# HOW TO MAINTAIN YOUR PRIZED POSSESSION (YOUR HOME)

## What you need to know

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# Preface

This is a culmination of numerous weekly articles that were written for a weekly newspaper.

Rather than these articles getting lost - We have compiled these weekly articles under 63 main headings, so that an e-book could be published.

The vast majority of the articles are still valid in today's building environment.

Thanks goes Jamie for the inspiration.

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# Rising Damp

No problem is so wide spread nor so misunderstood as rising damp. Probably every building built before 1900 has a damp problem in some degree and thousands of dollars are spent in repairs.

In many cases the cure is worse than the disease; ill-conceived treatments may in fact increase the problem and could decrease the real estate value of the building.

On top of this many renovation practices can cause problems where they may not have existed previously.

Expensive and good-looking renovations can turn into disaster areas by not allowing for moisture flow in old walls.

The symptoms of wall dampness are easily recognised: musty smell, deteriorating paint and plaster. The moisture behaves like a wick and in fact is called wick action, it literally rises the wall, like kerosene rises in a wick on the kerosene lamp. There comes a point where the damp cannot rise any further due to natural ventilation causing it to dry out this area is called the tide mark and is quite visible, at that point the drying out process is the fastest and mineral salts are deposited as visible marks on the wall. This tide mark is usually at about 900mm above floor level.

The first step in rectification is to source the cause, the damp proof course which is usually made of lead or galvanised iron or even bituminous material, which is imbedded between the brick coursing, in the hope of preventing the damp rising, may have deteriorated over the years. But more often the problem is elsewhere.

The most logical and essential consideration to the prevention of rising damp is keeping the ground on which the building is located as dry as possible. That is achieved by diverting any discharged water well away from the building and its foundations, it is also essential to check gutters, drains and down pipes for hidden leaks that may not always be obvious.

If the floor structure is timber then the underneath should be well ventilated using the natural cross ventilation system available, by means of vent grilles installed on the perimeter walls, at every 1.8 meters is desirable.

If it is a concrete raft slab construction, then the damp usually rises on the perimeter walls and is almost always due to bridging of cavities or the overflowing of eaves into cavity walls. Generally, the concrete slab itself with the plastic membrane underneath is a good water proofer thus negating any moisture conning up from under the slab.

If all these basic building rules have not been broken and the damp persists (highly unlikely) then other more effective chemical means may have to be implemented. These include the chemical injection of silicone liquids under pressure this is usually done by competent trades specialising in this type of work. Another method that I have heard and read about is the “FREEZTEQ” damp course System that can be done by the handyman or women.

"FREEZTEQ" is a unique and highly effective damp coursing system which has been patented in the UK and overseas and it offers several major advantages over other chemical techniques.

The system is based on siliconate solutions which are inserted into holes drilled into the mortar line of the wall to be treated being in the form of a circular section pre-frozen pellets which are inserted into the pre-drilled holes.

The slow melting system ensures a continuous water repellent barrier throughout the treated area, because the system depends on natural seepage (diffusion), which research has shown to be the most effective method for fluid distribution in masonry, accurate dosages can be readily achieved, and application costs are thus remarkably low.

The "FREEZTEQ" or known as the Passive system, is suitable for damp coursing all types of walls including stone and rubble and has shown itself particularly effective in treatment of older properties.

According to a spokesperson for "Consolidated Protective Coatings" who specialise in using the "FREEZTEQ" (+44 1386 701050) system say that, it is important to do a diagnostic analysis on the walls and then recommend which type of application to use in curing the rising damp. It apparently is not straight forward, since if the mechanical method is used, that is, injecting silicon liquid under pressure, then if the mortar is friable and the bricks are old and crumbly(Spalding) there is a good chance that they may fall apart or out, due to the Pressure that is used (between 50 to 120 psi) during the injection method. Hence the more Passive method comes into its own.

He also said that to perform a quality job the plaster needs to be removed and skirting which may be in the way all these will eventually have to be replaced and are reasonably costly items, but the choices are very limited.

Requirements for Damp-proof coursing and flashing materials are covered in detail in the AUSTRALIAN Standards 2904-1986

In fact, if building a new home and the Builder is registered with the Builders Registration Board, a directive from the Board has been issued to the builders to make sure that all shower cubicles are water tight and that the home built in general does not leak as it will be the Builders responsibility for 6 years.

In summary the main causes for rising damp in older homes are, the breakdown of the original damp proofing needing chemical intervention) In newly built homes, poor quality and control of workmanship is usually the cause. There is no excuse with today's technology, knowhow and information to have a damp or leaking abode.

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# Sub-Floor Ventilation

Let's look at improving sub-floor ventilation which if not done correctly can be a cause of decay to timber components.

The other day we were asked to inspect an older style home in Nedlands it was a grand old mansion with timber flooring throughout, massive ceilings space and it was oozing with old world charm. Generally, the home was in good shape some of the roof timber were showings signs of sag and ageing, but one room in particular was extremely cold, and it almost reminded me of the spooky stories one reads about cold rooms in haunted homes, but no such luck.

It turned out, after removing the inspection (male/female) opening in between the floor joists, it was obvious why the room was so cold.

For starters the distance between the ground and the floor was very close, the home was on a sloped block, and sub-floor ventilation was minimal. I will insert some data facts as supplied by CSIRO to us, on how to improve the subfloor ventilation with some interesting and common sense applications, but you may well ask what has a sloping block to do with it, well when water via rain is deposited around the perimeter of a house if the home sits on a flat block of land the water will seep into the ground vertically down, if the block is sloped the water that may pond in areas can and will flow down the hill and seep into the ground as it progresses down the incline of the land and hence we get damp and moisture under areas that would not normally get damp on a level block.

Now the CSIRO Division receives a steady stream of requests for advice on prevention and correction of decay in flooring and in the majority of cases the problem is one of inadequate subfloor ventilation, that is for a free flow of air under all parts of suspended timber floors.

In older buildings the problem can be complicated by an ineffective dam-proof course, by leakages from water supplies or wastes or by the discharge of storm water into the sub-floor cavity, furthermore in older buildings the provisions for under-floor ventilation is often inadequate.

We shall take a case in point, where in a double brick dwelling circa (1920) most of the timber flooring had to be renewed. During the repairs the size and numbers of openings in the brickwork below floor level was increased because, with a few exceptions, the only provisions originally provided for ventilation was the openings in the brick work beneath the doorways. Before the new flooring was laid, extra openings were provided within one (1) to two (2) meters of every corner of every room and midway along any wall over five (5) meters long. Each of the new openings occupied the space of at least two bricks.

In addition, because of the low sub-floor clearance and the difficulty of providing good cross ventilation, plastic sheeting was spread out over the ground and under all new flooring to reduce the area from which soil moisture could evaporate into the sub-floor cavity. Mortar droppings and other debris were removed from the inside of all external ventilator openings and finally the ventilators themselves were replaced.

Replacement of the ventilators was an essential part of the repairs. Surprisingly the smaller of the original terracotta vents provided for rather more free airway than the double brick size, even though the latter had one more opening. However, in practice, nether allowed for much air exchange between the subfloor space and the outside because the openings had been blocked by spiders and assorted debris. The pressed metal vents that were used to replace the original terra-cotta air bricks allow for about ten (10) times as much air flow through each opening. This together with the other measures taken should ensure that conditions conducive to decay do not develop again under that floor.

Adequate subfloor ventilation is also an essential requirement which is often overlooked when remedying the problem of excessive dampness in walls, by effectively ventilating all subfloor cavities, moisture that evaporates from the soil or the foundation is removed, and the sub-floor humidity is prevented from rising. However, achieving an airflow across or along the sub-floor space can be difficult in some houses, especially in terraces where there can be problems in providing vents at both ends of the house.

In case like that the Division often recommends the utilisation of disused fireplaces as a means of venting. If decorative facing is placed over the front of a fireplace openings cut through the hearth to the sub-floor space and a cowling or chimney pot placed on top of the chimney, then a n up-draught will be created when the wind blows over the roof and air will be drawn from under the floor.

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# Condensation in Houses: -

**What Causes condensation:**

THE AIR AROUND US ALWAYS Contains A CERTAIN AMOUNT OF WATER VAPOUR BUT THE AMOUNT THAT CAN BE PRESENT AT ANY TIME DEPENDS ON THE TEMPERATURE OF THE AIR.

When moist air is cooled below its “dew” point that is (cooled to temperature at which it cannot contain all the water originally present) and if the cooling is caused by contact with a colder surface, then the surplus water appears as droplets on that surface, we call this condensation.

In real every day analogy it translates like this: - we hardly notice the air around us on an average day, then night time approaches, the temperature drops, and things become cold as the temperature drops, so does the air, if this dropping in temperature continues then the water vapour that occurs naturally in the air turns into water and if cold enough into ice.

Air in a house can become moister because the occupants and some appliances produce water vapour. Typical quantities of water vapour produced in a home are: -

Adults breathing 0.1 litres/hr

Hot Bath 1.5 litres/hr

Washing Machine 3.0 litres/hr

Clothes Drier 5.0 litres/hr

Hot Shower 10.0 litres/hr

Water vapour is also generated in large quantities by gas stoves/hot plates and kerosene heaters so much so that a lot of water may be stored in the air each day as water vapour.

On cold days much of this water will condense (if the ventilation rate is low) on cold window panes and even on walls. Little wonder then when some house holders complain of mould, decay and damp carpets.

Steam coming from service areas such as kitchens laundries and bathrooms travel to other rooms in the house, even if these rooms are a considerable distance away. The worst condensation problems generally occur in unheated rooms facing south which receive little heat from the sun. The movement of the water vapour within the air (using the air as a travel medium) travelling from service areas to other rooms such as bedrooms is due to the difference in water vapour pressure.

Condensation in new homes: - Severe condensation problems often occur in new homes as construction moisture is stored in the bricks floor etc. in addition to the moisture generated by the occupants. It will take about six to 12 months for the water to evaporate. Some of this

moisture will be lost to the outside air by natural ventilation and much will find its way into other rooms in the house.

If moist air from the rooms is exhausted into the roof space, sever condensation may occur within the roof space causing costly damage to ceilings, roof members and insulation materials.

Poorly vented pitched tiled roofs with aluminium foil sarking directly beneath the tiles. To reduce the risk of condensation, ventilation should be provided in the eaves and gable ends.

Flat metal deck or cathedral roofs. On no account should moist air be exhausted into these roof spaces. It should be carried by flues passing right through the roof space (or external walls) to the outside air. Sever condensation could also occur if such roof spaces were connected via wall cavities to a moist sub-floor space.

Technical information by courtesy of CSIRO.

**How to stop condensation: -** Condensation is basically simple. It involves preventing moist air from coming into contact with cold surfaces (i.e. surfaces at temperatures below the dew point of air). In practice this can be achieved by:

Removing moisture laden air (by ventilation) and/or

Raising the temperature of any cold interior surface to a level above the room air dew point (by heating).

The best way to remove moist air is to use exhaust fans as its source. An electric fan should be installed in the ceilings of the bathrooms and switched on when using showers or baths. To enable the fan to work more effectively, leave a door or window slightly open while the fan is running.

A ceiling vent is recommended over every sink, basin or trough in the house.

More water vapour is normally generated in laundries tan in any other room. Clothes driers should be ducted to the outside air.

A hood fitted with an exhaust fan is recommended over hot plates and stoves as follows:

The exhaust fan should be at least 200 mm in diameter.

The distance between the hotplate and hood should be 600 mm, this distance may be increased to 750 mm if absolutely necessary.

The width and depth of the hood should be preferably the same as the hot plate or stove.

If it is not practical to install a hood, an exhaust fan may be located in the ceiling over the stove and used while cooking.

In rooms where exhaust fans are impracticable (e.g. bedrooms) adequate ventilation can be obtained by opening windows.

Remember it is better to ventilate continuously by having all windows slightly open than by opening one window wide for a short time.

**Heating: -** In addition to good ventilation, heating can also help to reduce condensation on walls and ceilings. Condensation on window panes and metal window frames, however, is not significantly reduced by heating. This is because glass and metal are good conductors of heat. Any heat which reaches these surfaces does not warm them appreciably as the heat quickly is lost to the outside air.

In very cold climates (and in Australia this can be takes to mean in areas above the snow line), it may be necessary to provide double glazing to raise the temperature of the inner pane.

It is better to provide some continuous background heating rather than short burst of heating. Continuous heating allows wall and ceiling surfaces to warm up and stay warm, which greatly reduces the risk of condensation. On cold days try to keep inside air temperatures at least $5^{o}C$ higher than outside air temperatures.

**Insulation: -** The risk of condensation is considerably reduced in any room if walls and ceiling are insulated, because it allows these surfaces to reach a higher temperature. For an existing house it may not be practical to insulate walls, but ceilings can usually be easily insulated. Apart from reducing the risk of condensation and mould growth, insulation will substantially reduce heating costs.

Technical information by Courtesy of CSIRO.

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# Wall Coverings and Mould Stains

Vinyl wall coverings (vinyl laminated to paper or fabric) have become very popular over the last few years, largely because they are more easily cleaned than the uncoated open-textured types. Yet it is just this impervious, otherwise-desirable surface that sometimes creates a mould problem.

In one home examined by the Division of CSIRO, red and purple stains were found to be showing through from behind a light-coloured vinyl wall covering within two weeks of application. The stains, which originated in the paste layer, were identified as a type of mould. The key factor in this rapid mould growth was the fact that paste had been sandwiched between a painted wall and a sub-substantial vinyl membrane.

On one hand, the impervious vinyl layer prevented evaporation of moisture from the paste layer while on the other hand, the painted background drastically reduced absorption of water into the wall. Thus, the paste was kept moist long enough for mould growth to start. Had an adhesive offering less nourishment to moulds been used, mould growth would have been unlikely. Similarly, had the wall covering been a plain paper or one of the "spongeable" wallpapers (papers with a very thin plastic film on the surface), or one of the "breathable" vinyls, mould growth would again have been unlikely since such coverings "breathe", enabling the paste to dry by evaporation.

When hanging wall coverings of solid vinyl sheet laminated to paper, it is a wise precaution to apply a fungicidal wash such as two percent sodium hypochlorite solution to the wall before sizing it with a dilute solution of a cellulose adhesive with fungicide added. For best results manufacturers suggest applying lining paper to the wall before finally hanging the wall covering, using the heavy-duty cellulose adhesive for both operations. In the case of mould staining described above the vinyl wall covering had been hung, without a preliminary fungicidal ash, using a starch paste (instead of a cellulose adhesive) with fungicide added. Obviously, this was not enough protection.

When the weather is very cold and damp the cellulose adhesive may take a long time to set, so an acrylic-reinforced latex adhesive might be advisable under such conditions, to avoid lifting of the seams. Alternatively, he cellulose adhesive could be used and, if the seams do lift, they could be bonded to the wall with the latex. When hanging wall coverings of vinyl sheet laminated to fabric, only the specially formulated adhesives recommended by the manufacturers should be used.

Normally, coverings are not hung on absorbent surfaces. Manufacturers recommend that bare surfaces be painted with a flat oil paint, and it has been assumed in the above that this has been done.

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# Rain Penetration of Solid Masonry Walls

From time to time the CSIRO is asked to suggest remedies for dampness caused by rain penetrating solid masonry walls, below are some of their invaluable findings and suggestions which are worth passing on.

Single-leaf construction cannot be expected to be water-tight, especially if it is subjected to wind-driven rain. If the wall thickness is increased it should be more resistant to rain penetration, but poor workmanship in the form of unfilled joints and un-tooled face joints can result in walls that are prone to dampness despite their thickness and apparent solidity.

Often people seek a quick and easy “brush-on” treatment, preferably to be applied from the inside, but we consider the latter to be unrealistic and a false economy. External treatment aimed at preventing the masonry from becoming damp in the first place is a sounder approach. Some possibilities are described:

**SILICONE TREATMENT** Silicone formulations brushed or sprayed onto porous surfaces make them water repellent, so that water then runs down treated walls instead of being absorbed. There is a risk in this, however, because fissures wider than hairline crack are not bridged by these materials. The increased amount of water running down the wall during a shower can result in more water penetrating the wall, via such fissures, than before the treatment. With this in mind walls should be examined carefully, and repaired if necessary, before silicone is applied. Silicones deteriorate in sunlight and periodic reapplication is required if the wall is to remain water repellent.

**CEMENT-BASED PAINT** This is a useful treatment. Two coats should be applied on the wall after the necessary preparation. A minimum preparation would be to repair gaps and defects in the mortar joints, but in practice “bagging” of the whole wall is advisable. A mixture of 1:4 cement: plasterer’s sand is suggested for this, the wall being “wetted down” before starting.

**ORGANIC PAINTS** If organic paints are to be used “bagging” is an essential preparation. As long as the paint film is intact the system will be effective, but once cracking starts water will be trapped behind the paint. This water will take a long time to evaporate and, under adverse conditions, the wall can become progressively damper. In any case the life of the paint system there-after is likely to be short.

**RENDERING** This treatment is virtually permanent and should be effective in all but the most severe conditions. For resistance to rain penetration a rough-textured and porous rendering is normally more effective than a dense and impermeable plain finish. Suitable cement: l lime: sand mixes are given in the British Standard Code of Practice CP 221, “External rendered finishes”, available from the Standards Association of Australia.

The discussions and hints given above will suit most homes that have damp problems, in fact silicone treatment seems to be the most popular, especially in the case where the external walls are face bricks.

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# Roof tiles Fact & Fiction

The other day I spoke to a gentleman who asked me, to confirm to him that he needs to replace his concrete tiles on his house with clay tiles, I questioned his rationale and a mountain of misleading statements flowed from his mouth, perhaps the most memorable was that "as concrete tiles become older they start to leak and there is nothing short of replacing them with clay tiles"

I must say I have heard many such rumour floating around, all of which I am hopefully about to dispelled. I decided to see if the concrete tile manufacturers have become aware of these rumours and what if any, their official response was?

After talking to several people connected to the concrete tile industry, a brochure was mailed to us prophetically titled "THE FACTS ON CONCRETE TILES"

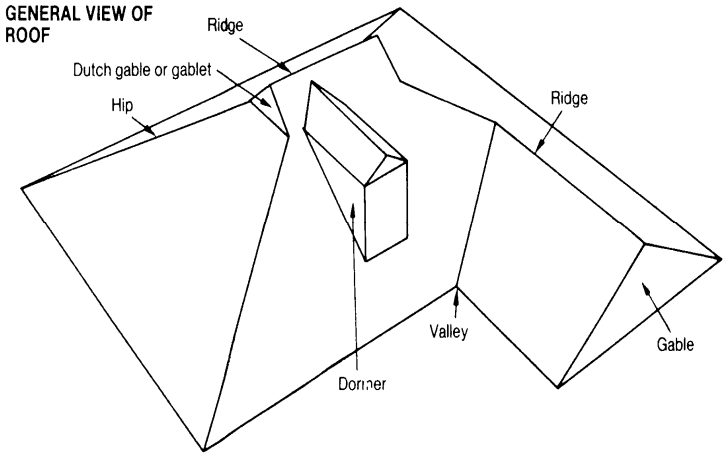
I will summarise and add some of our own comments to the questions and topics covered in this brochure.

**"ARE CONCRETE TILES DURABLE?"**

The modern manufacturing process makes the tiles exceptionally durable, they are manufactured to Australian standards and the physical properties of concrete will remain unchanged well in the excess of fifty or more years, irrespective of climatic conditions. Concrete becomes stronger with time and remember concrete is the preferred material for major structures such as bridges and high-rise towers because of its inherent qualities of strength and longevity, additionally it out last other roof cover materials as it does not rust or corrode.

**"DO CONCRETE TILES ABSORB WATER AND THEREFORE DOUBLE IN WEIGHT?"** No this is incorrect and a myth. The Australian standards AS1757-1989 specifies a maximum water absorption of only 10% per total immersion in water for 24 hrs. In practice the absorption of water by capillary action during periods of heavy rain would increase the weight of the tile by around 5%. Contrary to claims of some roofing companies, this weight increase is unlikely to cause structural roof or stump failure.

**"DOES WEATHERING OF THE ORIGINAL TILE COATING MAKE TILES POROUS?"** Not true. The colour coating is purely decorative and is not designed as a water proofing film. As in most water proof purpose made concrete, water proofing is achieved by using carefully selected, formulated, batched and graded materials which are then compacted during manufacture. This then produces a concrete product of high density and strength which naturally keeps out water.



**“ARE CONCRETE TILES FIRE RESISTANT”** yes, they are totally incombustible and fully fire resistant according to ASTM (USA)E108-88 tests, there is no comparable test available in Australia.

“**WHAT ABOUT THERMAL AND SOUND INSULATION”** Tiles take longer to heat up and tiled roofs usually have a larger volume roof spaces which “breathe” so houses with tiles roofs stay cooler longer, but once the heat build-up accumulates for long periods, it also works in reverse that it takes longer to cool down.

Due to the greater mass of concrete tiles they do provide a better sound insulating quality than metal roofing, they help to reduce to noise intrusion in particular caused by rain and hail.

If you are worried about the usage of concrete tiles when collecting rain water, well there is nothing to worry about as we are assured that the surface of the concrete tile is a suitable surface from which to gather water for drinking, and best results are achieved when an appropriate collection system is fitted.

If you are building near the coast you also need not worry, as the prolonged exposure of concrete tiles have a proven record of resistance to corrosive atmospheres.

Similarly, in tropical conditions the added weight of a concrete roof helps to counteract wind uplift during storms making it less susceptible to damage than some other roofing materials.

Normally concrete tiles require very little if any maintenance due to their exceptional durability, if some is required then only the affected tile will need to be replaced.

Cleaning of the tiles is also not a necessity, but Lichen and moss can be removed by high pressure jet water sprays or by the application of a specific chemical formula sold for this purpose of removing the lichen and moss. In fact, the formula for the magic potion is this: - 200 grams of copper sulphate, to 4.5 litres of water the average roof will need ten times this amount, the solution is broomed onto the offending areas and eradication will take place over the following couple of months and it should be left to work on its own as the moss and lichen will gradually disappear. On porous tiles the solution has a residual affect as it remains and inhibits any future or early re-growths.

When using copper sulphate solutions be careful that metalwork such as guttering is protected to prevent corrosive action. Gutters should be filled with water by blocking the downpipes as any solution running into the gutter will be extremely diluted and not affect the metal gutter. By comparison concrete tiles are very affordable and generally cost less than metal or clay covering, on most profiles the fit is neat and even, but the coating that is applied to the tiles is still subject to weathering and will eventually wear off and needs re-painting. So, myths like, Lichen and Moss will eat into your tiles and weathering of the original surface coating makes old tiles porous, is all a lot of old wife’s tales and scare tactics, invented by itinerant traders.

**Other Things You Need to Know**

If you have ever been rummaging inside your roof space and have noticed red dust on your ceiling space or on top of the insulation, then more than likely you will find deterioration of the clay.

The general perception that roof tiles are considered almost indestructible will seem to be a myth when the tiles are found to be damaged by salt attack. I have only seen this happen on clay tiles, where the underside of the clay tile has delaminated or found to fret, it also happens on the cut ends of tiles and subsequently a lot of red dust usually collects under hips and ridges. It only appears to be happening to random tiles and on the older homes. Replace these few tiles and we recommend that you periodically check to see if any other tiles have problems. Finding matching tiles may be a problem, but you should find them in most salvage yards.

It is also important to make sure that the Ridge and Hip tiles are secured to the bedding mortar. This separation is caused by the expansion and contraction movements of the roof timber, this is most severe in the first couple of years of a new roof as the timber is usually still green and needs settling in. The lack of incorrect strutting or propping of roof timbers like underpurlins ridge and hip boards is the major cause of excessive roof movement which is reflected in general sagging and ridge and hip cover tile mortar bedding separation.

A simplified explanation is that, when the mortar bedding has fallen out of the joints, then under storm conditions the chance of strong winds dislodging the tiles at the separated mortar bedding is far greater than if the bed joint was smooth, because the winds can then just glide over the smooth mortar bedding joint. Mostly no one really cares, as the attitude is that insurance will cover any damage caused, well so true, but it is the inconvenience and disruption that is caused by storm damage, by which we can minimise the risk.

The pitch on roofs also plays an important part. Manufacturers of roof tiles generally stipulate the minimum pitch of the particular tile profile, this is the point at which the tile is no longer guaranteed to be water proof under normal conditions. It is generally under stood in the industry that 15 degrees is acceptable on most tile profiles, lower pitches can be achieved if sarking is used under the tiles, this catches any water that might leak due to the low pitch, the idea is that the water collects on the water proof membrane(sarking) and flows down to the gutter at which point the sarking is neatly trimmed into the gutter.

Flat roofs are more susceptible to storm damage than pitched roof, as the wind blowing over the top of a flat roofed home causes a vacuum or sucking action, ripping and pulling at the sheets and if they are loose well of they come. In the case of a pitched roof the face of the roof facing the wind will have live wind loads applied with little or no chance of any roofing material being dislodged, whereas at the back of the same roof again a vacuum is created, and a pulling action is applied to the roof cover, so I guess in theory on a pitched roof only half the roof is in danger, storm clips are another added precaution that is available.

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# Structural issues to look for when buying a Home

It goes like this, before you buy something, and a friend had described it to you in detail" warts and all", it would have helped in shaping your ideas in the purchase of that something.

Well the same goes for when buying a car or a house. These are major purchases for most people and for some it is the single most important investment in their live. This being the case then, would it then not make sense that before buying, someone thoroughly checks out your proposed purchase before a final commitment is made on paper in the form of an offer to purchase. Preferably a mate in the building industry or a professional inspection institution can be called upon to give an unbiased opinion based on the structural nature of the building.

The things that a buyer should be aware of is that firstly the **foundation**, **walls** and **roof construction** are sound, as these components constitute the shell (load bearing) and anything else is purely cosmetic.

**Firstly, the foundations: -** If they are Limestone, then one would have to appreciate that they are large chunks of rock, shaped and placed into a hand dug trench and mortared into position, there was never any compaction carried out to the soil below the first laid limestone, hence the ground could move and settle as the weight of the walls was placed upon the Limestone. Large homes were built upon the limestone foundations and later the settling took place and was and still is evidenced in settling cracks noted on wall.

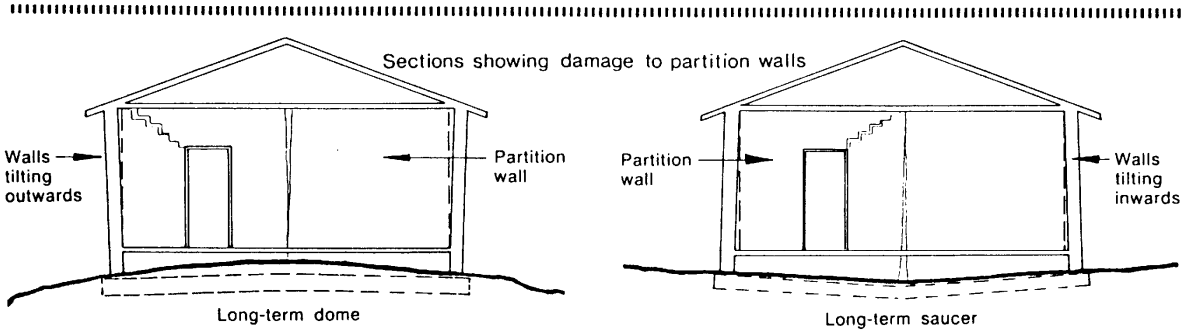
These days we build the foundations a different way, mostly it is a concrete perimeter beam and a floating slab is resting on top of these footings. This latter method is built on soil that has been compacted to a uniform compaction. If this compaction is not uniform then uneven settling can be the major source of settling cracks, as the foundation settles under the weight of the walls and roof. The importance of uniform compaction is so vital that theoretically, if the compaction was uniform then no settling would occur.

The importance of keeping the perimeter foundation at a constant moisture level is equally as important since a constant change in concentrated moisture levels content will cause the soils supporting the perimeter footing beam to move. This movement is transferred to the walls and settling cracks appear over windows and doors as these are the most vulnerable areas. So, it is important that the down pipes are connected to soakwells which are at least 1.8 meters away from any footing.

What is probably as important as consistent compaction is the design of the footings and the actual digging and pouring is equally as important. Firstly, footings should be designed according to the nature of the soil. For example, you would not design the same size footing when building in clay soils as you would if you were to build on sandy well drained soil.

It has always been our advice to firstly sample and categorise the soil, if you are to build on clay or loamy soil, especially where drainage is poor. This will then determine the type of footing design for the home and will minimise any settling or cracking that would normally occur.

Well we now have got, consistent compaction and a footing, designed specifically for the soil and a slab to match. The next step is to examine the perimeter masonry walls to see if and what type of settling cracks have occurred if any. The settling cracks that are visible on the brick work or internal walls are a signature or blue print as to what has occurred under the slab. The walls are a reflection or an indication as to the stability of the foundation. Below are some diagrams showing the different type of cracks that can occur and why.




***Long-term dome and saucer effects***

**Secondly Roof Construction: -**

At this stage we have had a close look at the foundations and walls and what to expect, the next important item is the roof construction.

When examining the roof construction, one should at least know the basics, that is the sizes of timbers, spans, and the function of each component. It is probably best to leave this to the experts. The most common faults that I find in roofs is the lack of strutting and the misuse of underpurlins.

So many roofs show a sag in the roof line that should not have happened and in almost all cases examined it is not the failure of the timber but the lack of strutting. When a roof line is showing sagging, it is almost saying “look there is something wrong with my supports”.

The failure to properly strut or support roof timber components can result firstly in visual unsightliness and secondly somewhere down the track failure will be imminent.

It must be pointed out that when timber gets older, it like everything else, it becomes brittle and frail. If say a span of timber has not been supported correctly and in the meantime, has bowed, then as it ages naturally the load bearing capacity will decrease. One thing to remember is that the dead loads (the weight of the timber, the weight of the tiles, installation of air conditioners etc.) remain the same, what does change and is variable, are the live loads (wind, rain, repair persons walking on the roof, etc) some of these we can’t control, but we can allow in our roof design for their occurrence in correctly supporting roof components.

The next item to look at from below the room and when inside the roof is the ceiling lining, how is it performing, is it still attached securely to the ceiling joist?

I have found that the older type ceilings like “plaster and lath” have a limited lifespan and replacing them is probably in most cases a good and safe idea.

Mostly these problems are not serious and re-grouting from inside the roof space once the ceiling has been pushed back up onto the joist will fix it.

I have found several Gyprock ceilings that have come away from the glue that has been used between the sheet and the underside of the ceiling joist. The recognition of this is problem is that when looking at the ceiling there appear to be parallel lines running along the length of the sheets. The failure of the adhesion is in the manufacturers product not the builder or trades mans. Re-pining or even grouting is recommended, as re-gluing the sheets would be impossible since this would means having to remove and replace the sheets once again.

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# Water hammer noise in plumbing pipes

## When Buying a Home: - #16

We had someone write in to us regarding a problem that some of us have experienced in the past and that is "**Water Hammer**". What is it, why does it occur and how can it be remedied. We searched for a simple explanation, one that was easy to understand, and we found this in an article written by Neville Rowe of Victoria, let me carry on.

Water hammer occurs when there is a sudden closure of a valve or tap in a pipeline system carrying a flow of water. The water hammer noise occurs when there is a sudden increase in pressure intensity within the pipeline and this is caused by the sudden or abrupt closing of the valve or tap.

As the increased pressure occurs in the pipe line and because water has the ability to transfer sound, the intense shock wave that is created travels along the pipe line creating a noise at some points in the pipe system.

In all plumbing systems the pipe work should be clamped on all on any bearers or joists where possible. Failure to do secure the piping allows the vibration and chattering the pipelines against the bearers or supports that the pipe is resting against.

The most common cause of water hammer in pipelines is the activation of washing machines, dishwashers, and most of the ceramic disk quarter turn tap ware. These items work in a manner whereby the valve or disk can be open and closed within a split second. This then creates the sudden increase in pressure or energy. As the energy travels along the pipe it dissipates in doing so the energy is transformed into sound in the pipe work. In some industrial applications water hammer has been known to fracture water mains.

In identifying the problem of water hammer several questions need to be asked. Where is the water hammer coming from? Which appliance, tap or valve is causing the effect? How many taps are causing the affect and in what part of the house are they? What size piping is being used, and what is the supply pressure from the water boards supply mains?

Most people ask can we put a water hammer arrester on at the meter suppling water into the house.???

The answer to the question is "**no**" because the water hammer arrester functions at its peak when and where the intensity of the pressure created form the water hammer first occurs. Therefore, the water hammer arrester is best placed in the pipeline system prior to the appliance, at best it should be about 1.8 to 2 meters from the appliances outlet which is causing the water hammer.

The most common arrester units available for domestic use are the 20mm units. As with all purchasable units there are brands on the market that have varying degrees of hydraulic pressure absorption.

Prior to commercially available water hammer arresters, long lengths of copper tubing were installed into the pipe work system, capped off at the end and filled with air, these acted as absorbers for some time until the pipe column filled with water and there were no longer any absorption qualities left, in which case they had to be re-installed with air.

These days there are many brands of water hammer arresters available, each one with different design configurations.

Some are designed with air trapped in a chamber and separated from the water with a rubber diaphragm see diag.1, here the trapped air must be maintained at a required setting for the unit to operate efficiently. In figure 2 the unit is made from pressed steel which encloses filled sacks of air that compress on sensing the pressure increase of water. Another design (figure 3) is a slim chrome plated steel unit with a piston and large spring to maintain an opposing pressure to the increase of the pressure in the pipe line. (Figure 4) shows a steel encased bellows membrane arrangement that expands and contracts against varying pressures. (In figure 5) a seamless copper cylinder uses an “o” ringed piston that absorbs the varying pressure separating the water from the air.

When purchasing a water hammer arrester, one should look for a maintenance free unit, one that can stand high pressure working conditions, one that is suitable for hot and cold water and preferably with a 12 month or more warranty.

Sometimes other noises are encountered within the plumbing lines especially when taps are turned on, the valves in the taps themselves at times need adjusting or reseating especially if excessively high pressures are encountered. A licensed Plumber would be able to sort out most of those problems.

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# Foundation Performance Details

As promised a couple of weeks ago we can now go a little more in-depth into foundation movement and its causes.

Foundation (soil) movement associated with reactive clays which swells when wet and shrinks when dried out, is a well-known fact among most people, however there are other type of soils that can cause equally sufficient movement to cause masonry buildings and their footings to fail.

These are classified into two types, Reactive soils and Non-Reactive soils a third one is soil with excessive organic matter in the soil. The latter causes the soils to become spongy and thus has little or no compaction capabilities, if a building is erected on such soil then the organic matter is squeezed together thus producing movement and the bearing of the soil is reduced and foundation failure is imminent.

Reactive soils, as the name suggest, are soils that are usually made of clay or fine silts, these soils then swell when water is introduced and shrink when dried out. Most areas especially in Perth are well identified, like the Darling escarpment and the lowland below, specially designed footings are recommended to be used when building in this clay type soil. Recommended in these areas of course are timber framed homes, as they can tolerate far greater foundation movement without the risk of excessive structural damage. The other alternative of course is the pile your footings into the soil so deep that seasonal changes in moisture content does not affect the pile upon which the house is resting. This method is rather expensive but the best.

Non-Reactive soils, are mainly sandy soils either granular or fine and they are mostly very stable but still require even compaction to stop uneven settling which can cause cracking. 7% or more clay material in a sandy soil is regarded as getting towards the reactive spectrum and can cause shrinkage and swelling when wetted.

Settlement is caused when a building that has been erected imposes a load on the soil causing the soil to consolidate. If the footings of the building have been correctly designed, then the load that is imposed by the building will be evenly spread to the footings and the consolidation will be almost negligible.

However, if the soil under is of a clay nature then if any moisture is contained in the soil it will then be very slowly squeezed out of the clay and the initial consolidation will be dependent on the depth of the clay vein and the weight of the home, and the area upon which it is built.

In sandy soil the consolidation is relatively quick as the sand granular particles roll into place due to the pressure that is applied by the house footings.

Consolidation of a foundation is not confined to the area that is loaded by the structure, but can spread and the area affected by this load is classified as the settlement crater, usually this only happens to very large/tall buildings and could affect adjacent buildings, and it is a design criterion to be considered by city designers.

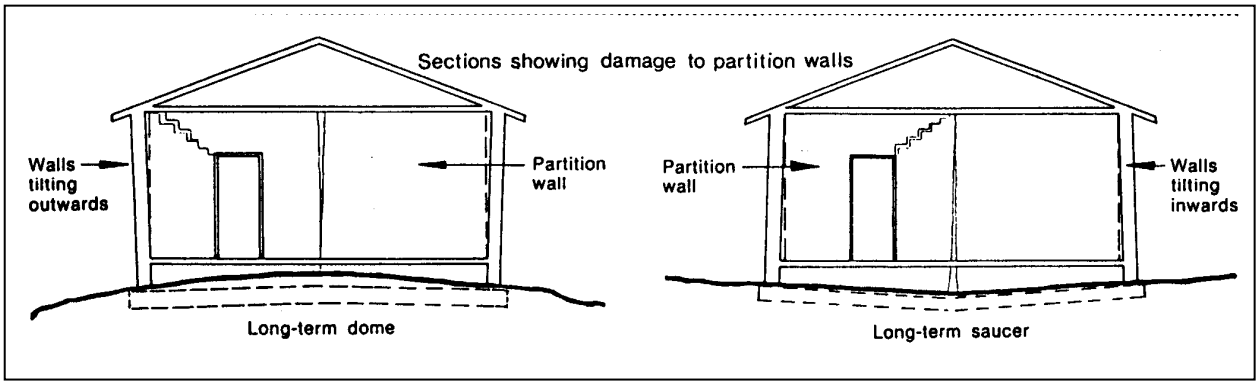
Shear failure of a foundation occurs when a foundation is excessively overloaded or when excavation is made too close to the foundation, in each case forcing the displacement of soil from under the foundation. This type of failure is usually due to excavating too close, for the purpose of burying pipes and should be avoided by at least allowing a safe distance of 500mm to 600mm between trench and footing.

By now we can safely assume that all foundation movement is due to and strongly influenced by moisture content. The main cause is thus rainfall which is not able to be controlled, the depth to which the moisture content can affect the soil varies from 1 meter in some areas to 6m in some. Where the reactive soil is very deep and excessive houses should be built on piles or piers driven down into the soil past the reactive materials, this can become economically prohibitive in some cases.

One must not forget that when a home is built on a plot of land that in itself will affect the moisture content and affect the footings, other phenomenon's that can affect the foundations on a home are "SOLAR RADIATION". Solar radiation can cause the rapid drying out of soil beneath the foundation on walls receiving most of the sun during the day, whereas walls that are in the shade will remain relatively moist, hence we get differential movement in the soil, this is very apparent in home built on clay or reactive soils.

In reactive soils one other very interesting phenomenon, attributable to foundation movement, is the saucer and dome effects caused by the physical presence of a building. It causes moisture migration towards the centre of the house in regions where the summers are hot and wet, and the winters are warm and dry driving the average temperature under house or within the perimeter of the footings to become less, than that of the soil outside of the perimeter, the soils temperature is also higher by the interception of the sun's rays helping to warm the soil. In areas where the Summers are dry, and the winters are cold and wet, the moisture tends to migrate away from under the house and the reactive soils under the house tend to shrink, thus causing a saucer effect or depression. In each case cracking can occur to the home and the type of cracks are identified leading to the speculation of the cause.

See enclosed diagrams on the type of cracks caused by dome and saucer effects.




The erection of a new building brings with it indirect changes in moisture content caused by the installation of gardens and lawns which must be watered. Excessive watering or even leaking pipes, taps, gutters, downpipes etc could have quite a dramatic and dangerous effect on the performance of foundations.

The roots of trees and scrubs can affect the footings in two ways, firstly by growing underneath the footings and lifting them and secondly the roots can cause subsidence of the footings by removing moisture form the soil immediately underneath the footing. The latter is far more common that the former. The root system of trees grown in suburbia usually extend readily to a distance of 20 or so meters from the tree itself. When a building is constructed over a root system preventing replenishment of moisture the root system will then compensate by looking for moisture more eagerly elsewhere.

Form a practical point of view, foundation movement causes damage to the building when the movement is uneven. Uneven movement is usually caused by excessive variations in moisture content in the soil from one end of the footing to the other.

If the footings have been correctly designed and the sand pad has been correctly prepared, then the building should remain essentially unaffected by the shift in moisture content and slight movement that it may cause. However, if the movement differs significantly form one part to another of the footing then the building will be twisted and racked, and cracking will occur. The shape and position of such cracks usually give a good indication of their likely cause and normal protective and remedial measures can be implemented. If these measures fail, then alternative and more expensive methods may need to be implemented like underpinning of footing systems that will be unaffected by foundation movement.

The first rule in preventing damage to buildings due to foundation movement is to assess the nature of the soil and to have the footings designed to suit the soil conditions and the building.

It is usually a good idea to examine buildings in the surrounding vicinity as these will usually indicate a degree of success achieved with the type of footings that they have been designed with. Equally important is the seeking of advice from the local shire authorities as to the type of footing that the soil should be accommodating.

Where there is doubt it is advisable to engage the services of soil engineers who would analyse the soil, showing whether the soil is reactive, what its bearing capacity would be and to what depth one would have to go before the soil becomes stable.

The most important factor in stabilising the moisture content of a site is proper drainage. It is essential to place drains uphill of the footings on a slope so as to divert water away from the footings. Surface drains can be incorporated in path and driveways and equally important are subsoil drains that are installed under the soil, draining way moisture under the ground.

Whatever the cause of the moisture variation in the soil under a building, it can be minimised by covering the soil, this is achieved by the installation of covered patios and paths around the building. The wider the coverage is the less chance of movement to the building. The continuous coverage around a house can only be justified on severely reactive soil conditions, but it can also be used to undo gradually long-term dome and saucer effects if these have begun to damage a building (see last week’s column).

Even minor movements of foundation(soil) will crack rigid mortar joints in drains and sewer pipes adding to the problem being caused by reactive soils, however the use of PVC piping has virtually eliminated this problem and should be used exclusively in these type of soil conditions.

It is quite impracticable to prevent gardening activities to prevent increase in moisture conditions of the soil around a house. The only practicable way is to keep the activities away from the immediate vicinity of the house and so minimise their effects, this is not so noticeable on sandy soils, but where reactive soils are known to exist, surrounding the building with paths and patios followed by grassed areas would be considered as sound planning. Garden beds and heavily watered areas should be kept well away from the building if possible.

When planning a garden around a new home, considerations should be given to the planting of scrubs and especially trees. It is good practice to place trees no closer to a building than their potential height and certainly no closer than 7.5 meters as any good gardening book or nursery will tell you. Equally important is the choice of trees, avoid planting trees which have a high-water demand or a wide-ranging root system.

One school of thought advises that immature trees and stumps should be removed from the vicinity of the planned position of a building and the stumps should be removed. Fully grown trees close to a building that have caused settling cracks to an old building have probably reached a balance with the foundations in so much that if the tree were to be removed further damage would be incurred, therefore the wisest choice would be to leave the tree rather than to disturb the attained equilibrium.

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# All About Contracts

Over the next couple of weeks, we will look at the revised laws that apply if you are Building a home or improving your property. We will give you extracts from the home owners guide to the Home Building Contracts Act put together by the Minister of Consumer Affairs and we will analyse and explain the various meanings to make sure all is understood, but let's start at the beginning.

In 1989, the Home Building Industry Enquiry identified a lack of protection for people building new homes and for home-owners having work done on their properties. The Home Building Contracts Act was introduced by the State Government to ensure that the home owner and the person doing the work are both protected against unfair practices. It does this by setting out the minimum requirements for a contract and prohibiting certain arrangements. The Act applies to contracts for home building and associated work valued between $7,000 and $250,000 entered into, on or after **April 4, 1992**. Examples of where the Home Building Contracts Act might apply include when a builder erects your new home, a swimming pool company installs a pool, your kitchen is renovated, or your garden is landscaped. It does not apply to the installation of fittings, such as curtains. Copies of the Home Building Contracts Act can be obtained from the State Government Bookshop at 815 Hay Street, Perth, phone (09) 222 8216, or State Print in Station Street, Wembley, phone (09) 383 8811 .

Whether you're arranging for a new home to be built, a swimming pool to be installed or your existing home to be renovated, the range of things you need to consider can be confusing.

Should you get a written quote or will an estimate do? Should you be given a copy of the contract? Do you need to take out insurance? What happens if there are problems? The HOME BUILDING CONTRACTS ACT gives you advice for dealing with these things. In addition, it helps you understand your legal rights and responsibilities under the Home Building Contracts Act.

You can employ a variety of workers to do work on your home. Some work will involve builders, some will involve trades people such as carpenters, brick-layers, painters or tilers, some will involve people who operate in a specific field, such as pool installation or landscaping.

For ease of reading, the booklet has used the terms "builder' and "tradesperson" However, you should note that these are only examples of people doing the work. The information about the Home Building Contracts Act applies to all people contracted by you to do building, renovations or improvements on your home, provided the work is valved between $6000 and $200,000

**ORGANISE: -** No matter how small or large the job, it's wise to set up a system for yourself. Make sure you have a safe place for all your important documents, such as copies of contracts and correspondence between you and the tradesperson. Keep records of any important conversations, agreements or decisions, perhaps by recording them in a diary. Then you can be sure to include all of your agreements in your contract. These precautions will be very useful if there is a dispute of some kind, because you will have proof for your point of view.

**CHOOSING YOUR WORKERS: -** Devote some time to making a careful choice. One of the most reliable ways to find a good tradesperson is by word-of-mouth. Ask your friends for recommendations, visit recently completed projects or ask a tradesperson for a list of recent clients. The experience of other people can be an excellent guide. You can also check a tradesperson's qualifications. For example, see if a builder is registered with the Builders' Registration Board, or if a painter is registered with the Painters' Registration Board. The requirement for registration of builders and painters varies depending on their location within the State. You can find out if a builder or painter is registered by calling their Registration Boards - phone (09) 3216891 .

