Surrey Building Control
Guidance Note - Number 18

Loft Conversions

The Council has produced some good practice guides for people considering a loft conversion. If you require any further help please contact the Building Control section.

The following guidance is intended to give general assistance on the requirements relating to loft conversions. This guide assumes a two-storey house, with a new second floor loft room. If your property differs from this example, you should seek further advice.

Note: certain requirements will not be imposed on bungalows with a loft room. More onerous requirements will be applied to three storey buildings with loft rooms.

Loft conversions

Structural stability

A structural engineer should ideally check new structural members or alterations to existing structural members. This can often result in a more economic design than relying on "rule-of-thumb" sizing of members. The Building Control Surveyor checking the plan or the works on site may require calculations to show that the new structure is adequate, or that the work will not adversely affect the stability of the existing building.

Floor joists

Existing ceiling joists are likely to be inadequate to act as floor joists, therefore new deeper joists will be needed. Floor joists can be supported on load-bearing walls, or floor beams (see below).

Load bearing walls

Load bearing walls need to carry the loads directly to an adequate foundation, or to a beam or other structural member that will support the loads. They will generally be masonry walls, but timber stud walls may be used (subject to structural engineer's calculations).

Any opening at lower levels in a load-bearing wall (e.g. a through lounge) requires an adequate lintel over. This may need to be exposed and checked by the Building Control Surveyor.

Floor beams

Beams to support floor joists can be made of solid timber, Glu-lam timber, steel, or a combination of timber and steel (a flitch beam). The exact size will depend on the loads on each beam and its span, but for spans of 4m or more, it is usually uneconomic to use solid timber sections.

Roof structure

The existing roof structure may be altered or upgraded as part of the conversion. Existing rafters, purlins or props may need to be removed to install the new floor or roof windows. The loads on the roof structure may increase (e.g. plasterboard ceiling to the underside of the rafters).

Where purlins or any intermediate props are removed, a new beam may be introduced under, or the size of the floor joists may be increased to carry the loads.

In a traditional roof design, the rafters are prevented from spreading by the ceiling joists or collars being securely tied to the rafters, and purlins acting as beams. If these are cut or removed (for example, when installing a dormer), then a ridge beam may be required, and if so, a structural engineer should be consulted.

Fire safety

Means of warning and escape

Mains-wired smoke detectors are needed in the hall, landing and stairs of all storeys.

- There should be at least one detector on each storey, and the detectors interlinked (so that a detection of any one, triggers all of them),

- Each must be mounted within 7.5m of the door to any habitable room, and at least 300mm from walls and light fittings, and

- They must be either wired to a separate circuit from the consumer unit or be connected to a frequently used lighting circuit, and have a battery back up.

The existing stairway (i.e., the hall at ground floor, the stairs from ground to the first floor and the first floor landing) at ground and first floor level should be enclosed within 30-minute fire resisting walls. The stairway should not be open to any other room such as a lounge, kitchen, etc.

Any glazing onto the staircase in the house will need to be upgraded to give a half hour's fire resistance.

The stairway should open either:

- directly to a final exit or

- to a space from which two escape routes are provided, each leading to final exits and separated from each other by fire resisting construction and fire doors.

All existing doors to habitable rooms at ground and first floors opening onto the hall or landing should be replaced with FD20 fire doors, and any new doors to the hall and landing need to be fire resisting as well.

There is no longer a requirement that these doors are made self closing.

If you wish to keep existing doors in place because of their architectural or historical merit, these will need to be upgraded to give 30 minutes fire resistance. This can be achieved by the application of special fire resisting paints, papers or varnishes (intumescents). There are specialist companies who provide the materials and assessment service for such upgrades. Building Control will need a detailed specification to ensure that the doors will provide the necessary fire resistance.

A new stair within an existing stairway enclosure should be separated from any new rooms by an FD20 fire door and fire resisting walls. Alternatively, the new stair may be separated from the existing storey by a fire door and fire resisting construction.

As the staircase is now protected by a fire resisting enclosure, including the doors, there is no longer a requirement for an escape window to be provided in the converted loft (new 2nd floor).

Surface spread of flame
Plastered walls and ceilings generally meet this requirement. Any timber finishes to the ceiling, and to the walls over a certain amount, will need to be treated with a fire-retardant paint or varnish (subject to Building Control approval).

Fire resistance

The new floor and any structure supporting it must have a fire resistance of 30 minutes from underneath. This should extend to the inside face of the external walls.

The fire resistance of a floor is dependent on the ceiling beneath, the size and spacing of joists, and the boards over.

- The existing lath and plaster ceiling below may provide the required fire resistance, provided that it is in good condition and firmly attached to the laths. If the ceiling is plasterboarded then 12.5mm thick boards are required to give 30 minutes fire resistance. You may have to provide an additional skim coat or additional plasterboard to the ceiling.

