

## Living in a modern timber frame home





The Structural Timber association (STA) is the trade association representing over 85% of UK timber frame manufacturers and also the sector's key suppliers. Established in 2002, our job is to:

- explain timber frame to the construction industry, policy makers and the general public
- provide information and guidance, both technical and consumer
- promote higher standards through our quality scheme and training services
- help all construction sectors of UK exploit the benefits of timber frame – speed of build, thermal and acoustic excellence, durability, environmental excellence and design flexibility.

Foreword

The world of timber frame is one where homes are snug, warm and draught free. Where low running costs are matched by precise engineering quality and a new home doesn't need to come at the expense of future generations. In the UK, more and more builders are choosing to build houses and apartments, of all shapes and sizes, with timber frame.

All new buildings have to conform to new energy efficiency standards. Timber frame buildings are able to easily meet and exceed these standards. And, thanks to the excellent insulation of the structural shell, the whole home warms up quickly, without uncomfortable cold spots.

Timber frame homes are precision-engineered under factory conditions, doing away with many of the building processes traditionally done on-site. Room dimensions are more accurate too – useful when you're fitting a kitchen or a carpet! A 'dry' plasterboard lining system is used allowing decoration to be carried out immediately the house is finished and eliminating the need to make good where shrinkage of the plaster has occurred.

A timber frame home also uses less energy to build because wood grows naturally, needing only minimal energy to fell, mill, transport and construct. Using more wood is a good way to help reduce the rate of global warming because wood is a renewable building material. Moreover, in Northern Europe, our forests are managed and there are always more trees growing than are harvested.

We believe passionately that timber frame is the best solution for most homes. This publication, prepared to help you understand the key features and benefits of your home, summarises general maintenance requirements and provides advice on eight DIY projects to improve your home. It also includes advice on ensuring that important aspects of fire safety are considered and maintained.

Lawrence Young  
Structural Timber Association



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Credits

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The Timber Trade Federation (TTF) is the body that represents the wood and wood products industry in the UK.







## Looking after your timber frame home

*Householders – even more than car owners – should recognise the wisdom of protecting their investment by regular care and attention.*

Modern **timber frame** homes, like appliances and cars, have evolved from decades of research and development, and are packed with technology. You can expect your home to be remarkably trouble-free, and to remain so throughout successive generations of occupiers, provided you understand the functions of the various elements of your home.

Timber frame construction offers many benefits to the householder. In this book we outline the general maintenance that your timber frame home will need, list some things you must not do, and show how to tackle eight DIY projects, including some for the more adventurous. Throughout, we highlight tasks that need professional help. So in your timber frame home you benefit from the ease of working with wood when making improvements.

Inevitably, we have used some building terms. We have **highlighted in blue** the more 'technical' ones that you will find explained on page 25.

Compared to masonry, timber is a relatively uncomplicated material for do-it-yourself (DIY). While the same common sense rules apply to all DIY projects, there are some aspects of timber frame construction that should be understood before you start. Most of the routine maintenance of a timber frame home is similar to a masonry one, but again we point out where it pays to know how timber is different.



### Timber: our heritage and eco-friendly future

**Timber** is a traditional building material and, in the UK, examples of early hardwood timber frame properties date back to medieval and Tudor times. Softwood timber frame homes have been built in increasing numbers since the 18<sup>th</sup> Century. Worldwide, about 70% of low-rise housing in advanced Western countries is timber frame. That makes it the world's most successful and widely used domestic building method. Timber frame accounts for about a quarter of new housing in the UK and more than two-thirds in Scotland. From a construction point of view, the modern timber frame is a fast and reliable method of home building.

Nowadays, we are increasingly conscious of the need to conserve energy to save money and to minimise climate change. When you consider the energy used to build your home, wood is effectively a 'carbon-neutral' material (even allowing for transport). In fact timber frame has the lowest CO<sub>2</sub> cost of any building system. And your timber frame home is engineered to be draught-free and generously insulated so that

the energy needed to run your home is radically reduced.

### How is timber frame different?

Most modern masonry homes have external walls made of concrete blockwork on the inside and brick on the outside, with thermal insulation in the cavity between.

In a timber frame home:

- the **cladding** is usually brick, although many other claddings are used, including timber
- the concrete blockwork in the external wall is replaced by a structural insulated timber frame, which supports all the loads
- there is a clear **cavity** between the brick and the timber frame (this may be partially insulated, but is always ventilated)
- the upper floors and roof structure are also timber, this is the case with most homes whatever the building method.
- alterations are easier to carry out than in other types, such as masonry and steel frame, because wood is an easy material to cut and drill, and the stud void within the wall is convenient for routing pipes and cables.

*The timber in your home is carefully selected, graded and assembled into quality-assured, precision-made components.*



## 5 ways to check if your home is timber frame



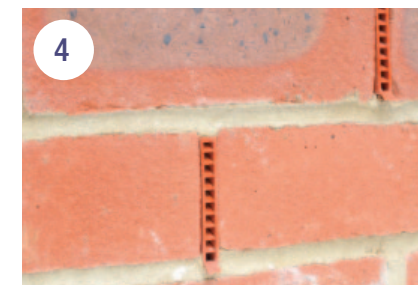
OSB sheathing on the gable wall



Wood behind the switch box



Tapping for studs in the wall



Vents in brickwork



Movement gap under window

*If you are not sure whether your home is timber frame or masonry, you might check with Building Control at your local council or your building warranty provider. Ask for a copy of the construction drawings, if available.*

Here are some checks that will indicate timber frame construction. The first two tests are fairly certain indicators; the rest help to confirm.

1. Go into the loft. In semi-detached or terraced homes look at the **party wall** which separates your home from next door. If it is **plasterboard**-faced, your home is almost certainly timber frame. In any type of building, look for timber **head binders** (known as wall plates in masonry homes); the **trussed rafters** rest on these. It is sometimes possible to see the top of the wall at the eaves in a roof space, indicating that the inner skin is a timber structure. Wall plates in masonry homes are commonly left sawn, whereas in timber frame they are normally planed smooth all round. You can also check the **gable wall**. In a timber frame home it will normally have a triangular panel with **sheathing**, forming the gable end.
2. Turn off the mains electricity supply, then, in an external wall, unscrew the cover plate on a light switch or socket outlet. Sockets in timber frame homes are normally mounted on horizontal noggings. The socket box has holes through which you should be able to see timber and insulation.
3. Knock on the inside face of an external wall. If it's timber frame, you should hear the pattern of sounds made by the vertical timber **studs**. You can also use a stud locating tool (available from DIY shops) or you could use a metal detector to locate the plasterboard fixing screws (masonry homes use dot and dab plaster for fixing the plasterboard).
4. Outside on the cladding, look for 'perpend' (small vertical gaps between bricks, usually with a ventilated plastic spacer, above ground level at about 1.5m spacings). These are to ensure the cavity between the cladding and timber frame is ventilated and allows any moisture that does penetrate the cladding to drain away from the cavity and keep timber frame dry.
5. Finally, in the outside brickwork again, look under the windows for horizontal gaps or compressed filler between the window and the brickwork. These are to allow movement between the timber frames that shrink as the timber seasons and the brickwork.





# Your home from top to bottom

*Timber frame construction generally uses wall frames and roof trusses assembled in a factory. Some systems have roof panels.*

The **timber frame** system evolved in the UK primarily for home building, although it is now also widely used for apartments, hotels, clinics, care homes, schools, student accommodation, offices and similar buildings. Every timber frame structure is designed by a structural engineer.

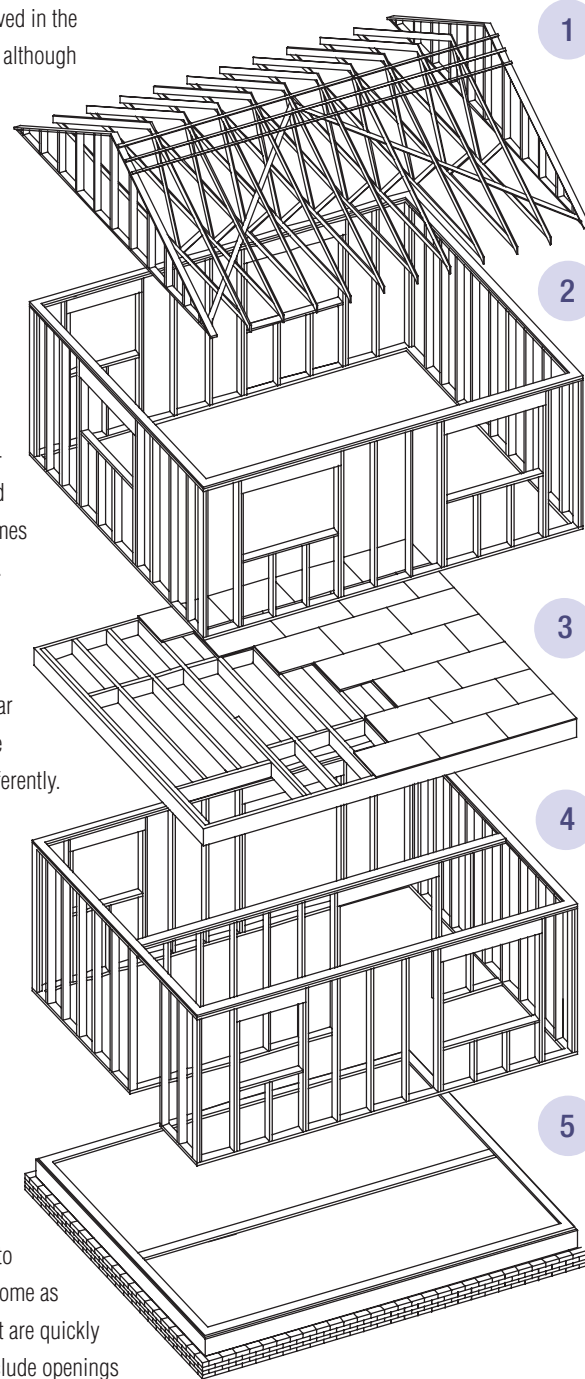
'Platform frame' is the most common timber frame method. Each storey is framed with floor-to-ceiling height wall panels and the floor deck of one floor becomes the erection platform of the next. The floor ties the walls together to stiffen the structure.

**The roof framing [1]** is similar to masonry homes, although the trusses are fixed to the walls differently. Notice the **roof trusses** are supported on the external walls. It is unusual to see internal walls bearing the weight of the roof. The roof contributes to the overall stability of the building.

**The external walls at first floor level [2]** are constructed from vertical **studs**, normally at 400mm or 600mm intervals, screwed with simple butt joints to **top and bottom rails**. These come as factory-assembled in panels that are quickly erected by crane. The panels include openings for windows and doors, as well as structural **sheathing** that is normally screwed to the external face of the frame. The sheathing keeps the panel square and resists wind forces.

**The first floor structure [3]** is often pre-

assembled in the factory as 'floor cassettes' that are craned into place. Modern floors take advantage of kiln-dried timber and increasing use of engineered timber components, such as I-joists, metal web joists and various composite



timber products. The floor cannot span as far as the roof trusses, so there is often an internal support wall.

**The external walls at ground floor level [4]** are much the same as those above. Notice the extra loadbearing wall in the middle.

**The ground floor [5]** might be of timber construction but it is more likely to be concrete. This is because timber needs protection from moisture when at or near the ground, and most builders favour concrete ground floors. The concrete floor may be either cast directly on the ground, over a membrane that prevents water seeping through, or 'suspended' above the ground. Suspended concrete floors are usually made using flat precast concrete blocks supported on a concrete frame that bears on concrete foundations. If your home has a timber floor, there will always be a gap between the floor and the ground with vents around the perimeter. It is essential for the long life of the timber that you maintain this ventilation.