**PAPER WORK: -** It may also be worth checking that the tradesperson has full insurance cover. The law in W.A now demands at least a written contract for all home building work which costs you between $6,000 and $200,000. This includes not only construction and alterations connected with your house, but things like swimming pools, pergolas, carports, sheds, paving, landscaping and other permanent fixtures to your property. Generally, the number of other documents involved in arranging work on your property depends on the cost and complexity of the job.

For example, a paying job worth $2,000 may only involve a written quote, whereas having your kitchen renovated may cost more than $6,000 and will involve detailed plans, specifications and a written contract.

**QUOTES AND ESTIMATES: -** If possible, you should always get an accurate, written quote for any work you want done. Remember, an estimate is not the same as a quote. A quote is a fixed price. It doesn't change, even if the work turns out to be more (or less) expensive than originally thought. An estimate is only the tradesperson's judgement of what the cost might be.

**PLANS: -** The person doing the work should build strictly according to the plans, so make sure they're right. If it's hard to imagine how the work will look, visit a few display centres to get a better idea of what the plans are showing. Late changes to the original plans once you have signed the contract can be costly, so be sure to check all the details. If you want to change the original plan, find out what effect this will have on the total cost.

**SPECIFICATIONS: -** These provide details of the type and style of materials to be used in the work. The specifications might include the type of bricks, the type of paints and the number of coats, the number of power points in each room or the make and model of stove to be installed. Study the specifications carefully. Inaccuracies or omissions can cause delays in the work and increase the costs. If you're buying a project home you've seen on display, find out exactly what the package includes. Features like floor coverings and light fittings may not be included. Changes to the specifications once the contract is signed can be costly.

**THE CONTRACT: -** A Contract formally sets out the deal between you and the person doing the work. Before you sign the paper take some time out to read it carefully.

The best time to clarify any aspects of your proposed agreement is right at the start as no problems have developed yet and both parties are keen to start. If a dispute does arise down the track, you'll be glad you had a written contract and that you took out time to read and understand it.

It is wise to bear in mind that it is very difficult to enforce something that is not written down in the contract, so therefore any verbal agreements must be put to pen and paper in the contract between yourself and the trades person.

**WHAT IS IN A CONTRACT: -** Your contract should be quite specific and state everything that you agreed upon with the trades person. It should at least contain the following: -

Who the contract is between.

The complete details of the work.

The fixed cost of the works.

How much deposit if any is to be paid.

When payments are to be made.

The date by which the works are to be completed.

What you are expected to do. i.e. you may be required to provide proof that you are the owner of the land or have sufficient finance s.

Who is responsible for organising any licences or approvals that may be required.

Your right to terminate the contract.

Your right to arbitration.

Note there are many more aspects to cover and the more that are covered the better you may feel. Most people use a standard contract available from the Housing Industry or the Master Builders association. This does not mean that you can't add or delete any changes before you finally sign the contract.

**WHEN TO SIGN THE CONTRACT: -** You should only sign the contract after all the drawings, specifications and any other documentations are in order and have been thoroughly checked and agreed upon by both parties. Take your time to sort things out you may even want an extension of time so that you can peruse the documents at your leisure making sure all that you have discussed is included. If you have any doubts about any legal clauses in the contract don't sign it until you have had some explanation and legal advice. So, the bottom line is check and check and check again before you sign don't rush it.

**MAKING SURE THE AGREEMENT STANDS: -** All Documents Should be completed and signed in such a way that no authorised additions or deletions can be made later. Blank spaces should be crossed out or marked "Not Applicable" then initialled by both parties. For added certainty the last word on every page should be initialled by both parties.

If any alterations are made at the last minute they must then be initialled by you and the tradesperson. Once you have finally signed the contract keep your own copy in a safe place.

**We will now render extracts and delve into "what the law says about Home Building Contracts".**

**BEFORE YOU SIGN THE CONTRACT: -** The Home Building Contract Act specifies that the person doing the work for you, must give you special notice before the contract is signed. This standard notice is called “NOTICE FOR THE HOME OWNER” and explains the main parts of the Act so that you fully understand your rights and obligations before you sign It is important to read this notice.

**YOU MUST HAVE A WRITTEN CONTRACT: -** There must be a written contract between you and the person doing the work for you, you should have signed a copy of this before the works is commenced.

If you don’t receive a copy you should write to the person doing the work for you and request it, it is important to keep a dated copy of your request.

If the contract is not in writing, stating all the terms and conditions, dated and signed by yourself and the person doing the work for you, you can then terminate the contract by notifying the person doing the work for you in writing and it is important to keep a copy of the date when this occurred.

**THE PRICE MUST BE FIXED: -** If the price of labour or materials goes up after the contract is signed the person doing the work for you, is not allowed to pass these on to you. Clauses in contracts which allow this to happen are called “Rise and Fall” and are now illegal under the Act. There are only three instances where a trades person or Builder can legally charge you for the cost increase and that is:

When the increase is the result of a change in government laws.

When the increase is due to increasing Government charges or taxes.

When the increase is due to a delay in staring work of more than 45 days from the date of signing the contract and the delay was caused by you not fulfilling one of your contractual obligations. i.e. you may be requested in the contract to prove that you are able to pay the contract price.

If the person doing the work for you does want to increase the price, then they must notify you in writing stating the amount of the price increase and when the increase is to be paid.

The request for extra money can only be for genuine costs incurred by the time that payment is due.

If the price rise is more than 5% of the total contract value, you have the right to terminate the contract by notifying the person doing the work for you or Builder in writing (we will discuss termination of Contract later). Alternatively, you can apply to the Buildings dispute committee to assess whether the price is justified.

So, in summary for the person to pass the increases on to you the costs must be genuine as defined previously and all notification and response must be done in writing.

**PROGRESS PAYMENTS: -** If the person doing the work wants to be paid at various stages of the works then it must be stated in the contract. You cannot be charged any more than the cost of works actually completed or charged for the materials actually supplied and used at the time of

the progress claim or payment. If this does happen, you have the right to terminate the contract by notifying the person doing the person doing the work. (explained more later).

Although this is not required by the ACT, you may include a clause in your contract allowing a fund for retention. This allows you to pay most of each progress payment when it's required, but hold back a pre-determined percentage of each payment until final completion.

The idea is of course for the person doing the work to complete the works a soon as possible with as little fuss as possible including rectifying complaints.

**CHANGING OR (VARYING) YOUR CONTRACT: -** If you and the person doing the work agree to making changes after the contract was signed, then these changes (variations) must be notified in writing setting out the date, terms and costing of the variation. The person doing the work must give you a copy of such variations as soon as possible and before the work relating to the changes begins.

When the variation is accepted and ordered the various authorities that originally passed the plans i.e. SECWA, HEALTH or the BUILDING SURVEYOR may require changes, in any case they need to be notified. Then within 14 days of the person doing the work having received your order to proceed with the variation he should then provide you with a written explanation and costing of the variation. You will be responsible for the increase in costs.

If the variation is due to unforeseen circumstances, then the person doing the work must first demonstrate to you that the variation could not have been foreseen using reasonable skill and experience.

If this then is the case, the person doing the work has 14 days to provide you with a written statement explaining the reason for the change and costing. You will be responsible for any cost increase. An increase in cost of the materials or labour cannot be passed on to you as an unforeseen circumstance. When you and the person doing the work disagree on a cost variation due to unforeseen circumstances, you have 14 days after receiving the notice to refer the matter to the Buildings Dispute Committee for a decision.

**RECEIVING THE OFFICIAL APPROVALS:** If a Building Licence is required by your local council then work cannot commence until a licence has been issued. You should contact your local shire to find out if the particular work that you are about to commence needs a licence. If you need one, then you and the person performing your work should do everything possible to obtain one. If conditions are placed on the works by the council, then work cannot commence until these conditions have been accepted by them in writing and your acceptance must be received within 45 working days of the contract being signed.

**WATER AUTHORITY APPROVAL: -** Check with the water Authority to see if you need their approval for the work you intend to carry out, if approval is required then work cannot commence until these conditions have been accepted by them in writing and your acceptance must be received within 45 working days of the contract being signed. Work cannot start until you have accepted all conditions on the other hand you may if you have time, appeal to the Minister to overturn a particular ruling.

The Home Building Contracts Act specifies what should happen if 45 working days have passed since you and the person doing the work signed the contract and:

**1)** The building licence from the shire has not been issued.

**2)** The water authority approval has not been issued.

**3)** You or the trades person doing the work have not acknowledged in writing your acceptance of conditions placed on the plans.

**4)**You and the person doing the works have not acknowledged in writing your acceptance of the water authority approval.

The consequences of these conditions not being met depends on who has not fulfilled their obligations regarding obtaining and accepting the building licence and water authority approval.

If it's the Trades person doing your works or your Builders fault meaning that they have not fulfilled their obligation, then the contract must stand as signed unless you both agree to change it. If you both agree to change it then you must meet the requirements as discussed in our previous column under the heading "Varying the Contract".

**WHEN IT IS NOT ENTIRELY THE TRADES PERSONS OR BUILDERS FAULT: -** If The delay in obtaining the licence and other official approvals is caused by you or by both of you or by something beyond the control of either of you, then there are several options.

1) The contract can remain as is or both parties can agree to change providing you adhere to the previously discussed section on "Varying the Contract".

2) You can terminate the contract by notifying the trades person or Builder in writing, however you will be expected to pay for the labour and materials provided and used up to the termination date. The person doing the work must return any unused money that has not been already spent on the job.

3) The trades person or builder can terminate the contract by notifying you in writing, the same conditions apply as in item (2).

4) The trades person or Builder may seek to increase the contract value. this should be done in writing, notifying you of the amount of increase and when it is to be paid.

If the person doing the work chooses to increase the price the written request for payment must require you to pay within 10 days of notification, or at the time of the next progress payment. The extra payment can only be for genuine costs incurred up to the time of paying.

If the price rises more than 5% of the total contract price, you may then terminate the contract. This must be done in writing within 10 days of receiving notification of the price rise. Alternatively, you can ask the Building disputes committee to decide whether the price or rise is justified.

**WHEN TERMINATING A CONTRACT:** - Where either you or the person doing your building terminates the contract under the "Home Building Contracts Act" the person doing the work must return any money that has not already been spent on the works.

You will be expected to pay for all the materials provided up to the point of termination, if you and the trades person or Builder cannot agree you can apply for a resolve from the Buildings Disputes Committee. Remember to terminate a contract you must do it in writing sending it to the person doing the work.

**INSPECTIONS AND ACCESS TO THE SITE: -** During Construction the building surveyor from the local council may check from time to time that the works is being done according to council regulations. However, this does not ensure that the work being done is in accordance with the terms of the contract. To ensure that you are getting what you paid for you will need to check these aspects for yourself. Alternatively consider hiring an expert like a building Consultant or an Architect to administer the construction. You have the right to make provisions in your contract for you or a person authorised (in writing) by you to inspect the building work.

While the person doing the work cannot prevent you from coming on site he or she can place provisions in the contract restricting your inspections to the trades persons normal working hours. The contract may also prohibit inspections at times which would unreasonably interfere with the building work.

It a good idea to come to an agreement about the inspection times before the work begins and include this agreement in to the written contract. Also, when you are inspecting the property it is important not to tell the trades persons employees what to do, in addition be careful not to obstruct the works in progress.

**YOUR GUARANTEE OF QUALITY: -** There is a 120-day defects liability period from the date of completion of the works. (warranty period) During this period the trades person must repair any defects relating to poor quality workmanship or defective materials, free of charge. You must notify the trades person or Builder of the defects in writing.

Any faults that develop after the 120 days warranty period and are not due to poor quality of workmanship or materials are your responsibility. However, in some cases a major defect may not show up until after the 120-day period. For example, a fault may become apparent only after a down pour of rain or where water leaks from a shower recess into the adjoining room. If such defects are due to poor quality work or materials, the trades person must then still repair it free of charge.

If you and the trades person can't come to some agreement about the complaint, the either of you can refer the complaint to the Building Dispute Committee. If the defect relates to the quality of works or materials, then the committee will deal with claims up to six (6) years after the completion of the job.

**WHEN THE TRADES PERSON OR BUILDER USES YOU PROPERTY: -** When you are having work done on your home, make sure you come to some agreements about how your property is to be treated. It is a good idea to place these agreements in writing before works begins. Set down things in your contract like: -

what facilities such as kitchen bathroom or telephone may be used by the workers.

where tools and equipment are to be kept.

where cars and trucks can be parked.

what pats of the garden require special protection.

what time work can start each day.

whether work can be done during the week end.

how workers can enter the house when you are not present.

the condition of footpaths and driveways before work commences.

**INSURANCE: -** insurance is another overlooked part and it is very important, check that the person doing the work has adequate insurance cover by sighting the insurance cover note. Trade people are required by law to take out Workers compensation insurance for all employees. Public Liability Insurance is also necessary, as this covers any members of the public who are injured because of the building work i.e. Someone may trip over a brick left on the footpath. Builders all risk Insurance covers loss or damage of materials on site or in storage. Before any works commences check with your insurance company or broker to make sure you are adequately covered as the law does not entertain any excuses.

If you are having work done on an existing property the risk of damage to your property may increase, before work starts advising your insurer in writing giving details of work to be done and ask whether the current premiums or cover is adequate or will be affected.

It is important to consider the benefits of a Housing Indemnity Insurance policy or Home Warranty Scheme. These forms of cover protect you from the loos of your deposit or work not having been completed due to insolvency or death by the Builder during construction plus they cover a number of other things. More information on the cover may be obtained from the M.B.A. on 221-5062 or the H.I.A. on 381-7300.

As an owner builder it is your responsibility to make sure that there is adequate cover for your subcontractors and the work site, ask if in doubt your insurance broker or company.

**When There's a Dispute**

You can help to avoid a dispute by taking the time to go through your contract thoroughly, and by getting all agreements in writing.

However, due to the complexity of building work, disputes can still arise.

Start by talking about it.

If a problem occurs, you should first try to resolve it yourself.

Contact your tradesperson, explain the problem clearly and calmly, and ask that it be corrected. You might arrange a time to meet and discuss a solution.

Most disputes can be resolved in this way.

Remember to keep a record of your discussions and to get any agreements in writing.

When you can't reach an agreement.

In this case, there are places you can go for assistance.

If the value of the work is between $6,000 and $200,000 and the contract was signed after 4 April 1992, the Home Building Contracts Act provides you with the Building Disputes Committee. This gives both you and the tradesperson a simple, inexpensive process for resolving disagreements.

The Committee deals with a wide variety of disputes, including:

Disputes Resulting from you or the tradesperson breaking the terms of a contract.

Disputes resulting from you or the tradesperson not complying with the Home Building Contracts Act.

Disputes resulting from your belief that the work has not been performed to a reasonable standard.

Applying to the Disputes Committee.

Before you make an application to the Building Disputes Committee, you must write to the tradesperson or builder, clearly stating your complaint and asking that the problem be fixed. Allow suitable time for the response, i.e. 10 working days would normally be considered sufficient.

If the matter is still not resolved, you may then apply to the Building Disputes Committee. Application forms are available from the offices of the Builders' Registration Board.

Once you've lodged your application, you will be notified of the time and place for inspecting or hearing. The Registrar may first try to resolve the problem with you and the builder or tradesperson. If either you or the builder or tradesperson are dissatisfied with the Registrars decision, you could ask the Building Disputes Committee to review that decision.

The Building Disputes Committee has the power to make an order or vary the Registrar's order and its decision is legally binding on both you and the contractor.

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# Timber - Dry & Wet Rot

Decay occurs in unprotected household timbers, fences and out buildings that are subjected to damp. Fungal spores that are always present, multiply and develop in these conditions until eventually the timber is destroyed. Fungal attack can be serious requiring immediate attention to avoid very costly structural repairs. There are two main type i.e. **Wet rot and dry rot.**

Signs of fungal attack are easy enough to detect but it is important to be able to identify certain strains that are much more damaging than others.

**Mould growth: -**

White furry deposit or black spots on timber plaster or wall paper are mould growths, these usually are a result of condensation. When they are wiped or scraped from the surface the structure shows signs of physical deterioration apart from staining. Cure the source of the damp conditions and treat the affected areas with a solution of 15 parts of water with 1 part of bleach.

**Wet Rot: -**

Wet rot occurs in timber with a high moisture content. When the cause is eliminated, further deterioration is arrested. The rot frequently attacks the frame work of doors and windows that have been neglected enabling rainwater to penetrate joints or between brickwork and adjacent timbers. Peeling paintwork is often the first sign, which when removed reveals timber that is spongy when wet but dark brown and crumbly when dry. In advanced stages the grain will have split and thin dark brown fungal strands will be in evidence on the timber. Treat wet rot as soon as practicable.

**Treating of wet Rot: -**

Having eliminated the cause of the damp, cut away and replace the badly damaged wood, then paint the new and surrounding woodwork with three liberal applications of fungicidal wood preservative. Brush the liquid well into the joints and end grain. Before decorating you can apply a filler to rebuild the surface and then repaint as normal.

**Dry Rot: -** Once it has taken hold dry rot is a most serious form of decay. Urgent treatment is essential It will attack timber with a much lower moisture content than wet rot, but unlike wet rot which thrives outdoors as well as indoors and only in poorly ventilated confined spaces indoors.

Dry rot exhibits various characteristics depending on the extend of its development. It sends out fine pale grey tubules in all directions, even through masonry to seek out and infect other drier timbers. It actually pumps water from damp timber and can progress at an alarming rate. The strands are accompanied by a white cottonwool like growth called mycelium in very damp conditions. When established, dry rot develops wrinkled, pancake shaped fruiting bodies, which produce rust red spores that are expelled to rapidly cover surrounding timber and masonry. Infested timbers become brown and brittle showing cracks across and along the grain until it breaks up into cube like pieces. You may also detect a strong musty mushroom like smell

associated with the fungus. In fact, to the untrained eye, what may look like wet rot is in fact dry rot and vice versa.

**Treating of Dry Rot: -** Dry rot requires more drastic action and should be treated by a specialist unless the outbreak is minor and self-contained.

Remember that dry rot can penetrate masonry. look under floor boards in adjacent rooms before you are satisfied with the extend of the infestation, also check cavity walls.

Eliminate the source of water and ensure adequate ventilation in roof spaces or under floors by re placing blocked ventilation holes or air bricks. Cut all infected timber by up to at least 450mm beyond the last visible sign of rot. Chop away the plaster that is affected by the strands by the same amount at least 450mm beyond the last visible sign. Collect all debris and place in a plastic bag and burn it.

Use a fungicidal preservative fluid to kill any remaining spores that may have been missed. Wire brush the masonry then apply three coats of the fungicidal preservative fluid on all timber brickwork and plaster within at least 1.5m of the infected areas. If a wall was penetrated by strands of dry rot, drill regularly spaced but staggered holes into it from both sides. Angle the holes downward so that fluid will collect in the holes and saturate the wall internally, patch holes after treatment.

Treat replacement timbers by immersing the end grain in a bucket of fluid, for at least five to ten minutes. When the wall is ready to be patched use zinc oxy-chloride in the plaster to prevent reinfestation.

**Rot Preventative Treatment**

Fungal attack can be so damaging that it is well worth taking precautions to prevent it occurring. regularly decorate and maintain window and door frames and exposed timber parts of roof barge or fascia and pergolas, especially in these areas where moisture can penetrate between timber abutments. It is wise to seal the abutting joins with a paintable mastic. Provide adequate ventilation between floors and ceilings and if you are lucky enough to have an attic then similarly provide adequate ventilation.

Check for any plumbing leaks and leaks that only occur during wet months and repair these then you will be less likely to have rot setting in.

In very many instances you will find that at the end of barge or verge boards where the barge board is attached to the last rafter and where the gutter buts to the barge there is a gap. The timber in this area is generally rotting and in some instances, is just existing visually only due to the paint keeping together its shape.

**LOOKING AFTER TIMBERWORK: -** Existing and new timbers can be treated with preservative. Brush and spray two or three applications to standing timbers paying attention to joints and end grain.

**Immersing timber: -** Timber in contact with the ground would benefit from prolonged immersion in preservative. Stand fence posts on end in a bucket full of fluid for ten (10) minutes.

For \other timbers make a shallow bath from loose bricks and line it with thick plastic sheeting. Pour preservative in to the trough and immerse timbers. To drain the fluid burry bucket at one end of the trough and remove bricks and guide plastic sheeting into the bucket to drain.

**PROTECTING TIMBER FRAMES: -** To protect timber frames insert preservative in a solid tablet form into the holes drilled at regular 50mm intervals in a staggered pattern or as recommended by the manufacturer. If the timber becomes wet the tablets dissolve placing preservative exactly where it is needed. Fill the holes with wood filler and paint over as normal.

There are numerous type of preservatives for wood for internally and externally, it is important to choose the correct one.

**Clear preservatives** are clear liquids specially formulated to protect. Alternatively, an all-purpose fluid also provides against wood boring insects then paint or varnish the surface when dry.

**Coloured preservatives** are tinted and are formulated to protect sound timbers against fungal and insect attack and stain the wood at the same time. Some are harmful to plants so check before you buy.

**Green preservatives** are normally harmless to plants when dry so it is mainly used for horticultural purposes. It can be used to eradicate rot and insect attack as well as protecting sound household timbers. Its colour helps to identify treated timbers in the future. The colour id due to its copper content and is not a permanent colouring agent Its protective properties are unaffected even when the colour is washed out.

Safety with preservatives is always important read the labels carefully and do not smoke and wear protective clothing at all times and ensure good ventilation. Do not sleep in rooms for at least two nights where preservative has been used.

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# Repairing Concrete

Concrete is used in and around the house as a surface for solid floors, drives paths and walls. In common with other building materials, it suffers from effects of damp-spalling and efflorescence and related defects such as cracking and crumbling. Repairs can usually be made in much the same way as for brickwork and render, although there are some special considerations you should be aware of. If the damage is widespread, it is common practice to resurface it prior to decorating.

**Sealing concrete: -**

New concrete has a high alkali content and efflorescence can develop on the surface as it dries out. Do not use any finish other than water thinned paint until the concrete is completely dry. Treat efflorescence on concrete as for brickwork.

A porous concrete wall should be water proofed with clear sealant on the exterior. Some reinforcement emulsions will cover bitumen satisfactorily, but it will bleed through most paints unless you prime it with a PVA bonding agent diluted 50% with water. Alternatively use aluminium spirit based sealer.

**Cleaning Dirty Concrete: -**

Clean dirty concrete as you would brickwork. Where a concrete drive or Garage floor for instance is stained with patches of grease or oil soak up fresh spillage immediately to prevent them becoming stains. Sprinkle dry sand on to the patches of oil to absorb any liquid deposits, collect it up and wash the area with white spirit or degreasing solution.

**Binding Dusty Concrete: -**

Concrete is trowelled when it is laid to give it a flat finish, if this is overdone the cement is brought to the surface and when the concrete dries out then this thin layer of begins to break up within a short time producing a loose dusty surface. You must not apply a decorative finish to the concrete in this condition. Treat a concrete wall with stabilising primer, but paint a dusty floor with one or two coats of PVA bonding agent mixed with five parts of water. Use the same solution to prime a particularly porous surface.

**Making Good Cracks and Holes: -**

Rake out and brush away loose debris from cracks or small holes in the concrete. If the crack is less than 6mm wide, open it up a little with a cold chisel so that it will accept filling. Undercut the edges to form a lip so that the filler will grip better.

To fill large holes in concrete ad a fine aggregate such as crushed rock to the cement and sand mix. make sure that the concrete sticks on shallow surfaces by priming the damaged edges with a bonding agent, when the primed surface becomes tacky then trowel in the concrete and smooth it out.

There are numerous ready to use handy man products on the shelf that need no mixing except with water.

## REPAIRING a CONCRETE Floor

Concrete floors can be subject to cracking caused by shrinkage. Usually the cracks are only in the screed and can be easily repaired, but a cracked floor that is also uneven may be a sign of settlement in the sub-base, and you should have it checked by a surveyor or by the Shire Building Officer, who will advise you on what steps to take.

### Filling a crack: -

Clean all dirt and loose material out of the crack and, if necessary, open up narrow parts with a cold chisel to allow better penetration of the Filler.

Prime the crack with a solution of 1-part bonding agent: 5 parts water and let it dry. Make a filler of 3 parts sand: 1-part cement mixed with equal parts of bonding agent and water; or use a ready-mixed quick-setting cement. Apply the filler with a trowel, pressing it well into the crack.

A timber floor which has been seriously damaged by rot or insect infestation can be replaced with a solid concrete floor provided that the space below it needs no more than 600 mm of infill material. If this were the case a concrete floor would be liable to damage through settlement of the infill, so a new suspended floor would have to be fitted.

Before taking any action consult your local Building Shire officer, because the converting of one floor can affect the ventilation of another. If the work involves the electrical supply main or the supply pipes for gas or water, you should check with the appropriate authority. Wiring and pipes should be re-run before the infill is laid.

### Preparing the ground

Remove and burn all the old infected timbers and take off the door of the room. Treat the ground and all the surrounding masonry thoroughly with a good fungicide and against termites. With bricks and mortar fill in any recesses in the walls left by the timbers that have been removed. Mark the walls with a levelled chalk line to indicate the finished floor level at the same time making allowance for the floor covering if you intend to use a thick material such as quarry tiles or wood blocks (parquetry). About 50mm below this line mark another one, the space between them representing the thickness of the screed. Then mark a third line a further 100 (4in) down, indicating the thickness of the slab.

### The infill

Lay the infill (rubble)material to the required depth in layers of no more than 225mm at a time, compacting each layer thoroughly and breaking up the larger pieces with a sledge hammer. You can use brick and tile rubble or, better still, gravel rejects, which are coarse stones from quarry waste. If you are using second hand rubble you should remove from it any fragments of plaster, which can react unfavourably with cement, and any pieces of wood. Bring the surface of finely broken rubble up to within 25mm of the chalk line for the concrete and 'cover' the surface with a layer of sand, tamped or rolled flat.

### The damp-proofing

Spread a sheet polythene damp-proof membrane of 1000-gauge minimum thickness over the surface of the sand turning its edges up all round and lapping it up the walls to form a tray. Make neat folds at the corners and hold them temporarily in place with tape. If the floor needs more than one sheet to cover it the sheets must overlap by at least 200mm and the joints be sealed with a special waterproof tape available from a builder's hardware store.

**Laying the concrete**

Mix a medium-strength concrete of 1 part - cement: 2.5 parts sand: 4 parts aggregates. Do not add too much water; the mix should be a relatively stiff one. Lay the concrete progressively in bands about 600mm wide. The direction of the bands will depend on the door because you will have to work in such a way as to finish at the doorway. Tamp the concrete with a length of 100mm x 50mm timber to compact it and finish level with the chalked line. As you go along, check the overall surface with a spirit level and straight edge, and fill in any hollows, though slight unevenness will be taken up by the screed.

When the concrete has set firmly enough to support a board to walk on, brush the surface with a stiff broom to make a key for the screed. Leave it to cure for at least three days under a sheet of polythene to prevent shrinkage caused by rapid drying. Alternatively, call for ready-mix concrete using a 25 MPA mix which you then have to place and screed yourself using pegs driven into the soil to make sure that an even level is achieved.

**Laying the screed**

Mix the screed material from 3 parts sharp sand: 1-part Portland cement. Dampen the floor and prime it with a cement grout mixed to a creamy consistency with water and bonding agent in equal parts. Working from one wall, apply a 600mm band of grout with a stiff brush.

Apply a bedding of mortar at each end of the grouted area to take 38mm x 38mm 'screed battens'. True them with a spirit level and straight edge so that they are flush with the surface level line on the walls. Lay mortar between the battens, tamp it well down, level it with the straight edge laid across the battens and smooth it with a wooden float. Lift the battens out carefully. fill the hollows left with mortar and level with the float. Repeat the procedure, working across the floor in bands 600mm wide. Cover the finished floor with a sheet of polythene and leave it to cure for about a week.

The floor will be hard enough to walk on in two weeks, but not fully dry for about six months in winter, this is weather dependent. A rule of thumb would be to allow a month for every 25mm of thickness and meanwhile do not lay an impermeable floor covering.

Trim the damp-proof membrane to within 25mm of the floor and fit the skirtings to cover its edges.

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# Cleaning Brick and Stone

Before you decorate the outside of your house, check the condition of the brick and stonework, and carry out any necessary repairs. There's no reason why you can't paint brick or stone walls - indeed, in some areas it is traditional to do so - but if you consider masonry most attractive in its natural state, you could be faced with a problem: once masonry is painted, it is not possible to restore it to its original condition. There will always be particles of paint left in the texture of brickwork, and even smooth stone, which can be stripped successfully may be stained by the point.

**Treating new masonry**

New brickwork or stonework should be left for about three months until it is completely dry before any further treatment is considered. White powdery deposits called efflorescence may come to the surface over this period, but you can simply brush it off with a stiff-bristled brush or a piece of dry sacking. After that, bricks and mortar should be weatherproof and therefore require no further protection or treatment.

**Cleaning Organic Growth from Masonry**

There are innumerable species of mould growth or lichens which appear as tiny coloured specks or patches on masonry. They gradually merge until the surface is covered with colours ranging from bright orange to yellow or green, grey and black.

Moulds and lichen will only flourish in damp conditions, so try to cure the source of the problem before treating the growth. If one side of the house always faces away from the sun, it will have little chance to dry out. Relieve the situation by cutting back overhanging trees or shrubs to increase ventilation to the wall.

Make sure the damp-proof course (DPC) is working adequately and is not being bridged by piled earth or debris. Cracked or corroded rainwater pipes leaking onto the wall are another common cause of organic growth. Feel behind the pipe with your fingers or use a hand mirror to locate the leak.

**Removing the growth**

Brush the wall vigorously with a stiff-bristled brush. This can be an unpleasant, dusty job, so wear a gauze face mask. Brush away from you to avoid debris being flicked into your eyes.

Microscopic spores will remain even after brushing. Kill these with a solution of bleach, or if the wall suffers persistently from fungal growth, use a proprietary fungicide, available from most DIY stores.

**Using a bleach solution**

Mix one-part household bleach with four parts water. Paint the solution onto the wall using an old paintbrush, then 48 hours later wash the surface with clean water, using a scrubbing brush. Brush on a second application of bleach solution if the original fungal growth was severe.

**Using a fungicidal solution**

Dilute the fungicide with water according to the manufacturer's instructions and apply it liberally to the wall with an old paintbrush. Leave it for 24 hours then rinse the wall with clean water. In extreme cases, give the wall two washes of fungicide, allowing 24 hours between applications and a further 24 hours before washing it down with water.

**Removing Efflorescence from Masonry**

Soluble salts within building materials such as cement, brick, stone and plaster gradually migrate to the surface along with the water as a wall dries out. The result is a white crystalline deposit called efflorescence.

The same condition can occur on old masonry if it is subjected to more than average moisture. Efflorescence itself is not harmful but the source of the damp causing it must be identified and cured before decoration proceeds.

Regularly brush the deposit from the wall with a dry stiff-bristled brush or coarse sacking until the crystals cease to form - don't attempt to wash off the crystals; they'll merely dissolve in the water and soak back into the wall. Above all, don't attempt to decorate a wall which is still efflorescing, and therefore damp.

When the wall is completely dry, paint the surface with an alkali-resistant primer to neutralise the effect of the crystals before you paint with oil paint; water-thinned paints or clear sealant et the wall breathe, so are not affected by the alkali content of the masonry, some specially formulated masonry paint can be used without primer.

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# Cleaning Old Masonry

Whatever type of finish you intend to apply to a wall, all loose debris and dirt must be brushed off with a stiff-bristled brush. Don't use a wire brush unless the masonry is badly soiled as it may leave scratch marks.

Brush along the mortar joints to dislodge loose pointing. Defective mortar can be repaired easily at this stage, but if you fail to disturb it now by being too cautious, it will fall out as you paint, creating far more work in the long run.

**Removing unsightly stains**

Improve the appearance of stone or brick left in its natural state by washing it with clean water. Play a hose gently onto the masonry while you scrub it with a stiff-bristled brush. Scrub heavy deposits with half a cup of ammonia added to a bucketful of water then rinse again.

Abrade small cement stains or other marks from brickwork with a piece of similar-coloured brick, or scrub the area with a household kitchen cleanser. Remove spilled oil paint from masonry with a proprietary paint stripper. Put on gloves and protective goggles, then paint on the stripper stippling it into the rough texture of the masonry. After about ten minutes, remove it with a scraper and a soft wire brush. If paint remains in crevices, dip the brush into the paint stripper and gently rub it with small circular strokes. When the wall is clean, rinse with water.

**Re-Pointing Masonry**

The mortar joints between bricks and stone can become porous with age, allowing rainwater to penetrate to the inside, causing damp patches to appear, ruining decorations. Replacing the mortar pointing, which deflects the water, is quite straightforward but time consuming. Tackle only a small, manageable area at a time, using a ready-mixed mortar or your own mix.

**Applying the pointing mortar:**

Rake out the old mortar pointing with a thin wooden stick to a depth of about 12mm. Use a cold chisel or a special plugging chisel and a hammer to dislodge firmly embedded sections, then brush out the joints with a stiff-bristled brush.

Flick water into the joints using an old paintbrush, making sure the bricks or stones are soaked so they will not absorb too much water from the fresh mortar. Mix up some mortar in a bucket and transfer it to a mortar board. If you're mixing your own mortar, use the proportions 1-part cement: 1-part lime: 6 parts sand. If the colour of the mortar needs to be colour matched, then experiment first before making the final batch.

Pick up a little sausage of mortar on the back of a small pointing trowel and push it firmly into the upright joints. This can be difficult to do without the mortar dropping off, so hold the mortar board under each joint to catch it.

Try not to smear the face of the bricks with mortar, or it will stain. Repeat the process for the horizontal joints. The actual shape of the pointing is not vital at this stage.

Once the mortar is firm enough to retain a thumb print, it is ready for shaping. Match the style of pointing used on the rest of the house (see below style type). When the pointing has almost hardened, brush the wall to remove traces of surplus mortar.

**Shaping the mortar joints: -**

The joints shown here are commonly used for brickwork, but they are also suitable for stonework. Additionally, stone may have raised mortar joints.

**Flush Joints: -**

Is the easiest profile to produce, a flush joint is used where the wall is sheltered or painted. Rub each joint with sacking material, starting with the verticals joints.

**Rubbed (rounded) joints: -**

Bricklayers make a rubbed or rounded joint with a tool shaped like a sled runner with a handle: the semi-circular blade is run along the joints.

Improvise by bending a short length of metal tube or rod. Use the curved section only or you'll gouge the mortar. Alternatively, use a length of 9mm diameter plastic tube.

**Raked joints: -**

A raked joint is used to emphasise the type of bonding pattern of a brick wall. It's not suitable for soft bricks or for a wall that takes a lot of weathering. Scrape out a little of the mortar then tidy up the joints by running a 9mm lath along them. There are ready made raking tools available from your local hardware shop.

**Weather struck joints: -**

The sloping and smooth profile is intended to shed rainwater from the wall protecting the mortar joint. Shape the mortar with the edge of a pointing trowel. Start with the vertical joints, and slope them in either direction but be consistent. During the process, mortar will tend to spill from the bottom of a joint, as surplus is cut off. Bricklayers use a tool called a `Frenchman' to neaten the work: it has a narrow blade with the tip bent at right-angles. Make your own by bending a thin metal strip then bind insulating tape round the other end to form a handle. You will find it easiest to use a Wooden batten to guide the blade of the Frenchman along the joints, but nail scraps of plywood at each end of the batten to hold it off the wall.

Align the batten with the bottom of the horizontal joints, then draw the tool along it, cutting off the excess mortar, which drops to the ground.

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# Repairing Masonry & Render

Cracks in external walls can be either the source of penetrating damp, which ruins your decorations inside, or the result of a much more serious problem, like subsidence in the foundations. Whatever the cause, it's obvious that you shouldn't just ignore the danger signs, but effect immediate cures.

**Filling cracked masonry: -**

If substantial cracks are apparent in a brick or stone wall, consult a builder or your local Building Inspection Service or even an Engineer to ascertain the cause.

If the crack seems to be stable, they can be filled. Where the crack follows the line of the mortar joints, rake out those affected and re-point in the normal way. If a crack that splits one or more bricks or stones cannot be repaired, then the damaged area should be removed and replaced, unless you are painting the wall. Use a ready-mixed mortar with a little PVA bonding agent added to help it to stick. Soak the cracked masonry with a hose to encourage the mortar to flow deeply into the crack.

**Priming brickwork: -**

Brickwork will only need to be primed in certain circumstances. An alkali resistant primer will guard against efflorescence and a stabilising solution will bind crumbling masonry and help to seal it at the same time. If you are planning to paint the wall for the first time with an exterior emulsion, you may find that the first coat is difficult to apply due to the suction of the dry, porous brick. Thin the first coat slightly with water. To economise when using a reinforced emulsion, prime the wall with a cement paint with a little fine sand mixed in thoroughly.

**Waterproofing masonry: -**

Colourless water-repellent fluids are intended to make masonry impervious to water without colouring it or stopping it from breathing (important to allow moisture within the walls to dry out).

Prepare the surface thoroughly before applying the fluid: make good any cracks in bricks or pointing and remove organic growth and allow the wall to dry out thoroughly.

Apply the fluid generously with a large paintbrush and stipple it into the joints. Apply a second coat as soon as the first has been absorbed to ensure that there are no bare patches where water could seep in. To be sure that you're covering the wall properly, use a sealant containing a fugitive dye, which disappears gradually after a few weeks. Carefully paint up to surrounding woodwork, if you accidentally splash sealant onto it, wash it down immediately with a cloth dampened with white spirit.

If the area you need to treat is large, consider spraying on the fluid, using a hired spray gun. You'll need to rig up a substantial work platform and mask off all timber and metalwork that adjoins the wall. The fumes from the fluid can be dangerous if inhaled, so be sure to wear a proper respirator, which you can also hire.

**REPAIRING SPALLED MASONRY**: -

Moisture penetrating soft masonry will expand in icy weather conditions, flaking off the outer face of brickwork and stonework. The process, known as spalling, not only looks unattractive but also allows water to seep into the surface. Repairs to spalled bricks or stones can be made, although the treatment depends on the severity of the problem.

If spalling is localised, it is possible to cut out individual bricks or stones and replace them with matching ones. The sequence below describes how it's tackled with brickwork, but the process is similar for a stone wall.

Where the spalling is extensive, it's likely that the whole wall is porous, and your best remedy is to paint on a stabilising solution to bind the loose material together (bondcrete or similar), then apply a textured wall finish, (Polytex or similar), which will disguise the faults and waterproof the wall at the same time.

**REPLACING A SPALLED BRICK: -**

Use a cold chisel and club hammer to rake out the pointing surrounding the brick then chop out the brick itself. If the brick is difficult to prise out, drill into it many times with a large-diameter masonry bit, then attack the brick with a cold chisel and hammer: it should crumble, enabling you to remove the pieces easily.

To fit the replacement brick, first dampen the opening and spread mortar on the base and one side. Butter the dampened replacement brick on the top and one end and slot it into the hole. Shape the pointing to match the surrounding brickwork then, once it is dry, apply a clear water repellent.

**REPAIRING RENDER: -**

Brickwork may be clad with a smooth or roughcast cement-based render for improved weatherproofing and to give a decorative finish; often the render is susceptible to the effects of damp and frost, which can cause cracking, bulging and staining. Before you redecorate a rendered wall, make good any damage, clean off surface dirt, mould growth and flaky material to achieve a long-lusting finish.

**Repairing defective render: -**

Before you repair cracked render, correct any structural faults which may have contributed to it. Brush to remove loose particles. Apply a stabilising solution if the wall is dusty.

Ignore fine hair cracks if you paint the wall with reinforced emulsion, which covers minor faults. Rake out larger cracks using a cold chisel, dampen with water and fill flush with the surface with exterior filler. Fill major cracks with a mortar mix comprising 1-part cement: 4 parts builders' sand, with a little PVA bonding agent added to help it stick to the masonry.

Bulges in render can indicate that the cladding has parted from the masonry. Tap gently with a hammer to find the extent of these hollow areas; hack off the material to sound edges. Undercut the perimeter of the hole to give a grip for the filler material.

Brush out debris then apply a coat of PVA bonding agent. When PVA is tacky, trowel on a mortar mix as for filling cracks then smooth with a wet trowel.

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# Rendering

**Reinforcing a crack in render**

To prevent a crack in the render opening again, reinforce the repair with a fine mesh embedded in a bitumen base coat (this will give it flexibility). Rake out the crack to remove any loose material, then wet it. Fill the crack just proud of the surface with a mortar mix of I part cement: 4 pans builders' sand. When this has stiffened scrape it flush with the render.

When the mortar has hardened, brush on a generous coat of bitumen base coat, making sure it extends at least 75mm on both sides of the crack. Embed strips of open weave fine fibre mesh (sometimes sold with the base coat) into the bitumen, using a stippling and brushing action. While it is still wet, feather the edges of the bitumen with a foam roller, bedding the fine fibre mesh into it. After 24 hours, the bitumen will be hard, black and shiny. Apply a second coat, feather with a roller and, when it has dried, apply two full coats of a compatible matching paint.

**Patching pebbledash**

Pebbledash comprises of small stones stuck to a thin coat of render over a thicker base coat. If damp gets behind pebble dashing, one or both layers may separate. Hack off any loose render back to a sound base and seal it with stabiliser. If necessary, repair the first `scratch coat' of render. Restore the texture of the top 'butter coat' with a thick paste made from a PVA bonding agent (bond Crete). Mix one part of cement powder with three parts clean, sharp (plastering) sand. Stir in one measure of bonding agent diluted with three parts water to form a thick, creamy paste. Load a banister brush or large paint brush and scrub the paste onto the bare surface. Apply a second generous coat of paste, stippling it to form a coarse texture. Leave for about 15 minutes to firm up then, with a loaded brush, stipple it to match the texture of the pebbles. Let the paste harden fully before painting.

To leave the pebbledash unpainted, make a patch using replacement pebbles. The result will not be a perfect match but could save you painting the entire wall. Cut back the blown area and apply a scratch coat followed by a butter coat. While this is still wet, fling pebbles onto the surface from a dustpan; they should stick to the soft render, but you'll have to repeat until the coverage is even.

**Removing rust stains**

Faulty plumbing will often leave rusty streaks on a rendered wall. Before decorating, prime the stains with an aluminium spirit-based sealer or they will bleed through. Rust marks may also appear on a pebble dashed wall, well away from any metalwork: these are caused by iron pyrites in the aggregate. Chip out the pyrites with a cold chisel, then seal the stain. Stains can also appear due to bore water and these mineral deposits can be removed with specific chemicals available at most hardware stores.

**EXTERIOR RENDERING: -**

Rendering is the application of a relatively thin layer of cement or cement-and-lime mortar to the surfaces of exterior walls to provide a decorative and weather-resistant finish. Any such

treatment of exterior walls should be carefully considered beforehand, because the finished outer surface should always harmonise with the character of a building and not look ill at ease with those of its neighbours. This is particularly important in the case of terrace housing, where the fronts of the houses form on unbroken run of wall.

**Planning ahead**

There are no regulations controlling the change of colour or texture of outer walls except those of listed heritage buildings and consequently one often sees houses made conspicuous by their individualistic decorative treatment.

Re-rendering a wall would always be acceptable as it is merely a case of renewing what is already there.

Rendering old brickwork might improve its weather-resistance, but at the cost of destroying the appearance of the building. Here it would be better to rake out the mortar joints, re-point them and, if necessary, treat the brickwork with a clear sealant.

**Rendering techniques**

The technique used in rendering is virtually the same as in plastering, for which cement, and lime are also sometimes used, and it generally involves using the same tools, though a wooden float is better than a plasterer's trowel for finishing the cement rendering. The wood leaves a finely textured surface that looks better than the very smooth one produced with a metal trowel.

Rendering the walls of a house is really a job for the professional, as it involves covering a large area and colour-matching the batches of mortar, which is critical if the finished job is not to look patchy.

While a non-professional can undertake repairs to rendering it is very difficult to match the colour of the new work to the old. You might consider finishing the complete wall with paint. New work can be approached by dividing the wall into manageable panels, using screed battens as in plastering. But colour matching the mortar will still be a problem, and 'losing' the join can be difficult. It might pay to concentrate on getting the rendering flat and then disguising any patchiness with paint, here again arises the question of the character of the house.

Before attempting to render a large wall, practise if possible on a smaller project, such as a garden wall.

**BINDERS FOR EXTERIOR RENDERING**

**MORTAR**

Mortar is a m mixture of sand cement and clean water. The sand gives the mix bulk and the cement binds the particles. A cement mix will bond to any ordinary masonry material and to metal. Mortars of various strengths are produced by adjusting the proportions of sand and cement, or by adding lime.

A mortar must not be stronger than the materials onto which it’s being applied to. In a wall of dense, hard bricks a cement-and-sand mix can be used. For soft bricks or blocks a weaker mix

of cement sand and lime is appropriate Cement sets by a chemical reaction with water known as hydration, and begins as soon as the water is added. Cement does not need to dry out in order to set, and the more slowly it dries out the stronger it will be.

Normally an average mix will stay workable for at least two hours. It will continue to gain strength for a few days after its initial set. reaching full strength in about a month.

Hot weather will reduce the workable time and can affect the set of the mortar by making it dry out too fast. In these conditions the work should be kept damp by being lightly sprayed with water or by being covered with polythene sheeting to retain the moisture and slow the drying time.

