a loft achieving a minimum U-value of 1.6 W/m<sup>2</sup>K (C rating) under the new **Part L Guidance in England and Wales**.

To maintain the required thermal performance of the roof, it is essential to ensure that the seal around the perimeter the windows is airtight.

To further enhance living comfort in the loft, it is recommended to use solar-control glass or suitable blinds to minimize heat gain from the sun in the summer months.

Fire-resisting doorsets must be fitted to the converted loft room, able to resist fire for between 20 to 60 minutes according to Building Regulations. The main escape route should be through the house rather than via windows. Mains-wired interlinked smoke alarms also need to be fitted on each storey of the property.

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## Ventilation and Insulation

Provision of appropriate levels of insulation and ventilation is critical in a loft conversion. Additional insulation installed between rafters is the most efficient means to insulate a loft.

Additional battens may be required to increase the depth of the rafters allowing sufficient amount of insulation to meet the required U-value as per Building Regulations.

	U-Value (W/m <sup>2</sup> K)
Pitched roof (rafter level)	0.16
Pitched roof (ceiling level)	0.16
Flat roof	0.18
External wall	0.28
Separating wall	0.28

**TABLE:** Minimum required U-values for loft conversions in England and Wales

To avoid development of interstitial condensation in the loft space, ensure the ceiling is well sealed and that an appropriate void (at least 50mm) is kept between insulation and the roof underlay.

To allow free air movement between rafters, several ventilation openings are provided to each void (at both low and high levels of the roof).