## Ventilation of the timber structure

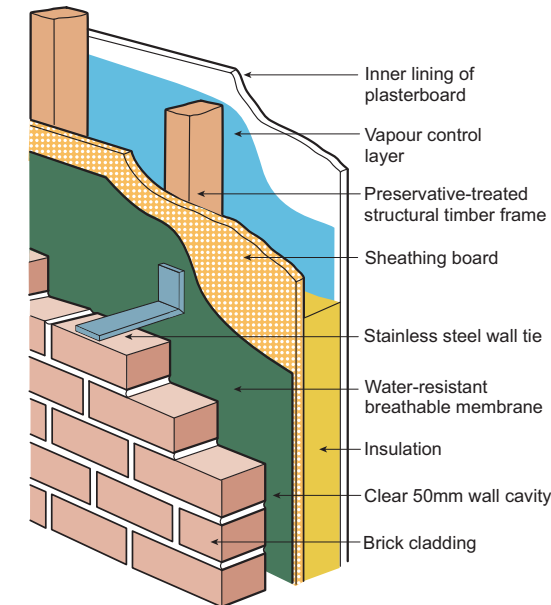
As well as the ventilation under timber ground floors, timber frame homes rely on the **cavity** between the timber frame wall and the cladding being ventilated. This is to control the moisture content of the timber. Kept dry, timber lasts for centuries.



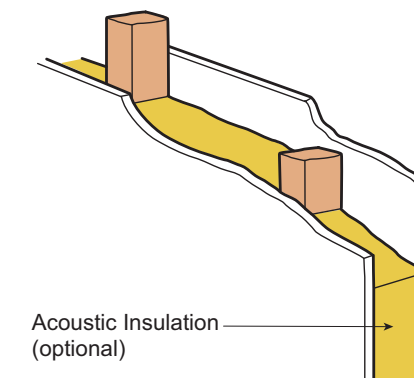
*Cavity vents ensure the timber frame is kept dry. Here, the large vent is for a suspended timber ground floor.*

# Features of your timber frame home

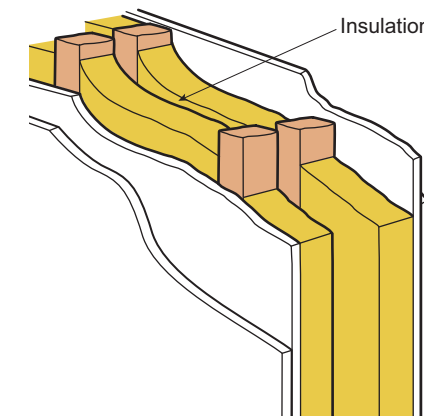
*The **timber frame** is normally made up of separate panels for external and internal walls, produced in a factory under strict quality control and then assembled on site. This is a thoroughly modern and efficient way to build.*



*External wall and brick*



*Internal wall*



*Party wall*

## External walls

The timber frame is usually covered on the inside by gypsum plasterboard and filled with high performance thermal insulation. **Sheathing** (such as plywood or **OSB**) is fixed to the outside face of the timber frame. Then the builder installs a **breather membrane** before attaching the cladding.

## Internal walls

Internal wall panels have plasterboard on both sides.

Sometimes sheathing board is added for extra stiffness and may indicate the wall is load-bearing. Usually internal walls are hollow but insulation can be added to reduce noise transmission (see page 21).

## Party walls

The separating or '**party**' wall is one of the most important features of semi-detached or terraced houses and flats. It consists of two separate timber frames spaced approximately 50mm apart. There may be sheathing boards on the cavity side for stiffness and strength. The **plasterboard** is usually double layered for fire and acoustic protection. Party walls are usually filled with insulation to limit noise between you and your neighbour. Flats also have **party floors** (see page 12)

## Floors and roofs

As with most construction methods, floors usually consist of timber joists spaced at regular intervals. Floors may be insulated to reduce noise transmission. Roofs are constructed usually with timber trussed rafters, also spaced at regular intervals. The roofs are framed with timber trusses and are usually tiled. Both floors

and roofs will be supported on the timber frame wall panels.

## Fire resistance

All buildings must comply with the buildings regulations to reduce the risk of fire due to accidents, malicious damage and the flammability of contents. Fortunately, in most cases, the occupants escape and the fire is extinguished long before the structure itself is at risk of combustion.

In timber frame buildings the wood is protected from fire by gypsum plasterboard as well as various barriers (described below) that inhibit the spread of fire.

## Cavity barriers and fire stops

The **cavity** could be a path for fire and smoke to spread. That is why the building regulations specify cavity barriers to limit the spread of fire in all buildings, regardless of construction type. Cavity barriers are lines of fire-resistant materials fixed in the cavity between the external cladding and timber frame wall panel, and run continuously around openings in external walls. They are also placed in party walls. If you are doing any work in external or party walls (for example replacing a window or door), make sure these are restored if they get disturbed.

STA has published technical guidance on cavity barriers at [www.structuraltimber.co.uk](http://www.structuraltimber.co.uk)

Fire stops are materials used to seal the gaps around services that run through party walls and floors. Again, you need to restore these if they get disturbed.

## Other elements

The remaining elements in a timber frame home are common to all construction methods. Timber is used in doors, fixtures and fittings, stairs and balustrades, skirtings and architraves. And many modern homes have wood windows.





# How your home was built



*Your timber frame home was built using a modern method of construction that moves much of the work away from wet, messy building sites into climate-controlled factories. The product is a precision-made frame that is fully planned, can be easily transported and then erected in an efficient and orderly manner. Unlike a masonry house, which depends on accurate setting out and positioning of every wall and block, a timber frame house assembles square and plumb. The result is that corners are square, edges are straight and fitted furniture fits.*



Firstly, the site was cleared and levelled. Then any pipes and drains that pass under the building were laid in trenches. Concrete foundations were cast and the base for the ground floor prepared. Most homes have a concrete floor made of an array of concrete blocks supported on concrete beams [1] or a concrete slab poured on the levelled ground. Some homes have a timber floor, where there is no risk of water affecting the timber.

Next, your timber frame arrived on a lorry [2]. The builder was waiting with a crane to assemble the whole frame [3].

The last part of the frame to be assembled was the roof [4].



Once the roof covering (usually tiles) was installed, the builder's next objective was a weathertight building, with all external doors and windows installed. The bricklayer (or joiner or renderer) then proceeded with the brick (or timber or render) cladding [5].

Meanwhile, the plumber and electrician were busy inside with 'first fix' of the pipes and cables hidden in the walls, floor and ceiling. Then the builder installed any insulation in walls and ceilings that was not factory-fitted.

In flats the pipes and cables often run in a 'false' ceiling that hangs below the party floor.



With all the pipes and cables in place, the dryliner installed a vapour-control layer and the plasterboard (sometimes called drylining) and finished all the corners and joints to give a smooth finish.

Your home was then ready for fitting kitchen and bathroom furniture.

After the kitchen and bathroom were installed, the plumber and electrician came back for the 'second fix' when all the lights, switches, outlets, taps, sinks, baths, basins, showers, drains and main services were connected and finished.

Finally, the decorator fixed tiles, applied paint and wall paper, and fitted floor coverings. With a final clean and polish, your home was made ready for you to move in.



# Understanding the structure of your home

*Before removing part of a wall, floor or roof, learn how the structure of your own home works, which elements are carrying floor and roof loads or contributing in other ways to the stability of the building. The easiest way of doing this is to refer to the working drawings which will have been submitted to Building Control at the time of construction. But if you don't have drawings, here are some suggestions to help you understand the structure of your home.*

## Internal walls

Are any internal walls **loadbearing**? See *Floor construction* below.

Do any internal walls contribute to the structural stability of the home? On wider homes (more than about 7m) the designer will sometimes have used one or more of the walls at right angles to the front or rear wall to stabilise it and give it stiffness against wind pressure.

Although they do not always carry other loads these walls must obviously be retained. If you suspect that your home incorporates walls of this type and you wish to modify them, check the drawings held by the local authority building control department or obtain professional advice.

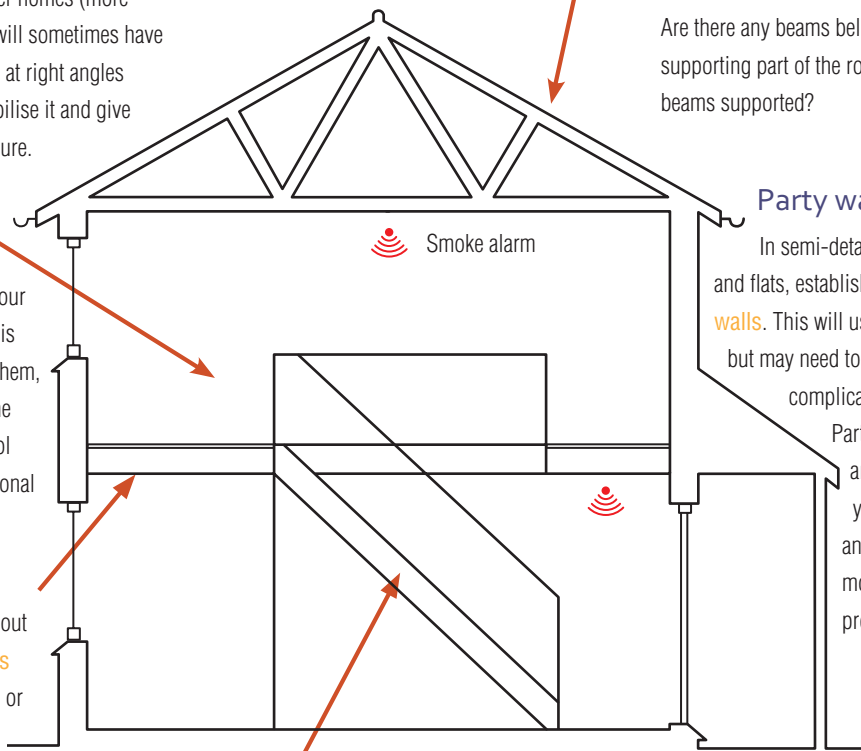
## Floor construction

It should be possible to work out the direction of the floor **joists** from the pattern of the screws or nails fixing down the floor boards or floor deck. Once you know this, it will be easier to identify the internal loadbearing walls. Joists will rarely span more than about 4m so expect to find supports at approximately this distance apart. Beware that floor joists may not all span in the same direction.

Are there any beams in the depth of the floor or below the ceiling level supporting part of the floor? If yes, how are these beams supported?

## Three-storey houses

All three-storey houses have fire-resistant walls and doors around the staircase to form a protected escape route.



## Roof

Most modern homes use prefabricated **trussed rafters** which span between external walls.

Do the roof trusses span front to back or side to side?

Does the roof have any special features which are supported by walls below, for example, hipped ends or feature gables? Are there any beams or purlins in the roof structure which are supported by walls below? If yes, make sure you understand which walls provide the support and how they are carried at the lower floor level.

Are there any beams below the ceiling level supporting part of the roof? If yes, how are these beams supported?

## Party wall

In semi-detached or terraced houses and flats, establish which walls are **party walls**. This will usually be very obvious but may need to be resolved in more complicated home or flat designs.

Party walls provide a sound and fire barrier between you and your neighbour, and should never be modified without obtaining professional advice.

## Staircase

How is the staircase supported? There is usually a trimmer joist supporting the top of the stair and carrying the joists where the stair opening is formed.

## Alterations

Have any previous alterations been made? If so, see what changes (if any) were made to the structure.

## Party floor

If you live in a block of timber frame flats, the floor between you and your neighbour (above or below) is called a **party floor**, which is specially designed to be a sound and fire barrier between you and your neighbours, just like a party wall. Party floors are described on page 12 and should never be modified without obtaining professional advice.