**CEMENT**

Cement made from limestone or chalk and clay and is generally called Portland cement. Various types are made by adding other materials or by modifying the production methods.

**Ordinary Portland cement (OPC)**

This common light grey cement is mixed with aggregates for concrete and mortars. It is available in 50kg bags but can be had in smaller amounts.

**White Portland cement**

This is similar to ordinary Portland but is white and more expensive It makes light-coloured mixes for bricklaying, rendering and concrete.

**Coloured cement**

Some coloured cements are available and pigments for colouring mortar mixes. The materials must be careful proportioned for the batches to match.

**Quick-setting cement**

This cement is mixed with water and sets hard in 30 minutes. It is non-shrinking and waterproof; useful for small repair jobs.

**Masonry cement**

Specially made for rendering and bricklaying, this grey cement is not suitable for concrete. Add no lime to it.

**LIME**

Lime is made from Limestone or chalk. When it leaves the kiln it is called quicklime, and may be non-hydraulic or hydraulic. Non-hydraulic lime, in use generally, sets by combining with carbon dioxide from the air as the water mixed with it dries out. Hydraulic lime has similar properties to cement; it sets when water is added and so can be used under water. When quicklime is slaked i.e. mixed with water- it expands and gives off heat This is particularly strong with non-hydraulic quicklime

Lime must be properly slaked before use, and at one time a batch would be soaked in a tub weeks beforehand. The soaked lime was called lime putty. Pre-slaked non-hydraulic lime powder, or hydrated lime is still sold by builder's merchants. It can be used at once, but is often soaked 24 hours before use to make lime putty. The Lime is mixed with water to a cream consistency or with sand and water and left to stand as lime mortar called "coarse stuff". This can be kept for some days without setting if it is heaped up and covered with polythene sheet to prevent the water evaporating.

The less active hydraulic lime is dry mixed with the sand like cement powder and the slaking process takes place when the water is added.

## AGGREGATES

Mortars are mixed with the finest aggregate, sand, and sand is graded by the size and shape of its particles. A well-graded sand will have particles of different sizes, not ones which are uniformly large or small.

### Types of sand

Sharp sand is used with other coarse aggregates for making concrete and floor screeds. Plasterers' sharp sand is of a finer grade, and is used for rendering. Soft', 'builders' or 'bricklayers' sand has smoother particles and is used for masonry work. Use well-washed sand, as impurities can weaken a mortar and affect the set. A good sand should not stain your hand if you squeeze it.

Most aggregates may be bought from builders' merchant by the cubic metre, some suppliers sell it in small packs.

### Stone chippings

Specially prepared crushed stone in various colours is used for pebble-dash rendering. Buy enough for the whole job in hand (check this with your supplier) as additional stones from another batch may not match the colour of those you have. If you do start running short, stop work at a corner rather than part way across a wall. The extra stones can be mixed with the remaining ones and a subtle change of colour is less likely to show on the adjacent wall.

### Dry-mixed mortar

Pre-packed sand-and-cement mortar mixes are sold by builders' merchants and DIY shops in large and small packs. They are ready-proportioned for different kinds of application and require only water to be added. As sand and cement settle, a whole bag should be used and mixed well, before adding the water.

This way of buying sand and cement is more expensive than buying loose material but the convenience and low wastage are great advantages, especially for small jobs.

## MORTAR MIXES FOR RENDERING: -

The mix for a mortar will depend on the strength of the material being rendered and the degree of its exposure. The undercoat mix should not be stronger than the background, and the top coat should be no stronger than the undercoat.

Though these considerations are not critical in most DIY work with mortar, however where a situation does dictate that a precise mix is required, the proportions of the materials must be measured quite accurately.

The material is measured by volume using a bucket. Loose cement and damp sand tend to 'bulk up' when loaded. Cement powder can be made to settle by tapping the bucket and it is then topped up. Damp sand will not settle so the measure is usually increased by 25 per cent. Dry sand and saturated sand will settle to a normal measure.

**STORING SAND AND CEMENT**

Storing the materials should not NORMALLY BE NECESSARY BECAUSE IT IS BEST THAT THEY BE BOUGHT AS REQUIRED AND USED UP BY THE END OF THE JOB.

However, if you are held up for a time after taking delivery you should store the powder or pre-mixed materials on plastic sheets in a dry place.

Sand should be stored in a neat heap on a board or plastic sheet and protect it from windblown dirt and rain with plastic sheeting. NB. dirty sand can affect the set of the cement. Keep it covered.

**ADDITIVES**

proprietary additives which modify the properties of mortars are added to the mix in precise proportions according to the manufacturer’s instructions. Their functions vary. Water proofers which make mortars impervious to by sealing its pores may be used when rendering exposed walls. Plasticisers, additives which make the mortar easier to work with can be used instead of lime.

**MORTAR MIXING FOR RENDERING**

Mix only as much mortar as you can use in an hour, and if the weather is very hot and dry shorten this to half an hour. Keep all your mixing tools and equipment thoroughly washed so that no mortar sets on them.

Measure the required level bucketsful of sand onto the mortar board or for larger quantities - onto a smooth, level base such as a concrete drive. Using a second dry bucket and shovel, kept exclusively for cement powder, measure out the cement, tapping the bucket to settle the loose powder and topping it up as needed. Tip the cement over the heaped-up sand and mix sand and cement together by shovelling them from one heap to another and back again (l)- and continue to turn this dry mix - the sand will actually be damp until it takes on a uniform grey colour. Form a well in the centre of the heap and pour in some water (2) - but not too much at this stage.

Shovel the dry mix from the sides of the heap into the water until the water is absorbed (3). If you are left with dry material add more water as you go until you achieve the right firm, plastic consistency in the mortar, turning it repeatedly to mix it thoroughly to an " even colour. It is quite likely that you will misjudge the amount of water at first so if after turning the mix it is still relatively dry sprinkle it with water (4)- But remember that too much water will weaken the mix.

Draw the back of your shovel across the mortar with a sawing action to test its consistency (5) - The ribs formed in the mixture by this action should not slump back or crumble, which would indicate respectively that it is either too wet or too dry. The back of the shovel should leave a smooth texture on the surface of the mortar.

Make a note of the amount of water used in proportion to the dry materials so that further mixes will be consistent. For cement-lime-sand mixes the lime powder can be added with the cement and dry-mixed as described above. Otherwise lime putty can be mixed with the sand before the cement is added, or the cement can be added to prepared coarse stuff. When you have finished, hose down and sweep clean the work area particularly if it is a driveway as any remaining cement slurry will stain the surface.

## MIXING MORTAR BY MACHINE

You can hire a small-capacity electric or petrol-driven cement mixer. Such a mixer can save you much time and effort, especially on big jobs, and is quite easy to use.

Set the machine as close as possible to the work area and place a board under the drum to catch any spilt materials. If it is an electric-powered machine take all due precautions with the power supply and keep the cables well clear of the work.

Load the drum with half the measure of sand and add a similar proportion of cement, and lime if required. Dry-mix them by running the mixer, then add some water.

Load the remainder of the materials in the same sequence, adding a little water in between.

Run the mixer for a couple of minutes to mix the materials thoroughly, then stop the machine and test some of the mix for consistency, as it may appear stiffer than it is.

A rendering mix should be less workable than a mix for bricklaying, and for rendering blockwork it is usually stiffer than for brickwork. but this will depend on the absorbency of the wall. It is advisable to wash out the drum of the mixer after each mix and to scour it out with water and some coarse aggregate at the end of the working day. If you return the machine with dry or drying mortar in its drum you may be charged extra.

### Cement mixer

Hire an electric or petrol-driven mixer when a large batch of mortar is required.

## TEXTURED RENDERINGS

Renderings may be textured by tooling while damp to make patterns or by applying a coarse aggregate, which is a skilled procedure (See below for details). Reproduce a texture when patch repairing.

### Roughcast Rendering

For this rendering, mix aggregate no more than 1Omm in size with the top coat mortar. Use about half as much as the sand used with enough water for a sticky mix. Flick it on the wall to build up an even coat.

**Pebbledash Rendering**

Crushed stone aggregate gives pebbledash its colour, and an even distribution of the chippings is required to avoid patchiness.

A 10 to 12mm thin top coat is applied and the stones thrown at it while soft, they are pressed with a float to bed them in.

**Tyrolean Finish**

A fine cement mix is sprayed from a hand-cranked Tyrolean machine' to build up a decorative honeycomb texture over a dry undercoat rendering. Doors, windows, gutters etc. must be masked beforehand. Tyrolean machines may be hired.

**Preparing the surface**

Neatly chop away the old loose coating on areas of cracked or blistered rendering, using a hammer and chisel. Rake out the mortar joints in the exposed brickwork if necessary and brush the area down. Clean off any organic growth like lichen or algae and apply a fungicide.

**Working platform**

Set up a safe working platform from which to do the rendering. You will need both hands free to use the tools, so it cannot be done from a ladder. Pairs of steps with a scaffold board between them can be used for working on ground floor walls, but for upper walls you will need a scaffold tower.

**New work**

Set up a 1Omm vertical screed battens spaced no more than 900mm apart, fixing them with masonry nails into the mortar joints of the brickwork. Check them for level and pack them out where necessary. Between two battens apply undercoat rendering with firm pressure to make it bond well onto the background, building it up to the thickness of the screed battens. Level the mortar off with a straight edge laid across the battens and worked upward with a side-to-side movement, then scratch the surface of the mortar to provide a key for the top coat and leave it to set for a week. You can fill in the panels between the battens in sequence or fill alternate ones. Whichever you do, let them set before removing the screeds. The former method will leave narrow strips to be filled in where the screeds have been removed, whereas in the second method the newly set alternate panels of rendering will provide a levelling surface for those to be done.

Apply top coat rendering about 6 mm thick, either freehand or with the aid of screed battens as before. In any case use a straight edge for levelling it off, then finish it with a wooden float, which will produce a finely textured surface on the rendering.

To apply rendering, this is the suggested Order of working: -

1 Set up a safe work platform

2 Divide the wall with vertical screeds

3 Apply the undercoat rendering between the screeds or alternate panels

4 Remove screeds and fill in gaps or panels

5 Apply top coat over keyed undercoat

**PATCH REPAIRS**

The rendering should be applied with a metal plasterer's trowel and the top coat finished with a wooden float. Take a trowel full of mortar from your hawk and spread it on the wall with a firm pressure and applying it with an upward stroke.

Build up the undercoat layer no more than two thirds the thickness of the original rendering or 1Omm, whichever is the thinner.

Level the mortar with a straight edged batten that fits within the cut-out of the area being patched, then scratch a key in the surface for the top coat. Leave the undercoat to set and strengthen for a few days.

**The top coat**

Before applying the top coat dampen the undercoat rendering if necessary to even out the suction. When the coat is on, level it with a straight edge laid across the surfaces of the surrounding rendering and worked upward with a side-to-side motion.

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# Painting

**SAFETY WHEN PAINTING: -**

Decorating isn't dangerous so long as you take sensible precautions to protect your health.

Ensure good ventilation indoors while applying a finish and when it is drying. Wear a facemask if you have respiratory problems.

Do not smoke while painting or near drying paint. Contain paint spillage’s outside with sand or earth and don't allow it to enter a drain.

If you splash paint in your eyes, flush them with copious amounts of water with your lids held open; if symptoms persist, visit a doctor. Wear barrier cream or gloves on sensitive hands. Use a proprietary skin cleanser to remove paint from the skin or wash it off with warm soapy water. Do not use paint thinners to clean your skin.

Keep any finish and thinners out of reach of children. If a child swallows a substance, do not attempt to make it vomit but seek medical treatment.

**PREPARING THE PAINT**

Whether you're using newly purchased paint or leftovers from previous jobs, there are some basic rules to observe before you apply it.

Wipe dust from the paint can, then prise off the lid with the side of a knife blade. Don't use a screwdriver: it only buckles the edge of the lid, preventing an airtight seal and making subsequent removal difficult.

Gently stir liquid paint with a wooden stick to blend the pigment and medium. There's no need to stir thixotropic paints unless the medium has separated; if you must stir it, leave it to gel again before using.

If a skin has formed on paint, cut round the edge with a knife and lift out in one piece with a stick. It's a good idea to store the can on its lid, so that a skin cannot form on top of the paint. Whether the paint is old or new, transfer a small amount into a paint kettle or plastic bucket. Old paint should be filtered at the same time, tying a piece of muslin or old nylon tights across the rim of the kettle.

**PAINTING EXTERIOR MASONRY: -**

The outside walls of your house need painting for two major reasons: to give a clean, bright appearance and to protect the surface from the rigours of the climate. What you use as a finish and how you apply it depends on what the walls are made of their condition and the degree of protection they need.

Bricks are traditionally left bare, but may require a coat of paint if they're in bad condition or previous attempts to decorate have resulted in a poor finish. Rendered walls are normally painted to brighten the naturally dull grey colour of the cement; pebble dashed surfaces may need a

colourful coat to disguise previous conspicuous patches. On the other hand, you may just want to change the present colour of your walls for a fresh appearance.

**Working to a plan**

Before you start painting the outside walls of your house, plan your time carefully. Depending on the preparation even a small house will take a few weeks to complete. It's not necessary to tackle the whole job at once, although it is preferable the weather may change to the detriment of your timetable. You can split the work into separate stages with days (even weeks) in between, so long as you divide the walls into manageable sections. Use window and door frames, bays, downpipes and corners of walls to form break lines that will disguise joins. Start at the top of the house, working right to left if you are right-handed (vice versa if you are left-handed).

**SUITABLE PAINTS FOR EXTERIOR MASONRY: -**

There are various grades of paint suitable for decorating and protecting exterior masonry, which takes into account economy, standard of finish, durability and coverage. Use the chart opposite for quick reference.

**CEMENT PAINT**

Cement paint is supplied as a dry powder to which water is added It is based on white cement, but pigments are added to produce a range of colours Cement paint is the cheapest of the paints suitable for exterior use although it is not as weatherproof as some others. Spray new or porous surfaces with water before you apply two coats.

**Mixing cement paint**

Shake or roll the container to loosen the powder, then add two volumes of powder to one of water in a clean bucket. Stir it to a smooth paste then add a little more water until you achieve a full-bodied, cream consistency. Mix up no more than you can use in one hour, or it will start to dry.

**Adding an aggregate: -**

When you're painting a dense wall, or one treated with a stabilising solution so that its porosity is substantially reduced, it is advisable to add clean sand to the mix It also provides added protection for an exposed wall and helps to cover dark colours.

If the sand changes the colour of the paint add it to the first coat only Use one volume of sand to four of powder, but stir it in when the paint is still in its paste-like consistency.

**EXTERIOR-GRADE EMULSION**

Exterior grade emulsion resembles the interior type; it is water-thinnable and dries to a similar smooth, matt finish However it’s formulated to make it weatherproof and includes an additive to prevent mould growth so apart from reinforced emulsions, it is the only emulsion paint recommended for use on outside walls. The paint is ready for use but thin the first coat on porous walls with 20 per cent water.

Follow up with one or two full-strength coats (depending on the colour of the paint)

**REINFORCED EMULSION**

Reinforced emulsion is a water-thinnable, resin-based paint to which has been added powdered mica or a similar fine aggregate. It dries with a textured finish that is extremely weatherproof, even in coastal districts or industrial areas where darker colours are especially suitable.

Although cracks and holes must be filled prior to painting, reinforced emulsion will cover hair cracks and crazing. Apply two coats of paint in normal conditions but you can economise by using sanded cement paint for the first coat.

**SPIRIT-Thinned MASONRY**

A few masonry paints suitable for exterior walls are thinned with white spirit but they are based on special resins so that, unlike most oil-based paints, they can be used on new walls without

**SPIRIT-Thinned MASONRY**

A few masonry paints suitable for exterior walls are thinned with white spirit but they are based on special resins so that, unlike most oil-based paints, they can be used on new walls without priming first with an alkali-resistant primer ( ). Check with manufacturers recommendations. However, it is advisable to thin the first coat with I 5 per cent white spirit.

**TEXTURED COATING**

A thick textured coating can be applied to exterior walls. It is a thoroughly weatherproof, self-coloured coating, but it can be overpainted to match other colours. The usual preparation is necessary, and brickwork should be pointed flush. Large cracks should be filled but a textured coating will cover fine cracks. The paste is brushed or rolled onto the wall, then left to harden, forming an even texture on the other hand you can produce a texture of your choice using a variety of simple tools It's an easy process but practise on a small section first.

**Concrete floor paints**

Floor paints are specially prepared to withstand hard wear. They are especially suitable for concrete garage or workshop floors, but they are also used for stone paving, steps and other concrete structures. They can be used inside for playroom floors.

The floor must be clean and dry and free from oil or grease. If the concrete is freshly laid, allow it to mature for at least three months before painting. Thin the first coat of paint with 10 per cent white spirit. Don't use floor paint over a surface sealed with a proprietary concrete sealer, but you can cover other paints so long as they are keyed first. The best way to paint a large area is to use a paintbrush around the edges, then fit an extension to a paint roller for the bulk of the floor.

**Using paintbrushes**

Choose a 100mm to 150mm wide paintbrush for walls; larger brushes are heavy and tiring to use. A good quality brush with coarse bristles will last longer on rough walls. For a good coverage, apply the paint with vertical strokes, cris-crossed with horizontal ones. You will find it necessary to stipple paint onto textured surfaces.

**Cutting In**

Painting up to a feature such as a door or window frame is known as cutting in. On a smooth surface, you should be able to paint a reasonably straight edge following the line of the feature, but it's difficult to apply the paint to a heavily textured wall with a normal brush stroke. Don't just apply more paint to overcome the problem; instead, touch the tip of the brush only to the wall, using a gentle scrubbing action, then brush excess paint away from the feature once the texture is filled. Wipe splashed paint from window and door frames with a cloth dampened with the appropriate thinner.

**Painting behind pipes**

To protect rainwater downpipes, tape a roll of newspaper around them. Stipple behind the pipe with a brush then slide the paper tube down the pipe to mask the next section.

**Painting with a banister brush**

Use a banister brush to paint deep textures such as pebbledash. Pour some paint into a roller tray and dab the brush in to load it. Scrub the paint onto the wall using circular strokes to work it well into the uneven surface.

**Using a paint roller**

A roller will apply paint three times faster than a brush. Use a deep-pile roller for heavy textures or a medium pile for lightly textured or smooth walls. Rollers wear quickly on rough walls, so have a spare sleeve handy. Vary the angle of the stroke when using a roller to ensure an even coverage and use a brush to cut into angles and obstructions. A paint tray is difficult to use at the top of a ladder, unless you fit a tool support, or better still erect a flat platform to work from.

**Using a spray gun**

Spraying is the quickest and most efficient way to apply paint to a large expanse of wall. But you will have to mask all the parts you do not want to paint, using newspaper and masking tape. The paint must be thinned by about 10 per cent for spraying, set the spray gun according to the manufacturer's instructions to suit the particular paint. It is advisable to wear a respirator when spraying.

Hold the gun about 225mm away from the wall and keep it moving with even, parallel passes. Slightly overlap each pass and try to keep the gun pointing directly at the surface, this is tricky while standing on a ladder. Trigger the gun just before each pass and release it at the end of the stroke. When spraying a large, blank wall, paint it into vertical bands, overlapping each band by 100mm.

Spray external corners by aiming the gun directly at the apex/corner so that paint falls evenly on both surfaces. When two walls meet at an internal angle, treat each surface separately.

When spray painting columns, i.e. columns as part of a front door portico for example, they should be painted in a series of overlapping vertical bands. Apply the bands by running the spray gun from side to side as you work down the column.

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# General Roof construction

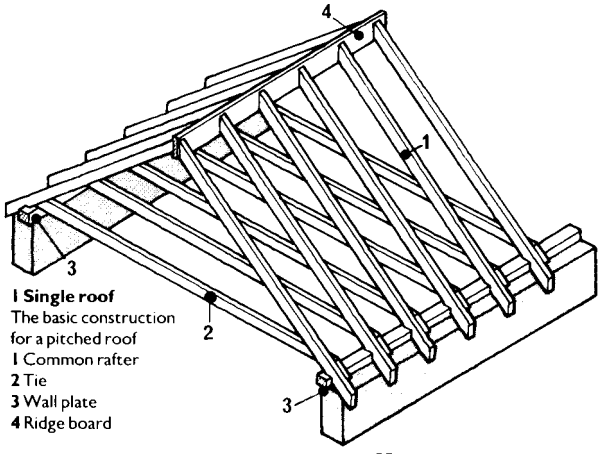
**ROOFS: - Pitched Prefabricated Roofs**

Most pitched roofs were once built directly on site from individual lengths of timber, but nowadays, for economy of time and materials, some builders use prefabricated frames called trussed rafters. These are specifically designed to meet the loading needs of a given house and, unlike traditionally built roofs, are usually not suitable for conversion because to remove any part of the structure can cause it to collapse.

**Basic construction**

The framework of an ordinary pitched roof is based on a triangle, the most rigid and economical form for a load bearing structure. The weight of the roof covering is carried by the sloping members, the "common rafters", which are set in opposing pairs whose heads meet against a central ridge board. The lower ends, or feet, of the rafters are fixed to timber wall plates which are resting on the exterior or interior walls and distribute the weight uniformly.

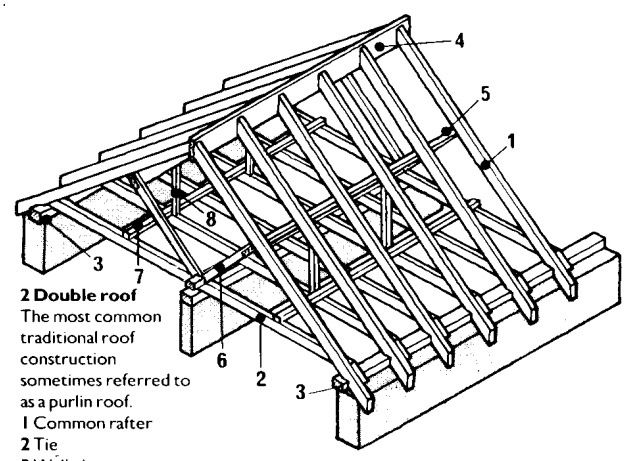
To stop the roofs weight pushing the walls out, horizontal `ties are fixed to the ends of each pair (or every second pair) of rafters and the wall plates, forming a simple structure called a "close couple" roof. The ties (ceiling joists) in older type of construction also usually support the ceiling plaster, in the modern method the ties are known as collar ties and the ceiling joist are separate from the pitched roof members. The rafters are also linked by the roofing battens.




**1 Single roof**
The basic construction for a pitched roof
**1** Common rafter
**2** Tie
**3** Wall plate
**4** Ridge board

**SINGLE ROOFS**

Any roof, pitched or flat, with unbraced rafters - except the pitched roof's ties, is called a single roof, and is only suitable for light coverings and short spans. For a wide span or heavy covering the design would need unduly large roof timbers.




**2 Double roof**
The most common traditional roof construction sometimes referred to as a purlin roof.
**1** Common rafter
**2** Tie
**3** Wall plate
**4** Ridge board
**5** Purlin
**6** Strut
**7** Binder
**8** Hanger

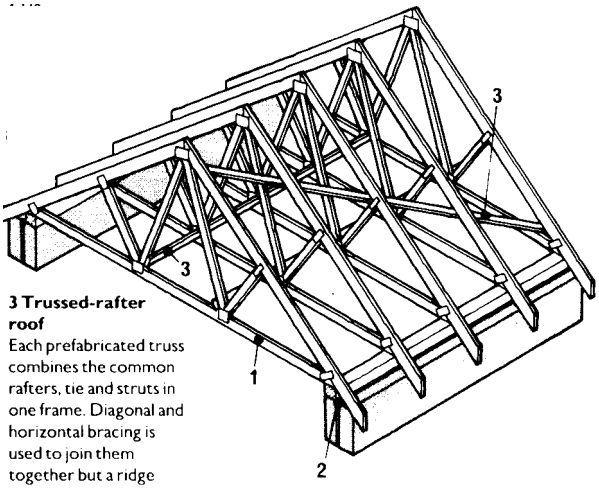
### DOUBLE ROOFS

In double roofs, horizontal beams called underpurlins support the rafters, linking them either midway between base and ridge or 2.5m apart. This reduces the span of the rafters and allows lighter timber to be used, 100 x 50mm being a common size. The purlins section depends on the weight of the roof covering but it usually exceeds that of the rafters 100 x 75mm is normal. The purlins ends are supported on the brickwork of a gable wall or, in a hipped roof, by the hip rafters

To keep the purlins size down, struts may be set in opposing pairs to brace them diagonally at every fourth or fifth pair of rafters. Struts transfer some weight back to the centre of the ceiling joists, which are supported there by a load-bearing dividing wall at right angles to them.

The ends of the struts may be jointed over a horizontal binder fixed to the joists right above the supporting wall. Where ceiling joists are light, and the span could make them sag, vertical timber “hangers” are fixed at the top to every third or fourth rafter or to adjacent purlins at like intervals, and at the bottom to a 'binder fixed at right angles across the joists.

## ROOFS: - Pitched Roofs (Continued)




**3 Trussed-rafter roof**
Each prefabricated truss combines the common rafters, tie and struts in one frame. Diagonal and horizontal bracing is used to join them together but a ridge board is not fitted.
**1** Trussed rafter
**2** Wall plate
**3** Bracing

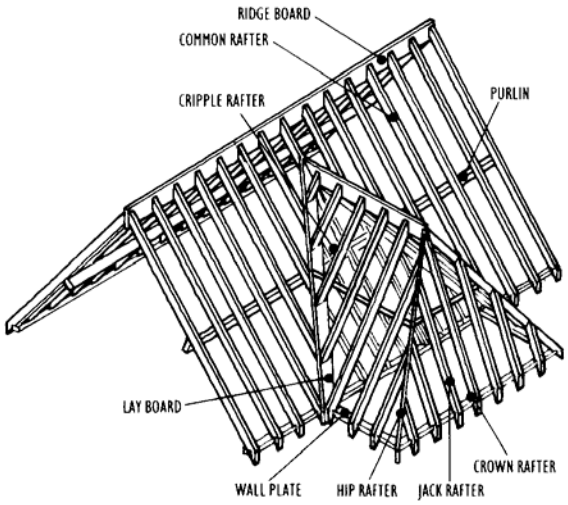
### TRUSSED ROOFS

Some traditional roofs embody trusses, rigid triangular frames that replace load bearing partition walls to give a wider span. Trusses carry the purlins, which in turn support the rafters and form a triple or 'framed' roof. The trusses are spaced at 1.8m or more depending on the purlins section or the roof coverings weight. As main bearers for the roof they transmit weight to the exterior walls. Few trussed roofs can be converted, and you should not try to cut into them. Trussed rafters are used in some new housing. Computer-designed for economy plus rigidity, the trusses are prefabricated of planed softwood or

hardwood. Each truss combines common rafters tie and strut bracing in one frame; the members are butt jointed and fixed with special nailed plate connectors.

The trusses are spaced a maximum 600mm apart, linked horizontally with brace members and nailed to the struts. Such roofs are quite light, and usually fixed to the walls with steel anchor straps to resist wind pressure.

## Just a short introduction to: -



Hips and valleys

### Hips and valleys

All the components mentioned earlier are found in an ordinary gable roofs. One with a hipped end or valleys has other parts, but all follow the same principles. Here is a double roof, it shows the parts and their names.

### Eaves

The overhang of rafters past the outer walls is called the eaves, but sometimes rafters are cut flush with the walls and a fascia board along their ends protects them and supports the guttering. Projecting rafters can be left open, the ends exposed, (called exposed eaves}and gutter brackets screwed to their sides or top edge.

### Closed eaves

The back of a fascia is usually grooved to take a soffit board, which closes the eaves. The board can be at 90 degrees to the wall or slope with the rafters, and it can be of various weatherproof materials. If ceiling insulation is laid, a roof with closed eaves should be ventilated by a small gap between soffit board and wall or by fitted vents.

### The verge

The verge is the sloping edge of the roofing face and can end, either flushed with the wall, or projecting past it. A flush verge means a roof structure that stops at the wall, with end rafters placed close to it and the roofing overlying it. A projecting verge means, timbers extending beyond the wall and short lengths of rafter set in the brick, to carry an outer rafter with a barge board, fixed to it. Behind the barge board may be a soffit board to conceal the outer rafters.

## POSSIBLE ROOF STRUCTURE PROBLEMS

A roof structure can fail when timbers decay through inadequate weather proofing, condensation or insect attack. It can also result from overloading caused by too-light original timbers, a new roof covering of heavier material or the cutting of a window opening that is not properly braced. You can detect any movement of a roof structure from outside. From ground level any sagging of the roof will be seen in the lines of the roof covering.

## INSPECTION

The roof should also be inspected from inside. In any case, this should be done annually to check the weathering (This is very rare in Australian roofs as the timber used is generally hard wood i.e. Karri, Jarrah or rarely used redgum) and for freedom from termite infestation.

Work in a good light. If your roof space has no lighting use a mains-powered extension light. Be very careful to only walk on the ceiling joist.

## ROT AND INFESTATION

Rot in roof timbers is a serious problem which must be rectified by experts, but its cause should also be identified and promptly dealt with.

Rot is caused by damp conditions that encourage wood-rotting fungi to grow. Inspect the roof covering closely for loose or damaged elements in the general area of the rot, though on a pitched roof water may be penetrating the covering at a higher level and so not be immediately obvious. If the rot is close to a gable wall you should suspect the gable flashing. Rot can also be caused by condensation, the remedy for which is usually better ventilation. If you bring in contractors to treat the rot it is better to have them make all the repairs. Their work should be covered by a guarantee which may be invalid if you attempt to deal with the cause yourself to save money. Termite infestation should also be dealt with by professionals if it is serious. Severely infected wood may have to be cut out and replaced, and the whole structure will have to be spray treated.

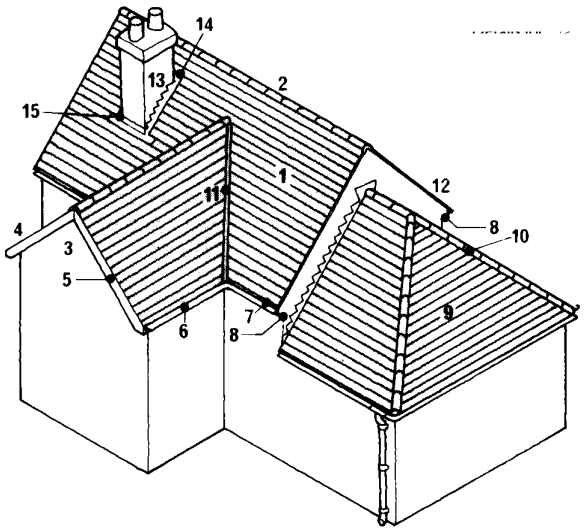
## STRENGTHENING THE ROOF

A roof that shows signs of sagging may have to be braced strengthened though it may not be necessary if a sound structure has stabilised and the roof is weatherproof. In some old buildings a slightly sagging roof line is considered attractive. Consult an Engineer if you suspect a roof is weak. Apart from a sagging roof line, the walls under the eaves should be inspected for bulging and checked with a plumb line. Bulging may occur where window openings are close to the eaves, making a wall relatively weak. It may be due to the roof spreading because of inadequate fixing of the rafters and other roof components. If this is so, call in an Engineer, builder or roofing contractor to do the repair work. A lightly structured roof can be made stronger by adding extra members. The method chosen will depend on the type of roof, its span, its loading and its current condition. Where the lengths or section of new timbers required are not too large, the repair may be possible from inside. If not, at least some of the roof covering may have to be stripped off. Any sagging roof must be surveyed, and the most economical solution adopted.

## PITCHED ROOF COVERINGS: -

**Roof-covering components for a pitched roof.**

**1** Tile or slate covering
**2** Ridge tile
**3** Gable end
**4** Projecting verge
**5** Barge board
**6** Eaves
**7** Fascia
**8** Soffit
**9** Hipped end
**10** Hip tile
**11** Valley
**12** Flush verge
**13** Lead stepped flashing
**14** Back gutter
**15** Apron

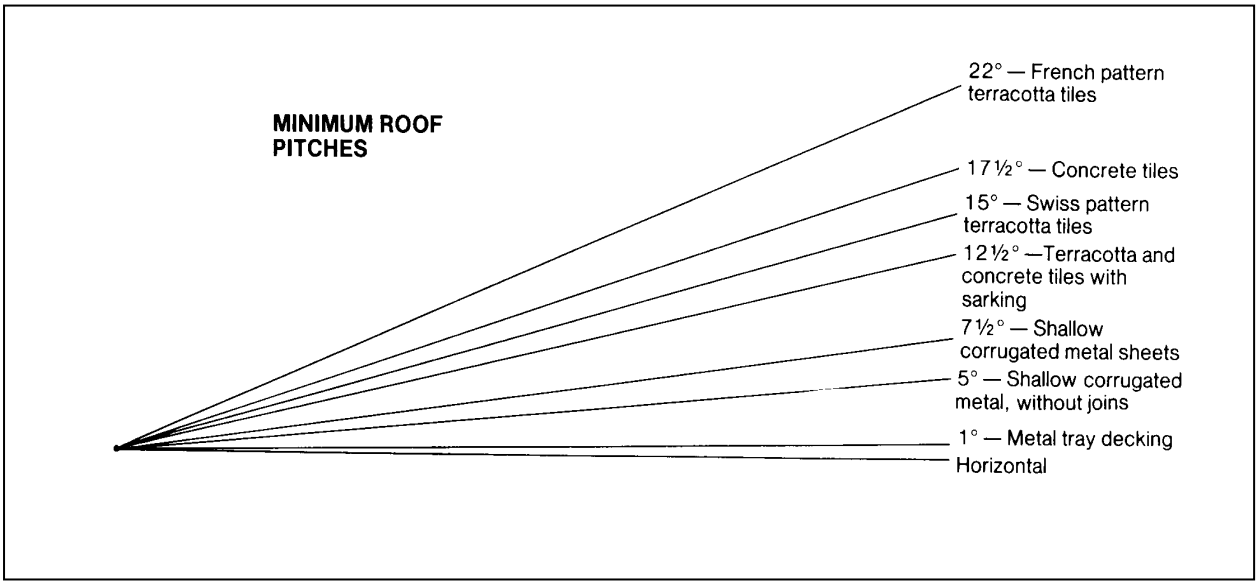



Coverings for domestic pitched roofs follow a long tradition, and despite the developments in new materials the older ones and the ways of using them have not changed radically.

Like most early building materials, those used for roofing were generally of local origin, which led to a diversity of roof coverings, including tiles, slates and timber shingles. For centuries they were hand-made, and had their own characteristics, to be seen in various regional styles.

During the last century the more durable roof coverings, such as tiles and slates, became more widely adopted. Most roofing materials are laid across the roof in rows called courses so that the bottom edge of each overlaps the top of the one below. This means that they are laid working from the eaves up the slope of the roof to the ridge. Specially shaped tiles are used for capping the ridge or hips so as to weatherproof the junctions of the slopes. Where the covering meets a chimney or a wall it is protected with flashing, usually made of lead or mortar.

When considering a type of roof cover to complement the design of a home one must check since all roof cover manufacturers have recommended minimum pitches by which they guarantee water tightness. Going below the recommendation, the chance of water ingress is quite real. Below is a general table or check with the relevant manufacturer.




**Reinforcing Roof Timber Components:**

Damage to roof rafters and deflection in roof structures are not unusual. Prior to the event of prefabricated trusses, the roofs of most houses were built from rafters, wall plates ridge beams hip beams and under purlins. Additional bracing straps and stiffeners were used to support the roof using the internal walls. The reason for failure of the roof components are various, a common problem is the tendency for rafters to deflect or move outwards at the eaves. This could happen due to the under purlin that supports the rafters between the ridge and the wall plates are not adequate in size. Running at right angles, a purlin supports the rafters, between the ridge and the wall plate, if the under purlin begins to sag so in turn will the rafters. The weight of the roof, is one of the major reasons for roof sag, even if the structure appears sound its integrity may be threatened if the incorrect sizes and spans are used this may not show up for several years.

If a problem of this kind presents itself, then you should engage the help of a structural engineer to identify the problem and recommend a solution. Once the remedial procedures have been designed, there is no reason why a competent handy man cannot do the work himself.

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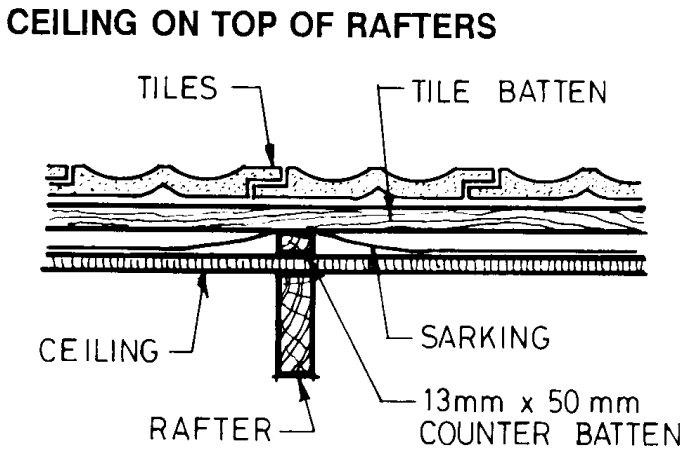
# Roof Tiles

**UNDERLAY: -**

Underlay or better known as sarking is sold in rolls and cut to length as required. the sheet material provides a barrier to any moisture that may penetrate the outer covering. It also improves the insulation value of the roof.




Like the tiles themselves the sarking is laid horizontally working upwards from the eaves with each strip overlapped by the other. The sarking is not to be stretched but to have a belly of 50mm between rafters. the sarking is also to run 50 mm into the gutter and 150mm over the ridge board.

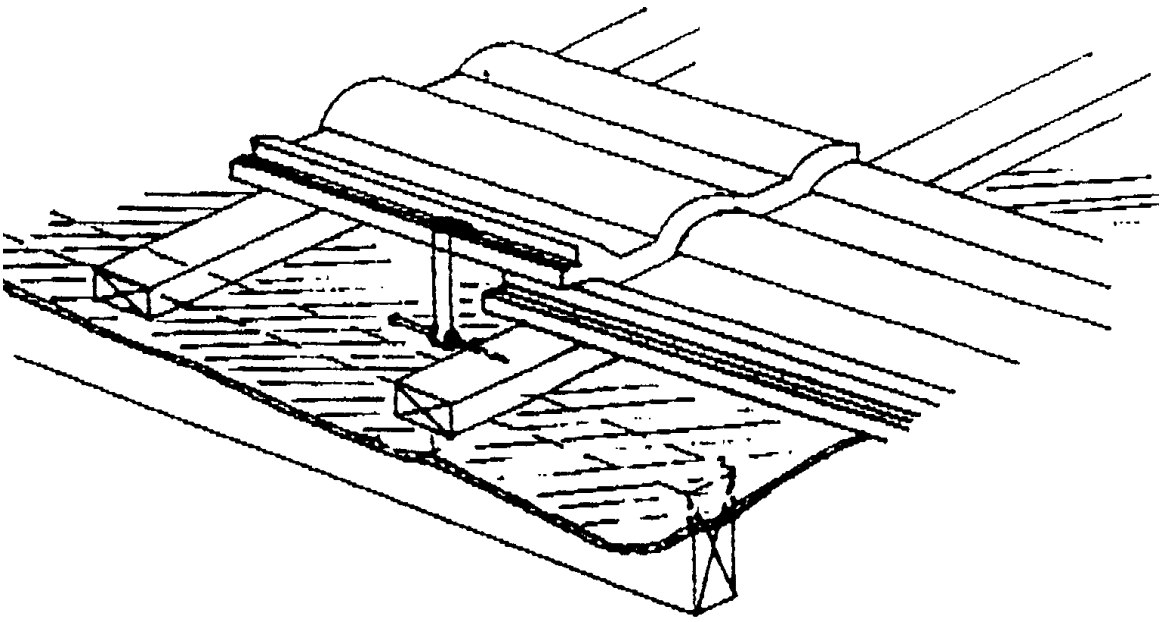
**BATTENS: -**

The roof covering is supported on sawn hardwood battens which are nailed across the rafters over the sarking. When the ceilings are of the exposed rafter type with the ceiling lining on top of the rafters, then there should be vertical counter battens under the horizontal battens to provide some ventilation under the tiles and allow any moisture to drain down freely.

**FIXING: -**

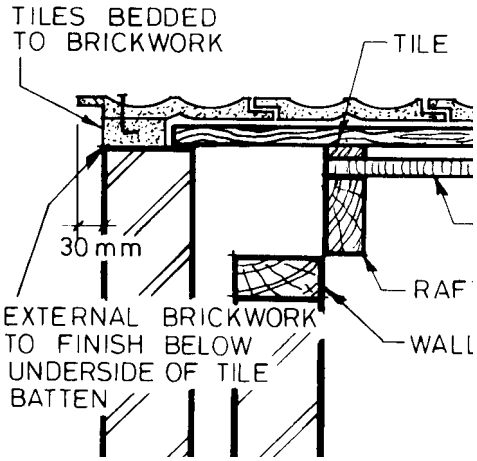
Generally, on closed and open eaves all tiles on the gutter course are nailed, the top ridge course of tiles are also all nailed and every second tile in the remaining courses are to be nailed. On gable roofs the first four tiles in from the verge on each course are nailed and verge tiles are nailed with 60mm spring head nails.

**Storm clips** are a galvanised clip attached to a zinc nail that can be used in conjunction with standard fixing methods as a further protection against high winds. Each clip is positioned to grip the tile and then nailed to the batten, this can be used on every tile or every second tile

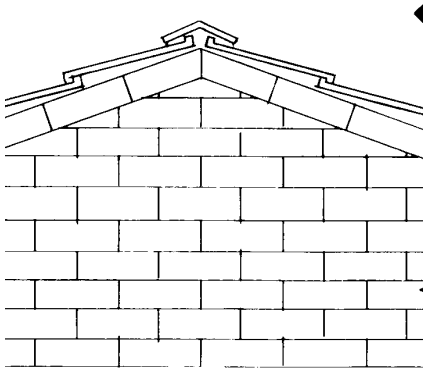


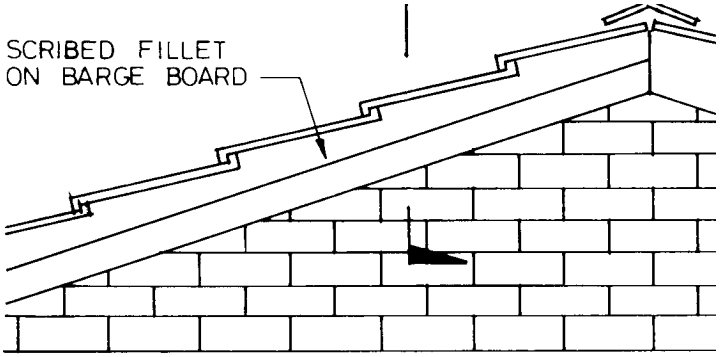
It is important that the overall appearance and performance of a roof is well finished at the **Verges**, **Eaves** and **Valley edges.**

**THE VERGE: -** The verge detail at a ridge can be finished in several ways

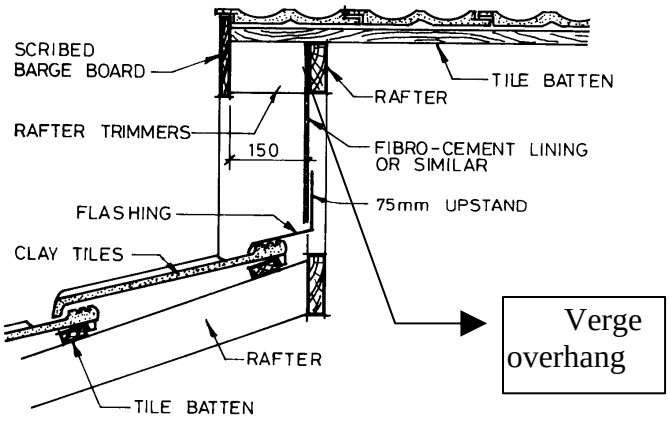



**(a)** A flush verge, this is where the tiles have a very small overhang, about 50mm. The last brick on a gable is cut as close as possible to match the roof pitch or the brick is laid to run the pitch. The end tile is then bedded neatly on a mortar bed which is finished of by the roof tiler.






**(b)** Instead of cutting the bricks to the pitch of the roof a barge board is fitted to the face of the gable brick work covering the staggered brickwork. The tiles are still allowed to sit and additional 25 mm past the fixed barge board. The gaps that are a result of the lapping of the tiles are then covered by fitting a thinner and narrower timber on top which is called a **scribe fillet**. As the name suggest the narrow timber is scribed to the underside of the profile of the tiles thus giving it a neat appearance.




(c) The verge does not necessarily have to be flush. Generally, they have about a 200mm wide overhang to gambrel and the gables are finished in a decorative cladding to enhance or break the look of a roof, the finish of the verges is then a mixture of (a) and (b).

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# Roof Eaves & Guttering

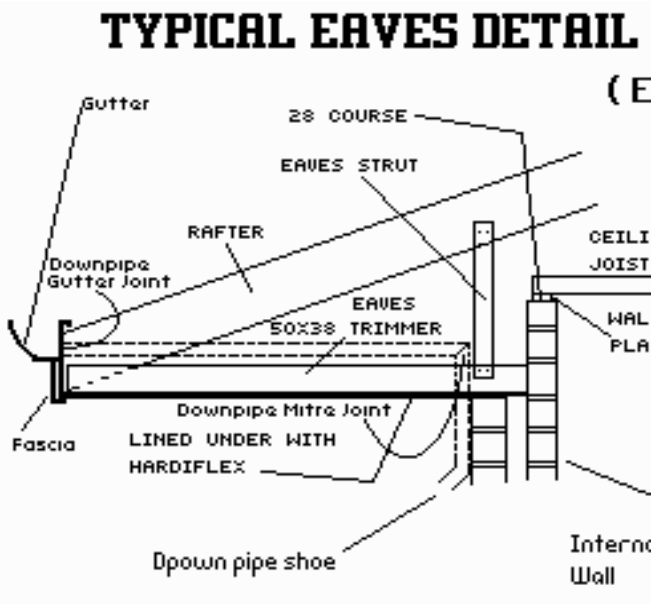
**EAVES: -** Eaves (open or closed) or sometimes called soffit, is the overhang of the roof, giving a sort of protection or shading to the house as well as a certain look. If you look around at homes, you will find that the majority of homes have eaves, the ones that don't stand out and are usually described as Mediterranean, Tuscan or French Provincial and as a general rule are cement rendered and painted.