- Joists to be at a maximum of 600mm centres, and at least 38mm wide (if the floor falls outside these limits you should consult Building Control),

- Floor boarding over to be tongue and grooved, or plain edged boards overlaid with hardboard (to restrict smoke and hot gases that might penetrate the ceiling).

The first floor over any habitable rooms under the landing should also have 30 minutes fire resistance. If the existing floor is plain edged boards, or badly fitting tongue and grooved boards, this should be overlaid with hardboard.

The separating walls between dwellings should have at least 60 minutes fire resistance. Some older properties do not have separating walls within the roof space, or may have holes or gaps in them. These will need to be sealed up to the underside of the roof covering. You will also need to be careful of any new structural elements supported on this wall, or passing through it (if beams, floor joists or purlins pass through the wall, they can provide a route for smoke, fire and sound to spread from one house to another). Please contact Building Control for advice.

External fire spread

Any dormer cheeks (the triangular external wall to the side) within 1.0m of a boundary to any other property will need to be either:

- 30 minutes fire resistant with not more than 2.0m² of combustible material added to the outside surface (e.g. timber or uPVC cladding), or

- Not more than 1.0m².

There are requirements for thermoplastic rooflights, and for combustible materials used as roof coverings. For further advice on this please refer to Building Control.

Sound insulation

In a terraced or semi-detached house, the separating wall needs to be able to resist the passage of sound, irrespective of whether or not the neighbouring house has a habitable room in the roof (sound can travel through the wall into your neighbour's roof void and through the ceiling, and vice-versa).

Walls

If the existing wall is

- 225mm (9") coursed brick or stone,

- 2 leaves of 100mm thick brick or dense blockwork with 50mm cavity, or

- 2 leaves of 100mm thick aerated concrete blockwork with 75mm cavity,

then this will be adequate if lined with 12.5mm plaster or plasterboard. All gaps and holes in the wall need to be filled prior to plastering or plasterboarding.

If the existing separating wall is not adequate, then the best solution is a separate timber stud wall.

- The existing wall should be rendered with sand & cement to seal any gaps,

- 50mm x 50mm timber stud wall, fixed only to the floor and roof structure (not to the wall) at least 13mm from the face of the wall,

- The perimeter of the wall should be sealed with tape or mastic,

- Mineral fibre at least 50mm thick between studs,

- Lining of 2 layers of 12.5mm plasterboard on the room side only, with joints staggered.

If there is more than one room in the loft, then any of the following walls will need to be sound insulated:

- any wall between a bedroom and another room or bedroom; and

- any wall between a WC and another room (but not if the WC is an en-suite to a bedroom).

This can be achieved by installing mineral fibre (at least 25mm thick) between the studs.

Floors

The new floor needs at least the following sound insulation measures:

- Floor boarding of at least 22mm thick chipboard, or at least 28mm thick softwood floorboards, and
- 100mm thick mineral fibre between the joists.

If there is a new ceiling under the floor, then it needs to be at least 12.5mm thick plasterboard.

As with thermal insulation, the mineral fibre should not be compressed to fit into a gap, as this reduces its effectiveness

Ventilation

Ventilation of rooms

Habitable rooms

- A window with an opening equivalent to 1/20th of the floor area, and
- Background ventilation (also called trickle- or night-vents) of 8000mm², which can be closed to prevent draughts.

Bathrooms or shower rooms (with or without a WC)

- Mechanical extract fan of 15 litres per second capacity, and

Either:

- background ventilation of 4000mm², and an opening window (no minimum size),
- or the extract fan has a 15 minutes overrun, controlled by the light switch or a humidistat.

Sanitary accomodation (i.e., a WC)

Either:

- a window with an opening equivalent to 1/20th of the floor area, and background ventilation of 4000mm²,
- or mechanical extract fan of 6 litres per second capacity with a 15 minutes' overrun, controlled by the light switch or a humidistat.

If the new storey contains a kitchen or a utility room, or if there is an open-flued [i.e. not room-sealed] appliance in any room, then you should consult Building Control for further advice.

Ventilation of roofs

The introduction of a room into a previously open roof space will restrict the flow of natural ventilation through the roof, and could cause condensation within the space between the insulation and the roof covering. The existing ventilation provision, if any, at the eaves will have to be increased, with a path for the air to flow over the insulation and out through the top of the roof slope.

Eaves ventilation

- A continuous 25mm wide opening or the equivalent area is required to the length of the eaves.

Cross ventilation

- A 50mm clear air space is required between the insulation and the roofing felt.
- The depth of the rafters may need to be increased to allow for this space plus the depth of the insulation; this can be done by adding battens to the underside of the joists.