## General advice

### Applying finishes

The internal finish of modern timber frame homes is similar to that of masonry construction. Ceilings and walls are generally dry lined with **plasterboard**, in some cases covered with a skim coat of plaster. So you can do the simple DIY jobs like painting and wall papering your timber frame home in the same way as in any other home. Timber offers some bonuses:

- Because it is a dry construction, a new home can be wallpapered immediately without any fear of staining or cracking. There is no drying out period.
- Wall papering, carpeting and tiling are made easier by the accuracy of timber frame.

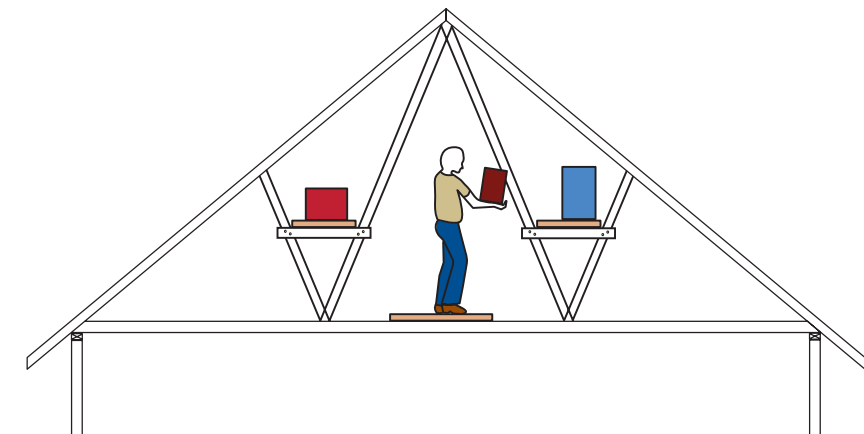
### Storage in lofts

Insulation has made the modern loft increasingly inaccessible. The traditional practice of laying planks on ceiling **joists** and the bottom chord of **trussed rafters** for the purpose of storage is no longer practical because the ceiling insulation is up to 400mm deep.

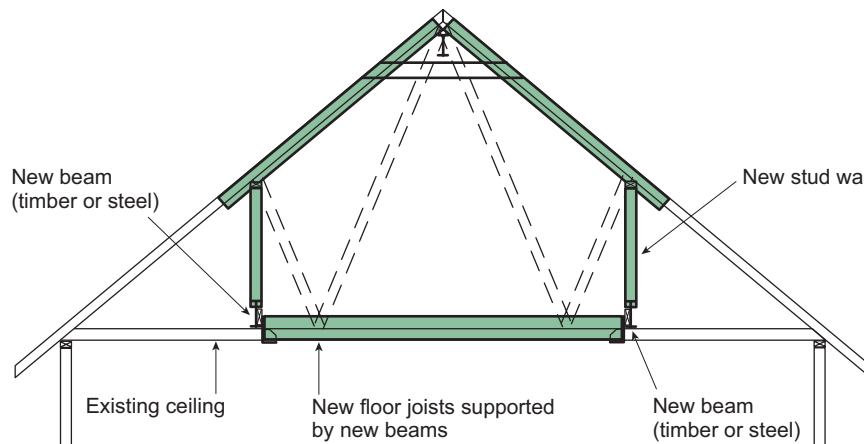
However, if the insulation is in suitable layers and you are able to temporarily roll back all but the lower layer, it may still be possible to install supports and boards to permit limited access along a line beneath the ridgeline. Roll back the insulation when finished. Narrow platforms for lightweight storage can be supported on the trussed rafters.

### Additions and extensions

Today's homes, although technically vastly superior to those of yesteryear, tend to lack the important commodity of space. If you need more space, you have three options: move to a bigger home, extend your existing floor area or extend into the roof space. Because moving can be traumatic and expensive, home owners are increasingly extending existing properties.



Shelves attached to trusses will support lightweight storage



In a loft conversion, trussed rafter diagonals that are 'in the way' can be cut after new framing is installed

For all additions and extensions, make sure that you:

- get professional advice on the design
- check whether planning permission is needed
- obtain approval from Building Control
- inform your mortgage lender
- inform your building warranty provider (such warranties usually run for 10 years)
- use only builders with relevant experience.

### Loft conversion

You might consider a loft conversion, possibly by introducing dormer windows and modifying the roof and supporting structure. Or you might increase the pitch of the roof and, by using clear span attic trusses, provide an additional room

or rooms in the roof space. The Trussed Rafter Association publishes advice on loft conversions at [www.tra.org.uk](http://www.tra.org.uk). The Construction Products Association and the Royal Institute of British Architects have a *Loft conversion project guide* at [www.ribabookshops.com](http://www.ribabookshops.com).

A loft conversion converts a two-storey house to three-storey, and requires a fire-protected escape route (see *Three-storey houses* on page 7).

### Major external extensions

If you are fortunate enough to have the land and planning permission for an external extension, this would allow for a major change in your living space. An extension of this sort must, of course, be built with the same skill and expertise as the original structure. This is not a DIY job.

### Simple external extensions

Modest external extensions such as conservatories and porches can add greatly to the quality of your home. The more competent DIYer could build a simple extension. These can sometimes be done without professional advice, provided that no additional load is applied to the structure. Do not make new openings in external walls (although existing windows can be extended to the floor to form a door). You must comply with the building regulations and you may also need planning approval.

### Installing services and appliances

Plumbing, heating and electrical installations have specific rules for the drilling of joists and studs, and the passage of flues and waste pipes.

Consult an electrician when installing lights recessed in the ceiling. These lights are a potential fire hazard because they generate heat within the ceiling. They may also transmit sound to other rooms. The Electrical Safety Council publication, *Electrical installations and their impact on fire performance of buildings* includes aspects unique to timber construction, available at [www.esc.org.uk](http://www.esc.org.uk)

### Flues and chimneys

Fireplaces and other heating appliances such as gas boilers, gas fires and wood-burning stoves can be fitted to a timber frame home in much the same manner as other types of construction. These installations are by no means a DIY project but you should be aware of the alternative types of equipment available. You should also make sure that the installer knows that the home is of timber frame construction.

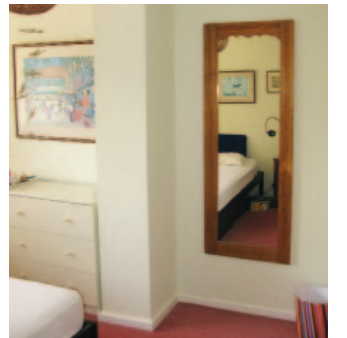
Installing a chimney requires approval from Building Control before starting work. When the installation means cutting away any structural timber in the walls, floor and roof, it is essential that you get advice from a structural engineer. The Trussed Rafter Association publishes a sheet

*Chimney and hatch openings in trussed rafter roofs*, at [www.tra.org.uk](http://www.tra.org.uk).

A gas central heating boiler or a gas fire can be connected either to an open flue pipe discharging at roof level or, if the appliance is located on an external wall, it can have a balanced flue which discharges through the back of the appliance. Installing a balanced flue gas appliance will entail cutting a hole through the external wall (see page 19), adding a non-combustible sleeve and providing adequate support to carry the boiler or gas fire. The installation of the boiler is not a DIY job.

### Solid fuel appliances

A solid fuel fireplace (an open fire or closable stove) must have a chimney discharging above roof level. A wood-burning stove may be a practical way to offset rising utility bills. The Solid Fuel Association publishes a range of advisory booklets, at [www.solidfuel.co.uk](http://www.solidfuel.co.uk). The installation of a solid fuel appliance is not a DIY job. But it helps to understand the structure of your home when planning where to put the stove and chimney.



Careful positioning in relation to the timber structure simplifies the flue installation

### Keeping fire safe

The same fire safety precautions apply to timber frame homes as any other types of construction. For general guidance, see *Fire safety in the home* at [www.direct.gov.uk](http://www.direct.gov.uk). The key points are:

- Fit multiple smoke alarms and test them regularly (see page 7) (All smoke alarms contain batteries that must be checked, including mains-powered systems installed in new homes since 1992)
- Take care when cooking.
- Plan an escape route and make a bedtime check.
- Don't overload sockets.
- Cigarettes - put them out, right out.
- Use candles carefully.
- Take advantage of home visits from your local fire and rescue service.

The Department for Communities and Local Government publishes the guides *Fire safety in the home* and *Fire safety in rented or shared accommodation*, at [www.direct.gov.uk](http://www.direct.gov.uk).



This symbol appears where the DIY projects in this book take account of fire precautions.





## Care and maintenance

*Homes, like cars, need care and regular maintenance to ensure safety, security and good appearance, minimise repair bills and guarantee your home will survive to serve future generations.*

*As you settle into your new home, read this entire book (up to the DIY projects) and use this section to make a list of the care and maintenance jobs needed in various parts of your home.*

### EXTERIOR

Make periodic checks of the external fabric of the building, at least annually.

#### Waste

Avoid leaving waste bins and combustible materials (such as rubbish and bark chippings) next to external walls, especially near air vents.

#### Brickwork

In general terms brick is a maintenance-free cladding. Fine cracks can develop in the mortar joints, allowing water penetration, in which case repointing may be necessary. Ensure the cavity vents are not clogged especially at ground level. The same principle applies to the ventilators in suspended timber floor construction.

#### Roof

Check for cracked tiles and loose verges and ridge tiles. Repair as soon as possible. Keep gutter and rainwater pipes clear of leaves and

other debris. This check is best carried out in autumn when the trees lose their leaves.

Take care when using ladders. For example, plant the legs on firm ground, don't prop against the gutter and don't overreach.

#### Weather seals

Check the weather seals around doors and windows to minimise draughts and leakage of heat. Keep weather seals free from paint. Lubricate rubber or vinyl products with petroleum jelly to keep them pliable and replace any damaged sections. Check that latches close firmly enough to compress the weather seals.

#### External woodwork

External timber joinery is manufactured from either preservative-treated wood or from a sufficient durable species to resist decay. External wood is usually finished with a translucent or opaque microporous coating that penetrates the wood to some extent, rather than merely

forming a surface film. These coatings are flexible and permeable enough to allow for the natural moisture movement of the wood without cracking or flaking. Unlike oil paints it is not necessary to 'burn off' or rub down before repainting. Wash with a stiff brush to remove dirt, and then apply the new coating. It is important to repaint before the wood appears 'grey' because this shows that sunlight is already affecting the surface, which affects adhesion.

Repaint with the original product where possible, otherwise the new and old coatings may not be compatible. For example, don't mix spirit-based and water-based products. And don't apply oil paints over the microporous finish because this would compromise the vapour permeability. Although it is not necessary to paint naturally durable wood, it will reduce surface splits, roughening and the rate of weathering.

Wood intended to be unfinished will bleach to grey. There is no need to paint it, but do wash and brush it occasionally to remove dirt and surface growth that affect its appearance.

#### Windows and external doors

Generally, with exception of the need to repaint wood frames, windows and doors made of wood or PVCu will require similar maintenance. This involves cleaning and lubricating hardware,

checking the flexibility and general condition of rubber weather seals and glazing seals. Regular washing will help maintain the appearance.

Modern wood windows must be made of preservative-treated wood or decay-resistant species. The majority of wood windows and doors are also factory painted under controlled conditions with translucent or opaque microporous vapour permeable finishes. Factory-applied coatings can now last 8-10 years before maintenance, and opaque finishes generally last longer than translucent.

The same guidance on repainting applies as for external woodwork. Avoid painting over rubber weather seals, as this will reduce their flexibility and effectiveness. Most weather seals can be easily removed from the retention grooves in the frames, and replaced after painting is complete.