Now the eaves generally overhang about 600mm and some are up to 900mm wide. We have found that the ones with the wider overhang develop a sag over time, due to the timber sizes not being of the correct dimension and it usually sags on the corners. This sagging generally causes the Hip end tiles and the mortar to become dislodged, requiring re-cementing.

You will generally find water staining on eaves and in 99% of cases we have found this to be due to several factors.

Gutters are not cleaned out regularly, the gutter and downpipe junction is not back plated **(diagram 3),** the join between gutter and downpipe is leaking, the mitred downpipe joins are leaking **(diagram 1)**, the overhang of the tiles into the gutter is not long enough and water can be blown back into the eaves **(diagram 2)**, a cracked tile **(diagram 2),** or the overhang of the last hip tile is also not long enough. All these above are known and common causes of damp in the eaves.

**Diagram (1)**



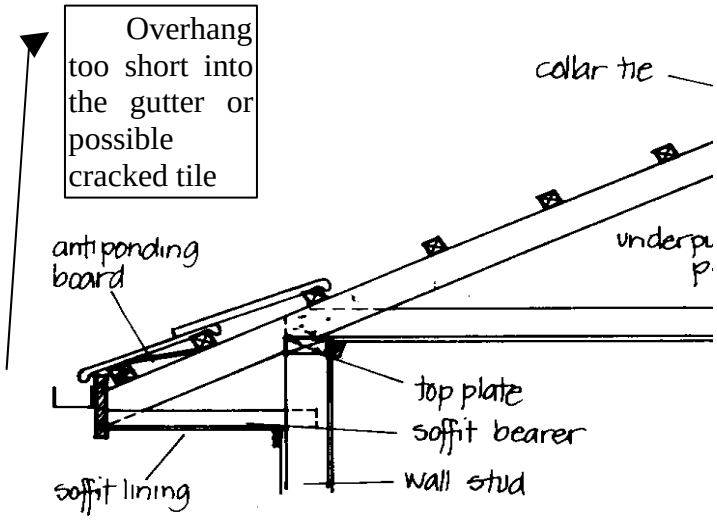
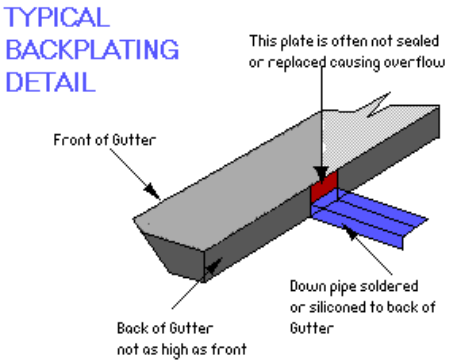




**Diagram (2)**

**Diagram (3)**

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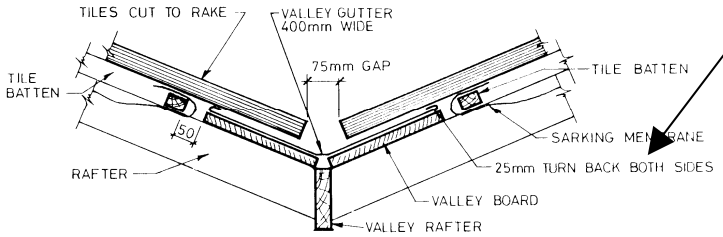
# Roof Valley & Ridges

**VALLEYS: -**

Valleys are a necessary evil, by that I mean the they are necessary in terms of draining a roof where the roof changes direction and without fail they are also the most common source of water ingress. Let's look a little deeper into the function and why water gets in:




SECTION - THROUGH VALLEY

STANDARD VALLEY GUTTER

The gutter sheet is turned up at the edges to stop water, as it flows rapidly down the tile from overshooting the valley. Inevitably these returns become clogged with debris which accumulates over time. When this occurs water quite easily overshoots, and water can ingress onto the ceiling below.

To maintain and avoid this regular cleaning is essential.

In almost all homes, new or old, that have water ingress problems, it was found that the where the sheet gutter had been returned, it was flattened down. This occurs when the roof tilers place the last cut tile into the valley. It is imperative to make sure that the upstand is not squashed down. The roof tiling contractors have been told by the respective employers, but it still happens. The problem is that supervisors do not lift all the tiles that have been placed to check whether the upstands have been flattened and it becomes a matter of work integrity, as the problem will only manifest itself during heavy rainy periods.

There are times when the installation has been performed as per the book and water still gets in especially when the roof pitches are very steep. The water then gains a high velocity and still overshoots the upstand. One remedy that has worked successfully in the past is the securing of a vertical upstand (100mm high) which acts as a baffle thus preventing the water from overshooting. The baffle is an L shaped section and the short length is siliconed to the centre of the valley gutter.

**RIDGE TILES: -**

Ridge tiles on **old** roof often become loose because of the breakdown of the old lime mortar. In newer homes it is due to roof sag, timber shrinkage and thermal build up in the roof space causing the timbers to move.

**To Re-Bed ridge tiles: -** first lift them off and clear all the old crumbling mortar from the roof tiles and from underneath the ridge tiles. Give the tiles a good soaking in water before fixing them back down. Mix a new bedding mortar (1-part cement to 4 parts of sand) wet the top part of the roof tile where the mortar is to sit and apply the mortar with a trowel to form a continuous 50mm wide by 75mm high edge bedding. Place the mortar for each tile in turn. Set each tile into

place tapping the ridge tile slightly into the mortar, there should be no mortar being squeezed out the sides.

**To Re-Point the ridge tiles: -** Mix (1-part cement, 3 parts of sand and oxide to suit the colour of the tiles (usually 2.25kg per .028 of a cubic meter). This is the finishing touch to a good and clean looking roof. Clean down and remove all superfluous mortar without smearing the tiles and make sure that all gutters are clear and free of any mortar that may have rolled down the roof.

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# Roof Sheeting & Maintenance

Roof sheeting in lieu of tiles has become very popular in recent times. Owner builders should be aware that the cost in terms of materials is dearer. Although the roof frame construction is not as heavy (smaller cross sections) and less timbers are used due to the increased spacings between rafters the cost of the cover is more.

In addition, special care must be taken to secure light weight roofs, maintenance is also an important factor to be considered, especially near the oceans. There are numerous technical manuals put out by the roof sheeting manufacturers (on colour bond) to help owner builders which we will discuss later.

We have included an extract from a retired senior inspector from the Builders Registration Board of Western Australia, Mr.Victor Hair. Since he has had many years of experience as a senior inspector we have thought to include his views on securing roofs in general and found them to be most comprehensive, sensible and very practicable. He has also written a book which we highly recommend for owner Builders. The book is published by Bookworks P/L. of Carlisle W.A.

These are his views on **“Holding down buildings and roofs in storms”**

Every building should be designed for the environment in which it is built. For example, in cyclone areas the whole building will require special engineering provisions to make it secure.

Even in areas of moderate weather conditions, a house roof comes under extra stress during storms. This will be especially so if a high wind can get into a large area of eave or open car port.

The lighter roof coverings, that is, corrugated asbestos-cement, galvanized steel and aluminium sheeting, will always need special holding-down bolts, straps or fixtures built into the external walls and roof. As tiled roofs are heavier, they are sometimes left without holding-down straps or bolts. This should not be done. Even in the most moderate climate, the roof may, at some time, even if only for a very short period, must withstand extremely high wind pressures. Any roof structure that relies on its own weight to hold itself down becomes an unnecessary risk.

The years have shown that insufficient attention is given to this simple, but important, matter. Many houses have been storm damaged when it could have been prevented. People contemplating building in exposed positions or with light-weight roofs are urged to obtain specialist advice on structural sufficiency always. During construction, before any roof sheeting or tiles are placed, you should ask someone in any building authority that has control over construction if the roof structure is secured in accordance with the authority's requirements, regulations or by-laws.

Roofs are usually held down by steel rods, plates and straps that are built into the walls while they are being erected. The fixing is later secured to the roof timbers.

Any cost that contributes to strong construction is a necessary cost, and should always be compared to the possible costs if some or all the roof was lost in a storm.

As I mentioned in last week’s column maintenance of colour bond sheeting during and after installation is important and included are some guide lines.

The interval of maintenance will vary widely but it's odds-on that the first maintenance exercises will involve a good wash down. No matter where you live, possessions left out in the open will eventually need a wash. The family car is a case in point and it would soon look grubby if you neglected it for years. Think of a Coloron steel roof or fence as being similar to the finish on the car.

**Frequent washing**

Applications where the surface is regularly washed by rainwater don't usually require frequent washing. However, surfaces such as soffits, wall cladding under eaves, garage doors and the underside of eaves gutters do require attention at intervals of something like six months. Environments such as marine and heavy industrial fallout are typical of those requiring more frequent preventative maintenance.

If washing is necessary, then: -

**I.** Wash the surface with a mild solution of pure soap or non-

abrasive kitchen detergent in warm water. Apply with a sponge, soft cloth or soft bristle nylon brush used gently to avoid creating shiny spots. Walls should be washed from the bottom up to prevent streaking and thoroughly rinsed to remove traces of detergent.

**2**. For grease, oil or deposits not removed by soap or detergent, contact your local BHP Sheet & Coil sales office for advice.

Never use abrasive or solvent type cleaners such as turps, kerosene, or petrol on Colour bond finishes.

Colour bond products will give many years of maintenance free service if you follow these instructions.

**Over-painting and Restoration**

When the time comes to either over-paint Colour bond products, whether because of a need to change colour or for eventual restoration, the surface provides an excellent base.

Dulux 613 Trim Coating, a 100% water based acrylic, is a suitable paint for the purpose, being available in the Collarbone colour range.

The Collarbone paint system contains lubricants and flow additives which assist the coil coating process and minimise damage by galling in subsequent transportation of the painted steel.

These lubricants rise to the surface during the oven-curing process and must be removed in order to satisfactorily overpaint Colour bond steel.

**Don't spread it around!**

Don't whip out the spray can if you have a few small scratches on roof or gutter. Sprayed repairs look terrible a few months down the track as the air-dry paint weathers at a far different rate to the original oven baked surface. Much wiser to leave small scratches alone. If you must touch up rivets and other small items, use the available touch up paints or squirt a little paint from a spray pack into its cap. The paint can then be applied sparingly with a small brush or cotton bud.

**It's a match**

Sometimes, the need arises to post-paint Zincalume roofing accessories such as flashing and gutters to match existing Colorbond roofing. No worries!! To begin with Zincalume steel can be painted without the need to etch prime, unless you are in a particularly corrosive environment. Simply degrease the Zincalume surface and apply water-based 100% acrylic or alkyd paints, of which Dulux Weathershield and Dulux Hi-Gloss are typical. For a real colour match, Dulux 613 Trim coating is available in all the popular colours.

**Leave the lead out**

NEVER use black lead pencils for marking galvanized, Zincalume or Colorbond steel. No, there's no lead in a lead pencil! So that's not the reason. Black lead pencils are made from graphite and clay. Graphite is carbon and a trail of carbon when placed in contact with most metals will create an electric cell when it gets wet.

The cell acts like a battery and will etch the surface of the metal so that, within a couple of weeks it will be impossible to shift. This can be most embarrassing when it happens at eye level or when a sharp-eyed client spots it and asks for its removal.

It affects Colorbond because the pencil scratches through the paint to reach the metallic coating and the same advice applies to aluminium which is similarly affected.

The answer!! Use any colour pencil BUT not black!

There are times when we need to seal a fitting made from either polythene or polypropylene to a steel surface.

We all know how difficult it is to gain adhesion to a plastic of these materials. Try flame brushing the surface of the plastic by simply flowing a "soft" flame across the surface. No need to heat it. Just cover the whole area to be bonded.

As you do so, there will be a visible change to the appearance. Don't ask how or why - just try it!!

In fact, try it by flame- brushing half the surface, applying the silicone rubber sealant to both treated and untreated areas and letting it cure. The sealant will be bonded to one half and not the other.

But, don't tell anybody. They won't believe you!!

The acid, freely used to clean down brickwork, can find its way into the gutter along with copious quantities of sand. The brew that results isn't exactly conducive to providing long life to

gutters and the effect is to consume the galvanizing within them. Perhaps the order in which the gutter fixing, and acid cleaning occurs should be reviewed?

Compatibility is always an area that is easily overlooked by the home handyman, since we are so used to seeing chimneys, flues and vents being flashed with the good old versatile lead.

When we find an existing roof is rusting around flashing, the tendency is to replace the flashing making the same mistake as before.

Compatibility of materials is most crucial and when the science of compatibility is explained in basic terms it is easy to comprehend and follow.

Corrosion is basically an electro chemical process and occurs between different metals. Each metal has a different electrical potential. For the minute electrical current to pass from one to the other an electrolyte is required such as water or damp atmosphere.

Some metals are very active while others are not. For instance, when copper (not very active) is coupled with zinc (very active) there is sufficient current to flow from one to the other just like a battery. If we ever look at our battery under the bonnet of our car we see white deposits around the terminals, this is the result of current flowing.

So, what happens is that, the more active metal (zinc) as in the case above becomes consumed by the less active(copper), in other words the copper remains, and the zinc deteriorates, this process is known as corrosion.

Let's identify the metal most commonly used in the building industry and chart a guide of active to less active for better understanding: -

Zinc **MOST ACTIVE**

Zincalume

Aluminium

Steel

Lead

Copper

Stainless Steel **LEAST ACTIVE**

As indicated on the chart above we can see that lead, very commonly used on roof flashing is at the bottom or (least active) and if coupled with zinc (most active) the zinc is consumed by the lead. So, it therefore makes sense that the lead should be protected i.e. by painting etc.

We know that zinc protects steel from corrosion and we find this commonly used on steel piping, balustrading, roof sheeting and angle irons, another very good example is when pipes are, or dock piers are underground or in the salty water lumps of zinc are attached acting like a sacrificial anode, i.e. the zinc will be consumed before the piping upon which the structure is built. Of course, regular checking is important, and replacement of the zinc is crucial as it is

consumed. Therefore, this process can go on forever. By the way this applies to the hulls of ships as well.

Hence as a general understanding to the rule of corrosion remember that metals listed close to one another are relatively compatible, while those further apart are not.

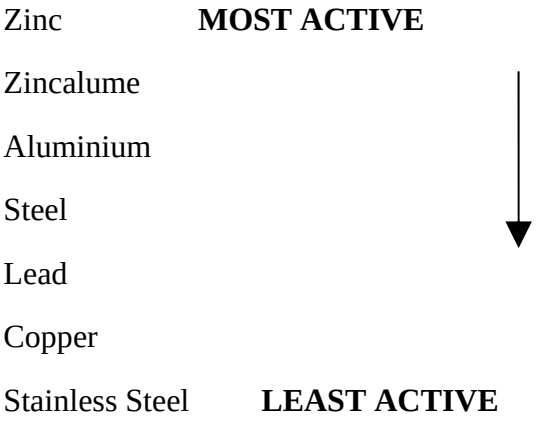
From last week's metals list, note that Aluminium and zinc are very close. hence an alloy product called "Zincalume steel" which is a coating of zinc on steel can be used with either of those metals without rusting problems occurring. And again, to reiterate note that lead is far away from zinc and aluminium and uncoated lead should therefore not be used or in contact with zinc and Zincalume.

As always, some rules are not quite adhered to like stainless steel and aluminium. They are less affected because both stainless steel and aluminium develop a tightly clinging oxide coating, thus reducing its corrosive effect on most other metals.

When it comes to roof situations where water flows from one metal to another such as when water runs over a roof down to the gutter, there is one simple rule to remember: - Water can safely flow down the scale (the list produced in our earlier columns), but water can't flow uphill without causing corrosion. In other words, water flow from zinc at the top of the scale down to stainless steel but it will create corrosion in certain degrees if it flows from stainless steel to zinc.

It is therefore important to consider the compatibility when choosing roof components like flashings and fasteners. A typical case or example would be water running down from a Colorbond roof into a galvanised steel gutter, you will inherently find that drip spot corrosion will be present. By converting the rust with a rust converter and painting out the gutter with a bituminous paint lie "Ormanoid" temporary protection can be achieved.

One other thing to remember is that the modern coated steel products, even when cut or holed for fixing will not induce rusting at those points. The reason is that the galvanised and Zincalume product has sacrificial properties which protects, to some degree, the newly exposed metals at a cut, hole or scratch. However, the degree of protection depends on the thickness of the coating and this is taken into account in the Australian Standards. It is therefore equally important to specify products that are standards approved and branded.



**DRIP- SPOT CORROSION: -**

Let's recap to date, Zincalume and Galvanised steel are compatible i.e. there is no corrosion problem associated by coupling the two metals and likewise there is no problem with water flowing from the galvanised material to the Zincalume steel, but there is potential trouble when water from a Zincalume roof is discharged onto a galvanised roof surface. The result is called **drip-spot corrosion**. We have all seen rust spots in a galvanised gutter or in a valley gutter and we tend to blame it on something coming out of the roof covering. The facts are that galvanised steel performs **well only with an unglazed concrete tile or a galvanised iron roof.**

When you drive down the road and look at a clay tiled roof, about five years old, with an unprotected valley you can quite clearly see the drip spots. That is due to the inert nature of the material (i.e. clay) however on a concrete tile roof this is not the case. Why?? Well the cut edges of tiles facing the valley or gutter leach calcium into the flowing water onto the valley or gutter. The calcium helps to resist corrosion on the surface where on clay tiles this is not the case.

The problem is worse if the water drips onto the surface rather than flowing over it although it will eventually occur.

So, the best solution is to use an inert roofing material for guttering and valleys some of these products available are fibreglass, polycarbonate, Zincalume, Colorbond, aluminium, stainless steel. Zincalume and Colorbond are now the most economical and should be specified if so desired.

**THE ACID TEST: -**

If you have specified, Zincalume roofing or guttering and galvanised steel has been used, how do you know that what you requested is what you got, quite often the job may be a mixture of both and you can't tell the difference, well then here is a quick test. **The acid test: -** A single drop of Hydrochloric acid on galvanised steel will show that the acid spot will stay clear for several seconds before it will go dark, however a single drop on Zincalume steel will go black almost instantly as the acid reacts with the aluminium in the alloy coating. If you are in doubt, try it out. You can then front your installer and ask for an explanation.

**About warranties: -** BHP/Lysaght warrant that Zincalume steel guttering and down pipes have a minimum life warranty of 12 years to perforation (rusting through) by natural weathering. In the case of Colorbond (pre-painted Zincalume) steel the same applies and a further warranty applies that the pre-painted surface will not flake peel or blister for a period of not less than 12 years. In both cases the installation must be in accordance with the Australian standards 2179 and 2180 "Metal Rain Water Goods" and the time period is from the installation date. Any claim must be to the installer who will contact the material, manufacturer who in turn will contact BHP if necessary. Also written proof of the installation date is required.

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# Flashing & Guttering

## ABUTMENTS AND PARAPETS

Wherever a roof be it flat or pitched abuts a house wall or a parapet wall, leaks can occur if the flashing is not correctly installed.

Parapet walls are prone to damp due to being exposed usually on both sides. Their top edges are usually finished with brickwork, stone, metal capping or tiled coping. All these coverings should overhang the wall faces to throw of rain water.

Damp proof courses of lead, bituminous felt or other water proofing materials must underlie the coping.

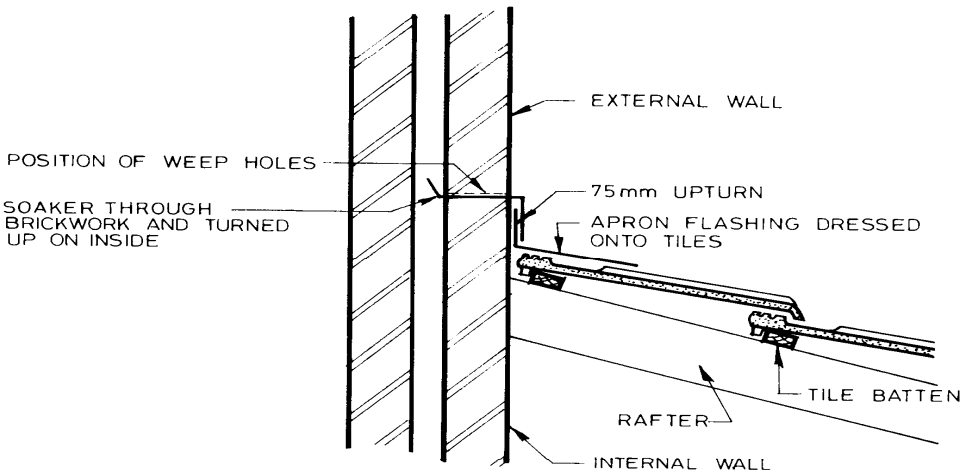
Parapet walls of no more than 350mm high can have the skirting taken up along the face of the wall and continued the full width under the coping to provide protection.

When a parapet wall is of solid construction the damp proof coursing must be through the wall following the abutted roof line.

Cavity parapet walls also need damp proof coursing where the roof abuts. Water penetrating from the exposed wall side must be prevented from running down the cavity to damage the interior walls below the roof level. The damp proof course is stepped up from the inside leaf to form a draining cavity tray. Cement rendering is not a satisfactory solution as sometimes the inevitable movement of wall can cause cracks that will let in water.

There are a host of flexible chemical solutions that can be applied on the face brick work to make them water proof, but they need to be applied carefully as per instructions and there is still no 100% guarantee of water tightness and besides this is only a temporary measure. The time proven Cavity flashing is the best and safest way.

6.1 **HIDDEN SOAKER FLASHING** (CONTINUED)

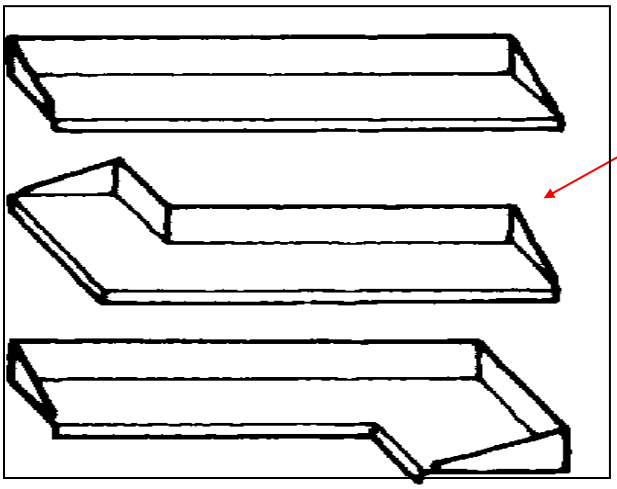



SECTION – ALONG RAFTERS

**FLASHING TO OUTSIDE WALL WHICH BECOMES INTERNAL WALL**

## FITTING OF CAVITY TRAYS

As with parapet walls, discussed last week, existing cavity walls also need to be made watertight if abutted by an extension roof, to protect it from any damp. If one knows far enough in advance the flashing would be built in, but in existing buildings with new extensions special trays - moulded units of polypropylene if available or purpose made galvanised trays- can be inserted from outside by removing of bricks above the roof line. A tray generally equals two brick-lengths and can also be used singly where a cavity is bridged by an extractor fan. **Below is an example of prefabricated trays.**

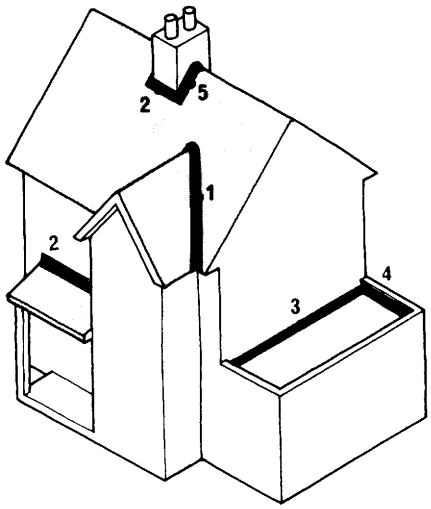


## INSERTING THE TRAY

Two courses above the proposed roof level remove three bricks, whole if possible, and without letting rubble fall into the cavity. On the cleaned bricks lay a length of flashing wide enough to project 50mm into the wall and cover the roof skirting by 75mm when dressed down. Trap the flashing with the first tray unit, pushing it into one end of the opening. Place two bricks in the tray and bed and joint them in mortar. Pack out the top joint with Hardiflex pieces and fill it with mortar pushed well home but not out at the

back. Rake out a weep hole at the base of the middle joint with a wire.

Cut out two more bricks, again leaving a three-brick opening, roll out the flashing and insert a second tray. Join the trays with lead or cover strip provided, fitting it over the meeting ends to make a water tight joint, and lay two more bricks in the opening. Continue in this way until the tray is the required length. Only one brick need be removed at the end to make a two-brick opening for the last unit.




## FLASHING

Flashings are used to weather proof the junctions between a roof and the other parts of the building, which are usually at the abutments with walls and chimneys and where one roof meets another. On the diagram included are typical areas that require flashing.

## FLASHING MATERIALS

The most common flashing materials are lead, zinc, aluminium & neoprene rubber. Of all these lead is by far the best because it weathers well, is easily worked - though shaping it is generally a craft skill - and can be applied to any situation and roof covering.

Zinc is a cheaper substitute for lead and is not so long-lasting or so easy to work into shape. Where zinc flashings need to be replaced the extra cost of using lead would be easily repaid because of lead's much longer life span.

## FLASHING CONSTRUCTION

The design of a given flashing will be determined by the particular details at the junction and to some extent by the materials being used. Typical situations are generally treated in a standard way, and these are shown here, using lead for the flashings.

## ABUTMENTS

Where the inclined edge of a typical pitched roof abuts a wall the type of flashing used is determined by the nature of the roof covering and the pitch of the roof.

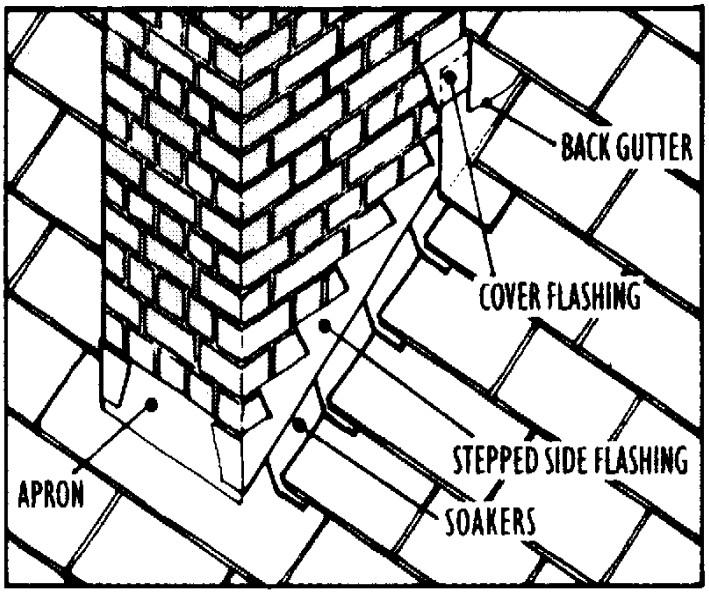
### Single-Lap Tiles

Contoured single-lap tiles (Monier, Bristle) can be treated at abutments with one-piece flashing. The lead is tucked into the brick wall by the stepped or chased method and dressed down over the tile, the amount of overlap depending on tile contour and roof pitch. On a shallow pitch it should be at least 150mm. The lead is dressed to the tile's shape and the step at each course and its free edge carried over the nearest raised tile contour.

### Valley Flashing

Most contoured tiled roofs have to have the valley tiles cut to suit that take the tiling into the angle of the valley, but most tiled roofs have valley gutters made of metal (flashing). Valley flashings are stock standard and installed by laying the section on boarding (valley boards) that runs from eaves to ridge, following the angle of the valley. Where two valleys meet at the ridge a saddle is formed, making sure that it is weather sealed. The edges of the tiles or corrugated iron are cut to follow the angle of the valley and to leave a gap of no less than 100mm between them. This ensures that leaves and other debris is not caught up in the valley. Some manufacturers state no less than 75mm, but in our opinion 100mmis better. The upturn of the valley must always be checked to make sure that it is up, otherwise the valley will leak. It has been our experience that 90% of valley up turns have been pushed flat and is the cause of many water ingress problems.

**Chimney Flashing**




The flashing where a roof meets the side of a chimney is much the same as at an abutment, but there are junctions at the front and back of the chimney. An apron flashing is fitted in front, the up-stand is returned on to the sides of the stack and its top edge set in a bed joint. The apron, extending beyond the chimney sides, is dressed to the tile contour. Side flashings are fitted, using soakers or one-piece flashing, and the back of the chimney receives a metal supported back gutter. The lead's front edge is turned up the brick face, its ends folded on the side flashings, and a separate cover flashing is dressed over the up stand.

The back of the gutter follows the roof slope and is lapped by the tiles, which are fitted last. Chimney flashing is rather tricky and in some cases many bricklayers have no idea. In fact, the upper half of a chimney, protruding through the roof, is in fact completely separated by lead or a metal try flashing.

**GUTTERING**

**Roof Drainage: -** Let’s talk a little bit about roof drainage. The size and layout of a roofs drainage system should enable it to discharge all the water from a given roof area. The flow load determining the gutters capacity depends mainly on the area of the roof. Manufacturers of guttering systems usually specify the maximum area for a given size and profile of gutter base on a rain fall rate of 75mm/hr (3in/hr). If you replace an old gutter of the correct capacity make sure that it is replaced with the same or slightly larger type. Sizes of gutters are generally specified by their overall width in cross section and sometimes also by their depth and at times by profile name or manufacturers name.

A down pipes position can affect the systems performance dramatically. A system with a central down pipe can serve double the roof area as against one with an end outlet.

The commonest type of guttering is the eaves guttering, this is fixed along the eaves fascia board which is generally prefabricated galvanised metal and the gutter sits neatly on a provided ledge. Eaves guttering can also be fitted directly to a timber fascia board and held in place with gutter brackets.

Parapet gutters are generally found in older houses and may serve a flat or pitched roof between two parapet walls. This type is normally purpose made.

Valley Gutters (discussed some time ago) are a type of flashing made of protective metal and is used at the junction between sloping roofs. They are not a guttering system in themselves but they direct water into the eaves or parapet gutters.

Gutters can now be supplied in the standard Galvanised metal, Colourbond, in Aluminium and in PVC (UV) stabilised.

**SOME COMMON TERMINOLOGY: -**

**Stop End**- Internal or external fittings at the ends of the guttering system.

**Gutter Brackets**- Normally screwed to the fascia board or fixed to rafters.

**Rain water Head**- Usually used as part of a down pipe system to receive copious amounts of rain water.

**Downpipe brackets**- Brackets to secure down pipe to wall.

**Shoe**- Throws water clear of a wall into an open gully or into a connected soakwell.

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# General Building & Renovation Guidance

## IN THE BEGINNING

Before embarking on structural repairs, alterations, or major home improvements, you must establish whether the work will need local authority approval. If you proceed without formal consent, you may be required to dismantle your work.

Two entirely separate applications may be needed: for planning permission and Building Regulations approval. Some types of work need no formal consent, but you must establish the position first.

### General guidance

In the last few years, considerable efforts have been made to help householders understand how formal approvals can be gained. For example, most local towns or shires have prepared booklets for public in conjunction with the relevant planning departments that explain the planning system. Material has also been published through the Citizen's Advice Bureau. Local councils also provide information about planning and building control applications.

Most of the literature available on these subjects is written in plain English with an absence of technical jargon. This, plus the method of presentation often adopted, is aimed at removing the impression that planning legislation is confusing or enshrouded in red tape.

### Planning permission

Planning regulations exist to protect our countryside, towns and cities. Indeed, it is within the context of environmental protection and the control of visual amenity that sections of the planning system apply to our homes. The planning system ensures that the appearance of a building is appropriate for its location.

Planning laws are made by Parliament and local shires, but the main responsibility for ensuring that planning requirements are put into practice rests with the local authorities. Accordingly, you need to approach the planning department of your district, shire or city for guidance and formal approvals to proceed with a development. All authorities are required to have development plans, which set out how land in the area will be used, and all planning applications must fit in with these proposals.

With this information so freely available, the points covered here are intentionally brief, and while everything is purposely made to seem simple, there will be occasions when applications to make alterations to a building are far from straightforward. For instance, if you live in a listed heritage building, proposals to alter the structure will be subjected to special scrutiny. Similarly, in conservation areas, you may even need permission to take down certain types of fences or railings. Even modern buildings on open-plan estates may be subject to special restrictions that could affect your proposals. So, it is essential that you seek advice from your local authority before stating any work.

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# Safety and Protective Equipment Guidance

## SAFTEY

The safety of everyone involved in building projects is crucial; injuries in the construction industry are not unusual, and the amateur builder must observe all precautionary measures taken by the professional. This may be self-evident when working on second or third storey buildings, but rather less obvious are the risks when working below ground level - trench collapse has led to many fatalities.

Dangers are also present when using power tools, plant and machinery. In the last few decades, awareness of industrial injuries has grown considerably, but the amateur must not presume that a brief excursion into DIY building will make protective clothing unnecessary. On the contrary, an accident may be more likely when the `weekend worker' is wielding unfamiliar items of equipment.

## PERSONAL PROTECTIVE EQUIPMENT

Most hardware stores and major DIY stores sell protective clothing. Don’t be tempted to regard normal clothing as suitable substitute for purpose designed work wear. The following protective gear is important.

* A safety hat is essential for many tasks and not merely as protection from falling objects. It will be needed anywhere you might bump your head.

* Gloves come in several types and for different purposes. When shifting or unloading masonry thick leather gloves will protect your hands from abrasion. Similarly, industrial-grade PVC or rubber gloves are essential when working with chemicals. Your hands may even need protection from mortar.

*Steel-capped footwear is necessary for many building and demolition operations. There is a range of styles to choose from.

*Eye protection is essential when working with any power tool, and can take the form of goggles, industrial spectacles or shields for ordinary glasses.

*Ear protection is necessary when using noisy machinery, especially in an enclosed space. Don't dismiss ear muffs; the cumulative effect of noise on the aural system can cause long-term damage.

*Nasal protection is commonly required in building work. Even something as simple as sawdust can act as an irritant. Similar hazards occur during masonry cutting and when chasing out plaster with power tools. A dust mask is cheap, although some products have a short life. For long-term use, a mask that accepts replaceable filters is better.

* Overall body protection may not always seem appropriate on a hot summer day, but there is no place for beach-wear in building work. Suitable overalls do more than keep the wearer warm.

* Take care when choosing clothes to work in. When using equipment that has rotating parts, loose clothing can easily become caught in the mechanisms. On a similar note, long hair, jewellery and draw strings are equally likely to fall foul of moving parts on machines.

**ACCESS EQUIPMENT**

Many repair and renovation jobs will involve some form of access equipment. A variety is available, depending on the job in hand:

**TRESTLES: -** Materials will often need raising above ground level. Equally, you may need to stand on a raised platform to reach inaccessible parts of the work. Purpose-designed trestles are useful in this respect and have several other uses.

**STEP LADDERS: -** Look carefully at the design when purchasing a set of steps. Some are notoriously unstable, and they are more suited for occasional use around the home than for serious building work. Ladders Lightness and weather resistance are two advantages of an aluminium ladder. There are several points to remember when choosing a ladder: there should always be at least three rungs above the highest point on which you'll put your feet; in the case of an extending ladder, there must always be a good overlap between the sections; and finally, when it is set up against a wall, the foot should stand away from the wall by a quarter of its height.

**EXTENTION LADDER ACCESSORIES & HINTS: -** Never rest a ladder against guttering. If there is a substantial eaves overhang, a ladder `stand-off' should be used. These are readily available and easily fitted. The foot of a ladder must be stable and level; if necessary, it should be fitted with a ladder leveller. Another useful fitting is a platform that increases the area of any rung on which you need to stand for a prolonged period. Most of these items should be available from the ladder manufacturers.

For long term use, the top of a ladder should be tied to a large screw eye set in the fascia board, while the foot can be tied to a stake driven into the ground.

**ROOF LADDERS: -** Gaining a footing on a steeply pitched roof is very difficult - and dangerous; moreover, the tiles may not bear your weight. A roof ladder is the answer to these problems. Purpose-designed roof ladders can be hired, but it is also possible to adapt an ordinary ladder by adding a ridge hook. Installing a roof ladder is quite difficult, and it is best manoeuvred into place from a tower or scaffold platform. Don't attempt it from a ladder.

**ACCESS TOWERS: -** Most Building equipment hire companies offer access towers, fixed or on wheels. All require a sound base and, in all but low structures, the tower should be constructed with outriggers to provide good stability. It should also be tied to the structure at suitable points. Handrails at the top, and a sound platform with kick boards at the sides are essential features.

Scaffolding for major projects, a rigger must be employed to erect scaffolding. Although the contractor will be responsible for erecting a safe structure, maintenance of safety falls squarely on the builder. Access ladders should be removed when not required, and warning notices displayed where appropriate. Never allow children to climb on scaffolding or access towers.

Chimney staging Repairs are often needed to chimney stacks, and purpose-made staging may be hired to provide a sound working base. These structures are usually made from pre-assembled sections, and many are made of lightweight tubing for easy transport.

## PORTABLE POWER TOOLS

Instruction leaflets supplied with portable tools are very detailed and many manufacturers include comprehensive safety guidance. It remains for the purchaser to act on that advice.

However, if a machine is borrowed from a friend or hired the important documentation may be missing. Tool hire companies normally display free leaflets containing general guidance about machinery that they may have available.

The provision of this information is an obligation to the customer and if it is not on display you should ask for it.

Information concerning a particular product can often be obtained by contacting the manufacturers agent or their technical services.

As a rule, manufacturers or their representatives are most help full since it is in their interest to ensure that their products do not cause injury, even if this may be the fault of the user rather than the equipment.

## ELECTRICAL SAFTEY

The danger of electrocution is ever present when using power tools, so an understanding of electrical safety is essential. The following will be of important use.

**Double Insulation: -** Most mains powered tools are double insulated, this means that they only have two wires (two core) running from the power point (three core) via the plug and do not need an earth connection. To achieve this the casing of the machine is usually made of plastic and the electrical components are contained within a separate insulated housing.

**Extension Leads: -** Where an extension lead is required it should be capable of carrying the load demanded by the appliance. As a general rule an extension cable should be unwound from its drum to avoid overheating, this is particularly important when using high wattage equipment. Professional trades on building sites must now have their leads tagged and regularly inspected.

**Residual current device:** An essential precaution when operating mains tools outdoors is to connect them via a residual current device (RCD). This safety cut-out may also be referred to as an “earth leakage circuit breaker” (ELCB). There are many ways of operating through an RCD, and some recently built new properties will have one linked to the main consumer unit serving the house, this is law on all new buildings. If working in a house with an older electrical system, it is easy to fit a special RCD socket to the point from which power tools will be supplied. RCD adaptors are also manufactured for plugging into any socket that you want to use. Alternatively, portable RCD units are available combined with a pre-wired extension lead. In the event of a fault developing in a power tool, or if the user should inadvertently touch alive wire in the supply cable, the RCD instantly cuts off the supply, affording complete protection from electrocution.

**Cordless tools** Despite these safety measures, it is inadvisable to work outdoors with mains-powered equipment when it is raining. This has led to the popularity of rechargeable cordless power tools. In particular, drills are very effective because they work at a low wattage. Some cordless jig saws are equally successful for light work. However, portable circular saws need more powerful motors, and cordless versions are seldom available.

While the electrical safety of cordless tools is one of their merits, the absence of a trailing lead makes them particularly suitable for high-level work. For instance, when repairing guttering, a cordless drill is much safer than a conventional mains-powered tool that has to trail a lead from the top of a ladder.

### Cutting tools

You are more likely to have an accident with a blunt saw than a sharp one. If progress is slow, and you force a blunt hand saw through material, the risk of the saw jumping becomes more probable. The same applies when working with a blunt chisel. Thus, keeping all cutting tools sharp is a pre-requisite for safety, not to mention the quality of finish achieved. Another traditional tip is to ensure that you keep your hands behind any cutting edge. You are asking for trouble if you try to hold down a work piece by hand in front of an advancing chisel or saw blade. The same applies when working on a saw bench. Experienced craftsmen claim that most accidents occur from behind the blade rather than in front of it. Typically, the operator finds that a small work piece is lifted by the blade, and the temptation is to hold it down at the back of the table while the remaining material passes the blade. However, if the material catches again, the hand can be thrown into the blade. Such accidents should not happen if, a) the equipment is properly guarded b) there is a riving knife behind the blade to keep the saw cut open c) and a push stick is used to move the work piece across the table. It is essential to buy good-quality equipment and obtain correct instruction before using a machine of this kind. With this in mind, consult text books on technique and safety, or attend woodworking classes. Like many other power tools, a saw bench is a great asset, provided you understand how to use it properly and safely.

### Abrasive disc machines

When fitted with a disc for cutting masonry, a portable grinder can fashion bricks or paving slabs into intricate shapes. It can also be used for chasing out a mortar course before adding lead flashing. Unfortunately, these machines are potentially very dangerous, and safety clothing must be worn. The most serious problem is the ever-present risk that a disc working under load may disintegrate and fly in all directions. In practice, this seldom happens, as abrasive discs are made with binding materials that keep them intact. However, goggles - or even a full-face shield - will be necessary in case particles fly away from the disc, or it breaks up unexpectedly. For the same reason, suitable clothing is needed to protect the arms, and reinforced leather gloves are equally important, as is a dust mask. Enormous amounts of dust are generated when cutting through masonry. If the work is carried out indoors, every effort should be made to protect yourself, and to contain the dust to the immediate area.

Despite these disadvantages, an abrasive disc machine can be very useful. For instance, if you need to chase out a groove in a floor screed to insert a section of narrow ducting, few tools

will complete the work as quickly, efficiently and neatly. Similarly, it will make far cleaner cuts in paving slabs than with a hammer and bolster chisel.

**Tools & materials**

Before embarking on home repair or improvement work, you must have suitable tools and equipment, and know how to use them correctly. Some items will be used for all manner of jobs and should be purchased, whereas others will be very specialised and used only for specific jobs. In this case, hiring is a better option. For example, the special wooden mallet needed for shaping lead sheet (a task referred to as `dressing') is not likely to be used very often. Therefore, hiring one, rather than buying, would be more sensible if you only need to dress a lead apron on a chimney stack.

**Hand tools**

Any work involving timber will require a selection of carpentry tools. Basic items like a hammer, a jack plane, a hand saw, and a measuring tape can be found in most DIY tool boxes, also a few G-cramps will be useful for temporarily holding timber in place. A punch is essential for burying the heads of nails in timber. Screwdrivers for slotted screws are obvious but the industry is increasingly using cross-headed screws (Phillips head), so appropriate screwdrivers are needed. Space precludes listing all the important tools you may need. Quite often, the best policy is to make sure you have a selection of basic tools, but delay purchasing any others until a need arises.

Compromise is essential, because there are many special products within each tool category. For instance, hand saws come as rip saws, cross-cut saws and panel saws. Each has a specific use, with variations in length of blade, tooth shape and the number of teeth. In practice, many carpenters compromise by purchasing a saw that performs a variety of functions: a cross-cut saw with a coarse cut of five or six teeth per 25mm (1 in) can be used for rip cutting - provided it's not pushed too hard and fulfils a wide variety of needs.

The situation is much the same with planes. For general use, a jack plane is often chosen, whereas its shorter partner is better for smoothing work, and a try plane (called a jointer) has a long sole for achieving straight, true surfaces on boards.

**Sharp blades**

With use, all cutting tools will become blunt, so you will need a means of sharpening them. An oil stone will be required for sharpening chisels and plane irons, together with a certain amount of skill to do the job correctly. However, a sharpening guide will simplify the job of achieving the correct cutting and honing angles (25 and 30 degrees respectively). A coarse oil stone is needed for the former, and a finer stone for making the honing angle.

High-speed twist drills also need a special guide, and various products are available. Flat bits (also called spade bits) must be sharpened by hand, but careful work with a fine file can revive a dull edge. Saws are a different matter and should be taken to a saw doctor, who will carry out the skilled job of sharpening for a modest charge. In the last few years, hand saws have become available with specially hardened teeth that cannot be sharpened, but which stay sharp for much longer than those of a conventional saw. 'these saws are so inexpensive that they can be

used until blunt, then thrown away. However, it is worth keeping an old saw for cutting plasterboard and similar teeth-blunting work.

**TOOLS & EQUIPMENT**

Having the proper tools and equipment at your disposal is essential as it makes the job you are about to embark on so much easier, fun and of course accurate.

A Builder barrow with good pneumatic tyres is virtually a must, don't waste time on a garden barrow unless absolutely necessary as the garden barrows just don't have the strength. A good solid shovel not a spade and keeping it clean is also advised as concrete has a remarkable tendency to stick to metal components. The same goes for the metal bowls of cement mixing machines. Therefore, careful cleaning of tools used for concrete work is an elementary discipline as is keeping all your tools clean. By keeping your tools clean and in good working order you will be rewarded with many years of good usage.