- If roof trimmers or hips restrict the passage of air from the eaves to the ridge, a series of 25mm holes may be drilled into these members to allow a continuous airflow. It is necessary to ensure that the location and size of these holes will not impair the strength of these members.

Ventilation at the ridge or high level

- A continuous 5mm wide opening or the equivalent area is required to the length of the ridge.
- Where the ceiling (or the insulation) is continued up to the ridge (as in first diagram), ventilation will have to be provided at the ridge. The ridge tiles can be replaced or altered with a vented dry-ridge.
- If there is a flat ceiling at some distance from the underside of the ridge (as in second diagram), then the void created over this ceiling can be vented. The simplest way to achieve this is by using vent-tiles. The spacing of vent-tiles varies with each type, and the manufacturer's recommendations should be followed. The vent-tiles must ventilate the void area and not lower down the roof slope.

Vapour control layer

Vapour control layers can reduce the amount of moisture reaching the void and the insulation (but not eliminate it completely, hence the need for ventilation).

- The walls and sloping ceiling should be lined with either:
a 500 gauge (150 micron) polythene sheet fixed between the lining and the insulation, or
a foil-backed plasterboard.

Sanitary facilities and drainage

Any WC in the new storey must also have a washbasin in the same room, or in a room giving direct access to the sanitary accommodation (i.e., in the outer room to an en-suite WC). It must have a supply of hot and cold water.

Any new WC, washbasin, bath or shower must be connected to the drainage system. The position of the existing drainage stack will dictate the position of the fittings.

- If the WC branch exceeds 6m, or if it is not a straight connection to the existing stack, then additional ventilation may be required to prevent water being sucked out of the trap. An air admittance valve is usually acceptable, but check with Building Control.
- Bath or shower waste pipes must be 40mm diameter minimum and should not exceed 3m for a 40mm diameter pipe, or 4m for a 50mm diameter pipe.
- Washbasin waste pipes must be 32mm diameter minimum and should not exceed 1.7m for a 32mm diameter pipe.

A ventilation stack should discharge at least 900mm above any opening window (if less than 3m away). The existing stack may need to be raised above any new windows or rooflights. An air admittance valve may be acceptable, but you are advised consult Building Control.

Stairs and guarding

Where possible a conventional stair should be installed to the new storey. Other alternatives are allowable in certain circumstances, such as a fixed ladder or a space saver stair (see below).

Stairs

Steepness of the stair

- The rise of the new stair should be no more than 220mm, and the going (tread less nosing) no less than 220mm. The pitch should be no steeper than 42°, so the minimum going cannot be used with the maximum rise. A good guide is that twice the rise plus the going (2R + G) should be between 550mm and 700mm.

Width of the stair

There are no minimum recommendations for stair widths, but the need for furniture to be moved up and down the stair should be considered.

It is suggested that:

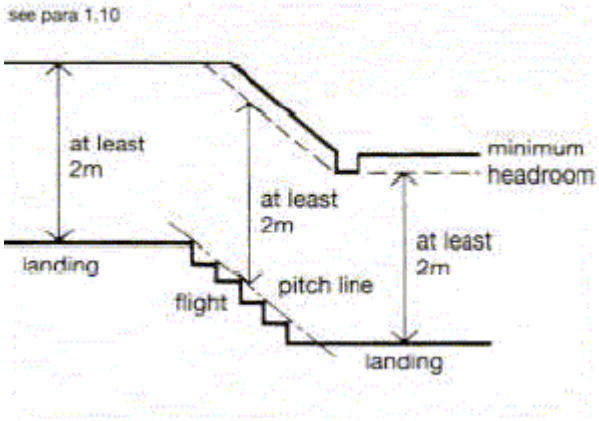
- where there are two new habitable rooms on the new storey, or where a unique facility is provided on this storey (e.g. the only bathroom to a dwelling), the stair should be at least 800mm wide, or
- if there is only one room on the new storey the stair should be not less than 600mm wide.

Tapered treads

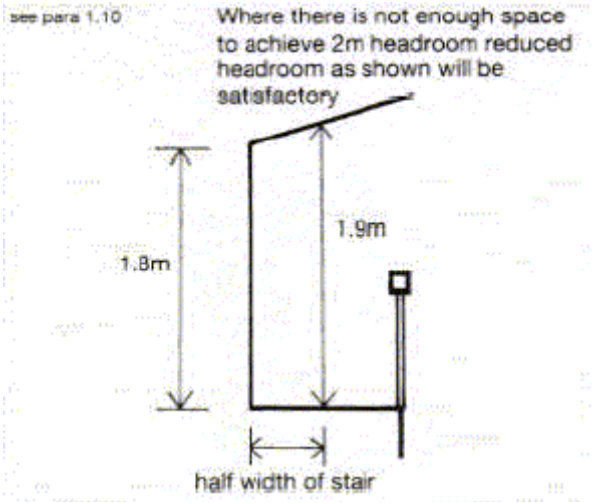
- The going in the centre should be no less than for the straight flight.
- All the tapered treads should have uniform goings.
- There should be a minimum tread of 50mm at the narrow end.