The glazing of thermally insulated glass units (IGUs) is usually by beads capped with silicone or EPDM gaskets, both of which will resist over-painting. If you can see condensation inside an IGU, it has failed. It is best to engage a glazing specialist.

When replacing windows and external doors, take care to maintain suitable cavity barriers around these openings (see page 5).

### INTERIOR

The internal fittings, fixtures and services of a timber frame home are essentially the same as those in a masonry home and require the same degree of care and maintenance.

- Boilers and wood-burning stoves will require annual servicing from a professional.
- Have an electrical safety test, at least every 10 years.
- Inspect the interior of the building at least annually.



#### Roof space

Inspect the roof space annually to ensure that none of the ventilation paths have become blocked by insulation or nests of animals and insects.

#### Ventilation

Condensation can be a problem in any home. It occurs where there is too much water vapour, not enough ventilation and cool surfaces for water to condense on. Remove vapour at source by fitting and maintaining exhaust fans in kitchens and bathrooms, and ensure that clothes dryers are vented to the exterior. If condensation does still occur, it will become apparent in the first instance on the glazing. This indicates that there is insufficient ventilation and opening the window a fraction will cause it to disappear quite rapidly, at which time the window can be closed.

If your home has a mechanical ventilation system, it is important that you keep it running, and clean and change filters as recommended by the manufacturer.

#### Tiling

Check ceramic tiles in wet areas such as bath surrounds, rake out any cracks in the grouting and refill with waterproof grout. At the same time, repair or replace defective mastic seals between plumbing fixtures and the walls.

#### Timber joinery and plasterboard walls

Walls and internal joinery require periodic cleaning because they attract knocks, smudges and scratches. Joinery is usually repainted at the same time as walls. Rub down joinery before repainting to restore a smooth finish.





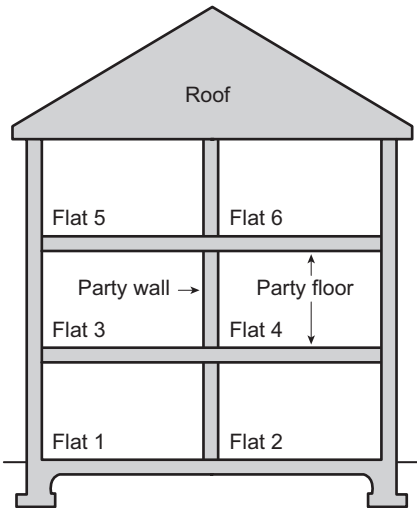


# Don't do this at home!

General safety precautions apply to DIY activity in timber frame homes as in any others. Here are specific features of timber frame construction to bear in mind.

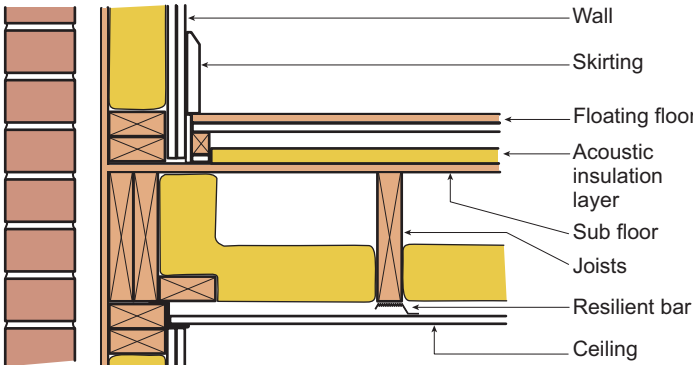


This power outlet in a party wall has an 'intumescent' seal that expands to block the opening in the event of fire



Compartment floors in a three-storey block of flats

Typical 'floating floor' construction



The party floor is a complex construction

## The cavity

Modern timber frame homes are already exceptionally well insulated. Although some modern timber frame homes have partial insulation in the cavity, it is essential that you do not fill the outer wall cavity behind the brickwork with additional insulating material. That would interfere with cavity ventilation.

## Party walls

The party wall is an important structure that ensures neighbouring buildings are self-supporting. It is also a barrier against fire and noise. The party wall is so important that you need to comply with the **Party Wall Act** in England and Wales, and similar laws elsewhere. If you don't you could invalidate your insurance and have problems selling your home.

Do not make holes in party walls; any holes will reduce their acoustic performance. It will also impair their fire resistance properties. The builder may have installed socket outlets in your party wall but you should not attempt to do the same. They will have been put in using special techniques that ensure the fire and acoustic integrity of the wall.

## Party floors

If you live in a block of flats, then the floors are termed compartment or 'party' floors which are specially designed to provide fire and acoustic insulation between you and your neighbours, just like party walls.

The top surface of party floors will probably be of 'floating' construction where the walking surface is separated from the joists by being mounted on an insulating layer, usually of mineral wool or resilient timber battens. Do not make holes in these floors or ceilings, because this will affect both acoustic performance and fire resistance. It is important that you do not penetrate the insulating layer or interfere with the 'floating' floor. So do not screw or nail the floating floor to the joists or sub-floor.



## Fire precautions when making holes

Remember that the structure of your home contains combustible materials. This applies when drilling or cutting opening in walls (see DIY projects 3 and 4) and when working in lofts and attics.

Do not use hot air guns, blowlamps or other naked flames near any hole in the outer cladding or the inner plasterboard skins. This is particularly important when undertaking jobs such as installing a garden tap.

Take care with power tools that generate frictional heat. For example, a masonry drill bit will overheat and can become red hot if it is forced through wood. So do not use masonry bits in timber; use only wood drill bits.

# DIY projects to improve your timber frame home

By reading this far, you will have a better understanding of how your timber frame home is built. Perhaps you are keen to carry out more ambitious DIY jobs.

A timber frame home differs from a masonry home in a number of important ways. Fortunately, timber construction makes many improvements easier than would be the case in masonry. Nevertheless, there are situations where you should get expert advice before doing it yourself. Some projects demand a specialist because they are difficult or to comply with regulations. In this book we use one, two or three hammer symbols to indicate the DIY difficulty. A hard hat means you should get professional advice.



This book contains eight DIY projects, classified according to their difficulty, where to get advice and whether using a specialist would probably be a good idea.

Except for fixtures and fittings, consult a structural engineer before you do any work on a party wall.

There is a wealth of advice available from DIY shops and trade specialists if you need it. Take care to choose sources that are well known and respected. Builders merchants often have 'Choose and use' information sheets to help you make the right choice of timber materials.

You can get advice on health and safety at [www.hse.gov.uk](http://www.hse.gov.uk).

DIY project	Page	Difficulty	Specialist
1: Fixtures and fittings	14	1 hammer	Home maintenance service
2: Additional TV point	16	2 hammers	TV aerial contractor
3: Small holes in external wall	18	2 hammers	Plumber or electrician
4: Opening in external wall	19	2 hammers	Plumber or electrician
5: Saving on energy bills	20	1 hammer	Home maintenance service
6: Improving sound insulation	21	2 hammers	Dry lining contractor
7: Remove non-loadbearing wall	22	3 hammers	Carpenter, plasterer
8: New non-loadbearing wall	24	3 hammers	Carpenter, plasterer

Here is a general list of tools and materials you will need for these DIY jobs. Use this list to build up a toolkit that will save you money time and time again as you undertake general maintenance, repairs and DIY jobs. Any special tools required are listed in each DIY project.

Carpenter's hammer Wood chisels Wood saw Saw horse Measuring tape Straight edge (1m) Spirit level Square	G clamps Electric drill (variable speed with hammer option) Cordless powered screwdriver Stud locator Powder fire extinguisher Protective goggles	Trimming knife HSS, masonry and wood drill bits Flat blade and Phillips screwdrivers Short- and long-nose pliers Wood rasp First-aid kit
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# DIY project 1

## Fixtures and fittings

Attaching fittings, such as shelves, curtain rails, smoke alarms, picture frames and flat-screen TVs, is the probably the most common DIY job.

Fixings to **timber frame** walls are ideally made using conventional wood screws through the **plasterboard** directly into the timber stud framing. Where this is not possible, secondary fixing can be made using **cavity** fixing devices (see page 15 for guidance).

As well as your basic toolbox you will need:

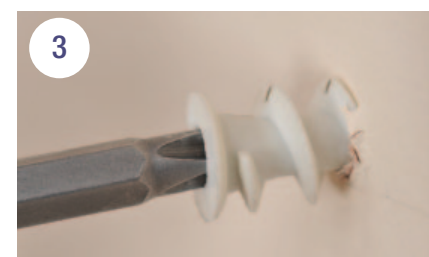
Type E self-drilling anchors (see page 15)



Find the timber studs



Level the batten then install the second screw



Screw in the popular Type E self-drilling anchor



Install support screw in self-drilling anchor



Finally, install and level the shelf

You must make sure the cavity fixings are of sufficient loadbearing capacity for the job. The strongest types of fixing spread the load across the back of the facing material. The less strong grip only the circumference of the fixing hole. Many manufacturers put load capacities on the package.

Making small holes in the vapour control layer has no measurable effect on its performance. And an added advantage of timber frame is that there is no need for masonry anchors or drilling and plugging holes to take heavy fittings.

### Locate the studs

You can find the vertical timber **studs** by tapping on the plasterboard until you hear a more solid sound, but this method is not absolutely accurate. A better method is to use a special stud finding device, the 'stud sensor', which works by measuring the density of the wall structure [1]. These are cheap and readily available from DIY stores. Alternatively, use a metal detector or magnet to locate the plasterboard screws which are fixed to the studs.

When you think the stud has been found, drill a small diameter pilot hole to confirm its position. If the first hole misses the stud a good tip is to take a piece of wire, bend into a right angle, and 'fish' for the stud by turning the wire in the pilot hole.

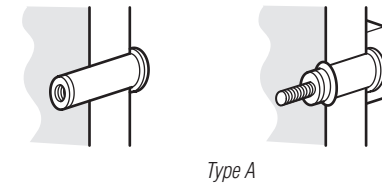
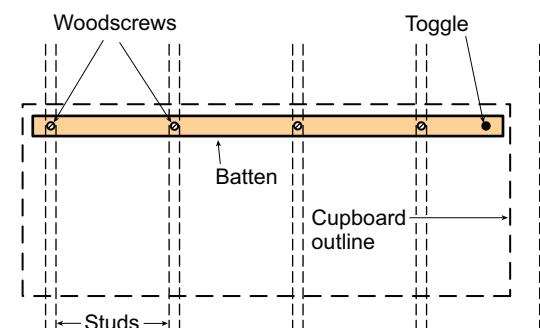
### Fixing to the studs

Plasterboard is not a reliable load bearing material. Apart from the risk of damaging the wall surface by overstressing it, the additional load could cause premature failure of the lining in a fire situation. Therefore, heavy objects such as kitchen cupboards, or wall hung furniture should always fix directly to the studs. If the stud spacings are unsuitable, fix a horizontal batten [2] to span across the studs as shown above, and then attach the object to the batten hidden behind.

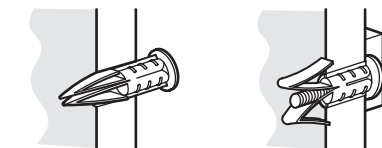
A combination of stud and cavity fixings are usually required because it is unlikely that your batten length will conveniently end on a stud centre-line. A ratio of two stud fixings to one cavity fixing is usually adequate.

### Fixing light objects to plasterboard

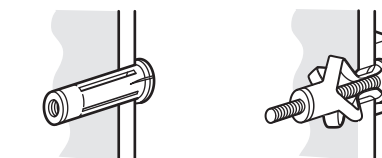
Cavity fixings (see page 15) are generally sufficient to fix light objects such as small shelves to the plasterboard. Here we show how the popular Type E self-drilling anchor is fixed in two steps [3, 4] to support the shelf, which is finally attached to its fixing screws and levelled [5].