The usage of levels for checking and measuring is extremely important in the building industry as this is what determine the length and accuracy of the project. The use of metal tapes when marking and measuring is generally more accurate than a fibre glass/fabric tape. A spirit level is also very important in the use of bricklaying, carpentry (roof and fixing), tiling, roof and general plumbing, concreting, paving and a host of other jobs. A 1meter spirit level and a smaller 300mm one will be useful in many instances. Some spirit level incorporate features that allow you to measure angles and more recently, but very expensive, digital type levels and measuring tapes are now available.

In addition to the tools mentioned above a bolster chisel, a club or Gympie hammer, a string line, a sledge hammer and an array of different size trowels, steel and wooden will prove use full for those jobs you are about to tackle. These tools will aid in tackling work like concreting, tile screeding, brick or block work.

To tackle wood work of any nature, be it fixing carpentry or roof work a good sturdy work bench with a vice or trestles using cramps are essential for holding materials to be cut.

## Power tools

Electric power tools have a major role to play in repair and renovation work. However, sustained use is far more likely to damage a portable power tool than a weekend DIY repair. In recent years, the manufacturers have recognised that some home owners are willing to tackle serious projects, and have developed more robust tools.

Regrettably, it isn't always easy to differentiate between product types. For instance, some DIY drills look large and purposeful, but the bearings and motor are of a lower specification to suit occasional DIY use. The problem is aggravated by the inclusion of tools in a DIY range that, hitherto, have been regarded as being for professionals.

Before buying a power tool, you should establish whether its specification is suitable for the kind of work you intend to do. A tool specialist is more likely to help you in this respect; staff at DIY supermarkets seldom have the necessary technical knowledge, and if you buy from this source, you must be sure that you know exactly what you want.

## Generators

On some sites, the lack of a mains electricity supply may make it necessary to obtain a generator. Industrial models can be obtained from tool hire companies, but the advent of smaller `leisure' generators has added an alternative source for the amateur user. These machines are normally powerful enough to operate electric drills, jig saws and planers. However, a circular saw, with its larger motor, may require a larger generator, as will electrically-operated machines like cement mixers and site pumps. A tool hire company will be able to advise you on the correct model.

## Special equipment

There are many other items that may be needed in structural improvement work, and most can be hired. For instance, a “jumping jack” will be useful for simple consolidation work when preparing a base for a concrete slab. Vibrating plates and rollers are more elaborate machines for carrying out consolidation work on a grander scale.

Concrete mixers can also be hired, as can miniature excavators that will operate in the smallest of spaces. Many amateur builders use these machines successfully, and there is much advantage to be gained from using mechanical assistance in preference to digging by hand.

A saw bench is invaluable for many woodworking tasks; a site saw is usually equipped with a large blade to provide a good depth of cut, although its accuracy for jointing work may not be very impressive.

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# Selecting Materials and Getting Help

## Selecting materials & GETTING HELP

Choosing the correct materials is an essential part of any repair or renovation project. In fact, the Building Regulations require you to use materials that are fit for their purpose. The wisdom of this is beyond dispute, but if you are not closely associated with the building industry, you may find it difficult to determine whether a material is sound for a particular job. Tracking down suppliers and verifying the claims made about the performance of their products may also seem daunting. Fortunately, there are several sources of useful information:

The Home Building Centres:- One of the best ways to find out about manufactured products is to visit “Building Centres” in the various capitals around Australia. Its facilities include a bookshop, an information service and a vast range of exhibition of products. The famous “Home Exhibition” held annually in the Burswood Dome is also worth visiting.

Trade journals like “Housing” published by the Housing Association and “Builder” published by the master builders Association can be picked up for free from various trade centres. The information in these magazines is invaluable to renovators and owner builders. The adverts carried in these magazines are worthy of note as the products are the latest available in the industry and it is also a ready source on where to get them.

The “Housing Industry Association” and the “Master Builders Association” are mainly regulatory bodies which lobby for the industry and are mainly geared up to help its affiliated members not so much the public. However, if you get stuck they can be the last refuge of call.

There are courses being conducted on becoming an “Owner builder”, your responsibilities and tasks. These are run (depending on demand) by some of the Exhibition centres. Legislation is currently being drafted so that Owner Builders will have the same legal and statutory responsibilities as licensed Builders.

Most manufacturers operate advice services, although in some instances you may need to contact the technical service department rather than the customer service department. As a rule, manufacturers are very helpful, and are usually willing to supply informative technical data sheets.

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# Damp Problems on Houses

**Let's start with Damp-proofing**

We are reasonably luck in at least Western Australia not to be plagued with damp. However, in some of the older homes rising damp is a problem. In some of the more modern homes the problem is not rising damp but water ingress from shower cubicles. Preventing the cause is better than trying to affect a cure. We shall focus on all of them in order.

**The main causes of damp are**: -

Rising Damp.

Water ingress from shower/bath cubicles.

Plumbing faults.

Faulty guttering, tiling, flashing etc.

Condensation (minor)

Weather penetration.

**DETECTION: -**

A problem with identifying damp is the fact that on many materials dampness may not be visible.

Moreover, the damage to materials like structural timbers might be taking effect long before dampness is apparent to the touch.

For this reason, identification of damp conditions sometimes needs a moisture meter. Inexpensive versions are available in DIY stores, whereas more professional test equipment can often be hired. However, hiring a meter is one thing; knowing how to use it properly is another, and any good tool hire company should provide full instructions on its use. The problem for an inexperienced user is to understand the percentage moisture content of different materials, recognising that an acceptable level in one material might be unacceptable in another. Equally the source of a problem can be difficult to identify, and it is important to be able to differentiate between dampness arising from condensation as opposed to, say, rising damp.

In many instances, it's better to seek the help of an experienced surveyor, for example, the presence of salts in masonry, left as a result of water penetration from a redundant flue, or from an earlier problem of rising damp, can cause a meter to register a high level of moisture. A surveyor or building inspector would recognise this and adapt the test procedures accordingly.

**Condensation**

In recent years, the need to conserve energy has led to improved thermal insulation of our homes coupled with effective means of draught proofing. At the same time, there has been a tendency for householders to use more facilities that create water vapour: hot showers, washing

machines, tumble driers, dishwashers, etc. As a result, we live in sealed buildings that contain a number of vapour producing elements.

The air in our homes is also able to hold more moisture because of higher room temperatures brought about by the widespread use of central heating. When that warm, moisture-laden air comes into contact with a cold surface - such as cold-water pipes, lavatory cisterns, metal window frames or mirrors - it cools and the vapour it contains converts into condensation.

This is often very inconvenient, and can lead to damage. Even more serious, however, is interstitial condensation. Vapour is able to penetrate many materials used in buildings, and if condensation occurs within the interstices of components like the roof timbers, severe damage can be caused.

**Trapped Moisture**

It is not uncommon for fireplaces in older properties to be sealed off; the installation of gas heating or reverse cycle air conditioning renders open fires unnecessary, the opening often being bricked up and the chimney capped. However, this means that any moisture in the flue may become sealed in. with no flow of air through the flue to disperse any dampness held in the masonry, moisture often starts to come through chimney breasts and is seen inside the rooms. The application of barrier materials on the inside, like lead or galvanised iron tray is a common treatment, if not done so initially. Otherwise the chimney can be removed since it is no longer required.

**Rising Damp**

Another serious threat to buildings is posed by rising damp. A course of bitumen laid just above footing level was an early preventative measure, but many buildings constructed during the last century have little or no provision at all. The common practice today is to lay a damp-proof course (DPC), using strips of bituminous, galvanised iron, aluminium or plastic material. This is built into the inner and outer skins of a cavity wall, and should be at least 150mm above the surrounding surface. This prevents heavy rain from splashing up to hit the wall above the DPC. Damp may start to penetrate masonry via blocked cavities if soil from a border is allowed to touch an external wall above the DPC.

**Weather problems**

Driving rain especially near the ocean can pose a threat to the structure of a building. A broken tile or a failed flat roof covering are obvious sources of trouble that can be seen and dealt with, but difficulties occur where there is no specific fault in the structure - other than the fact that it was built when construction methods were less efficient than they are today.

The external walls have mostly two skins of masonry with a cavity between them. Most turn of the century houses have solid walls, comprising of two layers of brick or of solid rock. Unfortunately, bricks are porous and driving rain may eventually penetrate such a wall. Even with a double-skin wall, it is not unusual for dampness to develop within the cavity. To ensure that this doesn't lead to further problems, modern practice is to install weep holes in some of the brick joints. Within the cavity, a damp proof membrane will be installed above window lintels and angled so that if water runs down the cavity, it will be dispersed via the weep holes.

A cavity tray may be installed within an area of exposed brickwork, particularly where an extension abuts the house wall. The tray collects water running down the cavity and directs it to the outside. Rainwater driving against a chimney stack may also penetrate the masonry. For this reason, a damp proof course should be incorporated to prevent water from percolating downwards.

**Tackling condensation**

There are three lines of approach when it comes to dealing with condensation:

1) Eliminating the creation of vapour at source

2) Eliminating cold surfaces

3) Introducing effective ventilation.

Eliminating condensation at source is the best strategy, although this is not always practical. However, confining it to the area where it is produced will help. So, too, will venting it to the outside air, by means of extractor fans.

Reducing the number of cold surfaces where condensation may form is another precautionary measure. For example, where a single pane of glass is fitted in a window, its outside surface may be cold, and since glass conducts heat fairly well, coldness is conducted to the inner surface. One of the reasons for fitting double-glazed units is that the cold outer pane is separate from the inner pane. A similar situation may occur on concrete slabs facing the S/W aspect which never receives direct sunlight and is subject constant reticulation. The moisture keeps the slab cold and condensation may occur on walls and carpeted areas.

Another way of preventing the formation of condensation is to introduce a system of controlled ventilation, such as cross ventilation in roof structures and suspended floors. Unlike extraction systems that use fans, cross ventilation is induced naturally, airways having to be created and kept clear. The position of ventilators in such a system is critical, as is the size of openings, so expert guidance is essential.

Ventilation in modern houses also makes use of trickle ventilators built into the frames of windows.

The fact that vapour can pass through many of the materials used in buildings is important to recognise. For example, problems of condensation in roof voids is due to its ability to pass through

plasterboard. A better answer is to install specially made foil-backed Gyprock. However, continuity of the foil barrier is essential if it is to be successful, and all joints must be sealed.

Ventilation of a roof can be achieved in various ways, including the use of rotary ventilators and eaves snap vents. Where there are gables prefabricated louvred sections can be built in.

**Cladding walls**

On exposed sites facing the prevailing winds, the walls of a property come under a particular threat. In some circumstances, the only satisfactory and economical solution to damp penetration is to clad the wall with a protective layer. This may require additional planning permission (check with your shire) you should seek advice from the local building authority, because the addition may have structural implications. For example, facing brickwork with modern clay wall tiles would provide a notable barrier. It would also have the advantage of allowing any damp already in the wall to disperse, since the tiles wouldn't seal in the residual moisture.

A similar strategy would be to fit a cladding material such as weather-boarding or Hardiflex. The disadvantage of adding timber cladding or Hardiflex, however, is that it will need regular maintenance. In some circumstances, PVC cladding might be better.

A water proof cement-based render could also be used to protect the wall. However, like the other precautionary measures, this would not be a cheap option, and the costs would need careful consideration.

## WATER REPELLENT TREATMENTS

Walls can be protected from penetrating damp by applying a silicone-based waterproofing agent. It involves cleaning the masonry, removing any algae or surface vegetation with a stiff brush and scraper. This should be followed by an application of a fungicide. The liquid itself should be applied in good weather, when the surface is completely dry. Use a large brush on a smooth surface, or a deep-pile roller on a heavily-textured one.

This method can be very successful, although the treatment will need repeating periodically. There may be undesirable side effects, however, and you need to understand the potential problems. To begin with, this treatment must not be regarded as a curative measure if a wall has even fine cracks in it. Equally, there's a risk that a surface treatment may seal in any moisture. Some products are said to allow brickwork to `breathe'. Nevertheless, it's fairly certain that the outward passage of vapour will be reduced. Also, you should not apply a surface treatment to the outer leaf of a cavity wall if there is a complete fill of cavity insulant. Moisture can be trapped between the silicone and foam, leading to frost damage. A further difficulty arises if only part of a wall is treated. The fast run-off of rain from the treated area will place the adjacent untreated area under a greater amount of wetting than normal.

## DAMP PROOF COURSES

The addition of a DPC to an older building can be achieved in a number of ways, including introducing damp-proof material brick-by-brick, or removing a line of mortar with an abrasive disc machine and inserting the DPC with a dry mortar bedding. A more common approach, however, is to inject a moisture-repellent fluid into the masonry.

A completely different approach involves passing an electrical charge through a wire embedded in the wall, known as the electro-osmotic process. The operating principle is based on the fact that capillary action is influenced by an applied voltage, and that moisture will move from a positive anode to a negative cathode whenever an electrical current flows through a special conductor.

Installation involves cutting a horizontal groove in the walls of the property, and burying a titanium wire in the groove. Subsequently, the groove is made good with mortar. When completed, the system is connected to a mains supply.

## OTHER MEASURES

Damp-proof membranes are used for larger areas in contact with the ground, such as concrete floor slabs. Where a plastic sheet is used, this must be overlapped with the damp-proof course in the walls to achieve complete continuity. Further provisions are needed at door and window openings, where the outer skin of a cavity wall joins with the inner skin. Traditionally, a length of damp-proofing strip (Alcor flashing, Malthoid or similar products) are embedded horizontally or vertically in the masonry thus providing a break in the continuity of permeable materials. More recently, Polystyrene has been developed for placing in the cavity. This not only breaks the continuity between the two skins of brickwork, but also provides thermal insulation.

## INSTALLING A CHEMICAL DAMP PROOF COURSE (DPC)

Although you can employ a contractor to inject a chemical DPC in the walls of your house, the work is not difficult and if kits are available allowing DIY treatment, then you might as well try and save yourself quite a lot of money.

Moreover, injection equipment can often be obtained from tool hire companies. However, the work can be quite messy, so it is essential to remove any items from the vicinity that could be damaged by the chemical.

Essentially, a section of brickwork, running around the house, is soaked in the water-repellent chemical, preventing moisture from rising through the masonry.

If Available a typical DIY injection kit should comprise of a container of DPC chemical

(usually 25 litre drum), a pressure pump (either electric or manual), injector nozzles and hoses, and tapered wall plugs.

### THE PROCEDURE FOR INSTALLING THE DPC ON A 110MM THICK WALL, IS AS FOLLOWS:

1) Indoors all skirting boards should be removed from the walls being treated. All plaster affected by rising damp should be hacked off to 450mm above the visibly affected area.

2) Holes are drilled into the brickwork 150mm below the floor level (externally) and 75mm deep angling the holes downward. Internally (if possible remove one flooring board) if this is not practicable start as close to the flooring. On the drill bit mark a depth using coloured tape or use a stop.

3) The chemical is pumped into the holes until the surface of the masonry is seen to be saturated (the area treated will darken as it becomes saturated) then the nozzles are moved to the next set of holes and the process repeated.

4) When treatment has been completed, holes outside are left as long as possible before plugging with mortar containing a waterproofing agent like "Silasec".

5) Indoors, the walls should be left to dry out for a month for each 25mm of wall thickness. If this is not possible, a waterproofing render or waterproofing additives can be used when replastering the walls like "Damit 800"or "Gropoxy CW". For addend security before replacing the skirting boards, treat the back with preservative i.e. paint (generally skirtings are not painted on the back).

**DRILLING THE HOLES AND HOW MUCH TO USE:**

Drill the holes for the water proofing fluid with a 13mm masonry bit fitted to an electric drill with a hammer action. As a rule, the holes for the fluid should be spaced about 100mm apart.

If the bricks are particularly dense, space the holes about 75mm apart but generally 100mm is fine. When treating a single-leaf wall, no thicker than 110mm, drill the holes from one side only to a depth of 75mm.

A cavity wall with two single leaves will need drilling from both sides to the same depth. A 240mm thick solid wall of two leaves of bricks will need drilling in the same way. Alternatively, drill from one side only to a depth of 75mm, inject the fluid, then drill the same holes further to a depth of 190mm and inject again.

The thickness of the wall being treated, and the walls porosity will determine the amount of water proofing fluid to be used. Generally speaking for a single leaf wall (110mm) thick you will need approximately 3 litres per 1meter length of wall for good saturation, for a solid wall this would be double.

The products mentioned above are available through most hardware outlets but for further information "CROMMELINS CHEMICALS" in Welshpool can supply data sheets on the various products.

If the hire of injection kits is not available in your area, you can improvise with a 2-4 litre hand pressure pump sprayer and inject the liquid slowly into the pre-drilled holes one at a time. This may take some time, but at a huge saving to your pocket.

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# Maintenance on Various Building Materials

**Asbestos Cement (A/C)**

This material was used extensively and was very popular many years ago, asbestos cement is a brittle material that is easily damaged. In addition, concerns over the effects of asbestos on health would commend its replacement. Before undertaking this yourself, it would be advisable to contact your local authority to discuss its removal and disposal. However, there are roofing contractors that will spray and old asbestos thus effectively sealing any loose fibres and giving to roof a new lease on life.

**Lead**

Lead rainwater systems are rare on ordinary domestic buildings, due to cost, but lead may be used to line box-section gutters and valley gutters, and used as apron flashings, which are constructed where two adjacent roof slopes intersect or known areas where water due to its velocity can penetrate the lapping of tiles. Replacing a lining or apron isn't difficult, but repair work to moulded lead components requires reasonably specialised skills. Lead wherever used should always be painted so as not to induce premature rusting to galvanised gutter components.

**Aluminium & Colorbond**

In recent times, rainwater systems extruded in aluminium have become popular. These can be manufactured in traditional profiles, but without the attendant problems of maintenance. In some instances, the materials can be coloured during manufacture to produce attractive, as well as long lasting, components. This material has much to commend it, but unfortunately, it's quite costly.

Another approach to aluminium systems is to have guttering specially fabricated on site. Contractors have machines that convert sheet aluminium into continuous runs of guttering in the required profile. At junctions, the unions are caulked with mastic, and a mechanical joint may be used as well. Along the gutter itself, the lack of joints is an advantage. This system is almost maintenance-free. Since its introduction in 1966 Colorbond guttering is another alternative, with a variety of subtle colours to choose from and the cost factor being not that great considering the cost of painting a standard guttering system and the additional life span Colorbond offers.

**Plastic**

Advantages of u PVC (UN-plasticised polyvinyl chloride) rainwater goods include the fact that any profile can be easily moulded, and the material isn't subject to corrosion or problems due to pollution. In addition, the products can be painted (comes in white) and needs minimal maintenance and some have a 20-year guarantee. However, over a long period, applied colours can fade, some plastics become brittle and shatter easily, while joints on eaves guttering sometimes develop leaks. Joint failure is partly caused by the problem of thermal movement. Plastic expands considerably in hot weather, and it's not unusual to hear rainwater systems creaking in the sun as pressure is put on the brackets and joints. Extremes of seasonal temperature aggravate this problem, and stresses occur in the joints between drain outlets and at all connectors linking sections of gutter. However, these types of systems have been improved

over the years and expansion joiners are fitted. In time, the rubber seals cease to give a water-tight union, and the gutter may drip quite badly. Any attempt to remedy this will require a sealant that is very flexible. In practice, a long-term cure may not be found, and the only satisfactory answer is to replace each of the faulty unions.

On downpipes, a more common problem is impact damage. A patch-up operation can be accomplished using bitumen-backed foil, which is used as an inexpensive alternative to lead flashing. The bitumen has impressive powers of adhesion, provided the plastic surface is completely dry, and products of this type may successfully cure a leak in a downpipe for ten or more years. Unfortunately, it lacks the flexibility needed to cover over a join in a gutter union and replacement is imminent.

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# Rainwater Systems – Downpipe Positions

Significant amounts of water are discharged from a roof in wet weather. This could be extremely inconvenient, so a system of collection, transport and dispersal is a fundamental requirement of any property.

Since faulty guttering or downpipes can cause severe damage to a building, it is not surprising that the adequacy of the system is a requirement of the Building Regulations.

On older buildings, rainwater systems are often in need of repair or improvement. In some instances, only due to special circumstances (allowed by the authorities) guttering may be omitted, i.e. in heavily wooded areas where constant depositing of leaves is a daily chore.

**IMPORTANT CONSIDERATIONS**

A rainwater drainage system should take into account the pitch of the roof, its overall size and the type of covering materials. This will have implications for the dimensions of eaves guttering and the number of downpipes required, together with their positions.

For instance, if a single downpipe is placed centrally, in a straight run, the guttering can drain a roof area twice as great as it would if the downpipe was situated at one end of the run. This is because no section of guttering will ever hold more than half of the total discharge from the roof.

Other aspects of a system that determine efficiency include the slope, or fall, of the guttering. Whereas it's considered acceptable to construct eaves guttering completely level, it will be around 20 per cent more efficient if it is laid with a fall of 1 :600, which equates to 25mm in a 15m run.

**USEFUL INFORMATION**

Information about design requirements is often given in the technical data sheets that accompany catalogues of rainwater goods. This information is very useful for anyone constructing a shed, porch or small extension. Alternatively, guidance is given in old building by-laws, most roof plumbers are familiar with design or the Australian Standards.

The procedure involves calculating the `effective design area' of the roof surface to be drained. On a flat roof, this is the same as the plan area shown on the drawings. On a pitched roof, the plan area must be increased by a factor that is determined by the pitch of the roof.

1) On a roof with a pitch of 45 degrees, the plan area must be multiplied by 1.4 to give the effective design area.

2) On a roof with a pitch of 30 degrees, the factor to use is 1. 15.

3) On a roof with a pitch of 60 degrees, the factor to use is 2.00.

**DECIDING ON THE SIZE**

Knowledge of the effective roof area allows you to determine the size of guttering needed, together with the minimum diameter of the outlets.

For example, a roof with an effective area not exceeding 18sqm can be adequately served by 75mm gutter with a 50mm diameter outlet.

A roof with an effective area up to 37sqm can be effectively drained by 100mm gutter and a 75mm outlet. However, there are other considerations to be taken into account.

These examples apply to guttering that is laid level. In practice, however, a fall is often preferred to ensure a more efficient rate of discharge. Sharp bends in a run of guttering also have an influence on performance. These have a detrimental effect because they slow down flow rates, leading to a greater likelihood in the build-up of water.

## DOWNPIPE POSITIONS

The design of a system isn't particularly complicated to work out if you are draining a simple roof. However, on larger projects, where greater quantities of storm water need to be dealt with, or on roofs of complex design, it is advisable to seek expert assistance. Rainwater goods can be surprisingly expensive, and if the system overflows due to bad design, remedial work may add even more to the total cost.

### Preventing blockages

Rainwater systems on properties that have been built near trees can suffer from persistent blockages, particularly during the autumn. Dead leaves not only settle in the guttering, but they also accumulate at the heads of downpipes, preventing rainwater from flowing away. The resulting overflow can, at the very least, be annoying, but more seriously, it may cause damp problems by running down the walls of the property.

To prevent a blockage in a downpipe, the normal precaution is to fit `balloons' in all the gutter outlet points. These are made from galvanised wire, and look very similar to a balloon in shape. Moulded plastic versions are also available, but look rather different. The installation of a balloon undoubtedly prevents leaves from entering a downpipe, but they tend to collect around it and, together with other waterborne debris, will eventually block it completely, causing an overflow. In consequence, this build-up will need clearing, and regular inspections are often necessary - especially during the autumn. However, this periodic chore is better than dismantling a downpipe in an attempt to remedy an unreachable blockage. A few systems include an inspection point that can be fitted into downpipes. This features a screw cap that allows access to the interior of the downpipe. Mostly you will find that the down pipe junction is near a hip on the roof and to clear the debris around the downpipe/gutter union tiles may need to be shifted to gain good access. By shifting tiles so close to a hip on a roof the mortar bedding can easily be disturbed, this is not desirable and will need to be re-cemented. So, prevention is better than cure.

### Gutter Mesh

One sure and very effective way to keep leaves out of the system is to install strips of a mesh material along the guttering and even in valleys. Several versions are available and can be purchased from builders' hardware stores. Made from moulded plastic, the grid is simply bent so

that the edges fit inside the gutter and rest on the edge of the last tile. The spring in the material is sufficient to hold it in place. Water drains through the holes in the mesh, whereas leaves remain on the top, dry out and blow away. Like the balloon, however, periodic cleaning is advisable, as the holes in the mesh may become clogged with silt from the roof. There are two types that we are aware of. The cheaper version is an open grid type which still allows smaller fines like seed pods and fine leaves from trees and scrubs trough the grid, the other type is called "The Great Barrier Leaf". The installation principal is the same, but the material has fine vertical slots cut into to the material. The designs allows the water to filter through the slots but leaves the leaves and fines on the outside. Again as the leaves dry out the idea is that the wind blows the leaves away. However regular maintenance is still recommended. At least the settled debris can be brushed off the top of the gutter guard and since the gutters have hardly any fine on the bottom they can then be flushed out easily.

When gutters are left unattended with debris year after year, the metal deterioration process is quite dramatically accelerated.

**Rain Water DISPERSALS**

The dispersal of rain water is a rather sore point especially in clay areas. If the home is to be built is in well drained sandy soil the perception is that any rain water discharge from the down pipes can be left to drain into the sandy soil close to the footings or using directional trays. These directional trays are available in either concrete or uPVC.

It is & has always been recommended that rain water be discharged at least 1.8m away from footings. The reason behind this is as follows. The sand pad under the main slab is dry, the footings are in an area where there is an equilibrium between the dry sand pad (the edge facing the inside the inside of the slab) and the damp outer face of the footing. Once this equilibrium is disturbed movement occurs mainly in the footing and sometimes in the slab.

The equilibrium will be disturbed by discharging litres of rain water in concentrated areas at the base of the downpipes which are close to the footing. By diverting the rain water via PVC pipes and draining the water into soakwells 1.8 meters away from the footings the equilibrium is maintained.

This becomes even more important if the home is built in areas where the solid are reactive like clay or silty soils. As the clay in summer shrinks and expands in winter the tendency is that the footing and sometimes the slab moves with it, thus causing distortion in the face and internal walls.

It is therefore not recommended to build homes on clay soils but rather install a minimum 600mm high sand pad and dig the footings into the sand pad. The sand pad then acts as a buffer to the seasonal changing soil under the pad, thus reducing the chances of cracking in walls.

However, in this scenario it is still important to discharge rain water way from footings whereby the reverse can occur in so far that as the clay soil expands it can lift the slab and cause distortion to the inside brickwork without too much movement being noted on the exterior walls.

In areas where there is known poor drainage and high-water tables the local shires have installed storm water drainage systems to which home owners can connect to. It is best to check

with your local authority if this is the case. There are a few other alternative methods that soils engineers have come up with to try and stabilise reactive soils under new buildings. One is placing sheets of polythene under the entire sand pad in the effort to retain the optimum moisture content in the soils under. However, the best and of course the most expensive is to seat your foundations on strategically placed piles which are drilled or poured into the soil so far down that hardly any movement is noted in the footings.

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# Brickwork, Timber and Rendered Wall Repairs

An external wall must be able to withstand the weather. In many instances, however, the appearance of a wall is important, too. The visual impact of brickwork, stonework or render can be of visual impact, and flaws are not easy to hide. Moreover, when repair work is carried out, it is important to retain the character of a building, especially if it has architectural merit or historic significance.

**Types of brick**

In broad terms, there are five types of brick, most of which are made from clay:

**Engineering Type:** These have a dense, semi-vitreous character to withstand the heavy compressive loading when supporting additional floors or machinery. Their level of water absorption is negligible. This type of brick is seldom used in domestic building, except to provide a decorative course in a contrasting colour. In some older type buildings, they may have been used as a DPC. **Common Type:** A general-purpose brick with no particular quality of strength, density or weather resistance. These bricks have no decorative qualities either, although they were used as facing bricks for inexpensive Victorian housing and were later used as internal render bricks.

**Fair Faced Common Type:** To add to their decorative quality, some common bricks are manufactured with a special facing on one long side (stretcher) and one short side (header). These may have a textured sand finish; others have an additional colour added to the facing. This type of brick can look attractive as long as the decorative facing isn't chipped by accident.

**Face Bricks:** These bricks are manufactured from a clay of distinctive colour to maintain their appearance throughout the unit. A variety of textured finishes is also available and are the most common external bricks that we see on homes around Australia.

**Hand-made/Mud Brick**: The traditional method of manufacture involved pressing clay into a mould by hand. Although this is a slow process, the surface of the brick is notable for its creases and textured finish. Hand-made bricks are expensive, but are justifiably popular for internal feature walls.

**Concrete Bricks/Blocks:** These bricks/blocks are made from concrete mix and poured into moulds. These are used mainly for retaining walls and on engineering projects.

**Sand/Lime Bricks:** These bricks are made from siliceous sand and slaked lime with sufficient water to allow the mix to be moulded under pressure and hardened by exposure to steam. This brick and its patented process was used in England back as far as 1866 and was further developed in Germany in 1880. This brick is widely used in Western Australia and known as a silica brick. Depending on the finish it can be used internally or externally.

A more detailed classification could include bricks with a ceramic facing, stock bricks and bricks of different density and durability. In addition, some bricks are made with a recess known as a `frog' some have vertical perforations, while others are solid. It should be stressed that the term `brick' refers to the size of the unit, rather than its constituents.

**Weather damage to bricks: -**

Good building practice ensures that brickwork is spared the persistent passage of rainwater by the construction of overhangs. These include projecting roof structures, sills on window and door frames, and copings that act as capping on garden walls. However, these features will not keep driving rain from the face of a wall, and on particularly exposed sites, a prudent client if advised or a good builder would select bricks that provided the best resistance to frost damage as can occur in areas of Australia.

In addition, in cavity wall construction, wall ties should always be placed with the ties drip groove facing downwards to shed water. It's not unusual for moisture to develop in a cavity, which is why modern practice ensures the inclusion of weep holes in the first course in the perpendicular joints acting as drainage outlets. It should be emphasised that some bricks will absorb more rain than others, and in winter this can lead to damage, however in the more temperate climates this is not a problem. When freezing water expands, some bricks will begin to crumble, whereas with other types, the face will start to fall away in layers. This process is known as `spalling'.

The problem of spalling seldom occurs with harder masonry, such as engineering bricks; softer bricks, on the other hand, are much more prone to attack. For instance, facing bricks with a wire-cut rustic finish are more likely to hold droplets of water. This is aggravated if they are not laid with the struck cut on the face pointing downwards. Some hand-made decorative bricks also have deep fissures created when the clay is pushed into the moulds; these act as water traps. In some cases, hand-made bricks are best reserved for interior feature walls only.

**Curing the problem:**

Where a brick has crumbled badly, one answer is to cut it away and replace it. Use a sharp cold chisel, as this is less likely to shake the surrounding structure than a bolster, and its tip will remove small fragments at a time. Greedy `bites' invariably lead to wider damage; patience is preferable to brute force. The replacement should be laid on a bed of fresh mortar and surrounded with more mortar by pressing it into the joints with a pointing tool.

If, on the other hand, only the face of a brick is damaged, an approved remedy is to cut away a shallow recess, about 30mm deep. This can be filled with a small section of brick called a `slip' or batt. You can ask brick cutting companies to cut you a bat from a similar or an original spare brick. These companies generally cut bats so that they can be used to clad plaster internal walls to give the impression of an exposed brick finish. Alternatively, you can cut them yourself, using a special brick saw. Once prepared, the slip/batt can be affixed using mortar.

**Mortar:**

The appearance and sound structure of brickwork is dependent on the mortar. This can take many forms depending on its constituents, the main one being sand. For brickwork, the sand should have graded particles, and it is often referred to as builders' sand as opposed to sharp sand, which is coarser and more suitable for concrete. In new building, soft sand should not be used for mortar because its fine silt content leads to shrinking when it sets. However, for repointing existing brickwork, a soft washed sand is more suitable. The binder in the mortar is the cement and we will issue a chart later.

**Varying colour:**

Since sand is a natural product, its colour can vary considerably depending on the region from which it comes. Where consistency in new work is important, this must be taken into account. In properties built in the early part of this century, or before, lime was added to sand to make a mortar mix. Today, lime is not considered suitable because it is weak and sets slowly. However, it can be purchased in small quantities for renovation work on old buildings. The modern binding constituent is ordinary Portland cement (OPC), and a typical mix for new work using clay bricks is 1-part cement and 3 parts sand (by volume).

This produces a strong, durable mix with good frost resistance when set. However, it is also brittle, and in some circumstance a small amount of lime is added to produce a less rigid mortar that is less likely to develop cracks due to thermal movement. A typical mortar mix for clay bricks is 1-part OPC, 1/2-part lime and 4 parts sand. A considerably less durable mix, is 1-part cement to 6 parts sand. This would be suitable for brickwork that is sheltered from the weather. A weaker mix of 1-part cement to 7-8 parts sand is recommended when working with calcium silicate bricks, but these are less common than the clay type.

**Plasticiser:**

When using ordinary Portland cement with sand, many bricklayers add a mortar plasticiser, which adds tiny air bubbles to the mix. This is known as air-entrainment, and the resulting mortar has a creamy constituency, making it easier to use. Plasticiser also gives a degree of frost resistance during the setting period, which is helpful when building in winter.

**Repointing**

In time, mortar joints may deteriorate due to water damage and structural movement. The solution is to re-point them. Only mix small batches of mortar at a time. If a batch starts to dry, throw it away; don't be tempted to add more water.

Select a mortar mix to suit the bricks:

For Normal exposure 1:1:6 (Cement: lime: sand)

For Hard dense bricks in exposed sites 1:1/4:3 (Cement: lime: sand). Soft, rounded, washed sand is best for pointing; avoid sharp sand. Using mortar oxides or colouring agents can lead to problems in maintaining colour consistency, especially with the need to mix many small batches. It is better to use a pre-coloured sand for creams and white joints.

**Cracks in Brickwork**

Structural damage to brickwork usually occurs for two reasons. A failed foundation will cause settlement, and cracks will appear in the mortar joints, or even the bricks. Similar damage may occur

through thermal movement but this is rare. In the latter case, however, the structure is not at risk - although the cracks must be monitored. In the case of a failed foundation, a surveyor should be consulted. There are various reasons for failed foundations, but one of the most common is a clay subsoil, which can shrink and expand quite considerably depending on its

moisture content. This will have a destructive effect on inadequate foundations especially ones built around the turn of the century. A failed foundation is a serious matter, but a building can often be given a new, deeper foundation by underpinning. However, this is a costly and complex task that requires expertise.

**Remedial work to cracks**

Shrinkage cracks can be dealt with in a variety of ways, some being cosmetic repairs rather than long term cures. One answer is to cut away the cracked bricks and replace it with new ones. Problems occur if no matching bricks can be found.

In this case, a remedy is to drill a series of holes along the crack, and inject them with a special resin grout to stop further cracking. The face of the brick is then repaired with colour-matched mortar using a mix of oxides and cement. If you have small parts of the same cracked brick, crushing the brick and using the fine dust mixed with white or grey cement can result in a satisfactory patch. Brick Stitching is another method of repairing stress or settling fractures.

Damaged mortar courses can be repaired in a similar fashion. This produces a permanent structural repair, which is difficult to detect once the joint has been finished with colour-matched mortar. Application tools for fretting mortar are also available.

**Removing stains:**

A variety of brick cleaners are available for removing mortar and paint stains. There are brochures available from most brick manufacturers on what to use on which type of stain. Most of these cleaners contain significant amounts of acid, so it is essential to follow the maker's instructions. You must wear appropriate clothing and eye protection. When using a product of this type, try it on a small test area first, before moving on to a larger area.

In some cases, a stained area will need treating with a stiff bristle brush, given that dried stains can be exceptionally stubborn. However, the use of wire brushes or other abrasive tools should be avoided, as they will damage the surface of the bricks and are only to be used in extreme circumstances. Chemical treatments must not be used to remove efflorescence - the white salts that often appear on new brickwork - and it is often best to allow it to weather away naturally. Since the deposit appears after the bricks and mortar have dried out, excessive water should not be used, since this merely allows the salts to be re-absorbed. At the very most, only a damp sponge should be used, rinsing it often. The best advice is to remove the salts with a stiff brush.

Lime stains on brickwork are usually an indication that mortar, or nearby concrete, is repeatedly getting wet. The discolouration can often be removed with a bristle brush, but over a longer period, it must be treated with a proprietary acid cleaner. The green vanadium stains sometimes observed on lighter bricks can be removed with a solution of caustic soda.

When it comes to removing grime from the face of a building, high-pressure hosing is preferable to sandblasting. The former is less likely to damage the surface, although the absorption of large amounts of water may produce efflorescence. High-pressure cleaners are available from most tool hire companies. Take care, however, since a powerful water jet can smash glass and cause injuries.

**Repairing rendered walls:**

Render is a thin layer of mortar applied to an exterior wall to provide protection and a form of decoration. Various finishes are used, including textured or painted surfaces. Problems occur, however, if a crack allows rainwater to penetrate the render; subsequent moisture action will soon pull sections away from the masonry behind.

Rendering a large area is a skilled job, but patching is less difficult if you follow these steps: Use a bolster and club hammer to break away loose render, wearing eye protection to guard against flying fragments. Cut back to a sound base and, if the surface is smooth, add score marks to improve the bond. Brush away all dust and debris.

Coat the surface with a 1 :6 solution of PVA (bondcrete or similar) bonding agent and clean water.

Prepare a 1: 1 :6 mortar of Portland cement, hydrated lime and sharp sand. Alternatively, you may be able can buy bagged pre-mixed render in small quantities from DIY stores. Add water to produce a stiff mortar mix, which can be shaped on the board with a trowel. If it slumps, it is too wet.

In dry conditions, flick water onto the wall with a paint brush. Then apply the mortar with a rectangular steel trowel. The correct technique is to place the mortar on a hawk, tilt the hawk towards you and push with the trowel, at the same time scooping mortar, towards the area to be rendered. Press the mortar onto the wall to be rendered before smoothing it off and levelling it with the surrounding render, by using a wooden batten.

Various finishes can be added just before the render has begun to harden. A metal trowel will produce a smooth finish, a wooden trowel will produce a rougher finish. The render can also be treated with a sponge or broom to create various textured finishes.

**EXTERNAL TIMBERS**

Wood is used on the exterior of most houses. On some properties, the material may only be used to finish off the edges of the roof, whereas other houses can have sizeable areas of cladding or other decorative features. Wood is also commonly used for doors and the frames of windows. However, wood is vulnerable to weather damage, and in all cases, it's essential to ensure that it is carefully and regularly maintained, using appropriate paint, varnish or preservative treatments.

**Timber treatments**

Traditionally, oil-based paint has been used for the preservation of cladding and fascia boards. However, in the last 20 years, wood stain preservative has become a popular alternative. Not only does this finish look attractive, but also subsequent coats can be added without the elaborate preparation normally needed if conventional paint has been used.

Sometimes marine varnishes are used on cladding to emphasise the grain of the wood. However, the choice of varnish needs careful consideration, because some products create a film on the surface that prevents the wood from breathing. Where nails puncture its surface, rainwater

finds a way through, but it becomes trapped below the skin, leading to discolouration of the timber.

Paint and preservative stains are undoubtedly successful, provided the surface is re-treated at regular intervals. However, if rot starts to develop, replacing sections of timber can sometimes be deferred by using chemical injection products. These include:

* A filler paste that's applied to a damaged area with a palette knife. This dries to provide a surface that can be planed, sanded and shaped.

* Preservative tablets which, when placed into predrilled holes, dissolve and release a powerful preservative that spreads through the wood fibres.

These treatments can be used on fascia boards, particularly at corners or joins in a run of boarding where deterioration often appears first.

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# Reinforcing Roof Timbers and Custom-Built or Prefab's

**REINFORCING ROOF TIMBER COMPONENTS:**

One method of preventing rafters from spreading out at the eaves is to add strutting rafter braces, these are better known as collar ties. The additional Installation of supports beneath purlins to prevent future deflection can also be done using struts. If there are supporting walls underneath, under purlin struts can be fitted, using high tensile bolts at the fastening ends, the winder is then turned to create a camber in the under purlin. This slight camber is annulled by the weight of the Tiled roof. Some roof problems are serious and should be tackled only by a competent roof carpenter.

When a roof covering is beyond repair and replacement is urgently required then the structure of the roof must be considered to make sure that the new roof covering material is adequately supported. In other words, if the original roof was corrugated iron and you now wish to replace the cover with clay or concrete tiles, then the original roof structure would not be sufficient to support the additional weight placed on the roof members. The roof would require additional stiffeners and struts.

**CUSTOM BUILT OR PREFABRICATED:** If the construction of a new roof is of a complex nature then there is no alternative but to custom built the roof structure, this applies especially to homes having a particular style. However, if the roof is a simple gable type construction, then prefabricated trusses would be more economic and be far quicker to erect.

The custom-built approach uses rafters that are resting on wall plates on the perimeter brick work and lean against the ridge beam. Collar ties are used to prevent spread of the rafters, under purlin are used to prevent sag, ceiling joists are fixed to the plates at rafter spacing and hangers are fitted at right angles to the ceiling joists to prevent sag of the joists. The under purlin is positioned half way between the wall plate and the ridge beam depending of course on the length of the rafter. Composite angled cuts to Jack rafters and valleys used in hipped roof construction would have to be custom fabricated on site.

Prefabricated trusses are engineer designed and when they arrive on site it is merely a careful crane assembly operation. Prefabricated trusses are extremely strong due to their design and must be fixed according to the manufacturer instructions, special clips and bracing straps are required to stabilise the structure. The bottom cord on the prefabricated trusses are used as ceiling joists and if the trusses are installed correctly, then the ceiling joist line will be almost perfectly level, resulting in a perfect ceiling finish. In addition, prefabricated trusses require less timber due to their computer design. This coupled with speed of erection will ultimately result in a more economical project.

# External wall claddings

## TIMBER CLADDING

Some homes have their external walls clad with timber boards mounted on a sub frame. Occasionally and very rarely oak or cedar shingles may be used instead of boards. Both types of finishes can improve the weather protection of the building and add charm to its appearance, but if you are considering such an addition to your home, you should discuss it first with your local building authority. In certain Shires there are stringent regulations as to the appearance of external finishes.

**A SUITABLE MATERIAL:-**If your building authority accepts your plans for timber cladding you need to decide on a suitable material. A good timber merchant should be able to supply boards with a variety of profiles, such as feather edged boards or ship lap rebated boards. These boards need to be fixed to a timber sub frame. Furthermore, it is normal to lay the boarding on a lining of sisal paper to give greater weather protection. Bullet head galvanised nails are recommended for securing the boards, because they grip the wood more effectively and are protected against rusting, serrated nails are equally recommended. The bullet head can be punched below the surface and concealed with filler.

All the wood components used for the lining should be treated well with preservative; you may be able to have your supplier to this for you before delivery, using a pressure impregnation system, is preferable. If this is not possible, you should brush a liberal coat preservative onto each piece, making sure that it is worked into all end grain and treating each piece before it is installed.

Once the cladding is in place, you can either paint it or treat it with a wood stain. Bear in mind that once you have decided on a finish, it will be almost impossible to alter it at a later date.

Specialised timber merchants may also be able to supply cedar shingles, which will require nailing horizontal to battens, over a layer of sisal paper for water tightness.

## METAL FASCIA SYSTEM

Recognising that that exterior timber needs regular maintenance to preserve its appearance many builders use metal facias in lieu of timber. Installation is straight forward requiring fascia clips, internal and external corners and joiners.

### Plastic wall cladding

Back in the 80's and perhaps as late as the 70s interlocking moulded claddings were quite popular because of their maintenance free quality.

In addition, the UPVC coating of the material offered longevity, good insulation quality and improved the thermal efficiency of an external wall.

Installation involved the construction of a subframe of preservative treated battens that are secured to the main wall structure. Some systems came with a metal clip fastening system. During installation, the battens or clips needed to be checked and carefully adjusted for

horizontal accuracy. It was also important to make sure that the base was flat because any irregularities would be reflected in the surface of the cladding. Invariably trims were included to provide neat finishes around door and window openings.

**OTHER CLADDING** Another popular type of external cladding is "Hardy Flex" planking, "Weathertex", or the very popular "Brickclad", again installation required a sub-frame or using the studs on a timber framed construction which were used to secure the planking. Detailed installation instructions are available from the various manufacturers of the products.

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# Roof Cover Type

**TILED ROOF COVERING:**

Tiled roof coverings that are less than the manufacturers recommended pitch will require a lining under, in case of water ingress.

This lining of silver sided isolation or sarking is placed on top of the rafters and secured down with the battens. The idea is that any water ingress through the tiles due to the low pitch of the roof will be collected on of the lining and deposited into the guttering at the lower level. It is therefore essential that the lining be in tact and not ripped or damaged otherwise the collect water will seep down into the ceiling below causing stains. This silver sided isolation also serves as installation.

Periodic inspections of flat tiled roofs is essential and several aspects needed attention:

When any water drainage from upper roofs is deposited on lower pitched roofs, it is essential that at the point where the water is deposited, there be a lead apron placed, as the force of the water will ingress passed the weather channels.

Regularly remove any build-up of moss and leaves.

**Metal Roof Covering:**

Most metal roof decking will allow very low pitches to be used, some will go down to at least one degree. The leaking of metal decking is very rare between joints and is generally only found to be leaking at the points of fastening. It is essential to make sure that there is at least a small amount of fall for drainage. After any metal decking has been pitched and it requires re inspection, make sure that the only areas that should be walked on, are on the screwed parts of the roof, walking on any other unsupported parts of the roof will generally result in dents damaging the roof integrity.

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# All About Chimneys

## CHIMNEYS

High winds and driving rain are the enemies of chimney stacks. These can be sizeable structures, and the larger they stand the harder they fall. So it is essential that they are kept in good repair.