Headroom over the stair and landings

- A clear headroom of at least 2m should be provided over the new stair and landings at the top and bottom, and if the new stair rises above the existing stair or landings, then 2m clear headroom should be maintained (see diagram).



- If 2m clear headroom to the new stair cannot be achieved, then 1.9m to the centre of the stair with a minimum of 1.8m at one edge can be accepted (see diagram).



Handrails and guarding

Handrails

- There should be a handrail on at least one side of the stair.
- The handrail should be 900mm above the pitch line.

Guarding

All landings, stairs and edges of floors with a difference in level of more than 600mm should be guarded.

- The height of the guarding to be at least 900mm,
- There should be no gaps larger than 100mm, and
- They should not be easily climbable by young children (e.g. no horizontal rails).

Altenatives to a conventional stair

Spiral stairs

- These should be designed in accordance with BS 5395: Part 2.
- Generally to comply with the requirements for rise, going and headroom, the outside diameter will need to be between 1.3m - 1.8m.

Space saver (or alternating tread) stair, or a fixed ladder

When there is not enough space to install a conventional stair (complying with the above requirements) in a loft conversion consisting of one habitable room only, then an alternative (space-saver or fixed ladder) may be considered. For further advice on this, please refer to Building Control.

Glossary

Going: the distance measured on plan across the tread less any overlap with the next tread above or below.

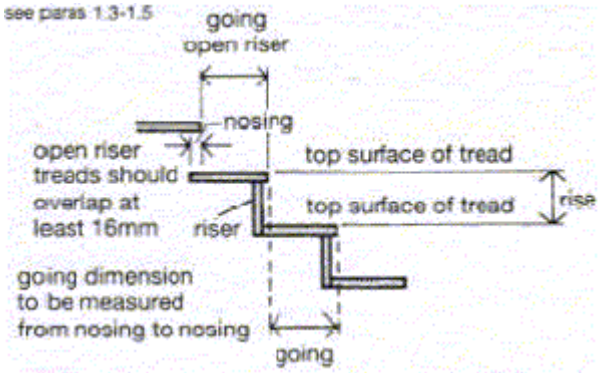
Headroom: the vertical distance above the pitch line or the surface of the landing.

Nosing: the 'overlap' of one tread to the next.

Pitch: the angle between the pitch line and the horizontal.

Pitch line: a line connecting the nosings of all treads in a flight.

Rise: the vertical distance between the top surfaces of two consecutive treads. (See diagram)



Thermal insulation

The majority of houses are insulated above the upper floor ceiling with a ventilated roof void over. Any habitable accommodation in this roof space will therefore need to be insulated between the accommodation and the roof covering.

Guidance on how to meet the insulation requirements is detailed below :

The various elements of the new storey will need to achieve the following 'U' values:

- Roof with a flat ceiling under - no more than 0.16 W/m²K,

- Roof with a sloping ceiling under - no more than 0.20 W/m²K,

- External walls (including the side walls between the room and the unheated roof void) - no more than 0.35 W/m²K, and

- Windows and rooflights - no more than 1.8W/m²K for new windows and rooflights.

- To achieve a 'U' value of 0.16 W/m²K to the flat ceiling, mineral fibre insulation at least 150mm thick between the joists, with another 100mm thick layer covering the joists will be sufficient.

- To achieve a 'U' value of 0.20 W/m²K to the sloping ceiling, rigid urethane foam (e.g. Celotex, Kingspan, etc.) at least 100mm thick between the rafters and 40mm thick under the rafters will be sufficient. The advice on providing ventilation to the roofspace above the insulation should be followed.

- To achieve a 'U' value of 0.35W/m²K for the dormer cheeks and for the side walls between the room and the unheated roof void, mineral fibre insulation at least 125mm thick, or 90mm rigid urethane foam will be sufficient. Mineral fibre should not be compressed to fit into a frame, as this reduces its insulation.

- If a multifoil type insulation is used in the roof, additional insulation may be required to achieve the necessary 'U' value.

Other materials may be used, but the thickness needed depends on its thermal conductivity.

- To achieve a 'U' value of 1.8 W/m²K for the windows and rooflights, these will need to be low-E glass with 16mm gap between panes. The amount of windows and rooflights is limited to the equivalent of 25% of the new floor area.