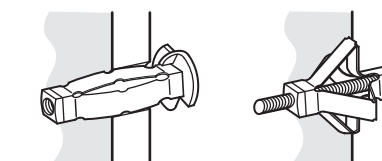
Type A



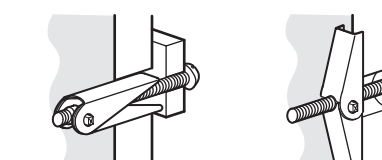
Type B



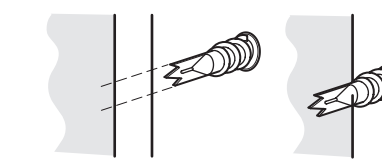
Type C1



Type C2



Type D



Type E

### Curtain rails

Brackets for curtain rails are notoriously tricky in masonry walls (due to the difficulty DIYers often have with accurate drilling) but straightforward in timber frame walls. In timber frame walls there are at least two studs at the edge of the opening in loadbearing walls and generous lintel and head timbers. The critical thing is to check the position of solid timber before drilling.

### Cavity fixing

Lighter items can be fixed to the wall with proprietary cavity fixings. There are at least five types available, made of polypropylene, light gauge metal or rubber.

They are designed for specific purposes so make sure you get the right type for the job in hand. There is a huge range of fixings from different manufacturers. So having selected a particular fixing of the type you need, check the manufacturer's advice on the pack and website.

**Type A:** This flexible plug will fix to virtually any material, either solid or hollow, and in brittle or unknown substrates. It is ideal for fixing in irregular or oversized holes. It grips the outer surface by expanding the rubber sleeve. It can regain its shape when the screw is unscrewed, so the whole fixing can be removed and used again.

**Type B:** These hollow wall fixings are easy to use for curtain tie-backs, lightweight wall hooks and smoke alarms. This type springs out after passing through hole. In this case the board thickness is critical.

**Type C1:** This plastic toggle is suitable for securing bathroom and kitchen fittings, ceiling fixtures such as light fittings, light shelving, brackets and hooks. Fixtures can be removed and replaced for redecoration. The socket is formed on both sides of the face board, allowing the screw to be removed and replaced in the same fixing.

**Type C2:** This is the metal version of the toggle.

**Type D:** The expanding wings of the spring toggle spread load over a wide area making the toggle ideal for overhead applications. Spring toggles can only be used once. If the screw is removed, the retaining toggle or flange on the other side of the board is released and will fall away.

**Type E:** This self-drilling anchor is very effective for light and medium applications. There is a toggle variation for heavier applications. These fixings can be re-used.

The drill hole diameter varies from 6mm to 12mm, the largest being for the spring toggle type. Check that the backplate of the item being fixed will cover the hole.

The depth of timber frame cavity is rarely a problem when selecting cavity fixings.

Check that the screw fixing is long enough for the fitting or batten you want to fix. This information is usually shown on packaging. If screws are not supplied, take account of the thickness of the fitting or batten when deciding on the length of screw.

The strength and security of the fixing also depends on the accuracy of the hole. An oversize hole will allow fixings to twist in the hole, making tightening up difficult.



## DIY project 2 Additional TV point

It is generally easy to install cables in timber frame homes because of the spaces within the structure. Inside the home, the normal practice is to run electrical distribution cables in the intermediate floor or roof spaces, with vertical cables running down within the timber frame wall panels to feed socket outlets and switches. Here we show how to install a TV point.

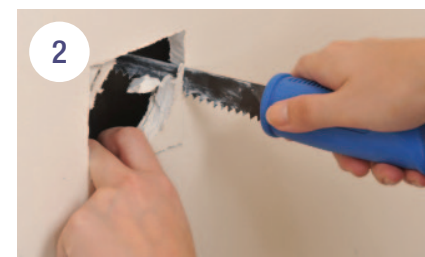
As well as your basic toolbox you will need:

Pattress box

Coverplate with TV aerial point



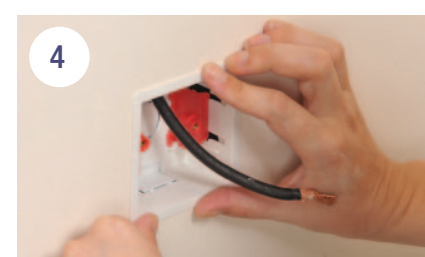
Mark the outside of the box on the wall



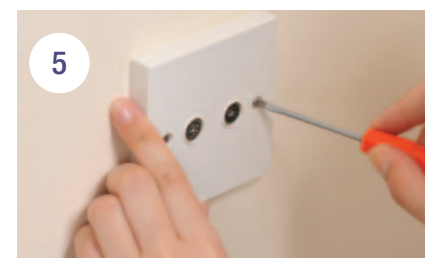
Drill holes to get started then cut with a pad saw



Pull the cable through the back of the box



Position the box in the recess



Connect the wires and fit the cover plate

In this project we also introduce some simple rules for drilling and notching the timber frame, on page 17. You need to follow these rules any time you run a cable or pipe through a timber wall or floor.

**NOTE:** These instructions are about the making of an opening in a timber frame wall for an additional recessed TV point, but not the wiring itself. The same principles would apply to an additional electrical socket. STA and TRADA Technology strongly advise DIYers against performing work on the 240V electrical system, unless they clearly understand how the domestic electrical system works, take all necessary precautions and get the work checked by an electrician. Beware that electrical cables generate heat and require special precautions (derating) when run in a space containing thermal insulation.

DIYers should take note of the building regulations when undertaking electrical work. For example, if you live in England or Wales, Approved Document P1: Design and installation of electrical installations specifies that most electrical work (including low voltage work in certain special locations) is 'notifiable'. That is, you need to tell Building Control. The work you can do without notifying Building Control includes most low voltage work (such as a TV point) or adding socket-outlets and fused spurs to an existing ring or radial circuit. But work in a kitchen or 'special locations' containing a bath tub or shower basin, swimming pools or paddling pools, and hot air saunas is notifiable. The Building Regulations require that all electrical work, whether notifiable or not, must comply with the IET Wiring Rules (BS 7671).

The plastic box that houses the TV outlet is called a pattress box. These may be recessed into the wall or mounted on the surface. There is a matching cover plate with screws that attach the cover to the pattress box. In this project we show a recessed pattress box.

Start by locating the two studs nearest to where the new outlet is needed. Mark out the centre lines of studs and draw a rectangle between the stud lines, where the outlet is to be situated using the pattress box as a template [1].

Drill four generous sized holes (say 10mm diameter) within the four corners of the rectangle. Then use a pad saw to cut the plasterboard neatly to the outline of the pattress box [2]. If you are working in an external wall, you may encounter the vapour control layer (vcl) behind the plasterboard. Take care to cut it neatly around the opening.

Feed the new cable down the cavity into the opening and through the rear of the pattress box [3].

Install the pattress box in the recess, following the manufacturer's instructions, taking care to keep the cable drawn through [4]. There are clips that fix the pattress box behind the plasterboard.

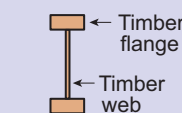
Finally, complete the wiring as per the instructions on the socket outlet and screw on the cover plate [5].

## Notching and drilling the timber frame

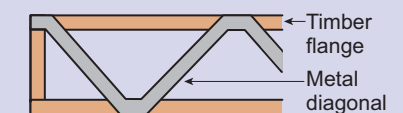
Cables and pipes usually run within the voids between joists in floors and studs in walls. But there will be places where the cable or pipe needs to pass from one void to another. There are strict rules that govern where and how you may safely drill holes or cut notches in the timber frame. When you follow these simple rules the strength of the timber frame will not be adversely affected.



Do not go beyond these rules without the advice of a structural engineer.



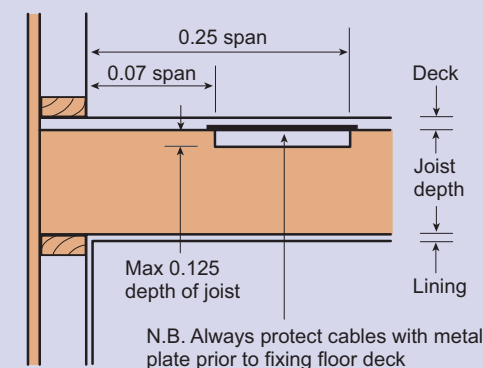
Section of I-Joist



Elevation of open-web joist

### I-joists and open-web joists

If your floor has I-joists or metal-web joists, do not drill or cut the flanges (the timbers at the top and bottom). Metal-web joists have convenient openings to run cables and pipes. Consult the manufacturer (or a structural engineer) before drilling holes in the web of I-joists (the vertical sheet between the flanges).



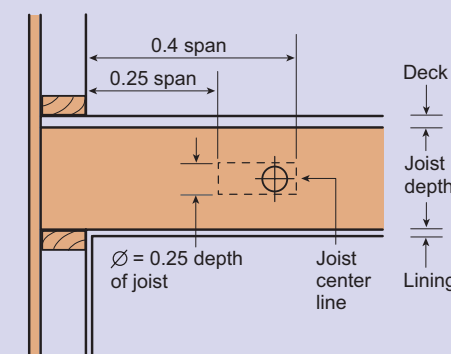
Safe notching of joists

Joists can be notched in zone shown

**Worked example**  
Joist span 3600mm, depth 244mm  
**Width**  
Span of 3600 x 0.25 = 900mm  
Span of 3600 x 0.07 = 252mm  
Width of notch zone = 648mm  
Starting 252mm from wall  
**Depth**  
Joist 244mm deep x 0.125 = 30mm

### Notching of solid joists

You might need to do this if you are running a cable or pipe immediately under the floor boards. Do not notch a joist immediately next to its support and at its mid span.



Safe drilling of joists

Joists can be drilled within zones shown up to maximum diameter indicated with one hole only.

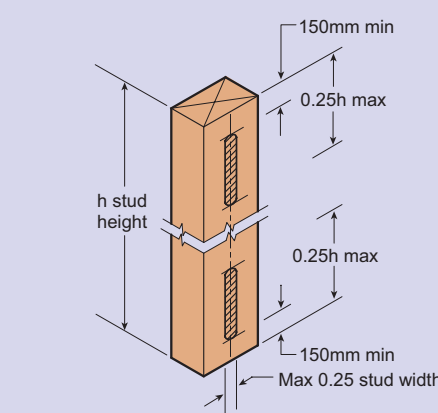
**Worked example**  
Joist span 3600mm, depth 244mm  
Thus 3600 x 0.4 = 1440mm  
3600 x 0.25 = 900mm  
Width of drilling zone = 540mm  
Starting 900mm in from wall  
Max hole diameter, 244 x 0.25 = 61mm

### Drilling of solid joists

You might need to drill through a joist to install a cable that runs perpendicular to the joists. Do not drill a joist immediately next to its support and at its mid span. A notch and a drill hole in the same joist must be at least 200mm apart horizontally.

### Drilling of solid studs

You might need to drill through a stud to provide a cable route between a floor and a wall. Do not cut notches anywhere in load-bearing studs.



Safe drilling of studs

Studs may be drilled within zones shown up to maximum diameter indicated.