With the demise of open fires in many houses, chimney stacks have often become redundant in older homes. However, before demolishing an unwanted or old chimney stack it is advisable to seek help from a builder or architect. Removing a chimney pot or capping the flue can at times lead to problems. For instance, when chimneys are not in use, they can provide ventilation, and when capped, water vapour becomes trapped in the structure. This may lead to dampness which often appears because on chimneys breasts.

Before repairing a chimney stack, it is useful to know what constitutes a good chimney design. The stack should be built so that rain water is deflected efficiently outwards onto the roof. In addition, rain driving against the sides must not lead to and in the structure below. Therefore, the criteria for a good chimney design should incorporate sloping at the top to shed the water. Provide damp proof courses to prevent water from percolating down through the brickwork into the structure below the roof. Lead flashing around the base to water proof the point where the stack breaks through the roof.

Quite often chimney stacks in older homes will require attention of some sort. Either the mortar or brick work is fretting, or the damp proof coursing or flashing has failed. Repointing is very common on older properties or some upper bricks are loose and require re cementing. If a chimney stack is cement rendered, check the soundness of the render, if the render its loose, carefully remove any lose particles then re render the area. The importance of a chimney tray is often over looked as its function is similar to the damp proof coursing. If the pitch of the roof is changed and the chimney remains, then compensation must be made for the chimney tray to drain above the roof line.

When older homes are renovated often we find the installation of solid fuel heaters or gas appliances. Both of these heaters require flues. Since a chimney has a bend in the stack, vertical metal flues are hard to install. However, installing a lining inside an existing chimney stack is much more difficult. The choice of liners is important, and its installation can be complex. Stainless steel ducting passed down through the stack is one option, but it is our recommendation to call in a specialist installer for this type of work.

### Chimney pots

Some chimney pots are surprisingly large, so take care if you have to remove one, and employ a helper when lowering it to the ground. When fitting a new pot, make sure that at least a quarter of its height, or 150mm (6in), whichever is greater, is covered by sloping mortar and a surrounding course of bricks. Specific designed chimneys have a special chimney capping or opening, which has a recess to accept the pot;(designs of pots are available from the "Bristile" Clay brick manufacturer catalogue). In older buildings, the edges of the pot were placed on slates before being covered with mortar.

**Sloping Chimney Mortar**

Cracks in this mortar are commonplace, and if this mortar capping is loose, it's best to remove it completely and replace it. Remember that it holds the chimney pot in place, so exercise great care, making sure that no debris tumbles down the flue.

The mortar is formed with a 1:3 cement: sand mortar mix, and should be carefully trowelled off to a slope so that rain will be shed efficiently outwards.

**Renewal of Flashing**

Our next topic will be flashing which always presents a problem for builders and handymen alike.

At the base of a chimney stack, lead flashing is the best form of weatherproofing. On older properties, zinc sheeting was sometimes used, and this may be in a poor state - especially in industrial areas or close to the ocean, where atmospheric pollution will have hastened corrosion. You may find a band of mortar holding the flashing in place, but this is seldom successful. Differential expansion causes mortar to crack and lose its bonding allowing the flashing to come loose or away from the chimney, so if repairs are needed, it is best to replace the mortar with lead flashing.

New flashings should be formed using **15 Kg** lead, which can be purchased from any builders' hardware outlet. If the chimney stack is situated on the slope of a roof, the sections of flashing needed are the sides, the apron (at the front of the stack) and the back gutter. A chimney stack coming through the ridge will have two aprons and a saddle piece rather than a back gutter. These sections of lead are attached to the stack by folding over their upper edges and securing them in the mortar joints with lead wedges and fresh mortar. The lead sheet is easily cut with tin snips and formed with the aid of a wooden rounded mallet (almost like a miniature baseball bat).

**1**) The apron, which is the cover piece along the lowest part of the stack, is fitted first. It must be taken around the sides of the stack by 150-200mm and overlaps the top faces of the tiles below.

**2**) At the sides, a roof that is clad with the common profiled single-lap, moulded, interlock concrete or clay tiles, it must have a separate tray called soakers, inserted around the perimeter of the chimney. The soaker will be folded up at the sides against the stack. Having done this, you then cut a stepped cover flashing to overlap the soakers.

**3**) Two pieces of lead are needed for the upper edge of the stack. One forms a gutter along the back of the stack, while the second is a cover strip attached to the stack. The gutter should be laid on a timber base, which is built as part of the roof construction. The recommended dimensions of back gutter flashing are:

Up-stand at rear of stack - l00mm

Length - width of stack plus at least 225mm at each end

Sole of gutter - at least 150mm

Extension piece for roof slope - 225mm (9in)

**4**) The ridge saddle for a stack in the middle of the ridge of a roof will be the last section to be installed. The saddle piece should be dressed over the ridge tile, ensuring that there is a generous overlap with the side flashing. It should also be cut with a stepped edge and anchored in two courses of the stack's brickwork.

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# All about Windows – doors and frames

## WINDOWS

There is a variety of materials, structures and methods of operation to be found in windows. Some are fixed with no opening light, whereas others are made with an opening section, which may be referred to as the `casement' or `sash'. Depending on the type of opening mechanism, a window can be classified as follows:

**Casement: -** This type of window has a hinged opening light - often called the `casement sash'. If its hinges are attached to a vertical side member (a jamb), the construction is known as a side-hung casement. However, if the hinges are fixed horizontally to the top cross-member of the frame, the opening portion is a top-hung.

**Pivot-hung casement: -** Sometimes a sash is fixed in the frame using a pivot arrangement, and this may operate in either a horizontal or a vertical plane. Some pivots are made with a friction system to hold the sash in any opened position. Alternatively, there may be brackets that limit the amount of movement.

**Sliding sash: -** This type of window was often used in Victorian housing and seen in many older Australian colonial homes, but there are modern versions that are also popular. The sill is normally made of solid timber, whereas the jambs and the head (the top section) are of box construction. In traditional designs, the side boxes house a pulley system and cast-iron counterweights, but modern versions use a spring-loaded tape or spiral rod system.

Other types Recent developments include factory-made windows e.g. (Stegbar windows) that have to be set in a separate hardwood/softwood sub-frame. Sliding patio windows fall into this category. You can also find moulded concrete sills and lintels that complement the shape of a window. Another modern window design has a sash with top hinges (Awning) a handle/lever selects the operating opening mode.

### Wooden windows

Traditionally, wood is the most popular material for windows. In most cases, hardwoods are used, although softwoods such as cedar may be found in more expensive products. The long-term performance of wooden windows is partly dependent on the quality of the timber, and the

treatments used by the manufacturer. Large joinery manufacturers use chemical impregnation processes. However, periodic maintenance is important, too, and hardwood windows are most commonly painted with primer, undercoat, and gloss topcoat. More recently, other forms of stain-type preservatives have become popular. Normally, a less-rigorous preparation of the surface is needed when further coats of preservative are required, and this is one of the advantages of these products.

### Steel windows

In architecturally designed residential housing, windows made from hot rolled steel are robust but are particularly not cost-effective. Rust proofing is achieved using a hot-dip galvanising process, although it is equally possible to specify factory-applied polyester powder

coatings. These are available in a variety of colours as an alternative to primer and a two-coat paint system. Powder coatings can last for 10-25 years before needing further treatment. Steel windows can be seen in the days prior to aluminium and are available in a variety of styles made to order and can be designed to accept double glazing units.

**Aluminium Windows**

Window frames made from extruded alloy and are also available containing hermetically-sealed double-glazing units. They include sliding, fixed, awning, vertical sash windows and casement window units. These windows come in powder coated or anodised form, they are popular and cheap as long as standard sizes are ordered. Salvage yards around Australia sell various types and sizes at bargain prices.

**Replacement Windows**

When necessary, it is advisable to replace completely rotted windows with standard-sized replacements, which should be in keeping with the age and character of the property. However, this assumes that the dimensions of the modern product will match the existing aperture, although a small amount of filling might be possible if the reveal is slightly larger, by using timber framing. In situations where a standard size of window will not do the job, there are a few options:

*Make a custom replacement yourself

*Reduce the size of a replacement window to suit

*Have a window made in Aluminium fitted in a timber sub-frame to suit opening.

* Have a window made by a joinery company to suit opening.

The first option is far from easy, obtaining good quality pre-treated timber being difficult. Moreover, the intricate cross-sectional shapes of window components must be reproduced to make the structure fully weatherproof. Without suitable woodworking machines, this is very difficult to achieve. Even though the second option requires some skilled woodwork if you want to do the work yourself.

**REPAIRING WOODEN WINDOWS**

Before replacing a window, make a check to determine whether remedial work may be feasible. For example, if parts of a sill are in bad condition, it may be possible to cut away the damage, and graft replacement timber into place. Similarly, it may be possible to build a new casement and fit it to the existing frame.

If rot has not spread too far, the frame can often be made good with a proprietary wood repair system. This will comprise:

*A brush-applied chemical that reinforces decayed wood and adds a moisture-repellent seal.

*A filler paste that will set into a solid material that can be planed, sanded and shaped.

*Preservative tablets that are inserted into holes drilled in the frame; dowels are glued into the holes to reinstate the surface. These tablets will subsequently dissolve and release a powerful preservative into the surrounding timber fibres.

## EXTERNAL DOORS

Being exposed to the weather, an external door may become damaged beyond repair, particularly if it isn't looked after. Buying a replacement can be quite costly, and it also takes a surprising amount of time to fit the hinges and other fittings. For this reason, you should determine whether repairs are feasible and economical before buying a new door.

There are several ways of coping with the problem of deteriorating wood. For example, there are products for repairing wood, while a number of epoxy resin wood fillers enable you to replace a rotted area of a door with a highly durable substitute. Once rubbed down and painted, a repaired area can be scarcely discernible.

Where rot has progressed so far as to weaken the door, it may be possible to insert new sections of timber. If fixed securely, they will extend the life of the door considerably. If too much is damaged, however, the only solution is to replace it.

When a deteriorating door is beyond repair, there's no option but to fit a replacement, this is especially true of the honeycombed type doors. This may also be necessary if a door develops a bad twist. Timber can be unstable, and once a severe twist becomes evident, efforts to re-straighten it are seldom successful. If the door is only mildly twisted, thin fillets of wood can be planed at an angle and pinned in the frame's rebate to close gaps and reduce draughts or the hinges adjusted. In extreme cases, however, a replacement door is the only satisfactory answer.

If your house has been built in the last 30 to 35 years, you will find plenty of suitable doors stocked at joinery centres and major DIY stores. When making your choice, you must make sure that the door's thickness suits the depth of rebate in the frame, this is fixed on metal jambs but is variable on timber jambs, as the door stops are pinned in place.

However, if you own a period property, it is obviously important to preserve its character. In this situation, you will need to contract a specialist joinery company to construct a replica.

### Popular material

Timber remains the most popular material for doors, and there may be little opportunity to fit anything different without replacing the frame as well. External aluminium doors are also available. Their major advantage is the fact that they are virtually maintenance-free, although they are not always as attractive as traditional wooden products.

### Safety considerations

Doors with large glazed panels may constitute an accident risk. Where glass is used in a lower panel, a stumbling toddler, or an elderly person losing their footing, can be placed at risk. This type of door was popular several years ago, but now the Australian Standards specify strict requirements concerning the location of such doors and the type of glass used. In other parts of a door, decorative glass such as a fanlight can be an attractive feature. However, the position of

any glass should be considered from the security angle; if a glass panel is too close to a latch or lock, it will be easy for a burglar to break it, reach in and open the door.

It is worth noting that some manufacturers produce front doors that match the design of garage doors. If these are situated in close proximity, the pairing can look particularly appealing.

## CHOOSING & FITTING HINGES

If you are replacing an existing door, the positions of the hinges will already be determined by cut-outs in the frame, and all that is necessary is to match those positions on the door by careful measurement.

On the other hand, if your new door is being hung in a new frame, the hinges should be positioned 150mm from the top and 200-225mm from the bottom. If a third hinge is required, this should be placed mid-way between the two.

Medium-weight doors, which include many fire rated doors, need three l00mm (4in) butt hinges. Heavier doors, particularly those containing glazing, should be hung using three brass butt hinges that incorporate steel washers. As a rule, brass hinges are preferable for external doors, since they are not susceptible to rust.

The hinges should always be fitted to the door before the frame, and their positioning relative to the edge will depend on the type of hinge used:

The most common is the **Butt hinge: -** The full knuckle of the hinge must be placed so that it extends beyond the face of the door.

### Cutting the housing

Before cutting the housing in the door, mark the hinge position carefully, scoring it deeply with a sharp craft tool.

One method of achieving accuracy when marking is to fix the hinge temporarily to the edge of the door using two or three screws. This allows you to scribe around it with perfect accuracy, and without fear of it slipping on the surface.

When you begin to remove the waste, the deep score marks will help prevent the wood from splitting accidentally as you cut with the wood chisel. The quality of workmanship depends on having a sharp chisel, and removing small amounts of wood at a time.

The procedure is as follows:

a) Using a mallet and a bevel-edged chisel with a blade slightly narrower than the hinge flap, cut down vertically through the wood along the scored lines.

Hold the bevel of the blade towards the waste side of the line and drive the blade down by an amount equivalent to the thickness of the hinge flap. If the chisel is sharp, you won't need to use a heavy blow with the chisel, even if the door is made from hardwood.

b) Make a series of small cuts across the waste wood (timber to be removed), holding the chisel bevelled edge down and keeping the blade within the outline of the hinge flap. Try not to drive the blade below the depth of the hinge flap outline.

c) Hold the chisel bevelled edge up, and cut across the waste material to remove it. You should not need to use the mallet for this, only hand pressure. Tidy up the edges with careful chisel cuts into the corners. Check that the recess has been cut to an even depth.

d) Open the hinge and check that its flap sits flush with the surface of the door. If necessary, make further cuts with the chisel until it does sit flush.

e) Fix the hinge to the door with brass or other screws, marking and pre-drilling their holes.

## REPAIRING-REPLACING ROTTEN TIMBER IN A DOOR

(This applies to solid external doors with ply or timber in-fills.)

Although finding an area of rot in a door can be a worry, provided the damage hasn't weakened the structure of the door, it may be possible to make a cosmetic repair using a special filler. While this is unlikely to provide a real long-term solution to the problem, it should at least stave off the time when more substantial repairs, or even replacement of the door, are necessary or affordable.

**HOW TO: -** (almost like panel beating)

Take the case of an external door in which a large area of rot has developed at one end of the bottom rail. The rot was removed with an old chisel, after which the area of the repair was allowed to dry completely before applying the treatment. The resin-based repair compound used comprises a two-part polyester filler and a paste catalyst. The latter is sometimes referred to as the hardener; it must be dispensed from its tube in a carefully measured amount if the filler is to perform as it should.

It is easiest to mix the two components of the filler together on a piece of board. Then the mixture is applied with the aid of a putty knife. Provided the preparation of the wood has been carried out carefully, the filler will dry to form a tough protective layer.

Because the filler becomes very hard when it dries, it is better to start smoothing it with a heavy grade of glass-paper before the compound has cured completely. This removes any major undulations in the surface while the filler is still soft. The final sanding work, however, should be left until the filler has hardened. It's essential to wear a suitable dust mask if a disc sander is used.

In some cases, the bottom of a door may rot to the extent that the only solution, is to replace it completely, it is therefore prudent to cut out the rot and rebuild the door with new piece of wood. For purposes of identification, the uprights -are called `stiles' - and the intermediates are called top and bottom or mid rails. The most common problem is that the bottom rail and let’s say the lower infill ply is rotting away but the side stiles are still intact. Obviously, damage of

this sort will vary from door to door, but the basic principles of the repair can be applied to any similar situation. Remove the bottom rail from the door by sawing through each end, the infill panel could then be removed from its rebate and replaced with a new panel of exterior-grade plywood or matching timber.

Remember that the bottom rail on a door acts as a brace so when replacing the bottom rail make sure that the two side stiles don't splay outwards once the original deteriorated rail had been cut away. Then accurately cut to length and positioned the new bottom rail between the stiles. The new wood is secured by drilling through the stiles from the outside and driving hardwood dowelling into the ends of the sections of timber. All old paint and glue needs to be removed from the joining surfaces, using an exterior-grade PVA wood glue to be applied to the joints before dowelling. Together with the dowel joints, the adhesive is an important contributor to the overall rigidity of the final structure. Sash cramps are useful for holding everything tightly together while the adhesive is setting. If these are not available, it should be possible to fashion a tourniquet arrangement from a looped rope that can be tightened by twisting.

## REPLACING A DOOR FRAME

If a door frame needs replacing, then the task of fitting it within an existing opening is essentially similar to that of fitting a window frame see (DIY118 & 119). For instance, you have to be careful not to over-tighten any screws that attach the frame to the brickwork, since this leads to distortion and subsequent problems when fitting the door later. If the frame is slightly too small for the opening, then by inserting timber packing pieces between the frame and the opening will ensure that its uprights won't bend outwards when you tighten the securing screws.

When replacing an external frame/jamb, it is important to check that the rebate is made for the type of door you want to re-fit. Front doors will need an internal rebate for an inward-opening door, but French doors, for example, will need an internal rebate for outward-opening doors. The frame/jamb should also be made with a hardwood sill that includes provision for a brass or aluminium strip, known as a weather bar. This is essential to keep out wind-driven rain.

There are two common methods of fixing the frame/jamb in its opening:

1) You can attach galvanised metal wall ties to the side of the jamb and mortar these into pockets cut in the brickwork.

2) You can nail the frame to wooden wedges set in the mortar joints between the bricks.

3) You can fit the frame/jamb by packing securely with timber wedges, then drilling through the sides into the brickwork followed by galvanised screws.

## REMOVING AN OLD FRAME & REPLACING

First cut the centre portion from the head by sawing at an angle, then treat the sides in the same fashion. By cutting the frame/Jamb with an angle cut it allows for easy removal of the cut components. Remove the upper portions (head) and breaking any horns at the top two sides of the frame free of any masonry fixings.

Replace the new frame in the opening and wedge it in place so that the jamb/frame is vertical, and the head and sill are in the horizontal. Check with a spirit level and make sure that the sill is at the right level in relation to the floor, then secure the frame/jamb as suggested earlier.

**HANGING A DOOR**

Before fitting any door, it is wise to check its accuracy, by holding the door in the vertical look down the length of the door with one eye closed to make sure that it is not bowed in any direction. If it is an external glazed door, then the glass rebate is always on the outside.

Make sure that if the door is for an external jamb that allowance has been made for the weather strip rebate at the bottom of the door. There should be an additional allowance of about 5-6mm to the rebate to accommodate eventual drop of the door which will tend to occur over time. Doors are generally manufactured wider than the frame or jamb, this allows the fixer to make sure that the door fits neatly. You must ascertain any discrepancies in the fit marking the edges with a pencil, of the door that will require trimming. This will take time and you will need to fit and remove the door several times to achieve a good accurate fit. A clearance gap of around 3mm (or a $1.00 coin) is recommended. When trimming the door is complete the hinges can be fitted to the door. When a door is fitted into an existing frame or jamb careful measuring is required to ensure that the hinge positions match those on the frame or jamb. Once that has been achieved you need to support the door in an open position to secure the hinges to the frame/jamb. On existing frames, the hinge should fit back into its recessed hinge position, however some final adjustment may be necessary. It is easier to fit a door into a new frame as there are no existing holes or rebates to match.

Finally, the door accessories are fitted, i.e. door furniture. Some may need to be recessed and cut outs installed. Most door furniture supplied include templates for positioning and cut out sizes which can be transferred from the template onto the door in pencil. When cutting mortises in a door they should be drilled out first with a brace or power drill fitted with a high speed flat drill bit. Then the series of holes drilled can be squared up with a sharp chisel. Take your time as accuracy is essential or leave it to an expert.

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# Brick Plastic Wall Ties

## A BUILDING PRODUCT ON THE MARKET THAT COULD SAVE YOUR WALLS FROM COLLAPSING.

I came across a unique product in one of the building journals. I personally have given this matter some considerable thought over the years but alas, nothing was ever done about it until now. Polymer wall ties, yes polymer. Just imagine no more rusting of the important ties, that hold the inside and outside house walls together, expensive stainless-steel ties were the alternative.

During our inspections over the years we have come across some insurance jobs, where walls have collapsed due to storm damage close to the ocean. Sifting through the debris we found that in each case the wire ties were badly corroded, this was no surprise since we have always maintained that the problems faced with maintenance to items like, gutters, downpipes, roof storm clips, lintels etc. are regularly neglected. These are very vital components in the make-up of any home, and are subject to extreme corrosion attack and should therefore be given the best possible protection available at the time.

Apart from stainless steel wire ties which are horrendously expensive we now have a more economical alternative "The Polymer Wall Tie" and they are manufactured in Western Australia being exported to the Eastern States.

**We have included an overview by Mark Hawken on the Ni~Ties with kind permission from the MBA Builder Magazine.**

When it comes to holding the inner and outer walls of a building in true and plumb position relative to each other, the humble "wall tie" has long been the solution for builders the world over. But in areas like Western Australia which experience the drastic and diverse effects of conditions that extend from coastal to desert weather, the intense humidity of our tropical north and the blustering saline winds of the deep south in Winter result in a highly corrosive impact on the simple galvanised I tie. Conditions of high humidity within cavity walls result in accelerated corrosion in an area where a particularly high percentage of the population choose to be coastal dwellers. To overcome the problem, we have traditionally stipulated the use of stainless steel wall ties that is, we did up until the middle of 1995. Ní-TlES Pty Ltd, a forward-thinking company then located in Narrabeen, N.S.W., introduced the revolutionary injection moulded, industrial strength polymer (or plastic) wall tie that was immediately welcomed by the building industry in W.A. as the long-term solution to corrosion in brick ties within our "hostile" coastal and industrial sectors.

The original Ní-Tíes were hailed as a major improvement to the common brick tie and Western Australian builders used the product extensively, creating a demand that resulted in the engineer grade polymers now being manufactured in W.A. and exported back to the eastern states. But the Ní-TlES evolution did not stop there. As demand grew in the west the inventors took the design phase to its next natural developmental stage with the introduction of an advanced `tie-shape', converting the original open-ended brick polymer tie into a rounded tie end. This simple improvement saw the addition of a stiffener to assist grip in the mortar

providing better use of the polymer strength characteristics and the prevention of injury to site workers on protruding tie ends.

Further to this, Ni-TlES developed a range of side-fixed wall ties for brick veneer and face-fixed ties (the "stubbie") for stud or steel-framed homes that have recently become so popular in W.A.

Profile Products (WA) Pty Ltd is now marketing the new Ni-TlES product range under the trading name of "Ni-TlES" as the alternative to stainless steel or galvanised wire ties previously

used in high risk areas such as coastal Western Australia. Manufactured from Engineering Grade Polymers which satisfy the Australian Standard A52699-1984 (Wall Ties in Masonry Construction) they fully comply with the Building Code of Australia. This evolution of the Ni-TlES adds a new dimension to their applications as they are not sharp, light and easy to use while their simple colour coding immediately confirms the classification of the ties in the wall as per the standard. This makes Building Site Inspections a simple matter of looking down between the wall cavities to identify the correct Ni-TlES usage by its colour coding. Red Ni-TlES are for Medium Duty applications and yellow Ni-TlES are for Light Duty usage. Compared with stainless steel alternatives the polymer ties are economical and only marginally more expensive than the old galvanised iron ties, although they are unaffected by acids and alkalines. Ni-TlES even absorb some acoustic sound vibrations and are registered by the national Building Product Register, a body administered by the CSIR0.

The building industry in Western Australia abounds with "horror" stories of renovators having stripped away walls to find the ties have completely corroded away. In fact, once existing wall ties deteriorate there is no way of replacing them without disrupting the structural integrity of the wall. Ni-TlES company spokesman, David Campbell said the Building Code of Australia stipulated that non-corrosive ties should be used in coastal regions and large salt water and industrial areas. "In the Newcastle earthquake, for example, corrosion of ties was a primary cause of wall failure when the ties did not act as intended. As a result of that disaster, stainless steel ties were specified but many builders found them too expensive to include in their structures unless they were specifically ordered." This is where the carefully evolved Ni-TlES product comes into its own, having been developed and patented in Australia for Australian conditions and enjoying a life expectancy of more than 50 years.

NI-TlES have been developed to cater for differing applications and conditions with versions including the medium duty (red) and light duty (yellow) ties for cavity brickwork and the light duty, side-fixed (veneer) and face-fixed (stubbie) ties for brick veneer jobs. lt is little wonder that Ni-TlES won the coveted HIA Innovative Product award for 1996.

The distributing agents for the Ni~Ties are Abey Australia Pty Ltd. 1/8 lee Way Court in Osborne Park on (09) 446-8255 and we have been informed that they are available through most major hardware stores outlets in WA. i.e. Bunnings, BBC Hardware, and Beri Distributors.

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# All About Concrete Floors

## CONCRETE FLOORS

In the early 1900s, a ground floor usually comprised a suspended platform built in timber. Today, floors cast in-situ from concrete - and more recently, constructed from reinforced concrete beams with a block infill - are more common.

Whatever method of construction, precautionary measures must be taken to keep damp out of a building. One thing that intrigues me is that there is no call for thermal insulation required under the slab, despite some of the very cold winter nights that we are experiencing. In homes with large tiled areas these floors become very cold in winter, some form of thermal insulation to prevent heat loss from the building into the ground would be energy efficient and would not cost a bundle.

### The Options

When it comes to laying a concrete floor, there are three basic methods of construction:

1) Floating Raft footing: Where a building is erected on unstable ground, its foundation will be constructed using a reinforced concrete footing. This provides the base on which a formed thin (75-100mm) concrete floor is placed, together with some form of insulation, would be laid (optional). The edges are thicker to take the weight of the internal and external leaves allowing for cavity step down. This is better known as raft and strip footing and is common throughout WA designed for sandy soils and double brick work.

2) Concrete slab build-up: More conventionally, concrete strip foundations are laid in a trench, then walls built from brick or block to a level just above the surrounding ground. Within this structure, a concrete slab floor can be laid. (again insulation i.e. polystyrene sheets, can be laid prior to pouring the slab for insulation purposes)

3) Beam and block Using the foundation walls described above for support, the floor can be built from pre-cast, steel-reinforced concrete beam/slabs. A clear space is left beneath the concrete beams - as with a suspended timber floor. Gaps between the beams are filled with thermally-efficient insulation. This method is not used in Western Australia.

### Reinforced raft floors

Where building is carried out on an infill site, the risk of subsidence is acute. The ground has poor bearing capacity and building a reinforced concrete raft is one of the options. The use of deep piles and concrete lintels/beams is another.

Sometimes, the raft will be a flat structure of uniform thickness, but where the ground is particularly compressible, a `wide toe' raft is preferable. In this design, the edges of the raft, and any areas that have to support the internal walls of the building are stiffened by incorporating reinforced concrete beams or footings. This is an involved operation, which is best left to a specialist contractor.

### Uninsulated slab floors

Since insulation underground slabs is not common in Western Australia, numerous immigrants are adopting this technique which is common and incorporated in the building regulations of most European countries. Let's look at this in more detail.

The ground floors of unheated outbuildings, (WC, Laundries) do not need any thermal insulation. Moreover, a small extension, not exceeding $10m^2$, needs only adopt the level of thermal insulation of the 'parent' building. However, whether the floor is insulated or not, a concrete slab is only suitable where ground conditions are stable. Its construction is as follows:

**A)** Prior to marking a site and digging trenches, all plants, topsoil (usually 150mm) and humus must be skimmed from the surface. The actual depth removed will vary, and in rural locations it may be as much as 300mm.

***Methods B & C are not the usual methods used in WA, but are considered excellent for small DIY jobs***.

**B**) An infill of hardcore, at least 150mm deep, is needed next. This will form a base for the concrete, and raise the level to the required height. Correctly selected, hardcore also helps prevent damp rising from the ground below by capillary action.

**C**) The next task is to `blind' the hardcore base by adding a sealing layer - usually of sand to fill any gaps in the surface of the hardcore, to a depth of approximately 50mm. This prevents the wet concrete from falling into the gaps, which is wasteful. In addition, concrete permeating through the hardcore might absorb moisture from the ground.

**D**) Skipping B & C, a layer of clean sand at least 300mm is needed, this will need to be uniformly compacted and will form the base of the concrete. The level of the sand pad plus the thickness of the concrete will achieve the required 0 course level. Protection against termites is introduced at this stage, if the pad pray method is to be used.

**E**) A damp-proof membrane (DPM), of heavy-grade polyethylene, can be laid on top of the blinding or compacted sand pad. The membrane that is placed between the concrete, should be at least 0.25mm thickness (10 gauge) is required; more recently, 0.3mm (12 gauge) has been specified. The laps of the DPM should overlap of at least 150mm (6in) and seal it with a mastic tape. Another method is to create a series of folds and hold them down with bricks until the concrete is poured. The membrane must be taken up the sides of the slab to overlap the DPC.

**F**) For a small project, it may be more convenient to hire a mixer; for a large one, however, it's best to order ready-mixed concrete. A key constituent is ordinary Portland cement (OPC), which should not be confused with masonry cement. The sand must be sharp sand (also known as concreting sand), which is coarse. It must be mixed with blue metal that has been graded to a specific size.

These three materials can be bought separately and mixed to the required proportions. On the other hand, it may be more convenient to buy 'all-in' aggregate, in which the sand and blue metal is already mixed. This is often referred to as 'pre-mix bags. A pre-mixed bag will stipulate on the bag, the volume of concrete it will make when mixed as per instructions. When using a cement mixer, start with a small quantity of clean water in the bowl and then add sand and gravel

in measured amounts by volume. Add more water to ensure the particles are coated and damp, but not awash.

Concrete for hand or machine mixing is identified by the ratio of cement, sand and blue metal, based on their dry volume. The best way of measuring this is by the bucketful. Ready-mixed concrete, however, is referred to using an Australian Standards specification, as measuring by volume.

To calculate the quantity needed, multiply the depth, length and width of the slab. For a small shed, the slab will be no more than 75mm thick, but in a domestic building 100mm is more usual and preferred.

**Steel reinforcement**

The slab may need reinforcing, depending on the ground conditions. Normally, steel mesh is used and placed prior to adding the concrete. Where reinforcement is needed, the advice of an engineer should be sought regarding its positioning and size.

**Laying Concrete**

Although laying a concrete slab is a relatively straight forward task, the job will be easier if you follow these tips:

1) When laying a slab, you will find a garden rake ideal for spreading a load of concrete and bringing it to the approximate finished height.

2) Check that the concrete is worked into the corners of the slab and thoroughly bedded down, and that the polyethylene DPM doesn't lift away from the base.

3) Embed a PVC conduit or a batten in the surface of the concrete, if services are likely to run across the slab later. When the batten is removed, it will leave a channel for pipes, etc.

4) When working in bright sun, the concrete may dry out too quickly and begin to crack. Spray the area periodically with a fine mist of water. In addition, cover the surface with damp hessian sacks or even an old carpet to slow down the water evaporation rate of the concrete.

5) Leave the surface rough if a screed is to be added later.

6) If the slab represents the final surface, (in a garage, for example) it may be `trowelled-up' to achieve a smooth finish. Usually, this is done using a steel trowel, but wait until the concrete has started to cure before beginning.

7) Once the concrete is trowelled and the finished surface required is achieved, curing the slab for the next 4 to 7 days is crucial to the strength of the concrete.

**Laying a Screed**

Normally, a fine sand/cement screed is applied to a concrete floor slab, forming a suitable base for ceramic tiles, vinyl and other popular floor coverings. Achieving an accurate level is essential, but this is simplified by dividing the slab into bays with wooden battens, known as `screeding rails', and using the battens as depth guides. If the screed is laid directly on a slab, it

will bond with the surface of the concrete and need only be 38mm thick. However, if a damp proof membrane hasn't been installed below the concrete slab provision must be made before screeding. One option is to apply several coats of a damp-proofing liquid, another is to lay 12-gauge polyethylene sheeting. In this instance, the screed remains separate from the slab, so it needs to be at least 50mm thick.

The slab must be clean and dust free. First, it should be dampened, then a cement water grout slurry applied, mix this to a creamy consistency. Many builders add a PVA bonding compound to achieve better adhesion. Apply the grout to small areas at a time - as much as you expect to be able to screed in about 20 minutes.

Although a sand/cement mix is the traditional way of screeding concrete, you can also obtain self-levelling floor screeds. Many of these cure within a matter of hours, having to be mixed and poured from a bucket, then spread with a steel float.

**Insulated slab floors**

In a house, especially in the colder parts of Australia the floors when tiled can become extremely cold during winter, hence a concrete slab floor can incorporate an insulating layer, and the insulation requirements are determined by its size and shape. Solar designers can calculate what is known as the `shape factor', based on the floor perimeter and area. The perimeter/area, or P/A, ratios are used to determine the type, thickness and placing of the insulation.

**Adding the insulation**

There are two methods of insulating a slab:

2) Rigid plastic foam boarding or Polystyrene can be placed on top of the soil before the concrete. This presumes that the ground is stable. The foam must have a high compressive strength, a good resistance to moisture, and be unaffected by ground conditions. In addition, 25mm wide insulation layers need placing vertically around the sides of the slab and screed unless insulating blockwork is used below the DPC, or the cavity insulant extends below the slab.

1) Insulation can be placed on top of the slab before laying the final screed. This method may be used if there's a possibility that contaminants in the ground could damage insulation placed under the slab. Several types of insulation material are available, extruded polystyrene achieving slightly lower thermal conductivity than expanded polystyrene. A typical thickness of material needed for a normal house slab is 50mm extruded polystyrene, or 75mm expanded polystyrene.

Care must be taken to insulate service entry ducts and drainage stacks that pass through the slab. The insulation around water pipes and vent stacks must extend below the ground, under the slab, to a depth of at least 750mm to protect against the cold in the ground or frost in certain parts of Australia. Air must also be prevented from entering a building via the ducts. For this reason, foam should be injected where conduits pass through foundation walls - a precautionary measure that also helps to keep out rodents and termites. Foam should be used to seal around any pipe where it passes through polystyrene insulation. Urethane foam is available in cans.

**Damp-proof membranes**

There are various methods of installing a DPM:

1) If there's any possibility that an insulant could be damaged by chemicals in the ground, the DPM should be placed below the insulant.

2) Placing the DPM above the insulating blocks, but below the slab, prevents the concrete mix from running down between joints in the insulating blocks. It is also less likely to snag when laid on a flat surface, than it is on the base material (clay or sand).

3) A DPM, or a liquid damp-proofing compound, can be placed above the slab if a moisture-sensitive floor finish is planned (parquetry), since it could be affected by damp rising from the slab. If plastic sheeting is used as a DPM, it should be 200-gauge polyethylene (black or red). The damp-proofing must extend up the sides of the slab, to the top of the slab, preferably folded over under the first course of bricks to keep out any residual dampness in the walls.

**INTERNAL WALLS**

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# All About Timber Floors

## TRADITIONAL TIMBER FLOORS

When comparing timber floors, you will see that there are differences between a suspended timber floor at ground level and a one built at a higher level. In particular, the ground floor structure needs ventilation to the void below the timbers, thermal insulation, and a possibly concrete capping of the ground below. Specifications relating to these elements are clearly laid down in the local Building Regulations.

### Changing practices with the times: -

The construction of ground floors has undergone many changes. Originally, they were built on compacted soil, and damp problems were commonplace. This prompted the introduction of elevated timber floors in the late nineteenth century, while air bricks helped to disperse dampness that developed in the void below.

However, floors were still built over exposed ground, so the problem of moisture rising from below wasn't completely solved. In England, for example, the Health By-laws of 1936, required a layer of concrete to be laid over all ground within the internal walls of the building. Air bricks were still included in the design, and clearances were standardised to give good cross ventilation below the timber structure. In Australia and in particular in Western Australia soil drainage is not such a problem, but good cross ventilation still holds true. Today, concrete ground cover is no longer obligatory.

A space of at least 150mm (6in) is required between the soil surface and the underside of the bearers or insulating materials. The Building Regulations also recognise the part that floors can play in providing lateral support to external walls. This can be achieved by using purpose-made metal straps.

Ground floor structures today must not necessarily include the provision of insulating materials to minimise heat loss, but it is well worth the consideration, especially since we are living in an energy conscious society. Without insulation, the ventilation system below the floor introduces cold air into the building, and heat loss is substantial.

### Design points: -

Like many aspects of self-build work, it is best to leave the design of a floor, and the structural calculations, to an engineer or building designer to be checked by an engineer. In upper floors, the joists may need to span quite large rooms, and are properly referred to as bridging joists. In some cases, the floor may also need to provide support for a dividing wall in an upper room. This is often achieved by placing a double bridging joist directly below the position of the wall, the two lengths being held together by coach bolts and double-sided, tooth plate connectors. This technique makes it possible to build partitions using lightweight blocks instead of timber.

### Joist spacing

This is partly governed by the standard sizes of boards that will be attached to the joists later, such as plasterboard to form a ceiling below, and chipboard for the floor above. Therefore, the distance from the centre of one joist to another may be 400, 450 or 600mm

Spacing is also linked to the width and depths of the material used for the joists which, in turn, are related to the span between the points of support. Information on an architect's drawings will also consider the most economical use of timber.

**Size of timber**

Structurally, the depth of a bridging joist gives it greater stiffness than its width. From solely structural and financial viewpoints, it might appear that the optimum dimension and disposition of joists is straightforward. In practice, however, there may be circumstances where cost and efficiency are sacrificed to achieve another objective. For instance, a wider joist might be used to reduce its depth. The depth may also be reduced significantly by spacing joists at 400mm centres instead of 600mm centres. These alternatives may need exploring if greater room height is needed in an existing building.

**Types of timber**

Timber for building comes from a variety of tree species, and in a range of qualities. Because its structural role, timber is given different stress grade classifications. Timber is also graded differently, and this is usually shown on the drawings. If you see reference to `Stress Grading' (F8 STR3 green or F14 STR3 seasoned for hardwoods and F5 seasoned for softwoods like pine) this must be acknowledged when ordering from the supplier. Graded Timber designated as such is checked visually and verified by skilled graders, who look for defects like knots, the slope of the grain and so on. Machine grading involves subjecting timber lengths to deflection tests, and is a particularly reliable way of evaluating structural characteristics. The material is stamped with its grading, and it is essential to purchase the timber specified.

As a rule, timber used for joists is supplied with a rough sawn finish on its sides, and a planed finish top and bottom better known as gauged. This provides a smooth surface for the subsequent fixing of floor and ceiling boards. Nowadays, you can purchase material that has been factory treated with a chemical preservative. This vacuum impregnation is especially appropriate for ground floor timbers.

**SUSPENDED GROUND timber FLOOR**

A key feature of the suspended ground timber floor is that it avoids contact with any source of damp. At their extremities, the joists are mounted on timber wall plates measuring 100 x 75mm. Sometimes, galvanised steel joist hangers are used instead, but are rarely used. Whatever method is used, checks must be made to ensure joists finish level with each other.

Additional support is provided by brick piers or timber stumps, which are topped with an ant cap to keep the termites away and a wall plate of 100 x 75mm timber. This intermediate support, via a bearer, helps to distribute the load of the floor and allows joists of smaller dimension to be used. They also provide fixing points so that the joists can be cross-nailed in position.

The perimeter wall plates are bedded on mortar with a damp proof strip. Usually, this is a bituminous polymer material or galvanised iron flat sheeting.

**Ventilation**

Cross ventilation is essential in a suspended timber ground floor, because the timber can be damaged by moisture accumulating in the void, this applies more so to areas which are low lying and with poorly drained soil. This provision also eliminates the need for laying a vapour control membrane as part of the floor structure.

For good ventilation, a space measuring at least 150mm from the virgin ground to the underside of any bearers must be provided, and at least 225mm to the underside of the joists. The ventilators themselves must provide an actual open area of either 1500mm2, for every metre length of the external wall or 500mm2, for every 1m2 of ground floor area, whichever is greater. They should be located in at least two opposite walls and must not be obstructed by insulation materials on the inside, or soil on the outside. The ventilators (wall vents) are normally placed within 450mm of the corners of the floor, and at no greater spacing than 2m centres.

Although many buildings are correctly constructed with air bricks in outside walls, their long-term success is wholly dependent on the vents remaining unblocked. Soil from flower beds must be kept clear of the apertures. The cast-iron grilles often seen in Colonial properties do not always stand the test of time and should be replaced. If they become broken, they provide easy access for vermin.

**Insulation**

Given that a good flow of air between joists is essential for dispersing any damp and stagnant air, traditionally-built suspended floors are also often cold in winter. The heat loss can be appreciable.

Therefore, in new work, it is necessary and prudent to incorporate insulation into the structure. This can also be done if an older property is being renovated. A degree of improvement can be achieved by laying a composite board of block foam, bonded to plywood, directly on top of the original floorboards. Inevitably, this reduces room height and necessitates modifications to doors, but it is easier than lifting floorboards to install insulation between the joists.

The latter procedure is easier when building a new floor, mineral fibre quilt or block materials, such as expanded polystyrene or extruded polystyrene, being equally suitable. However, a support system is needed, and heavy-duty plastic netting may be stapled to the joists for this. It is better, however, to attach battens to support solid block insulation, or to fix boarding on battens nailed low down on the sides of the joists to provide a base for a quilt/blanket insulation. The thickness of the insulation depends on the floor area, and this should be specified by the solar architect. The level of thermal efficiency required is normally achieved by installing loose mineral fibre or fibre glass batts to a depth of 75mm. Alternatively, if polyurethane foam is used, this would typically be 25mm thick in a terraced or semi-detached property, and 40mm, in a detached/single dwelling house.

In colder areas, it is essential that there are no gaps in the insulating material itself, or around the perimeter of the floor structure. This means that a blanket type insulation should be inserted between the external walls and the outer most joists. Care must be taken to ensure that there is continuity in insulation at the threshold of external doors. Precautions must also be taken to prevent air entering from the void below. This can occur in several places, including:

1) Around the outside of the floor

2) Where pipes or other services penetrate the floor

3) Around access panels/trap doors built into the floor. These gaps can be closed with sealants and draught stripping material.

## SECOND STOREY FLOORS

Floors for a second storey, involve a number of different constructional elements, partly because the joists have to bridge much larger spans. Additionally, it is important to achieve accurate levels on both sides of the joists, since they have to provide a level surface for floor boards above and ceiling boards below. For economy, joists are normally laid across the narrower span.

Timber is rarely perfectly straight, and twisted material should be rejected, since it can become progressively worse, leading to serious distortion later. However, a slight bow over the length of a joist is less of a problem, although you should ascertain the straightness of all timbers before beginning construction.

The procedure is to look along the length of each joist, then to lay it on the ground so that the cambered edge is uppermost. Having done this, the joists should be compared, and those that have the greatest camber placed in the middle. The straightest joists should be placed near the edges. This is how the timbers will be installed, thereby producing a slight rise in the middle of the platform, rather than a sag. When furnishings are added to the room later, there will be a natural tendency for the floor to revert to a flat surface under their weight.

### Supports

Joists are generally installed when exterior walls are being built. Normally, one end of the joist rests on the inner skin of the external wall, and the other on a load bearing internal wall. Joist ends should be treated with preservative and cut so as not to project into the cavity.

The difficulty with this method lies in achieving a consistent level on the bearing points. Constant checks are required, using a spirit level and a length of timber with a good straight edge. Joists should be levelled by adding small packing pieces of Hardiflex or metal packer under the bearing points.

### Joist hangers

An alternative method of supporting joists is to build galvanized steel joist hangers into the inner skin. The advantage of these is that the timber isn't built into the wall, so it is less susceptible to damp rot. It is easy to pack pieces of plywood into the bottom of hangers to level the joists. If a floor needs to incorporate horizontal support to stabilize the walls (in houses of

more than two storeys, for example), joist hangars are available that include a hook, which rests within the cavity. This method is very rarely used in Australia.

**Bracing**

The floor structure in modern buildings usually acts as a bracing element to prevent movement in the external walls. Where needed, bracing can be achieved using special joist hangers, or by the addition of galvanized mild steel straps. These straps tie the floor structure to the brickwork, forming a cohesive structure.

**Struts between joists**

It is inevitable that floor joists will twist as shrinkage occurs in the material. This can lead to distortion of the floorboards and damage to the ceilings below. To prevent this, some form of bracing is needed between the joists.

Where the span is 3.5m or less, one line of strutting is needed. For each additional 1.5m in span, further struts are required.

The simplest method is to cut lengths of timber to fit tightly between the joists. These are either skew nailed in place, or offset so that nails can be driven into both ends. The problem with this method of bracing is the fact that it's very difficult to cut timber accurately enough to fit tightly in each recess. Herringbone or cross strutting is usually preferred. Fitting herringbone struts between joists is a traditional method of preventing them from twisting.

Traditionally, each herringbone strut is made from 50 x 38mm batten, being nailed top and bottom. This has the effect of bracing the joist and preventing twisting. To complete the bracing, the outer most joists must be prevented from flexing outwards by driving wedges against the wall.

**Trimming**

Frequently, apertures are needed in upper floors: - On a landing, an opening is needed for the stairs, while in buildings with a chimney, a frame must be constructed around an internal flue so that the joists are not in direct contact with the brickwork.

The shortening of joists and construction of a frame around an aperture is known as trimming. The timber that forms the frame will be thicker than the normal bridging joists, and is usually 75mm in width. At least one of the sections, known as trimmers, will carry the combined weight of the shortened joists that butt against it.

The traditional way of constructing the frame was to form joints between each trimmer, and between the shortened joists that connect with the structure. Usually, these took the form of some sort of housing joint. Today, however, the timbers are normally joined by nailing, using steel beams or using joining brackets.