**Worked example**  
Stud height 2400mm, depth 140mm  
Thus 2400 x 0.25 = 600mm  
End distance = 150mm  
Length of drilling zone = 450mm  
Starting 150mm from the top or bottom.  
Max hole diameter, 140 x 0.25 = 35mm

Drillings on centre line only. Hole diameters not greater than 0.25 stud width and hole centres not closer than 4d (d=hole diameter)



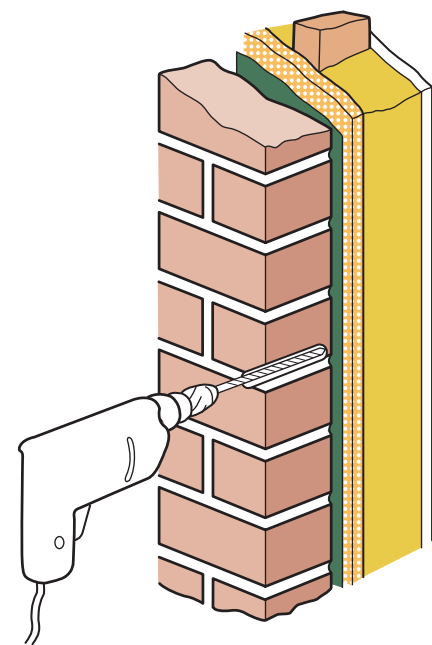


## DIY project 3 Small hole in external wall

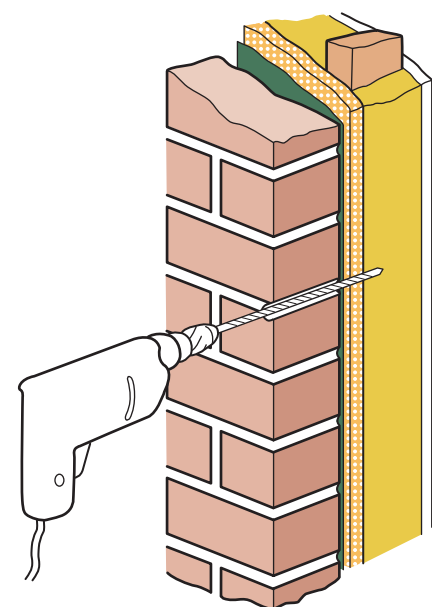
If you want to install an outside light or tap, you will need to drill a hole through the external wall in order to run the cable or pipe. Making a hole for a pipe or cable through an external wall is straightforward but requires care to avoid damage and get the best alignment.

As well as your basic toolbox you will need:

Large diameter masonry and wood drill bits



Drill through the outer wall with a masonry bit



Continue the hole through the internal wall using a wood drill bit

The hole can be drilled from either the internal or external face, but drilling through the brick first makes it easier to get a neat result. Plan on drilling through the mortar between the bricks, not the brick itself. You will need to make careful measurement inside and out to see where the hole will be. Take care not to drill through the vertical timber studs. The hole should pass through the panel close to but not through a stud. It should slope down slightly to the outer face to avoid any risk of water running along the cable or pipe and wetting the internal wall.

Begin by drilling from the outside using a masonry bit, just long enough to drill through the brick cladding (which is about 100mm thick) [1]. Slope the hole slightly upwards.



Do not drill through the **timber frame** wall with the masonry bit. If you should encounter wood, the masonry drill would generate a lot of heat.

Make a pilot hole through the timber frame wall, using either a long wood drill bit [2], or by hammering through a sharp steel rod. Then drill the hole from the inside with a wood drill bit the same diameter as the masonry bit.

After drilling, a cable can be simply threaded through the hole which should then be sealed with cement mortar on the outer face and with mastic on the inner face.

If a pipe is to be installed [3], this should have any capillary joints (those requiring heat to make the joint) fitted before it is placed through the wall. The final joints should be compression type fittings.



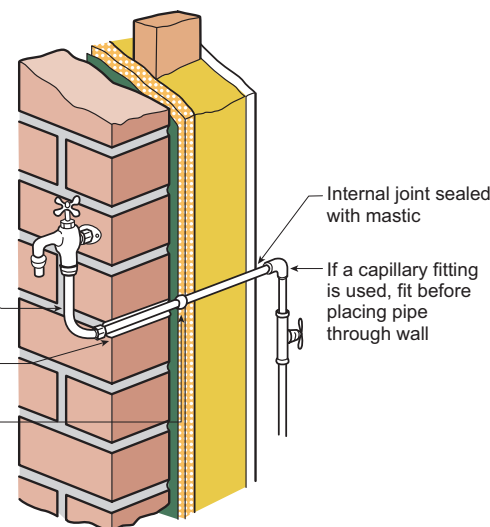
If you are making soldered joints, do not use a blow lamp near the hole to avoid the risk of heat or flames reaching the cavity, and possibly setting fire to the frame, sheathing, breather membrane or the vapour control layer.

Avoid using a blowlamp near the hole through the wall.

Tap connection with compression fitting

Joint pointed with cement mortar

A plumbing olive placed on the pipe in the cavity acts as a drip to reduce the risk of water transfer to the timber wall



Fit pipework through hole



## DIY project 4 Opening in external wall

You might need a larger opening, for example to install an exhaust fan or a vent for a tumble dryer. For this you will need to remove some bricks, not merely drill through them. Here we show how to make the opening in the timber frame wall and brickwork. We show a circular steel duct passing through the wall, but the same principles apply to any kind of duct.

As well as your basic toolbox you will need:

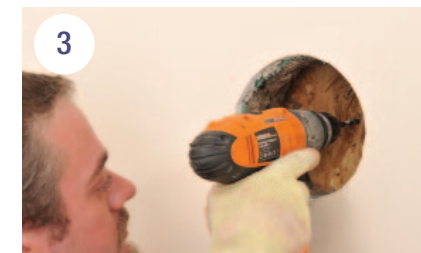
Cold chisel for cutting away bricks



Drill a circle of holes then cut out the disk



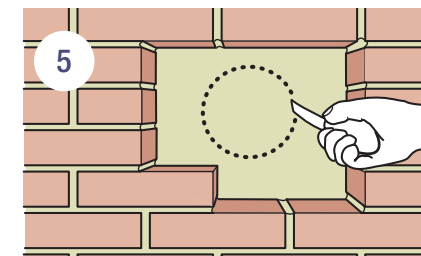
Cut away the insulation



Drill a hole in the sheathing to locate the centre



Begin removing bricks by drilling in the mortar



Remove enough bricks to cut a circular opening in the sheathing

The objective is to achieve a snug fit when you install the duct. Ensure the steel duct is sized to connect to the appliance.



As long as it is a snug fit, the 0.5mm thick steel pipe will have the necessary 30-minute fire resistance to act as a cavity barrier.

Begin by locating the position of the vertical timber **studs** (see page 14), so that the opening can be made between them. Check there are no cables or pipes in the way.

Working on the inside face of the wall, mark the size of the required opening on to the **plasterboard** face and stitch drill around the opening with a small wood drill bit. Finish making the opening with a padsaw. Take care not to tear the polythene vapour control layer beyond the size of the opening.

Remove the disk of plasterboard [1].

Carefully cut away the wall insulation from the hole to expose the sheathing [2].

Still working from the inside, use a wood drill bit to drill on the centre line through the sheathing [3]. Change to a small diameter masonry drill at least 200mm long and drill through the outer skin of brickwork. Allow a slight fall towards the outside to prevent rainwater running back along the duct. Now you will be able to see the centre line of the opening you need to make in the brickwork.

Working from the outside, you need to cut away enough bricks around the opening. Start by drilling holes in the mortar [4] and then cut out the bricks using a hammer and cold chisel. It is easier to oversize the opening slightly. Take care to avoid debris falling into the wall cavity.

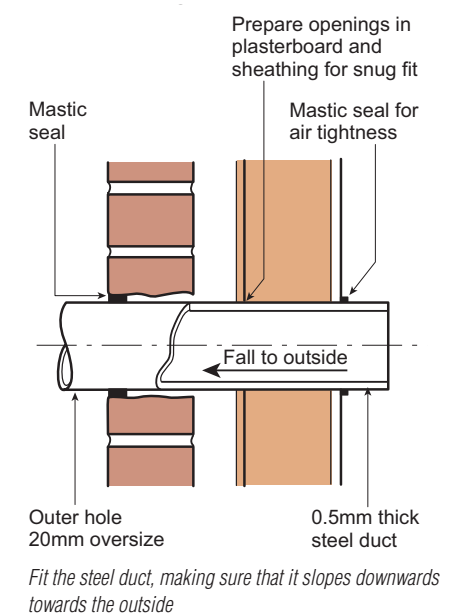
Screw a hook or woodscrew to the sheathing board so that you can hold on and prevent it from falling in the cavity once it is cut. Stitch drill around the opening with a small wood drill bit, finish making the opening with a padsaw and remove the disk of sheathing board [5].

Tidy up the edges of the breather membrane by taping or tacking them neatly.

Replace the bricks, cutting as necessary around the duct. Seal the wall to the duct with mastic and fix the external grill.

Make good the internal plasterboard face with a proprietary filler and seal the lining or housing to the opening with mastic before fitting the internal appliance.

Finally, connect the appliance and make good finishes.





## DIY project 5

### Saving on energy bills

Broadly, there are seven ways to save energy in your home:

- increase the amount of thermal insulation in the floor, walls and roof
- make insulation as continuous as possible
- reduce air leakage around windows, doors and in the building fabric
- fit better windows and doors
- install more efficient lights and appliances
- turn the heating down
- switch off lights and appliances when not in use.

The Energy Saving Trust advises on practical ways to save energy ([www.energysavingtrust.org.uk](http://www.energysavingtrust.org.uk)). Here we consider those related to the timber frame.

Modern windows and doors fit well and have reasonable thermal performance provided they are double glazed. So replacing these for energy performance alone is usually a false economy. If you have wood windows, these generally offer better thermal performance than plastic ones, owing to the higher thermal resistance of wood.

In a timber home, the complete outer 'shell' of the building is so well insulated and sealed that the whole home becomes comfortably warm with no cold areas and is not prone to surface condensation on walls. Conversely it stays cool and airy throughout the home during the hot summer months. Yet until the building regulations demand a 'zero carbon' standard, there is still scope for improvement.

It is impractical to improve the thermal insulation of the floor. If it is timber, it will usually mean lifting and replacing the floor to fit it, something that is inconvenient to occupiers and risks damage to floor coverings. Similarly, it is impractical to improve the insulation in walls, unless you are making major renovations. Therefore the only practical DIY solution is to improve the loft insulation.

### Loft insulation

There is a law of 'diminishing returns' with insulation. Mineral wool is the most convenient type of insulation for lofts. The optimum thickness is about 400mm of mineral wool. So if you have much less than that, you should consider adding another layer of insulation. Add new insulation perpendicular to existing in order to improve the continuity of insulation.

DIY shops provide instructions for installing mineral wool. When fitting additional insulation, take care not to block the roof space ventilation. Make sure that insulation is not placed beneath cold water tanks and that these are adequately insulated. Also make sure that all exposed water pipes are well lagged. Fixing a seal on the loft access hatch and attaching insulation to its upper surface also reduce heat loss into the roof space. Make sure you wear a mask to avoid breathing in fibres and overalls to protect clothing [1].

### Draught proofing

Considerable economy can be made by fitting good quality draught stripping to the windows and doors if none was originally fitted or if it has deteriorated over the years.

### Solar panels

These appliances either heat water or generate electricity. The Government or your energy supplier may offer financial incentives to install these to increase use of renewable energy.

As well as your basic toolbox you will need:

*Mineral wool insulation in rolls*  
*Disposable face mask and overalls*



Note: STA and TRADA Technology strongly advise DIYers against doing solar panel work as the interfaces with existing hot water and electrical systems can be complicated. This work is best left to accredited professionals.



## DIY project 6

### Sound insulation between rooms

There are three sources of irritating noise in the home:

- from neighbours in semi-detached and terraced homes, and flats
- from outside caused by traffic or similar sources
- generated within the home.

As well as your basic toolbox you will need:

*Mineral wool insulation in rolls*  
*Disposable face mask and overalls*

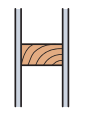
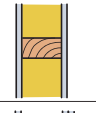




Timber frame homes are well known for their good thermal performance because they are well insulated and sealed. These properties also assist with sound insulation. So you can expect not to hear much from your neighbours in a timber frame home.

Timber frame construction comfortably meets building regulations for noise transmission. It is unlikely that improvement work on modern party walls and floors could be justified on economic grounds. Timber party floors are effective at limiting noise transmission between neighbours. Party floors are too complex for the DIYer. A 'squeaky' floor, is a defect that should be rectified by the builder.

Although the Building Regulations do not cover sound transmission from outside, there is unlikely to be a problem with transmission through the timber frame wall itself. The weakest links are the windows and particularly trickle vents if fitted. Unless external noise is severe, modern double-glazed windows provide adequate noise reduction. However, gaps and faulty seals can 'leak' sound. Replacing deteriorated weather seals in windows and doors can improve sound reduction by as much as 10 decibels. Do not block the trickle vents as this increases the risk of condensation.

### Ways to reduce sound transmission through internal walls

Form of Construction		Noise Reduction
	basic timber stud partition (with 12.5mm plasterboard on each face)	35 decibel noise reduction
	basic timber stud partition + 90mm mineral wool insulation	40 decibel noise reduction
	basic timber stud partition + one additional 12.5mm plasterboard on one face	<b>a</b> 39 decibel noise reduction with plasterboard only <b>b</b> 41 decibel reduction with 90mm mineral wool insulation
	basic timber stud partition + one additional 12.5mm plasterboard on both faces	<b>a</b> 42 decibel noise reduction with plasterboard only <b>b</b> 44 decibel reduction with 90mm mineral wool insulation

The main way sound is transmitted through internal walls is through air paths in the construction. So filling gaps at top and bottom of internal walls is usually worthwhile. This may mean removing the skirting to reach the gap, which can then be filled with a compressible material such as mastic. Any shrinkage gaps at the top of partitions should also be filled, and seal gaps around doors.

Your next option is to either fill partition walls with mineral wool insulation or to add extra plasterboard lining to one or both faces of the wall. The table shows these improvements in typical 90mm stud walls, together with the noise reduction you can expect to achieve. If you decide to add insulation, allow for replacement of plasterboard on one face as it will not survive removal.

The effects of various reductions, measured in decibels, are:

- With a 35 decibel reduction, loud speech can be heard but not distinguished.
- With a 40 decibel reduction, loud speech faintly heard but not distinguished.
- With a 45 decibel reduction, loud speech can be heard with difficulty.

### Installing sound insulation in an internal wall

The first task is to determine the stud spacing (see page 14) and order mineral wool of a suitable width to fit snugly between the studs.

Remove the skirting and plasterboard on one side only (see page 22).

Place the mineral wool into the voids between the studs [1]

Replace the plasterboard and make good joints and skirting.

Repaint the wall.





## DIY project 7 Remove non-loadbearing wall

Removing a partition can radically improve your impression of a space. And it can make life easier. For example, many people 'knock out' the wall between the family dining room and kitchen to create a modern kitchen-diner.

As well as your basic toolbox you will need:

Crowbar

Note: Be absolutely sure the wall you want to remove is non-loadbearing. This is explained on page 7. If you are in any doubt at all, ask a structural engineer. Work done on loadbearing walls must be notified to Building Control. STA Technology strongly advise against DIYers making structural changes to loadbearing walls. This work is best left to competent professionals.



This work is done in two stages: demolishing the wall and then making good the exposed surfaces.

You may come across other variations of support framing. However, a sound job will result if you follow these principles.

### Demolishing the wall

Turn off the power to any electrical outlets.

Remove skirting and ceiling cove using a crowbar [1].

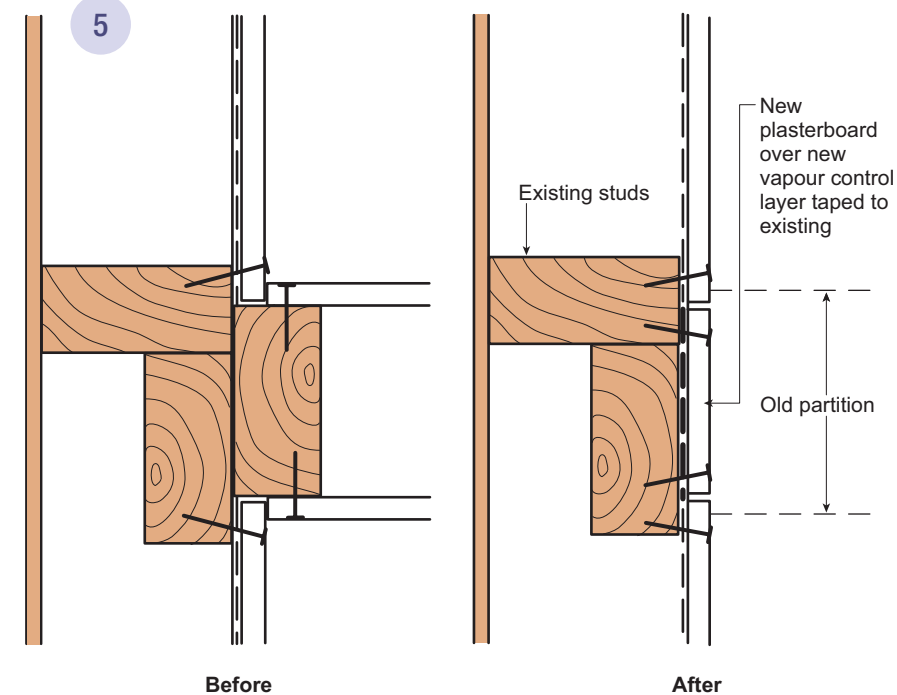
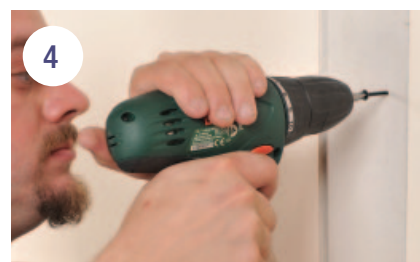
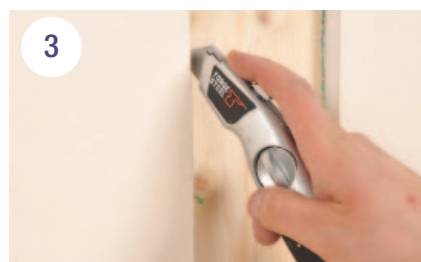
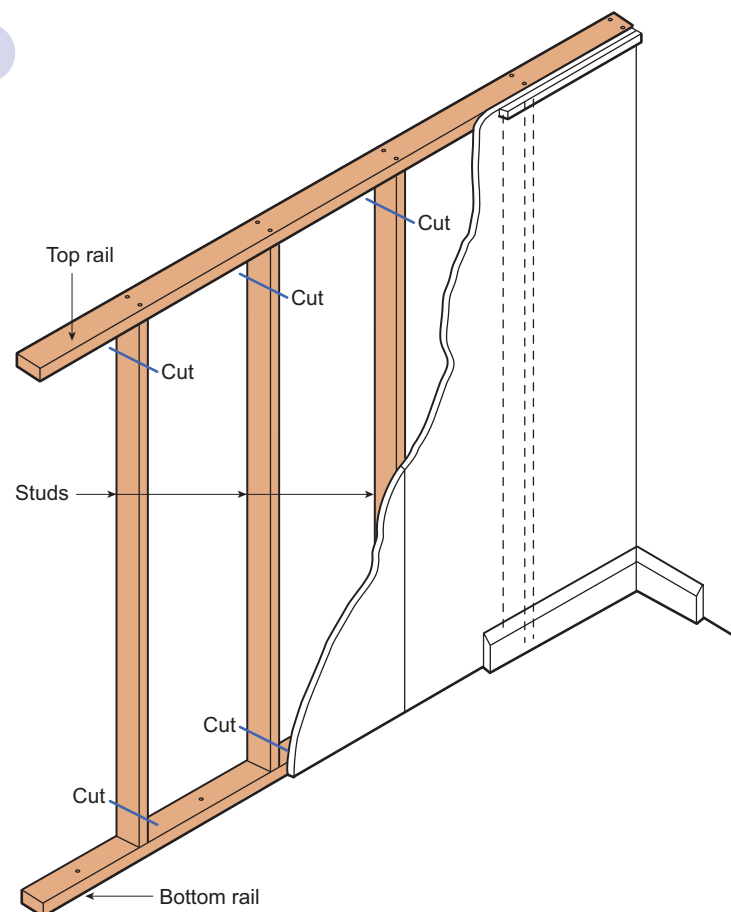
Cut through plasterboard joint at ceiling and at joints with adjacent walls with a trimming knife.

Remove plasterboard from one face and deal with any electrical or plumbing services in the wall. Remember that plasterboard is a heavy material which needs to be handled carefully. Once removed, it is unlikely the plasterboard will be reusable because it is brittle and tends to break up when removed.

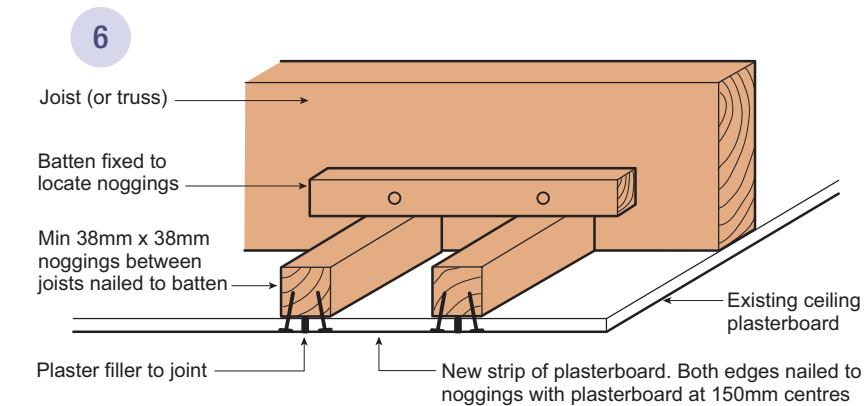
Recycle plasterboard and timber at your local waste and recycling centre.



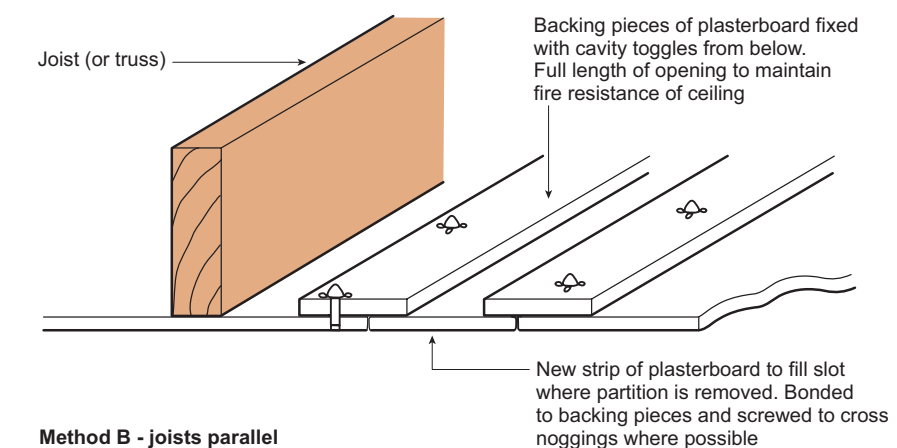
Crowbar for removing skirting



Wall/wall junction



Method A-joist at right angles



Method B - joists parallel

Wall/ceiling junction

**Check again that the partition wall is non-loadbearing.** For example if the exposed timber framing has a post of two or three studs fixed together this would suggest that it is carrying a concentrated load and no further work should be carried out without professional advice. Another example might be where one side of the partition is sheathed with plywood or OSB. This might indicate that whilst the partition is not carrying any vertical loads it may be designed to take horizontal forces from wind loads.