**Flooring**

In very old houses, lengths of floorboard with square edges were used, and there was no interlock between them. This means that you can easily lift a board for inspection. However, as

shrinkage occurs, large gaps develop between the boards. Similarly, it is more likely that a single board will twist, pulling out its nails and shaking loose.

Tongued-and-grooved (T&G) boards are much better. The tongue is usually machined slightly off centre, and the wider portion should be laid uppermost. This provides an allowance for wear before the T&G section is exposed.

Where the boarding will be left exposed, treated and polished, the tongues and grooves are cut on a slight splay so that the nails can be driven into the tongues. Once a board is fixed, the next board hides the heads of the nails, this is called cross stitching and also reduces squeaking in floor boards

Although softwood boarding is still used, flooring grade chipboard panels are now more common.

Panel sizes are typically 2400 x 600mm and 18mm thick. They are manufactured with tongues and grooves. Installation is comparatively fast, and another advantage of the material is the fact that it does not shrink twist or warp like floorboards. However, when any inspection is needed below the boards, sections have to be cut away and replaced with the addition of supports under the cut edges. The thickness of boarding adds to the strength of the floor.

Timber flooring boards should have at least 16mm finished thickness where joists are spaced up to 500mm centres and l9mm finished thickness is required at up to 600mm centres.

**T &G Floor Boarding**

For a traditional-looking floor, tongued-and-grooved hardwood boarding should be chosen. When laying the boards, follow these guidelines:

1) T & G floorboards tend to shrink as they dry out. To avoid this becoming a problem after they have been laid, it is always best to store the boards for as long as possible in the room where they are going to be installed.

2) Another precautionary measure is to ensure that when they are finally laid, many boards will be placed on the joists and then cramped together tightly so that the tongues are forced deeply within their grooves. This is done prior to nailing, and it is not unusual for a dozen or more cramped boards to bow slightly during this process. So, order some spares.

3) Cramping is carried out with special flooring cramps that grip the joists with serrated cams. They are extremely effective, and can be obtained from tool hire companies.

4) The nails used for securing softwood or Hardwood boarding are known as floor brads, and typically are 55mm long. They are designed so that the head will become embedded in the board as the nail is driven home with a hammer, thereby eliminating any need for punching-in afterwards.

5) In the case of secret nailing through the board tongues, each board must be fixed individually, and the cramping procedure cannot be applied to more than one length at a time. Moreover, an oval brad or a lost-head round wire nail will be necessary. Fixing requires an

accurate hammer action, and the head of each nail must be punched below the surface of the tongue so that it does not interfere with the adjacent board when it is positioned.

6) The ends of boards should be staggered across the floor, and an accomplished fixing carpenter will mitre the ends at 45 degrees to form a scarf joint. This should occur directly on top of a joist, allowing both boards to be fixed by the same nails.

## FLOORING GRADE CHIPBOARD

Using tongued-and-grooved chipboard panels will provide a quick and simple means of laying flooring. However, there are a few points to consider:

1) Particle boards are unlikely to shrink, but it is still sensible to ensure that the tongues of the boards locate deeply in the adjacent grooves. Never hammer directly on the edge of a board; instead, use a panel off-cut, about 300mm long and 75mm wide, with a groove along one side.

2) Use lost-head round nails to secure the panels, driving them into the joists at 75mm centres. To save time in spacing the nails, cut a batten to the appropriate length. Alternatively, mark the spacing on your hammer handle with adhesive tape.

3) Flooring grade chipboard is very dense, so you may find it useful to drill pilot holes for the nails.

4) It is not unusual for boards to spring away from joists at a later date, producing a creaking floor. To reduce the likelihood of this occurring, use screws for some of the fixings - about four per board should suffice. Alternatively, annular nails can be mixed with the other nails, as the rings on the shank provide better anchorage or even the use of liquid nails.

5) Generally, the interlock of tongues and grooves on particle board panels is good and creates a stable, continuous platform. However, you can provide an even stronger bond between the boards by applying a thin coat of PVA wood glue to the tongues. When laying the boards, make the large dimension span the run of joists, and ensure that the joints are staggered.

7) Chipboard is notorious for blunting tools, so bear this in mind when panels need cutting. Moreover, sharp particles can often fly out when using a circular saw, so eye protection is essential.

## REFURBISHING A TIMBER FLOOR

Replacing a floor completely is a substantial undertaking, but in some instances repairs can be carried out to floorboards without their removal and replacement. Typical problems are loose, twisted and shrunken boards.

Re-attaching loose boards is quite a common job - particularly in areas where there's heavy traffic, such as across a landing. In general, it is better to re-fix loose boards with wood screws rather than nails, because screws will effectively draw a deflected board back against its joist. A screw with a shank will pull a board down more effectively than one that is threaded along its full length. It is important, however, to remember that water pipes and electrical cables may run below the boards. Before driving in fixings indiscriminately, lift a board and make a preliminary inspection of the void.

Gaps can be the sources of draughts and can also damage the underside of carpets. If they appear between square-edged boards, the problem can often be solved by filling them with timber inserts. Another remedy is to apply a latex-based levelling compound, products being available that can be trowelled onto the surface.

Twisted boards are rather more difficult to remedy. One method is to drive the fixing nails deeply below the surface, or if screwed counter sunk the screw head below the amount that needs to be removed, then plane down the edges of the boards that stand proud. An industrial belt or rotary sander may be suitable for this, but if a lot of material needs removing, a plane will more effective.

A new surface; These precautions must taken prior to laying a new carpet, but where the surface is very poor, a cure is to lay Masonite on top of the boards. This forms a smooth surface and evens out small irregularities. Use Masonite if carpeting is to be laid. However, if ceramic tiling is planned, the use of Hardiplank will be more suitable, because it is more conducive to water-based adhesives. It should also be laid rough side uppermost to provide a better key for the tile adhesive.

When attaching Masonite sheeting, a quick method of fixing is to use long staples driven in by a compressed air stapler. However, annular ring nails achieve a better grip liquid nails may also be applied as an added help in fastening in case the other fixing methods become loose. Either way, this type of repair work should always be regarded as a patching-up exercise. Where there are a large number of boards in poor condition, it is much better to replace them with new boards or chipboard flooring panels if carpeted.

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# All About Internal Walls

## INTERNAL WALLS

The removal or construction of an internal wall is a structural matter, and expert opinion and confirmation is needed before work can begin. When large open planned ground floor rooms became popular a few years ago, there were instances when owners had sought neither design approval nor advice before indiscriminately removing walls. As a result, some structures became seriously unsafe, putting the occupants at risk.

At the design stage, you must seek the help of a builder or structural specialist. Not only should a qualified person look at the structural implications of the work, but also issues like ventilation, plumbing, electrical and precautionary measures in the event of a fire.

### Structural Internal Walls: -

Some internal walls may only divide the available living space into smaller units. These are non-structural walls. Other walls, however, provide support for floor joists and may brace the roof structure as well. These are structural internal walls. Such a wall must be built on a suitable foundation, just like an external wall. To discover if a wall has a load bearing function, it is often necessary to inspect it from above. This may involve removing floorboards, if the home is double storey timber floored, to see if it provides support for the joists. Similarly, an inspection from within the roof space may establish whether the roof has bracing struts supported by an internal wall. Walls built from timber stud framework may also have a structural function. In a timber-framed house, the roof is wholly supported by its external walls, while the floors will also rest on timber-framed walls.

In the case of a suspended concrete upper floor, the original engineering plans would be required to determine the full function of internal walls and then the approval a suitably qualified structural person should be attained before commencing any work on internal or external walls.

### Adequate support: -

Where an opening is required in a load bearing wall, important dimensional criteria must be considered. This is because any construction built above the opening needs adequate support. The weight of the structure above any opening is borne by a reinforced brick, concrete or steel lintel. When making alterations, then this is inserted in the wall first and projects beyond each side of the opening by about 200mm, where it is supported by the remaining portions of the wall or by specially-constructed piers as the case may be.

## NON-STRUCTURAL INTERNAL WALLS

A non-structural wall can be built in a number of ways and from a variety of materials. This type of construction is sometimes referred to as a partition wall. Obviously, it will need adequate support at its base, taking into account the loading imposed by the material from which it is built. For instance, an internal wall constructed in 75mm (3in) brick work imposes a greater load than a timber-framed wall. While an internal wall might not be required to support any of the building's structure, this does not mean that it can be removed without forethought. For example,

adjoining non-load bearing walls may support each other, so removing one may cause adjacent walls to become unstable.

Some modern single storey houses have few, if any load bearing walls, on account of the use of trussed roof design. In contrast with a traditionally built timber framed roof, a modern trussed roof is designed to span between the exterior walls without any intermediate support. As a consequence, all the floor rooms in this single storey construction can be divided by non-load bearing walls, since they provide no support for the roof. It's not unusual therefore, to find that in some modern single storey houses, all first-floor walls are made from timber frames clad with plasterboard or gyprock - referred to as stud walls. This may equally apply to double storey homes to the upper floor rooms if the roof construction is engineer designed roof trusses.

For some time now, partition walls have been constructed using lightweight metal framing, plaster blocks, brick or concrete blocks and more recently "Thermalite".

**No continuity: -**

Consistent with this feature of modern houses is the fact that internal upper floor walls have no upward continuity with walls built at ground floor level. In older properties, this isn't always the case.

Quite frequently, a wall providing a division for ground floor rooms continues upwards into the bedrooms. This is almost always a structural wall.

The construction of additional non-load bearing walls is relatively straightforward. In particular, stud walls are often preferred, since they are light and usually can be built directly over a timber floor. A disadvantage, however, is their relatively poor soundproofing characteristics - even when the void is filled with wool, fibreglass or foam insulant.

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# All About Angle Irons And Lintels

**INSTALLING A LINTEL (on a brick wall)**

Remember provided modifications have been approved by a structural surveyor, and the size of the opening has been strictly agreed, making an opening in a load bearing wall is a relatively straightforward procedure.

The description given here concerns the construction of a small opening perhaps a double doorway to link two rooms, but the techniques are the same regardless of the size.

The first job is to insert a lintel (support) above the proposed opening to bear (distribute) the weight of the brickwork above, and the wall must be supported temporarily while the lintel's slot is cut. For this, you will need adjustable steel "Acrow" props and some sturdy timbers to act as supports, known as `needles'. The needles should be measure 150 x 50mm and be no longer than 2.7m.

Holes for the needles must be carefully knocked or cut through the wall just above the lintel's position.

They should no further apart than 900mm centres; where possible, 600mm centres are preferred.

Once the needles (timbers) are inserted, the needles have to be supported at each end by an adjustable steel "Acrow" prop.

The props should stand on a plank to spread the load. On an uncertain timber floor, it may be necessary to remove the floor boards to check joists and establish a stronger support.

With the needles installed/inserted at right angles to the wall and the prop winders secured, you can prepare the opening for the lintel.

Make sure that the ends of the lintel will rest on good bearing points projecting at least 150 to 200mm beyond the intended opening. If you have any doubts about the strength of the masonry bricks bearing point capacity, then replace it using engineering bricks available at most brick yards, but this is highly unlikely.

Purpose-made steel or pre-stressed reinforced concrete/brick lintels are normally used for internal openings and are available made to order from brick yards or steel fabricators.

Having made the aperture in the wall, bed the lintel on mortar at each end, making sure that it is level. Additional mortar should also be spread along the top of the lintel before it is placed in the aperture to provide a bed for the masonry above. Then wait at least 24 hours for the mortar to dry completely before removing the props and needles and proceeding further.

In this straightforward example, it is presumed that the bearing points will be able to carry the weight of the structure supported by the lintel. However, in some cases, a building builder may recommend that a pier be built at each end of the opening to provide extra support. These

would require a suitable foundation. Proper advice regarding this strengthening work must be sought, before going ahead.

**MAKING THE OPENING (after installing the lintel)**

When the lintel is in place and the mortar securing it has been allowed to harden, then the temporary supports can be removed, and the holes occupied by the needles refilled. Removal of the masonry below can now proceed, bearing in mind that you should work with caution, dismantling small sections at a time. Never take large bites with a sledgehammer. The procedure is as follows:

**Quick overview: -**

1) Outline the opening on the wall with a pencil or chalked plumb line.

2) Chop vertically through the plaster along the marked lines, using the bolster chisel. This will ensure a sharp edge and reduce the amount of making good necessary later.

3) Chop off the plaster within the marked opening, holding the chisel almost parallel to the wall so that you can drive the blade under the layer of plaster.

4) Remove the masonry by cutting through the mortar joints surrounding the bricks. Save some of the broken bricks for making good around the opening.

5) Where a brick projects into the opening from the wall, cut through it.

6) Make good the opening by plastering the reveal, or fit a timber liner and a door frame. This can be installed by means of frame ties bedded in pockets in the wall, or by screws driven into wall plugs set in holes drilled in the reveal.

7) Where the floor is solid, all that is necessary is to level the base of the opening with the surrounding floor. If there is a suspended timber floor, however, the masonry should be removed to just below floor level and a new section of flooring fitted between the joists.

**There's more to this job than meets the eye: -**

A) Once the lintel has been installed, mark out the extent of the opening on the plaster with a pencil. Then begin removing the plaster with a bolster chisel and club hammer.

B) When all the plaster has been removed, the bricks can be chopped out. Drive the chisel into the mortar joints surrounding the first brick until it can be levered free.

C) Continue to remove the bricks by cutting through their mortar joints and levering them out. If the wall is 2 bricks thick or a cavity wall, then remove one leaf first, then the other from the opposite side.

D) Try to cut the edges of the opening as cleanly as possible, as this will save a lot of making good later. Drive the chisel into the brickwork at right angles to the face of the wall.

E) When removing a second leaf of brickwork, take care when chopping through the joints, as there will be nothing behind to support the bricks.

F) Once the opening has been completed, it can be prepared for plastering. However, if a door is to be fitted prepare the timber frame by attaching four metal frame ties to each side.

G) Using the bolster chisel and club hammer cut pockets in the sides of the opening to accept the frame ties and the projecting ends of the head. Place the frame next to the opening to check the fit.

H) Use a spirit level to ensure that the sides of the frame are truly vertical and that the top is horizontal. Make any necessary adjustments with the aid of wooden wedges.

I) Secure the frame ties by filling the pockets with mortar and brick off cuts. Similarly, fill any gaps between the frame and opening. Then cover the exposed masonry with more mortar.

J) Once the mortar has hardened, spread floating mortar over the masonry using the frame as a guide.

K) When the float has hardened sufficiently, apply a second layer if necessary, keying the surface first If not, trowel on a layer of finishing plaster.

L) Keep the finishing plaster as thin as possible, but make it flush with the wooden door frame. Allow it to stiffen, then polish the plaster to a smooth finish with a wet trowel.

M) then fit architrave, door stops and door.

**Safety: -**

It is essential to take precautions to protect yourself from flying debris while removing masonry from the wall.

Wear old clothes or overalls, as a considerable amount of dust and dirt will be generated.

Equip yourself with thick gloves to protect your hands and safety goggles to protect your eyes.

Wear heavy boots, ideally with steel toe caps.

Make sure your bolster chisel is fitted with a mushroom-shaped hand guard.

Seal off the doors to other rooms to prevent dust from spreading. Also, dampen the dust to make it settle.

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# How to Build a Stud Partition Wall

## BUILDING A STUD PARTITION WALL

Where the bottom plate of a stud partition is built on top of a timber floor, fixing is straightforward provided it crosses at right angles to the floor joists. If it is aligned or runs parallel with them, but not directly above a joist, you will need to install supporting noggins between the floor joists. The same situation applies at the ceiling for the head plate, for secure fixing.

Make sure that the timber used is free of defects and not bowed, twisted and warped, alignment of all framing members is important. Timbers that are not flush with the general line of the overall framing should be packed out or straightened. It is desirable that noggins between studs should be at least 150mm away from the sheet joints, if they do fall behind a joint then it is important to make sure that the noggins are flush with the main stud otherwise bulging may occur.

Having completed the floor and ceiling fixings, you must calculate the positions of the studs, bearing in mind that the frame would normally be clad with standard 1200mm wide Gyprock or plasterboard sheets.

When constructing the frame, skew nailing is by far the quickest method of joining the various pieces. For the less experienced, who may find it difficult to drive home an angled nail, it often helps to drill a pilot hole first. To prevent the uprights from sliding sideways out of position when driving the nails home. The recommended nails to use for gyprock are 40mm clouts, or use specific nails or screws as recommended by the lining manufacturer.

Noggins can be fixed in a similar fashion if they are to be aligned. However, they can often be staggered, allowing you to drive nails through the stud directly into the ends, which is much easier.

At openings for doors, you should allow for the width of the door frame and the dimensions of the lining, generally both finished lined sides are the same width as the door frame allowing an architrave to cover the gaps.

For additional strength, the cross-member at the head of the opening should be attached to the uprights by cutting housings for its ends with a chisel. At the foot of the opening, the studs can be skew nailed, but it is preferable to cut housings for them in the floor plate.

Before cladding the stud wall, any electrical wiring should be taken through holes drilled in the centres of the studs and noggins. Similarly, metal or plastic boxes for sockets or switches should be attached to the framework. Lastly, it is worth filling the void between the studs and noggins with bats or other sound deadening materials to reduce sound transmission through the wall.

**A Quick summary: -**

A timber stud partition is made up of a wooden framework comprising of a floor plate, a head plate, the uprights (studs) and intermediate horizontal pieces known as noggins. This is then clad

with Gyprock or plasterboard. Sawn and gauged softwood is normally used for the framework, measuring 100 x 50mm or 75x50mm according to the situation. The studs are normally set at 600mm centres (depending on the lining thickness used) although a 400mm spacing can be used with particularly thin cladding materials. Noggins should be placed centrally between the studs. If the partition is taller than a standard sheet of Gyprock or plasterboard (2400mm), additional noggins will be needed to support the joining edges of the sheets. Other length are available check with your chosen supplier.

**A Quick Summary**

Having determined where the top plate is to be fixed to the ceiling, use a plumb line to transfer the position of the centre of the top plate onto the adjacent wall. Use the mark on the wall and the plumb line to centre the sole(bottom) plate exactly beneath the top plate position. Nail it to a wooden floor, or use screws and plugs on a solid floor.

Drill clearance holes through the top plate for the fixing screws. Then hold it against the ceiling and mark the screw positions. Drill pilot holes and screw the top plate to the ceiling.

**METAL STUD PARTITIONING: -**

A modern variation on traditional timber stud walling is the metal stud partition. Using this system, partition walls can be erected quickly as generally they are prefabricated and made of lightweight galvanized steel.

Once the metal framework is in place, it is clad with standard Gyprock or Plasterboard panels that are held with screws.

Provision is made for securing insulation material within the framework, and the system includes accessories such as clip-in electrical boxes, obviating the need for supporting noggins.

The top and bottom channels of the frame work are screwed to the timber joists or flooring.

Where a door is to be installed the opening an opening is allowed for the timber frame insertion, the timber door frame is drilled and installed with the aid of special screws.

The Gyprock or Plasterboard is screw fixed to the metal framework at 250mm centres. After cladding one side, insulation material is fixed in place. Then the partition is completed by cladding the remaining side.

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# All About Wall Plastering

**WALL PLASTERING: -**

Acquiring plastering skills is not something you can accomplish in a couple of weekends, and most self-builders sensibly enlist the help of a professional to carry out this important finishing operation. However, plastering a walk-in wardrobe or similar small area offers a splendid training ground if you are keen to give it a try. If your efforts are far from perfect, at least they won't be too obvious.

**Changes in plaster materials: -**

Considerable changes have occurred in the materials used for plastering. In the early part of this century, interior walls were finished with a lime, sand and cement plaster. This was applied on a base of wooden or metal laths that provided a good bond. The use of expanded metal as a replacement for the traditional 25 x 6mm pine laths began in the last century, and even today metal plays an important part as a structural binder. For example, external corners are formed using metal beading with a meshed edging.

- Before the advent of cement, plaster was made from lime with a binder to provide strength. Ox or
- horse hair was added to the mix, and anyone renovating an old property may find evidence of this.
- Wattle-and-daub plastering, using clay, skew and dung, is an even older technique.

Compared to earlier finishes, cement-based plaster is very impact-resistant, which is why it's also used for external rendering. It's comparatively heavy, and on interior walls a cement/sand base-coat is finished by applying a layer of lime which is slaked. This is a hard finishing coat that can be trowelled off to produce a very smooth surface, which is ideal if you want to paint the walls. Hard-wall plaster begins to harden after 15-20 minutes; but it can be re-tempered without detriment by adding more water, thus extending its working time by an hour or more.

Although traditional sand/lime/cement plaster provides a tough surface, some tradesmen use a modern gypsum plaster containing perlite or vermiculite. These materials are fire-resistant and enhance the thermal insulation properties of the plaster. In addition, modern plaster is lighter and very much easier to work. Unfortunately, it doesn't fare well in damp conditions. If you are doubtful about the integrity of a damp proof course (DPC) in a building, use a traditional sand/lime/cement plaster finished with hard-wall plaster. Some builders also prefer to use this traditional plaster in bathrooms.

The information given in this section provides a guide to plastering techniques and the products available for those who want to try their hand. There is no substitute for practice, and you must follow the manufacturers' instructions when using any plaster products.

**Modern plasters**

Even though the constituents of modern plasters are different from lime-based plasters, they are compatible. In other words, you can use a modern product to carry out repairs to an old surface finished with a traditional plaster.

**There are four types of modern plaster: -**

**Float Coat: -** This is for backing coats and should be applied quite thickly - up to 10mm - to smooth off undulations in the wall.

**Bonding Coat: -** An alternative backing coat for use on surfaces that don't readily absorb moisture, such as concrete ceilings or engineering bricks.

**Finishing Coat: -** A surfacing coat that is applied on top of the backing or float coat once it has hardened, to a depth of no more than 4mm

**One-coat: -** Instead of requiring a day between coats of conventional plasters, one-coat plasters allow the work to be carried out in one operation. However, there are disadvantages. Trowelling-off a one-coat plaster can be difficult. Since the product doesn't begin to dry with a `snap' finish, like conventional products, the action of trowelling can shift the material around. While there's a benefit in using this for repair work, it isn't as easy to use as many DIY builders expect.

There are several points that should be remembered when using the different type of plasters.

**MODERN PLASTERS**

a) Never use two layers of skim coating. This can lead to the top layer shrivelling and crazing. Instead,

apply a layer of cement float to even out undulations and finish with one coat of skim coat plaster.

b) An alternative to using a skim coat, is to coat a moisture-resistant surface, like a concrete lintel or concrete ceiling, with a liberal application of a PVA adhesive, such as "Bond-crete". This creates the adhesion needed by setting plaster.

c) Never use old plaster; it dries too quickly. Modern plaster contains a retarding agent, but this becomes less efficient after a long storage period. Store a bag of plaster in a strong polythene outer bag to prolong its working life.

d) Buy a fine plant sprayer from a garden centre for dampening surfaces. Professional plasterers typically flip a wet brush over the surface, but a hand sprayer will distribute water far more efficiently and accurately.

**Essential tools: -**

There is a range of specialist plastering tools available. Not all of them are essential for every plastering job, and some can be made at home. **Here are the basics**

**Hawk** A wooden, metal or plastic square attached to a handle for carrying plaster to the wall. You can make your own from a 30cm square piece of chipboard or thick plywood screwed to a length of short broom handle.

In addition to being a convenient way of transferring plaster to the wall, the hawk also acts as a safety net. By placing it directly below the area being plastered, any plaster falling from the trowel as you press it onto the wall will merely fall back onto the hawk.

**Plasterer's trowel** A thin rectangular steel blade with a plastic or wooden handle for applying plaster to the wall and polishing the surface. Also known as a steel float.

**Wooden float** A rectangle of wood with a handle for giving a flat finish to the float finish.

**float** Used for keying the surface of the float coat ready for the finishing plaster coat. A wooden float can be converted into a deviling float by driving a couple of nails through one end so that their tips just protrude underneath. Passing the float over the surface of the trowel/float produces scratches on the float surface so that the finishing layer of setting plaster can rigidly adhere to. The deviling float is rarely used these days as it means additional time and labour but produces a sound backing for the finishing coat.

**Rule** A long, straight wooden batten used for levelling the float finish, after the float/render has been applied to the wall, in a reasonably even thickness.

**Spot board** for keeping the plaster close to the job. You can make one yourself from a 1 m square of exterior-grade plywood. Support it on trestles, or similar, so that it is at a convenient height. One edge should overhang the support so that you can hold the hawk below as you scoop plaster onto it.

**Making Patch Repairs**

In an old building, the plaster may be in a particularly bad way, and areas of it may have broken away from the backing, moving when you press against them. If several areas of a wall are loose like described, it is better to strip all the old plaster off and re-plaster the wall completely (**discussed next week**). If only one or two weak areas are found, they can be patched.

Patching a small area of damaged plaster is not difficult, and the first job is to discover the extent of the damage. Knock the wall with your knuckles - loose plaster will produce a hollow sound. Use a pencil or piece of chalk to mark out the area of damage, then begin to remove the plaster with a bolster chisel and club hammer.

Use a bolster chisel and club hammer to remove the damaged plaster from the wall, taking it right down to the masonry (or laths on homes up to 1935) underneath. Make sure you remove all the weak and loose plaster, cutting it back to sound material. Square-up the area of the repair, straightening the edges, and undercut the edges slightly to aid the grip of the new plaster. Wear goggles while doing this to protect your eyes from flying debris.

Remove all the dust and debris from the area of the repair, using an old paint brush. Make sure all loose material is removed, otherwise the new plaster will not adhere to the wall as well

as it should. Going over the masonry with a vacuum cleaner will also ensure that it is perfectly clean. Then dampen the wall with water, either using a brush to apply it, or a plant water spray.

Hold the hawk bearing a small amount of cement float render firmly against the wall below the damaged area. Insert the trowel blade into the mix on the hawk, angle it at about 45 degrees, bring and push it firmly towards the wall. Press the mix upwards on the trowel, pressing firmly inwards at the same time. As the cement float render mix is transferred to the wall, flatten the trowel to an angle of about 30 degrees, increasing the inwards pressure.

Level the cement float render mix with a wooden batten, using a sawing action and moving up or down along the patch. Then, as the cement float render mix begins to harden, cut it back with the trowel so that it sits slightly below the existing surrounding plastered wall. The backing cement float render coat should be about 1 mm below the surface. If the original plaster is too thick to allow this with a l0mm coat, you will need to apply a second coat, after a couple of hours as too thick a coat will fall off the patched area. Key the first coat with a devilling float.

When applying the finishing plaster coat, make sure that the mix is creamy and completely free of lumps. Transfer a quantity to the hawk and use your steel trowel this time to press it hard into place, holding the trowel so that the blade is at an angle to the wall. Again, hold the hawk firmly against the wall immediately below the area of attention. Cover the entire area of repair as quickly as possible, keeping the trowel moving.

Use the steel trowel to smooth the finishing plaster coat by moving the trowel upwards, then from side to side. Polish the plaster by resting the blade flat against the surface, with slightly more pressure on the trailing edge of a sweep. If the surface begins to dry before you have finished, wet it very lightly with a plant spray, or flick water onto it with a brush. A polished finish is surprisingly easy to achieve, but don't over-polish, as emulsion paint may not adhere properly.

**Plastering a wall - Overview**

Plastering a new wall follows the same broad principles as patching plaster work. The main difference, however, is the need to recognise surface depth and undulations of the final product while you work. It is essential to prepare the wall, or walls, with depth guides so that a minimum thickness of plaster can be applied, leaving a flat, smooth, vertical surface.

Any door linings should be positioned carefully to suit the required depth of plaster; similarly, metal or plastic boxes for power points and switches should be set into the masonry/brickwork, but recessed a little.

In a new building, door linings should project about l0mm (finish) prior to plastering. Fit metal corner beading to any external corners of walls, openings and window reveals, setting them in dabs of plaster and aligning them carefully with a spirit level. Alternatively, they can be anchored with masonry nails.

PS Metal angle beads for external corners are designed to accept a floating and finishing coat on masonry walls, and a finishing coat only on plasterboard walls.

To ensure the correct depth of plaster across the expanse of a wall, the should be divided into manageable sections, or bays, using vertical wooden battens temporarily nailed in place. These are known as grounds and provide a useful guide to the plaster's depth. They should be set with the aid of a spirit level to ensure that they are truly vertical. As the floating coat (the initial layer of cement render) in each bay is completed, the right-hand ground/batten is repositioned to form a fresh bay ready for plastering.

Plastering a wall needs care and patience, as plaster is not the easiest of materials to work with. It may readily slip from the hawk or trowel, or may slump perilously down the wall. However, these faults can be overcome if you are prepared to persevere. Don't take on to an ambitious project to begin with; where possible, learn the skills on an area that will not come under critical gaze.

The mixes for the float coat are varied depending on the background onto which it is applied, a simple rule of thumb is, strong mortars on strong hard backgrounds and weak mortars on softer backgrounds e.g. Cement mortar on Concrete or Compo Mortar on lime silica and wire-cut bricks. The weaker the background the weaker the must be the mortar.

**TYPES OF MORTARS: - (used for Floating)**

Lime Mortar:

3 parts sand, 1 part lime - seldom used now. Does not attain great hardness, very flexible.

Cement Mortar:

4 parts sand, 1 part cement. Reluctantly recommended because it sets very hard and few bases these days provide surfaces able to withstand its movement. Is liable to crack and craze. Mortars as a base are only needed to be durable and long lasting.

Compo Mortar:

6 parts sand, 1-part lime, 1-part cement. This is a combination of cement mortar and lime mortar hence its name. This is a general all-purpose mortar and can be used for almost anything as a base or as a finish.

Plaster Mortar:

2-3 parts white or light-yellow sand, 1-part plaster. This mix has a good bond and can be set the same day. It has an extremely good bond on concrete.

Lime & Plaster Mortar:

5 parts white or light-yellow sand, 1-part lime, 1-part plaster. This mix also has a good bond and may be set the same day, but has a very hard surface finish.

**NEVER** use sand containing clay, as it accelerates the setting time for all types of plaster, request specifically plasterer's sand.

**STEP BY STEP Application for the DIY Handyman**

Mix the type of mortar selected for your job, stirring it with a stick until thoroughly blended. The mix should have a stiff consistency, resembling that of porridge. Tip the float out onto a spot board, placed close to where you are to work. Then knead the mixture with your trowel, sprinkling on more sand, lime or plaster, if the mix appears too wet.

**Practice Makes perfect:**

Scoop some mortar onto the hawk and practice loading and unloading the trowel. Hold the trowel at right angles to the hawk, push the blade forwards and rotate the hawk.

Continue tilting the hawk until it is vertical and scoop off the mortar. Keep the trowel blade horizontal with the mortar on top. Then level the hawk and tip the mortar back onto the board

Next, practice applying the mortar to the wall. Rest the trowel blade against the timber ground and push upwards, steadily reducing the angle of the blade as the plaster is spread onto the wall.

Keep the blade on the timber ground, reducing the angle until it is almost parallel with the wall. Finish by pressing the lower edge in slightly to squeeze the mortar mix against the wall.

When you are confident scrape off your practice section and begin applying the floating coat to the first bay. Work from the bottom right hand corner and apply the mortar in strips the width of the trowel

Level the mortar with the timber grounds, using a wooden batten with a sawing motion, working upwards. Fill in any low spots with more mortar and level them off with the batten.

Use a devilling float to key the float coat before it sets. Reposition the right-hand timber ground to form the next bay and repeat the procedure.

Finally spread a thin layer of finishing plaster over the hard-floating coat, working from top to bottom. Then use wide sweeping movements of the trowel to produce a smooth surface.

Any ridges or splashes in the finishing coat can be lightly trowelled off, stroking the blade lightly downwards. Keep the trowel blade at a shallow angle to the wall.

Allow the finishing coat to harden, then go over it with the trowel again, keeping the blade wet. This will polish the surface, producing a nice smooth finish.

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# All About Plaster Board

**Plaster Board Linings**

Since the advent of manufactured plasterboard (Plaster Glass & Gyprock), interior finishing work has changed significantly.

For instance, modern plasterboards can be used to clad an internal timber stud partition, speeding the

job considerably. Similarly, the material is used for the construction of ceilings. No longer are walls and ceilings constructed from wooden laths coated in plaster that has been mixed on site. As can be seen, plasterboard is an invaluable product for the builder. In addition to stud walls and ceilings, plasterboard can also be used to line a brick or block walls, instead of using a traditional plastering technique. This is of particular interest to DIY enthusiast, who justifiably has misgivings about conventional plastering. The potential of plasterboard is considerable, and it's important to be aware of the different types, so that the best can be selected for the job in hand.

**Modern Plasterboards**

Gyprock panels are made by sandwiching a layer of gypsum plaster between two sheets of thick paper.

For general work they are available in two standard thicknesses: 10mm and l3mm. The former is used where the supporting timber members are spaced at 450mm centres. If the timber supports are set at a wider spacing - for example at 600mm centres - the thicker plasterboard should be used.

Board sizes vary, too. The most popular measures 2400 x 1200mm, although a larger panel at 2700 & 3000 x 1200mm are also available but are harder to handle, particularly when working alone. NB. 2400 x 1200 is the smallest size available and all come with a Recessed edge.

**Different types of Gyprock Plaster boards**

Some boards are finished with an ivory paper on one side, while the other side has a grey finish. Where the intention is to skim the surface with a finish plaster, the grey finish gives a better bond. On the other hand, the ivory surface should be used when wallpaper will be applied directly to the surface. In the event, plasterboard with a grey surface on both sides tends to be more common, since most professional installers prefer to apply a final skim coat to the surface.

Other variations include the edge finish. Some boards are manufactured with a square edge, whereas others have a tapered edge. The latter produces a shallow recess on both sides of a joint, which can be filled with jointing compound and scrim tape that won’t stand proud of the adjacent surfaces, making it easier to conceal the joint.

**Important developments:**

Another important development is the production of plasterboard that's bonded to an insulating layer of foil. This is particularly useful in refurbishment work where the thermal insulation level of a property needs to be improved.

Also of interest is the availability of a “Fresco Panels” a sculptured Plaster board for achieving classic appearances of walls and ceilings. Other products include plasterboard with additional fire resistance, and plasterboard that is moisture-resistant. The moisture resistant product is especially appropriate for installation in wet areas like bathrooms, kitchens and Verandas linings. The manufacturers of Gyprock plasterboard invariably offer technical help on installation methods and product selection, and it is worth consulting them and their technical literature before commencing a project.

**Brick or block walls:**

Many builders prefer the use of plasterboard for lining brick or block walls approach to the traditional use of applying a plaster finish to the walls. There are several advantages to this, quite apart from the fact that a `wet trade' such as plastering inevitably introduces a significant amount of damp material into the building. A long drying-out period is then needed before the building can be occupied.

With careful installation, plasterboard panels fixed to a brick or block wall will produce a particularly flat, true surface. To a degree, these lining boards will also improve the level of thermal insulation, although where this is an essential requirement a special insulating plasterboard should be chosen instead of the standard product.

**A flat surface:**

In the refurbishment of an old property, drywall techniques are easily carried out. For example, if the walls have unattractive irregular surfaces, the supporting framework can be packed out where necessary to produce vertical and flat surfaces when lined with Gyprock wall sheeting. In cases, where existing walls suffer from damp a separate framing system can be advantageous.

**Fixing Plasterboard:**

The traditional method of mounting plasterboard to a wall is to construct a sub-frame, using wooden battens measuring approximately 25 x 19mm. The centres of the uprights should coincide with the edges of the boards. In addition, you should add horizontal battens at the bottom of the wall to support the plasterboard and provide a firm fixing for the skirting board. Similarly, horizontals are needed near the ceiling, and at any point where the panels need additional support. It is best to use a preservative-treated timber for the framework. Follow these guidelines for success:

A) It is essential that the supporting framework offers a truly vertical surface on which to attach the plasterboard panels, so each upright must be positioned with the aid of a spirit level. If necessary, packing pieces of hardboard or plywood should be placed behind the battens to bring them into line.

B) The simplest way of mounting the battens is to use frame fixings, which combine a special hammer-in screw with a plastic wall plug. A hole is drilled through the batten

and into the wall. Then the plug and screw are pushed through the batten, and driven home with a hammer. Any final tightening can be done with a screwdriver. Alternatively, normal screws and wall plugs can be used.

C) When offering up plasterboard panels, a foot lifter will be useful for raising the bottom edge of each panel so that the top can be pushed hard against the ceiling. You can make one from a scrap of wood, cutting it to give a shallow triangular profile. Working single-handed, you can seesaw the lifter on its fulcrum to elevate the board. If the wall is significantly taller than a standard panel, it is best to add an extra strip of board at the bottom, as the skirting board will hide any slight irregularities in the surface where the boards are joined.

D) Proper galvanised plasterboard nails should be used to fix the boards to the battens. They should be placed about l3mm in from the edge of the board, and spaced at intervals of no more than 150mm. You can make a mark on your hammer handle to aid correct spacing. Drive each nail in until its head just dimples the surface of the board, without causing a tear in the paper binder.

E) An alternative to nails for fixing plasterboard panels is to use countersunk wood screws. Their length should be double the thickness of the board. However, this method would be quite time consuming and would only be viable on a small project. If you do choose screws, make sure they are a non-rust type.

**Cutting plasterboard:**

When dealing with plasterboard, occasionally you will have to cut panels to fit around obstructions. The material is easily sawn with an old fine-tooth saw, but don’t press down too much - let the saw do the work. Alternatively, you can cut panels using a straight-edge and a sharp knife. A proprietary cutting guide is also available for this. Several passes will be needed with the knife to deepen a groove through the plaster. Moreover, to preserve the paper binder, you should also scribe another groove across the reverse face. Depending on the finish needed, you can often achieve an acceptable edge by snapping off the waste without having to cut through the board completely.

**The Direct Bond Method**

In contrast to attaching plasterboard to a framework, it is also possible to bond panels directly to a brick or block wall. This approach is often favoured in new work, since its quick to complete. However, it requires a little more skill than the boards to a sub space frame.

The wall must be in a good condition and not susceptible to damp. Equally the wall should be reasonably flat, because the dabs of adhesive can only accommodate minor surface irregularities.

Patience, care and confidence are required when tackling this process, since subsequent corrective measures can be exceedingly difficult to carry out.

**Simple Step by step Bond method.**

1 The floor and ceiling are marked with a chalk line, allowing for the thickness of board plus at least 10mm of adhesive.

2 Next, the walls are marked with vertical lines to indicate the positions of the rows of dabs. Use a long straight edge, spirit level and a piece of chalk, or a chalked Plumb line.

3 Mix up the special adhesive and scoop some of it onto a hawk. Then use a steel float to place then on the wall. The dabs should be 250 mm long and about 50--70mm wide.

4 Dabs are needed at 600 mm centres, plus 50mm below the ceiling. A continuous line is needed above the floor. Apply enough adhesive for one panel at a time.

5 While being lifted clear off the floor with a foot lifter, the plasterboard panel is pressed firmly onto the dabs of adhesive. Then the panel is wedged in place at the bottom.

6 Finally, the plasterboard is tamped into place with a long straight--edge, aligning it with the marks on the floor and the ceiling. Repeat the process for subsequent panels.

7 The final process will be to finish of the sheet joints neatly with flushing tape.

PS Gyprock Sheets can also be fixed directly to stud metal frames by using special screws, and final flushing is still required.

**Finishing the board: S**ome method of finishing plasterboard lining is to skim the surface of the boards with a fishing plaster coat, keeping this layer to a maximum thickness of 5mm. If this method is chosen, the boards should be mounted as closely together as possible. The Gyprock installation manual gives a good indication of different types of boards that can be used. Foil backed plasterboard, ceiling panels, fresco panels, aquachek, supa-ceil, partition panels, are all different types of products available for specific purposes.

**Taped joints:** covering joints between plasterboard panels is carried out with a jointing compound, used in conjunction with a tape. Fill the recess evenly and fully with jointing cement, bed the tape centrally over the joint and cover lightly with cement. Alternatively, lay the tape along the centre of the joint and press firmly into the recess. Cover with a thin layer of cement. Cover all fastener heads with jointing cement allow the jointing cement to harden for at least one hour. When the first coat is dry or hard, apply a second coat, about 180 mm wide, finishing slightly above the board surface and feather the joint edges. Cover faster heads with a second coat of cement, overlapping the first coat by about 25mm. Allowing setting for at least one hour and drying time for 24 hours. When the second coat is dry or hard, apply a thin coat [finishing} of cement centrally over the previous coat, about 270 mm wide. Soften the outer edges of the newly trawled cement with a damp water brush before feathering the edges with a trowel. Again, make sure that previously stopped fastener heads are covered with a final coat of cement. Ensure that the edges of the flushing cement are neatly feathered and that there are no knife edge marks left in the final stopping. When dry sand with 150 grit paper or with 220 grit sanding mesh. Avoid any heavy pressure which might scuff the joints. Caution: if previous coats of cement are not thoroughly dry before application of subsequent coats, imperfections can result from delayed shrinkage of the cement.

**Butt joints:** Butt joints are treated similarly to recess joints with the marked difference being in the finishing of the finished surface at the joint. The first and second coat applied should give a gradual convex camber over the tape, making sure that the outer edges of the cement are feathered. After at least 24 hours of drying time sanding with 150 grit or 220 grit sanding mesh

can be used to finish the surface. Remember finished joints should have an even and slightly convex camber from edge—to—edge.

There are many jointing compounds [cement] available many of which are Gypsum based and have a setting time of around 90 minutes. Remember the secret to a smooth finish is to feather the edges, going over the edges with a sponge often helps. Finally, a sealing coat is recommended prior to applying emulsion paint.

Remember that there are internal angles and external angles available for high traffic areas, the angle beads are secured with fastener, make sure that they are straight, and plumb, apply the jointing cement to cover the angle beads, then sand smooth with 150 grit paper. There are also numerous jointing mechanical tools available these tools can significantly increase productivity by cutting the amount of time taken to finish the job, i.e. apply tapes by machine, apply second coat with a 200-millimetre box, apply finishing coat with a 250 or 300-millimetre box, internal tape guides, feathering tool for internal corners. Being a D. I. Y. plaster board finisher can be a daunting task, best left to the experts. If you are keen to try it would be best to experiment on a small section or in a small room.

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# Ceiling Repairs and Decorative Finishes

**CEILINGS:**

The traditional method of constructing a plaster ceiling involved nailing closely spaced wooden or metal laths to the joists and coating them with plaster. Adhesion was achieved because the wet plaster was pressed through gaps between the laths. The lath-and-plaster method is very different from present-day practice, which makes use of plasterboard. Where joists are placed at 450mm centres, it is usual to fit plasterboard that is 10mm thick; 12mm plasterboard is preferred where joists are spaced at 600mm centres. If a vapour control layer is needed above the ceiling, foil-backed plasterboard can be used. However, to ensure this fulfils its function correctly, any breaks in the foil at joins in the board should be sealed which necessitates access from above.

**Making Repairs**

Where a traditional ceiling is in poor condition, improvements can be made by adding a textured wallpaper, such as a woodchip or embossed covering. This will disguise superficial irregularities quite effectively. However, this is not a viable solution if the plaster is loose and likely to fall away from its backing.

Where the laths are sound and still in place, you can reinstate the damaged area using gypsum plaster Modern products are fully compatible with older lime plasters and will adhere well to the laths. First, all the old damaged plaster must be removed and raked from between the laths. Then an undercoat of browning plaster should be applied, pressing it into the laths well. When it has started to harden - in 2-3 hours, the surface should be scratched to achieve a key. It should be left for around 24 hours to harden completely; after which you can apply a thin coat of finishing plaster, using a steel trowel to produce a smooth, level surface.

In very old properties, you may need to experiment with repair strategies. For instance, if the plaster looks crumbly, you will need to stabilise the surface before adding a further skim layer. Painting a PVA bonding product directly onto the surface, using a wide brush can do this. When it has dried, apply a thin layer of finishing plaster. Provided the laths are sound, this is usually very successful.

**Decorative finishes**

For many years, a popular way of finishing a ceiling has been to apply a textured coating. Many pattern effects can be produced; some of which are quite easy to reproduce if they become damaged.

More recently, however, there has been renewed interest in plain surfaces, many home-owners wanting to remove the textured finish and reinstate a smooth surface. Regrettably, this can be quite difficult. An industrial steam stripper may help, but it is still difficult to scrape away a textured finish without damaging the surface below. Sometimes a plaster coating can be added directly on top; but in many cases, it is best to remove and replace the plasterboard completely. One thing you must not do is try to remove the finish with any kind of abrasive tool. Some early textured finishes contained lead, so the creation of dust would represent a serious health hazard.

**Open joist finish**

An attractive cottage-style look can be given to a ceiling by leaving the joists exposed. Plasterboard panels can be nailed to battens fixed between the joists, or directly to the underside of the floorboards above.

**PATCHING PLASTER AND LATH CEILINGS:**

If a small section of a lath and plaster ceiling becomes damaged, the simplest remedy is to patch it with a section of plasterboard. This may be coated at all contact points with a bonding compound and manoeuvred over the damaged section and pressed into place, where it should remain because of the adhesive properties of the plaster. However, this will only work for a very small area of damage, as any substantial piece of plasterboard will fall away under its own weight. It is much better to cut the damaged laths back to the nearest joists and nail the plasterboard to the lath. Having closed off the hole, you can use the plasterboard as a backing for layers of fresh plaster. Where a small area is involved, you should be able to purchase a repair pack of one-coat plaster from a major DIY hardware store.

**Detailed steps to repair:**

1. If the damage to the ceiling includes broken (laths, the first job is to pull them out and cut the ends back with a saw. Saw them off at the centres of the adjacent joists.

2. Clean up the edges of the plaster, then cut a piece of plasterboard to fit tightly in the hole. Nail this in place, using 30mm galvanised plasterboard nails.

3. Treat the plaster around the edge of the hole with PVA adhesive. This will not only ensure good adhesion between the new plaster and old, but also reduce water staining.