Remove plasterboard from the other face of the partition.

Cut through the studs approximately 75mm from top and bottom to avoid the screw fixing, and pull them away [2].

Carefully lever the top and bottom rails away from the ceiling and floor. On concrete slabs there may be a sole plate set flush with the finished floor which may be left in place if it proves difficult to remove.

### Making good exposed surfaces

Repair any gaps in plasterboard to maintain its fire resistant and acoustic qualities.

If ceiling and wall linings were installed before the partition itself was put up, no gaps will exist and you will only need to fill the screw holes and redecorate. But where these linings were fixed after the partition was erected, framing gaps will be left and these have to be made good.

In modern construction, there will be a stud facing the partition.

To make good, trim the plasterboard and exposed membrane with a trimming knife [3].

Then, cut a new strip of plasterboard of the appropriate size and thickness, lightly sand the edges and screw the strip into place [4].

[5] shows the wall/wall junction.

Finish off with plaster filler and redecorate.

[6] shows the wall/ceiling junction.



## DIY project 8 New non-loadbearing wall

*As a dry, modular form of construction, timber frame lends itself to alterations. Here we describe how to build a partition wall. The new wall does not contribute in any way to the stability of your home.*

You can position a partition built on a solid floor anywhere, but you must take account of the floor **joists** when positioning a partition on a suspended timber floor.

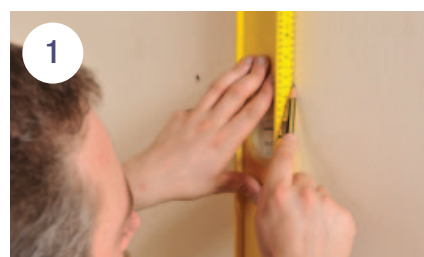
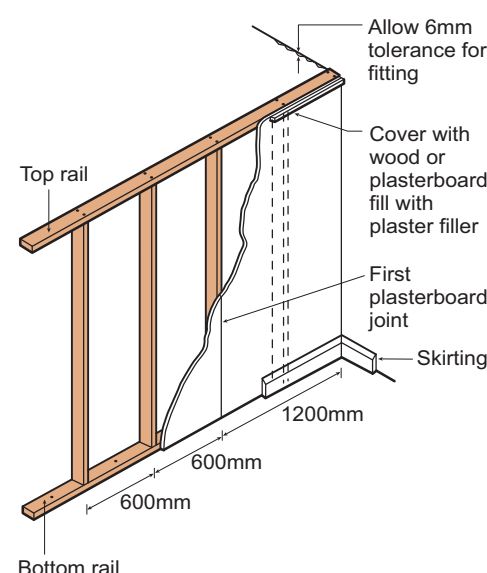
If your new partition runs parallel to the floor joists, the centre lines of the partition must be within 50mm of the centre line of a joist. If the partition is at right angles to the floor joists, you still need to locate the joists in order to provide support and adequate fixing points for the new partition.

To restrain the top of the partition, you may need noggings concealed in the ceiling between the joists. This can be required where ceiling members are parallel to, but do not coincide with, the planned position of the new partition. For similar reasons, it may be necessary to insert an additional stud in walls running at right angles to partitions to provide a suitable fixing.

The drawing (right) shows the main elements of a new partition wall. New timbers are usually 38mm x 89mm

As well as your basic toolbox you will need:

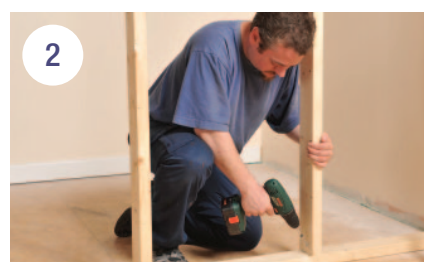
Plumb bob



1

Start by lifting the floor covering and locate the floor joists by looking for the lines of screws or nails in the floor boards. Accurately mark the position of the partition on floor, adjacent walls and ceiling [1].

Use a metal detector to find electrical cables and pipes. Turn off the power, gas or water before cutting and drilling into the structure.



2

Check the height between floor and ceiling along the length of the partition in case it varies.

Cut the top and bottom rails to the required length and mark the stud positions on both of them. Plasterboard sheets are 1200mm wide and applied vertically, so accurate spacing is essential to provide support for the joints. Set the spacing at 400mm or 600mm intervals.

If space permits, assemble the timber frame on the floor. Using the minimum height recorded deduct the thickness of the two rails plus a tolerance of 6mm to allow for positioning, and cut the studs to length. Then erect the frame and fix the top and bottom rails at 600mm intervals.

If there is no space to do this, fix the bottom rail to the floor and the top rail to the ceiling. Use two screws at each joint fix the studs to the rails [2]. Hang a plumb bob from the face of the top rail and align with bottom rail to ensure the wall will be vertical.

If additional fixing noggings are required in the ceiling or the walls, remove the plasterboard lining in one piece, using a trimming knife to cut to the centre line of the two nearest studs. Then insert the additional noggings and screw them into position at 600mm intervals. Mark their position on an adjacent wall or on to a batten so that they can be accurately located when fixing, and replacing the plasterboard.

Apply plasterboard dry lining in accordance with the manufacturer's direction [3]. Refer to page 21 to decide what thickness of dry lining and insulation are required to achieve sound reduction.

Finally, fix skirtings, make good and decorate.



3

## Terminology

**Timber frame:** a structure consisting of a series of vertical **timber studs** uniformly spaced at intervals not exceeding 600mm and nailed to rails of the same dimension at the top and bottom. External walls will have **sheathing** such as **OSB** nailed to the studs to provide rigidity. A second timber member is sometimes nailed to the top rail to tie adjacent panels together and provide additional support for **loadbearing** elements. Non-loadbearing walls and partitions are of similar construction.

The remaining terms are listed in alphabetical order

**Bottom rail:** a horizontal member at the bottom end of the **studs**, fixed to them with annular ring nails (see diagram below) to form a wall panel

**Breather membrane:** a moisture-vapour-permeable but waterproof sheet material fixed to the outside face of the **sheathing** for additional weather protection. Also known as breathable membrane (see page 5)

**Cavity:** the clear space between the **cladding** and the **timber frame** wall, also the void in an internal wall (see pages 5 and 14)

**Ceiling cove:** a horizontal joinery or plaster strip or moulding at the wall/ceiling junction (see page 22)

**Cladding:** the outside face of an external wall, usually brick but may be other materials such as render or timber (see page 5)

**Corner stud assembly:** a minimum of two studs

nailed together to provide a connection between panels and support for the edges of external sheathing and internal linings (see diagram below)

**Cripple stud:** shorter length **studs** at both sides of an opening to support the lintel (see diagram below)

**Gable wall:** the triangular portion of a wall between the edges of a sloping roof

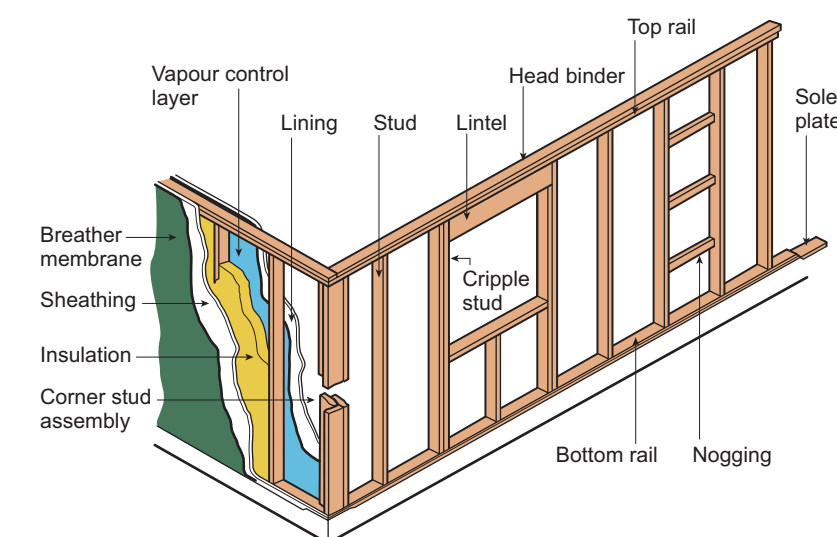
**Head binder:** a horizontal member with the same dimension as the **studs** is sometimes nailed on top of the top rail. Joints should occur over the centre line of the studs and should be offset from joints in the top rail (see diagram below)

**Top rail:** a horizontal member at the top end of the **studs** fixed in the same manner as the **bottom rail** (see diagram below)

**Joist:** a horizontal spanning element found in floors, and in ceilings without trussed rafters (see page 8)

**Lining:** a sheet material, usually gypsum **plasterboard** screwed to all internal faces of wall framing to provide fire protection, acoustic performance and a surface for decorating (see page 5)

**Lintel:** a horizontal structural member used over openings in **loadbearing** walls and. The same width as the **studs**, the lintel may be solid timber or two pieces of timber nailed together, and supported on **cripple studs** (see diagram below)



External wall frame

**Loadbearing:** supporting the weight of the building (see page 7)

**Nogging:** a horizontal member fixed between **studs** to provide a fixing for adjoining walls, services or heavy wall-hung fixtures such as kitchen cupboard (see diagram below). Also called a 'dwang' in Scotland.

**OSB:** oriented strand board, a panel made of compressed strands (flakes) of wood, a structural board used in **sheathing** and **party floors** (see page 5)

**Party floor:** a robust floor between one flat and another above it. A party floor is also a barrier to fire and noise (see page 12)

**Party wall:** a robust wall between adjoining buildings. Its two-part structure ensures that each building is self-supporting. A party walls is also a barrier to fire and noise (see page 5)

**Plasterboard:** a panel made of gypsum plaster, pressed between two thick sheets of paper, used to line interior walls and ceilings (see page 5)

**Sheathing:** A structural sheet material nailed to the **timber frame** (see page 5)

**Skirting board:** a horizontal joinery strip at the base of a wall (see page 22)

**Sole plate:** a horizontal member of preservative treated **timber** fixed to provide a level surface on which to erect wall panels (see diagram below)

**Stud:** a vertical member in a timber framed wall usually planed all round for dimensional accuracy and strength graded (see diagram below)

**Timber:** the term for processed wood used in structures

**Trussed rafter:** a triangular shaped timber structure that spans the building (usually from front to back) and supports the roof. The timbers are held together with metal plates that have teeth pressed into the timber. Also known as roof trusses (see page 4)

**Vapour control layer:** an impervious sheet material, usually polythene, placed under the lining on the warm side of external insulated walls (see page 5)



# Living in a modern timber frame home

- explains the key features and benefits of your timber frame home
- summarises the general maintenance your home will need
- describes eight DIY projects to improve your home
- is written by the experts on timber construction

Although modern homes look similar (especially the brick-clad ones) there are important differences between timber frame and traditionally built homes. These features bring many benefits ranging from the low environmental impact of construction to energy efficiency and the ease of working with wood in DIY improvements.

This concise book explains:

- five ways to check if your home is timber frame
- how your home was built
- its structure and features from top to bottom
- basic maintenance and improvements, including fire safety
- things to take care about, in particular party walls
- eight DIY projects to improve your timber frame home
- building terms.



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