4. Mix up some bonding plaster and trowel a layer onto the plasterboard patch with a steel float. Make sure that it is pressed into the edges of the hole well.

5. Level, plaster by ruling it off with a straight wooden batten. Leave the plaster to stiffen slightly, then flatten it below the surrounding plaster and key its surface with a devilling float.

6. Finally, spread two coats of finishing plaster over the patch, carefully levelling it with the surrounding plaster. As it begins to set, wet the trowel and polish the surface

**Cornices & Decorative Mouldings**

A decorative plaster moulding at the junction of the walls and ceilings was very popular in quality houses erected during the last century. The plaster finish was often intricate. Today, a similar, less ornate feature, known as coving or cornice, is sometimes used. Coving/Cornices add a smart finish to any room, but they also have another important function - they can be used to cover cracks.

Differential expansion between plasterboard ceilings and plastered walls often leads to an unsightly crack between the two. Although a filling compound may initially overcome the unsightly finish, the cracks invariably reappear. Adding plaster cornices is much more effective. Gyprock - Westcove and Slimline cornice is available in two standard sizes: one has a girth of 75mm and will extend 75mm onto both wall and ceiling; the other has a girth of 55mm and extends 55mm. Various lengths are made, and it's best to avoid creating joins in long runs wherever possible. Even with the most careful workmanship, the joint is difficult to disguise.

**Decorative Mouldings**

Although modern cornices are far simpler in design than the ornamental versions preferred in the last century, there are signs of a revived interest in more decorative plasterwork. Techniques of manufacture are modern, however, although the end-products bear similarities with earlier designs. Hence you can purchase an ornamental plaster ceiling rose as a manufactured unit to place around a central light fitting. Similarly, there are also nanofeatures who specialise in making decorative cornices being mainly made out plaster.

**Measuring and cutting coving/cornice**

Cutting internal and external mitres on lengths of cornice needs careful consideration; it's all too easy to get the cutting angle wrong. All measurements also need taking and marking out with care. Gyprock cornice is made from fire-resistant gypsum plaster, encased in a paper liner that must not be removed.

Cutting should be carried out with an old tenon saw, as the plaster will soon blunt a new blade, and DIY coving kits often include a paper template that is laid on the face of the coving to mark the cutting line.

A more accurate approach is to make up your own mitre cutting block. While it's true that small gaps in adjoining sections can be filled reasonably successfully using the adhesive, it's always best to cut the material correctly in the first place.

**Fitting Plaster cornice**

Installing coving is a relatively straightforward operation, provided you take care in measuring and cutting the lengths of plaster or Gyprock moulding. When working with a long section, it is best to have assistance in supporting the material when it's offered up to the wall. Attempts at a step-by-step guide will be outlined next week.

**Fitting Plaster cornice**

As soon as the adhesive touches the surface of dry plaster, moisture will be drawn away quite quickly, and the setting process will begin at once. If you accidentally jog the length of coving while holding it in place, the developing bond may become fractured. Once this happens, adhesion cannot be re-established, and the only answer is to remove the coving, scrape off the adhesive and start all over again. Bearing this in mind, on a longer run, it is a good idea to tap 25mm panel pins into the wall plaster to offer temporary support beneath the coving while you are holding it in place.

When the adhesive is dry, the pins can be removed with a pair of pincers, and the holes filled with coving adhesive or a normal filling compound. Gyprock offers an installation manual on Google.

**STEP - BY - STEP**

A) Cracks often develop at the junction of the wall and ceiling. You can fill these with conventional filler, or hide them completely by fitting coving.

B) Coving adhesive should be mixed in small quantities only, since it dries quickly. An old ice cream tub is ideal for this purpose.

C) Cut a block of wood to the same depth as the coving and use it as a template to mark off the contact points on the wall and ceiling.

D) Using a cutting jig, the mitres at the ends of lengths of coving can be cut with an old tenon saw.

E) Make sure that the mitred cut runs in the correct direction. Provided you don't force the saw, you should be able to obtain a clean cut.

F) Carefully smooth any ragged edges on the paper binding with fine glass-paper. However, take care not to remove any of the plaster.

G) Press the coving gently, but firmly, into the angle between the wall and ceiling. Then hold it in place for a minute or so to allow the adhesive to grip.

H) Draw the blade of the filling knife along the edges of the coving to remove any surplus adhesive before it has a chance to set fully.

I) When the adhesive has set, the ceiling and wall can be decorated. The finished coving will add a smart finish to the room.

J) The same procedure applies to decorative plaster cornices/coving, but more care needs to be taken in making sure that pattern in the cornice match on internal and external corners.

**Timber clad ceilings:**

A completely different finish can be achieved by cladding a ceiling with strips of tongue and grooved timber.

Carefully selected wood can look most attractive; moreover, once the work has been completed maintenance is minimal

However, wood cladding has fire characteristics quite different from plaster board. This means that if you add timber cladding on top of a plaster ceiling, you will be increasing fire resistance properties. In certain locations, such as a kitchen this use of material could be unacceptable. The whole subject of fire precautions is convex, and the building regulations contain a wide range of measures that must be complied with, check with your local council for advice. The issues do not merely relate to the combustibility of different building materials, but

to other aspects as well, such as surface spread of flame. The ability of flames to track across surfaces and to cause ignition at some distance from the ritual source of a fire is a well no phenomenon. For this reason alone, any plans to clad a room or rooms with a timber finish rather than a plaster product, should be discussed with your local building authority. Your proposals must gain full approval and in some instances, your builder will be required to apply flame retarding finishes to the cladding after installation. Polyurethane varnish is unacceptable. Flame retarding finishes react in a fire by starting a blanket of so which forms a dense insulation barrels preventing the fire from spreading or igniting further. Generally, fire retarding finishes do not spoil the appearance of cladding and are specifically formulated for this kind of construction finish.

Fire safety is a complex matter, and although timber clad surfaces can be very attractive, you must or should seek expert advice before installing them. If the cladding is installed in inappropriate locations and coated with the wrong finishes, serious implications for the safety of the occupants could be the result.

**Materials:** There are many find cladding materials available, especially exotic hardwood, but the cost of these is often prohibitive. Hence most home handy men are likely to select soft woods like pine, or large sheets of timber grain veneer, which are relatively inexpensive. The choice of profiles available these days is wide and varied but since the cladding is only decorative and not structural, the cladding need only be very thin. Once the wood has been purchased, it should be stored level and flat in the room where it will be installed. If you notice that the timber is new and fresh it would be wise to store the timber for some time, allowing it to dry, thus reducing the chance of excessive shrinkage once it has been fitted to the appropriate location. The longer the timber can be left to dry the better, alternatively asked for kiln dried timber or furniture grade, however these requests can become very expensive. Should you install the timber lining in winter, provide heating within the room to reduce excessive shrinkage, this will also help to dry the timber before installation. The penalty for installing wood too quickly is that it will shrink in the warmth of the house. In some cases, the tongue and groove boarding will begin to separate, and the fixing will distort. On the other hand, if you use wood that has been stored indoors for lining, say a porch outside, you will be surprised and find that the strips will swell and buckle as the timber absorbs the moisture from the exterior.

**Installing Timber Cladding.** Let’s assume that a plaster ceiling is already in position, the first job would be to remove the cornices, then attach small 50 x 25mm soft wood battens to the ceiling, screwing them securely to the ceiling joists from underneath. The timber cladding will then be secured to these battens. To locate the position of the ceiling joists, you can either tap the ceiling and probe with a nail or better still you can purchase a proprietary joists detection meter. **Fitting the timber boards/cladding.** Where there is a long run and the timber available is not of the same length, joints will need to be made on supporting battens. Normally a butt joint is used, however a much better finish would be to mitre the ends to form a neater Joint. The overlapping ends on a mitre joint prevent ugly gaps from opening if the timber decides to shrink along its length. Boards that run along an undulating wall will need scribing and trimming. At the preparatory stage, use some off-cut woods to calculate the progression across the ceiling or wall. You must make sure that the last board to be placed is not to small, otherwise this will look ridiculous. The boards should be held in place by secret nailing if you decide to use tongue and groove timbers. Secret nailing is not possible on the first and last board to be placed, however

you can often disguise nail heads by positioning them alongside knots or discoloration’s in the timber. Before nailing a board, you should make sure it is pushed fully home on the tongue of the adjacent board.

You can tap the board own using a short off-cut that fits over the tongue. By using rust resistant panel pins you are less likely to split the tongue. The pins need to be driven home with care since they bend easily. The fixing of large pre—finished sheets is much simpler, but it requires to people, one for holding the sheet in position while the other person secures the sheet. Again, careful measurements need to be taken, making sure that you don’t end up with a very thin piece at the end. When fire retardant application is called for follow the manufacturers construction carefully, ventilation, face mask and eye protection are essential when applying chemical treatment.

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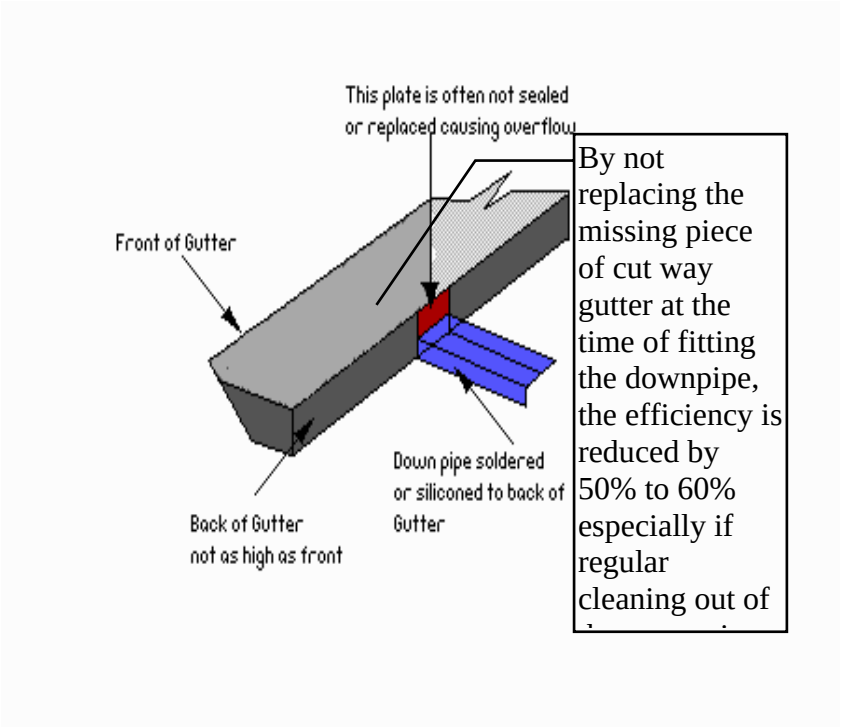
# Roof Maintenance in Preparation for Winter

**Roof Repairs in Preparation for Winter:**

Now that winter is drawing closer it is time to prepare our roof and drainage system for the onslaught of those wet and blistery days.

A checklist would be a handy item to have so here is one: -

**A) CLEAR ALL GUTTERS OF DEBRIS:** that is leaves and even build-up of dirt collected over the years, as all those particles can firstly clog up the downpipe pipe entry and cause a build-up of water in the gutter and secondly when the gutter dries out debris will hinder the drying process allowing rust to form in suspect areas.

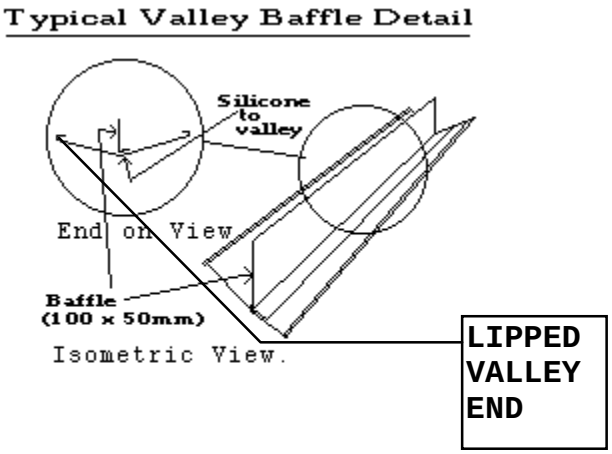



Also check to see if the gutter has been back plated **(see diagram)** if not then overflow of water into the eaves, under the conditions mentioned above is very likely. This can be rectified by replacing the removed portion of metal from the gutter, efficiency of the gutter is reduced by 50-60 percent if the back of the gutter is not reinstated.

Sometimes downpipes can also get blocked, it is wise to flush them out especially if they are connected to soakwells. Never seal the join between the down pipe and the shoe where it runs into a soakwell, because if the soakwell ever loses its capacity then it can overflow at ground level at the join and not at gutter level.

For gutters to last longer the inside cam be painted with a bituminous paint which will effectively double the life of the gutter.

**B) VALLEY GUTTERS FLASHINGS & OTHER PROTRUSIONS:** It is also wise to check that all protrusions are still water tight, that is the seal between lead flashings and the pipes (vents & Flues) are still water tight if not seal them with a bead of paintable Silicone. All metal components should always be protected to slow down the deterioration process and all Lead components should be painted so as not to cause accelerated rusting to the galvanised metal components on a roof such as gutters and downpipes.




Valley gutters should also be kept free of leaves and debris which can quiet, easily get caught especially if the free valley space is less that 100mm (4”). The water as it rushes down from the tiles onto the valley will get caught up in the leaves and debris and soon it will act as a dam and tend to overflow along the sides especially as over a period of time the **LIPPED VALLEY ENDS (see “End on View” diagram)** of the valley gutter have been clogged with dirt, crimped down by the weight of the tile or flattened down by holding down nails, it is very time consuming to carry out and rectify this but is well worth it if water ingress is a problem along valley lines.

Another problem is that valleys can overflow due to the sheer rush and volume of water deposited during a storm on steeply pitched roofs. Fitting baffles will redirect the flow of water and eliminate this problem.

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# Damp the Eternal Enemy

## DAMP

No problem is so widespread or so misunderstood as rising damp. Broadly, every building built before 1900 has a damp problem in some degree and thousands of dollars are spent in repairs.

In many cases, the cure is worse than the disease, ill-conceived treatments may in fact increase the problem and could decrease the real estate value of the building.

On top of this, many renovation practices can cost problems where they may not have existed previously. Expensive and good booking renovations can turn into disaster areas by not allowing for moisture flow in old walls. A civil definition of rising damp is the following: Rising damp is dampness in a Brick wall caused by ground water rising through the bricks and mortar. It usually appears as a regular line of efflorescence with discolouring and patch darkening below or around the damp area. Substandard workmanship and/or ineffective damp-course [damp-proof course] materials cause rising damp. Poor architectural detailing and the use of unsuitable materials may also be responsible, as can inappropriate landscaping usually following construction. Rising damp makes it possible for soluble salts to attack the brickwork in ways that can destroy mortar joints and cause substantial deterioration of the bricks and the plaster work internally, in ways that can destroy mortar joints and cause substantial deterioration of the bricks and plaster. Such damage is unsightly and if unchecked, can reduce the strength of the brickwork and plastered surfaces significantly.

### Durability

Durability is the resistance within a brick to attack by soluble salts. The important components affecting durability are environmental conditions, i.e. availability of moisture and soluble salts and the amount or degree of hardness formed within the brick, during firing. It is important that the capacity of a brick to resist attack from salt matches that or exceeds the severity of exposure. If this is not the case, then the brick or bricks will suffer extensive damage in time. Australian Standards 1225—1984, Clay Building Bricks, specifies the properties required for burnt clay or burnt shale bricks. The standard defines four durability classes:

Internal: - Bricks suitable for use in internal walls above a sheet or membrane damp—proof course.

Above damp-proof course: - Bricks suitable for use in an external wall only above a sheet or membrane damp-proof course and below an adequate coping, roof or similar top covering.

General purpose: - Bricks suitable for used in an external wall under ordinary exposure conditions.

Exposure: - Bricks suitable for use in external walls exposed to severe local conditions such as,

1. On walls especially below the damp—Proof course, in areas where there is possible

exposure to attack from salts in the soil, ground water, in the air or from the brick itself

[Salt attack or salt damp].

2: on sea fronts where the walls are exposed to attack from wind—borne salt spray.

3. Retaining walls.

4. Under conditions of regular cyclic freezing and thawing. Because of increasing reports of saline ground water, even in inland areas, exposure grade bricks are recommended below the damp—Proof course especially when there are brick build ups used.

Whilst there is a place in the construction industry for each type of brick. Not every brick is supported for every requirement. Bricks must be chosen carefully.

For example, a general-purpose brick may be used where internal or above damp-proof course bricks would be specified. However, general-purpose bricks should not be used in applications requiring exposure grade.

**Water Absorption** Bricks are able to absorb small quantities of water if exposed to moisture however in cavity wall construction, the internal leaf of brickwork remains relatively dry. During heavy exposure to rain the external leaf will become quite wept and water may reach attaching, however proper building practices and correct detailing and the use of flashing will ensure that water remains free and drains away from the cavity. Semi—dry pressed bricks are generally the most absorbent: hard fired extruded bricks the least.

**Efflorescence**

Soluble salts occur naturally in or clay [bricks]. These soluble salts are not obvious nor generally of no concern, however these salts at times do occur on the surface of the brick as a white powder, known as efflorescence.

This is a natural occurrence and various in extent. Small amounts of efflorescence are not harmful and generally weather away. It is the continued flow of water being absorbed from the ground by the brick, that causes permanent efflorescence resulting in what is known as salt attack.

Efflorescence can be greatly reduced by firstly laying the bricks dry, as wet bricks hold enough water to start the efflorescent process. Nearly all the salts that cause efflorescence come from sources outside the brick, namely ground water, salt from the nearby ocean carried in the air, industrial fallout, and especially mortar ingredients in contact with the brick.

The best way to remove efflorescence is to brush it off the brick when dry. Wetting the brick dissolves the efflorescence allowing the dissolved salt to be re—absorbed back into the brick, only to re—appear at a later stage when drying occurs.

**Water entry damage** One of the main reasons for damage caused by rising damp is the continual evaporation of the water carrying the soluble salts. These salts break the natural bond of the material by crystallization. The growth of these crystals causes a large build-up of pressure within the structure of the material on the surface, exceeding the tensile strength of the material causing disintegration or better known as fretting.

When rising damp does occur continually, the fretting process can destroy water joints and bricks to the extent of walls becoming structurally unstable.

Salt content of ground water [bore} varies from area to area. Well drained soils are usually low in salt content {most of Perth] but coastal areas and low-lying areas can have high soluble salts within the soils. Watering gardens with bore water is generally the most offending culprit.

Common agricultural fertilizers contain liberal amounts of soluble salts causing heavy damage, so special care should be taken when billing on such real estate.

In older buildings, rising damp will soften lime plaster and weaken the bond between the plaster and the brick. Any subsequent movement of the building is likely to break the bond causing delamination and drumming of the plaster. However modern plaster with Portland cement base is generally not weakened by dampness, but damaged or disfigured by the soluble salts. Rising damp will also cause paint to peel off the walls. The dampness deteriorates the paint, reducing its adhesion, combined with efflorescence literally forces the paint off the wall. If the walls are wall papered then the paper is lifted by the glue failure, staining of walls caused by mould growth also occurs and is hard to remove. The majority of rising damp is cosmetic only and to say the least annoying. The majority of damage caused by rising damp is mostly all repairable.

Of concern is also the problem of damp that may come into contact for long periods with timbers, these may eventually rot, and if the timber is a structural component, serious consequences can result.

**Summary on Damp**

Damp problems are shared throughout Australia, Adelaide is notorious for salt damp Sydney suffers mild rising damp, expansive clay soils trouble parts of Melbourne and some older suburbs of Perth. Humidity is a problem in the northern regions of Australia. The type of damp encountered range from dry and wet rot, falling, lateral or rising damp and condensation. The fact of damp migrating into a home is generally not considered as a structural problem, it becomes of concern when the water contains prolific amounts of salt/minerals which cause the damage to the structure of the home. Luckily Perth does not have serious salt problems like say in Adelaide. By the time damp has become evident be damaged is generally already done some of the symptoms are musty smells, mildew, white efflorescence etc.

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# Internal Doors

Replacing an internal door is relatively easy, and changing trends in interior décor have encouraged many home owners to fit replacements. However, fitting a new frame is more involved, since inevitably this will cause a degree of damage to the surrounding plaster-work.

Most interior doors are finished to a jamb fitted with separate wooden strips that act as door stops, as opposed to a rebated frame generally used for exterior doors. There are exceptions, and occasionally interior doors may be found to be pre—hinged and manufacturing with an integral rebated frame as a combined unit.

Although door jambs are sold in standard sizes to accept doors of standard height and width, the relatively simple joints between the sides and top can easily be altered to produce a narrower opening.

Where the internal walls of a house are built from bricks or blocks, liners are often fixed using nails driven into the pre—drilled and blocked masonry walls. This is done prior to plastering. A door lining is far more easily fitted to a timber stud wall. Once the liner has been fitted architraves are fitted to hide the joints between the door liner and the plastered wall.

**Selecting a Door**

The range of doors currently available is expensive. There are the ultra-light and inexpensive hollow doors, filled with a honeycomb core of cardboard, these types of doors are acceptable in many situations. However, fire rated doors may be needed in other locations. For instance, a fire door offering at least 30 minutes fire resistance is required between habitable rooms and a garage. These requirements are contained in your local building regulations manual. Accordingly, you should seek advice before purchasing new doors, since the requirements concerning fire safety are most stringent.

**Changing styles**

Styles of internal doors are continually changing. After many years in which plain doors were popular, there's a renewed interest in panelled doors. In the event, many modern doors having a traditional panelled appearance are hollow, and merely copy a decorative surface that copies the panel style. Technological development has also influenced Surface materials. Many inexpensive doors bear an attractive wood grain finish, although in fact this may be printed paper affixed to a hard board base.

In the refurbishment older properties, the task of selecting doors is far less easy. The openings may be wider than normal, and it may be necessary to employee a joinery company to custom make doors. Alternatively, it may be possible to obtain recycled doors from an architectural salvage supplier.

Even when selecting a door for a comparatively modern house, you may find difficulties in matching the size. This is because of the change from Imperial to metric sizes.

Many joinery specialists continued to manufacture doors in Imperial dimensions but expressed then in metric measurements; for example, 762 mm instead of 2 ft. 6 in. However, the introduction of true metric doors, saw the arrival of new widths and new heights.

**Checked carefully.**

Imperial sizes are still manufactured, recognizing the fact that in refurbishment work one is often faced with Imperial sized openings. Therefore, joinery catalogues should be checked carefully, and replacement doors selected accordingly.

Similar caution needs to be exercised with regard to door thickness. If a door is replaced by one of a different thickness, the door stops on the door jamb may need to be prised away from the jamb and reposition. If the frame happens to be a metal frame, then it is even more so important to choose the correct thickness door.

## HANGING AN INTERNAL DOOR

When hanging and internal door, follow these steps to ensure a successful job.

1. Check the sides and top of the door liner for straightness, using a long straight-edge. In older houses, there may be a slight bow in the head of the liner (frame) which must be duplicated by trimming the top of the door.

2. Position the door against the frame, using small wedges underneath to keep it tied against the top of the liner [frame]. Using a pencil, mark the perimeter of the door to transfer any undulations in the frame onto the face of the door.

3. Position the door on its edge for trimming, make sure the door is supported well. Plane down the sides to the pencil mark, working on the hinged side first; it is important to get this correct before dealing with the other edges. At the top of the edges of the door, plane in the edges slightly, for each edge. This prevents the wood from splitting at the corners/edges. Should you find that the face of the door splits when you are planeing across the top, scribe your pencil line deeply with a sharp knife.

4. Reposition the door to check your progress, this may have to be done several times until the door fits into position. The gaps at the top and sides need to be about 3 mm, bearing in mind that heating in a house, may course shrinkage, a smaller a gap say (2mm) may be a more prudent selection. You can always take off more, but it is difficult to add to the door. Note also, take into consideration floor covering.

5. The edges of the newly fitted door should be trimmed square. However, on a thick heavy-duty door i.e. fire rated door, you may find that the leading age clips the door frame as the door begins to close. This problem can be solved by bevelling the edges slightly.

6. Most internal doors can be supported by a pair of butt hinges. Brass hinges are preferable, especially in bathrooms, kitchens, laundry and especially on external doors, since they don't rust. However, steel hinges are much cheaper. Position the upper hinge 150 mm from the top of the door, and the lower hinge 200 mm from the bottom. The centre line of the spindle on a brass hinge should align with the edge of the door. However, when pressed steel butt hinges are used,

the hinge knuckle should project beyond the face of the door. When fitting the hinges to the frame or door, you will need to cut a hinge plate recess, attached with at least but no more than two screws.

7. With the hinges attached, position the door in an open position, standing it on thin ply or timber to create the required clearance underneath the door.

Scribe the hinges on to be door frame. When the recess for the hinges has been cut, screw the hinges into position, using only two screws at this stage per hinge. This allows you to check the closing action while leaving fresh wood behind the hinge holes should you need to make slight alterations to the hinge positions. Only when the door closes correctly should all the screws be fully fitted.

**FITTING THE DOOR FURNITURE**

The positioning of the catch and its handle in modern properties are often fitted half way between the top and the bottom of the door. In older properties the position is slightly below the mid-point. To prepare a door to accept the catch mechanism, a cut-out is made by drilling a number of holes, then clean up the cut-out with a bevel edged chisel. Insert the catch into the prepared hole, so that the new plate sits flat on the edge of the door. Now you can score deeply around the plate with a sharp knife to outline the recess needed so that the plate will be flush with the edge of the door. Chisel out the wood from within the outline with a bevel edged chisel. Similar techniques are used for setting the striker plate in the door frame. When the catch fits properly, you can cut or drill a hole through the door for the operating shaft. Take care not to let the door close accidentally before you have fitted the square shaft and handle. It's all too easy to shut yourself in a room with no means of escape. Fitting the handle and the operating shaft is generally self-explanatory as detailed instructions and templates are supplied when purchasing your door furniture. At times you may find that the shaft needs cutting down with a hacksaw, this will depend on the thickness of the door. On some of the more modern designs screws securing the plate to the door face are hidden by a clip cover plate for a neater appearance.

**DOOR STOPS AND ARCHITRAVE'S.**

Once the door has been fully installed, the door swings smoothly on its hinges, and the door furniture operates smoothly, then the door stop can be nailed in position to the frame. The door stop is then fixed with small oval nails with the heads punched below the face of the door stop, the nail holes are then filled. Architrave's are then fitted across the top and both sides of the frame. The architraves are also fixed with oval nails and they are usually set back from the frame by about 6 mm. The architraves should be wide enough to cover the edge of the wall and wide enough to allow the skirting to run into the architrave.

In older properties you may find an ornately shaped block fitted at the bottom or top of the frame to cover the ends of both the architrave's and skirting boards. At the top corners, the architrave is mitred and pinned. When fitting architrave's, be most careful not to bruise the Surface with the hammer head, since this damage will be difficult to disguise later. Finally, fill all mail holes, prime the timber ready for painting.

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# Fireplace Construction

**Construction of a Fireplace.**

In this discussion about the construction of a fireplace two important elements will be looked at closely.

Firstly, we need to decide whether the fireplace is to be an open wood burning type or to accommodate a heating appliance such as a gas fire. Secondly there it is the element of decoration, where a fireplace is the central focus of the room.

***Construction Requirements***

When considering an open fireplace or the installation of a heating appliance, you should check what implications this has for the flue. Different arrangements are needed for different types of heating systems. For example, an existing flue designed for an open fire, may not be suitable for use with a gas fired appliance. If you are in any doubt about this, Consultant the supplier of the appliance. Regardless of the type of heating the structure must comply with the relevant sections of the building code.

**1.** Provisions for adequate supply of air for combustion, and for the efficient operation of the flue or chimney.

**2.** Adequate provision for discharging the products of combustion to the outside.

**3.** A construction used in which the materials protect the building from catching fire as a result of the heating system.

Designing the operational elements of the fireplace so that there is full compliance with the regulations is something that should be carried out by a qualified specialist. However, working from specifications and drawings a skilful home improver may be able to carry out some of the constructional work. The building regulations keep detailed information's on the form and dimensions of the base unit, referred to as the constructional hearth; fireplace recesses are similarly detailed. Additional guidance is available from various trade associations concerned with the promotion of heating products. There are inexpensive publications that deal with a range of relevant topics. A number of specialists are also able to supply and arrange the installation of fireplaces places. These are offered in a wide range of designs, many of them quite decorative and suitable for forming and impressive centrepiece for a room.

**A NEW FIREPLACE**

Reinstating a fireplace that has previously been closed off may not always be as straightforward as a first seems. Elements like the provision of ventilation may be overlooked, but they must be included in the plans. You should check the requirements laid down in the building regulations.

The constructional hearth should be made of solid, non-combustible material and be at least 125 mm thick. Non-combustible materials are permitted below a hearth, except at the extreme perimeter to provide support. In reinstatement work, however a constructional hearth is likely

still to be in place, despite the fact that the opening to the flue has been closed off. This is because the removal of a constructional hearth can be quite difficult, this is very obvious in older homes. A fire back (fire wall) needs to be installed in the fireplace opening. Then a suitable fire surround should be added to finish off the opening.

**COMPLEX DESIGN.**

The design of the complete system is quite involved. For example, faults in the design of the flue for an open fire can lead to downdraughts and smoke-filled rooms. A good draw on a flue is essential. Overall construction is complex and far more difficult been building the decorative features of the fireplace itself. In some instances, it may even be better to leave construction of the operational part of the structure to an expert, and to devote your attention to the non-functional parts of the construction.

**REPLACING A FIREWALL.**

With age and use, it is not uncommon for a fire wall to develop cracks, and if these open up it will be dangerous to continue using the fire. If the cracking is relatively minor, a repair can be made with special fire cement. Once all the soot has been brushed away, the crack can be raked out with the point of a travel, under cutting it slightly, then soaking the wall in water. Special fire cement should then be trowelled well into the cracks and given a smooth finish by going over it with a brush soaked in water.

**THE SAFE SOLUTION.**

If there are large cracks in the fire wall, or a piece of it has broken away, the only safe solution is to install a new one. Special fire bricks are available for the purpose off construction of open fireplaces from most brick manufacturers.

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# Stairs, Cork and Vinyl Floor Coverings

## STAIRS

Of all the timber structures in a house, the STAIRS are usually the most complex. Building a flight of STAIRS is a major joinery project, involving a considerable amount of material, calculation, setting out, construction and assembly work. Traditionally craftsmen build a staircase that relied wholly on joints and contained no nails or screws at all. Even today there are still skilled trades that build high-quality staircases in this manner and in some building work, custom designs are needed. However, in most of today's housing developments and project market, mass produced units are used, concrete being a very popular choice.

The construction and installation of a staircase involves close coordination between architect, builder and installer, because the finished product must comply with the Australian standards. Some requirements rely specifically to the construction of the STAIRS, for instance, rise on a stair must be between 155 -- 220 mm: the going must be between 245 -- 260 mm. Further details, such as the minimum dimensions of tapered treads, are also dealt with in the standards. Additional matters like installation and other safety matters are also covered in the Australian standards. This is probably best left to the experts.

## LAYING CORK AND VINYL FLOOR TILES.

Laying cork or vinyl tiles is one of the easiest ways of providing a durable and stylish floor covering.

Cork and vinyl make practical floors for hard -- wear areas such as kitchens and bathrooms. They can also be used in imaginatively in other rooms too: in living and dining rooms, for example, a neutral colour background of tiles is an excellent foil for colourful rugs. Laying tiles is relatively simple: they are light and easier to handle and sheet flooring, and there it is usually less wastage involved if you make a mistake in cutting to size. Tiles can also be used to create interesting floor designs by mixing colours or plain and patterned tiles.

## CORK OR VINYL?

The appearance of the floor covering is important, of course, but cork and vinyl each have their own qualities.

**CORK:** has an attractive natural look and is comfortable, warm and quite to walk on.

Colours range from warm honey gold to dark chocolate Brown. Most tiles are plain, but some are patent with geometric designs in contrasting cork, while others are marbled with patches of colour, such as green or read.

Tiles are available with different finishes: they can be pre-sealed with a clear acrylic or vinyl coating for increased durability; or pre--waxed; or left untreated [these are usually called pre-sanded].

Untreated cork must be sealed after laying with polyurethane varnish or special floor sealants to give a tough wipe-down finish. Pre-sealed tiles also benefit from one or two extra coatings of seal to prevent water seeping into joins between tiles.

**VINYL:** is harder wearing than cork but little less gentle on the feet. Some vinyl's, however are cushioned with a layer of foam to make them softer to walk on.

Tiles come in a wide range of colours and patterns and are available with a smooth surface or with an embossed and textured finish to look like natural brick or stone. Some brands have a self and he is of backing which makes the job of laying them a lot simpler.

Care and maintenance: vinyl and sealed cork tiles have an easy-clean Surface. Simply wipe with a well wrung cloth or mop. To remove grease or stubborn dirt, use a little washing up liquid; do not use harsh abrasive detergents.

Pre-waxed cork tiles should be polished occasionally.

**BUYING TILES:** most cork and vinyl tiles are 300 mm square and a usually sold in packs sufficient to cover about one square meter. To calculate how many tiles you need, we suggest you follow these instructions.

**CALCULATING QUANTITIES:** once you know the tile sizes, you can calculate how many tiles you need:

Measure the length of the area to be tiled and divide it by the size of the tile to give the number of tiles needed to fit in one row. Count part tiles as whole tiles. Measure the width of the area to be covered and divide these by the tile size. Count part tiles as whole tiles. Multiply the two figures together to get the total number of tiles needed. Buy a few extra tiles to allow for any mistakes in cutting. You can always use them to repair worn or damaged patches later.

**TILE PATTERNS:** if you are going to make a pattern with tiles of different, colour or design, make a scale drawing of the room on graph paper and mark in the pattern. Then count how many tiles of each colour or design you will need. When laying the tiles, keep your plain handy to make sure that you are following it correctly.

**Preparing the Surface.**

The sub floor must be structurally sound, smooth and level, and free of dust and grease.

**Scrub down old flooring.**

If existing tiles or wood blocks are flat and firmly fixed, they can often be left in place and tiled over. Scrub the floor with a solution of warm water and sugar so or household detergent to remove dirt, and rinse. Then rough up the Surface with medium grade steel wool to give a key for new tile adhesive.

**Level a wooden floor.**

Prepare the floor by punching in any protruding nails with a hammer and nail punch, and secure loose boards with nails all screws. Then sweep the floor and cover the whole Surface with

sheets of hard board. Lay the sheets rough side up, with three mm between each sheet to allow for expansion. To fill gaps around edges of the room, cut sheets to size, sawing with the rough side down. Don't worry about fitting them exactly to the contours of the wall. Fix securely with hard board pins nailed all over at 15 cm intervals.

**Level a solid floor.**

Fill any holes and small cracks with screed mortar; sweep down the floor and wash down with detergent solution. Then use a self-levelling screed compound to level the floor. Starting at the furthest point from the door, pour some compound onto the floor. Use a steel float, held at a slight angle, to spread the compound evenly to a thickness of about 3mm. Cover the whole floor [making sure that you finish up at the door] and leave to smooth itself out. To not fix new tiles until the compound has hardened completely -- this can take up to 12 hours.

**Laying the tiles.**

A tiled floor looks best if you start tiling from the middle of the room so that any cut Tiles are around the edges of the room. It is worth making the trial layout of tiles first check how they fit. You can then adjust the starting point a little, if necessary, so that you have at least a third or half a tile's width left at the edges -- this makes accurate cutting and shaping to fit, much easier.

**Find the centre point.**

Mark the midpoint of two opposite walls, then stretch a length of string between the two points and pin it to the skirting board. Repeat for the other two facing walls. The centre point is where the strings across.

**Check the fit.**

Starting from the centre point, lay a row of loose tiles [without adhesive] out towards each wall. Butt the tiles are closely and keep them hard against the string lines. If the space between the end of a row of tiles and the wall is very narrow, adjust the string little and shift the tiles so that the gap is at least a third of the tile wide.

**Mark the floor.**

When you are satisfied with the layout, remove the tiles. Then rub each length of string with chalk and snap against the floor to leave chalk guidelines to follow when laying the tiles. Remove the strings but leave the pins in place so that the chalk marks can be re-made if necessary.

**Spread the adhesive.**

Start in the corner of the room furthest from the door. Work away from the centre point out along the chalk lines, and apply only as much adhesive as is necessary for lying about 4 tiles and a time. Fixing methods and he is its very, so follow the manufacturer’s instructions carefully. With some tiles, for example, you have to spread adhesive on the underside of the tile as well as on the floor.

**Stick the first tile down.**

The position of the first tile is all-important. Place it at the centre point, lining it carefully inside the angle of the chalk guidelines. Then press it down firmly on top of the adhesive with the palm of your hand.

**Tile the first quarter.**

Stick the tiles down, working in a fan shape outward from the centre point. Butt the tiles against each other, lowering them carefully into place rather than sliding them on the floor. Use a damp cloth to remove any adhesive squeezed up between tiles before it sets. Finish laying whole tiles, then moved on to the next quarter. Leave cut border tiles until last.

**Tile the other quarters.**

Tile the other 3/4 of the room in the same way as the first, leaving the openings until last so that you do not disturb tiles already laid. Before you lay tiles in the door area, check that the additional thickness of the tiling fits in the gap under the door, you may have to remove the door and plain down its bottom edge so that it clears the newly laid tiles.

**Mark out border tiles.**

When you have laid all the whole tiles, start filling in the gaps around the edges of the room. Place the tile to be cut squarely on top of the last whole tile laid before the skirting board. Place another whole tile on top but with its edge pressed firmly against the skirting. Drawer a cutting line across the middle tile with a sharp pencil, using the top one as a profile -- the exposed part of the middle tile should fit the gap exactly.

**Cut border tiles.**

Place the marked tile on a cutting board. Place a metal rule against the pencil line, and cut tile carefully with a sharp knife (this applies only to cork or vinyl tiles). If you are working with ceramic tiles then the tiles must be cut with a special cutting tool, which you can usually hire from the tile supplier. When cutting vinyl or cork tiles make sure you change the blade of your trimming knife whenever it starts to feel blunt, so that you'll always get a clean cut right through the tile. Once the tile is cut try it out for size and trim if necessary. Then spread the adhesive onto the surface and press the cut tile into position.

**Seal untreated cork tiles.**

After cork tiles have been laid leave adhesive to set for at least 24 hours. Gently run down any and uneven joins between the tiles with fine grade glass paper, and wipe up dust with a soft cloth dipped in white spirit. The cork flooring must then be sealed with special polyurethane varnish. Allow plenty of drying time between coats, at least two or three coats of varnish are recommended. Rob the Surface with very fine steel wool between coats. Leave the varnish to harden for two or three days before replacing furniture.

**Fit threshold strips.**

Protect the sharp edges of tiles in doorways by fitting a mental or timber threshold strip across the opening.

**Cutting corner tiles and awkward shapes.**

When cutting corner tiles, the same technique is used as for cutting borders, but position tile that is to be cut on both sides on the angle and Mark the tile with two cutting lines. Joined up the pencil lines and cut away the waste, to leave an L-Shape filler piece. For awkward shapes, you can use a profile gauge, or a paper template. This is used to Mark tiles to fit around objects such as pipes, mouldings or door architraves. A profile gauge is useful when dealing with very intricate shapes -- push the metal teeth on the profile gauge firmly against the object and transfer the impression on to the tile.

**Back**

# General Repairs Around the House

I was pondering the other day that I have almost covered everything that I can possibly think of and its suddenly occurred, that perhaps we should look at **practical house repairs**. Things that we all need to do at some stage, things that we have neglected over time.

Maybe we need to put up some shelving, or quieten a squeaking door, perhaps renovate some old furniture, repair perhaps a chair, replace architrave's or other woodwork, renovating cupboard doors, generally looking after the outside, exterior decorating, a more detailed look at laying wooden strip flooring, try your hand at vinyl sheet flooring, renovating brass copper or bronze, renovating iron, steel, wood and renovate furniture, all these can take on an extra warmth when properly stained and polished, stripping and re-finishing wood.

I guess before we can do any of following one of the most basic tasks and probably not the easiest either would be how to " fix to wood and masonry"

If you want shelving and the like to stay up, make sure you use the right fixings for the job.

Fixing one item to another, i.e. putting up curtain tracks, shelving, hanging pictures, all require special anchors. Selecting the right anchors is the secret. In this section, we will try to cover securing things with screws, as screws are a stronger fixing than nails and of course a neater finish as well. Another advantage of using screws is that fixings can be disassembled far more easily.

Possibly the simplest screwed fixing is made into wood, all one has to do is to make a small pilot hole to guide the screw, as it cuts a thread into the timber.

Screws fixed into masonry walls require a pre-drilled hole, filled with a plug which gives the screw something to turn in to for a good grip. If the wall is hollow, then the fixing is made through the wall with a special hollow wall-fixing plug.

**Identify the Wall**

Tap along the wall with the handle of a screwdriver, or use your knuckles. If it is a hollow wall then there will be a change in sound between plaster cladding and the solid timber uprights, or you could use a "stud locator" which can be purchased at most hardware stores. This device requires a battery, it throws out a sonar beam and either beeps, or a light indicates the position off a stud.

**Hollow Walls**

Hollow walls are either made of a timber framework consisting of upright studs lined with plasterboard, or in older homes plaster over horizontal wood slats, better known as "lath and plaster".

**Solid walls.**

Solid walls are built of brick, block or concrete skimmed with plaster. If the dust from a drilled hole is red or yellow, then the wall is brick; if it is grey, then the wall is a concrete block construction. If it is very difficult to drill holes at all, it is probably concrete.

**Tools and equipment.**

**Screws.** Screws come in a range of sizes, materials and finishes. There are also several types of screws for specific purposes. The size of a screw is specified by its length in inches or mm and by diameter of the shank [the section between the head of the screw and the thread] which has a gauge number. The higher the gauge No., the thicker the screw. As a rough guide, 3/4 in. No. 8 gauge screws will generally suffice for light loads, and 11/2 inch No. 12 should be considered for heavy loads. Unfortunately, most sizes are still marked in the imperial system. Most screws are made of steel. Remember that Brass screws are decorative and are not as strong.

**Screw types.** There are too basic types of screws: round head and counter sunk [with a flat head]. Both are available with cross head (Philips) or single slot [normal type] drives. Cross head screws require a special screwdriver but are easiest to drive in and remove.

**Countersunk.** To be used where the head of the screw must be flush with the Surface, such as hinges.

**Raised countersunk**. To be used where a neat appearance is required, used for fixing decorative hardware such as door handle plates.

**Domed head.** This is another type of screw where decorative appearance is essential, a cap fits into the countersunk screwed head, mainly used for mirror and bath panels.

**Round head.** A round head screwed, as the name suggests, has a head that protrudes in a round semi-circle shape from the surface, mainly used for fixing materials such as thin metal, that cannot be countersunk.

**A drill.** A drill is essential for making holes in wood or masonry. A hand drill can be slow but easier to control than a power drill. A two-speed electric drill is worth buying if you expect to do a lot of do-it-yourself, some drills have a hammer action that can be switched in, to make drilling hard materials, such as concrete easier. The drilling tool is called a "bit". There are different types of bits to suit the material to be drilled. When drilling into walls, always match the Bit size to Plug size.

**Drill bits.** Masonry bits have a hardened tip for drilling brick, block, and tiles. Use an impact type bit (generally referred to as a masonry Bit) with a hammer action drill for drilling concrete. Twist bits, are used for drilling wood and will also cope with plaster board. All come in a range of sizes. Countersunk bits are used to taper a hole so that the head of the countersunk screw will fit flush with the surface.

Using a drill is a skill essential to most fixing jobs. Here are some tips; when drilling wood, rest the wood you are about to drill on a scrap piece of timber to prevent damage when the bit breaks through the drilled timber. When drilling a wall, use a nail to mark the starting point, or turn the drill bit by hand to make a small indentation, this will reduce side slip of the drill bit. When working with an electric drill, always use a firm, steady pressure, don't use excessive force

to make it work faster, otherwise the drill bit will over heat. In general, you will require a high-speed drill for drilling wood and a low speed for masonry. Measure the length of the screw against the bit to establish the depth of the hole needed. Some electric drills have a depth guide. If not, mark the length on the bit by winding a piece of adhesive tape around the bit. Don't let the tape ride up the bit when drilling. Always keep the drill at right angles to the surface that is being drilled. Where possible, get a second person to hold a square against the wall with its blade pointing outwards alongside the drill, as a guide.

**Wall plugs** are essential when fixing to solid walls, they expand when a screw is driven in, to provide grip. Moulded plastic plugs are most convenient to use, some have a small lip that sits flush with the walls Surface, others don't, and they are available for a range of screw sizes.

Plugging compound is used for repairing badly drilled holes in solid walls, this happens quite often and comes in handy. Hollow wall fixings are special devices or screws used in plaster board of hollow walls, sometimes they are better known as Butterfly bolts. They essentially open behind the wall panelling to spread the load and prevent the fixing from pulling out. When using a screwdriver make sure that the screwdriver used is of the right size for the screw, too wide or too narrow a blade will damage the head of the screw.

**Fixing to solid walls.**

Use an electric drill with a masonry bit to make the hole for the wall plug. In very hard surfaces, such as concrete, use a hammer action drill with an impact type masonry bit. Mark your drill position on the wall with a nail, drill at slows speed, withdrawing the bit every so often to allow it to cool. Clear away any loose dust then push the wall plug into the hole, tapping it gently with a hammer so that its rim is flush with the surface of the wall. If the plug is too long, cut of the tapered bottom rather than the top, if the plug is still sticking out of the wall a little, trim it off with a sharp knife. Position the item that you are fixing to the wall, insert the screw and drive the screw into the wall plug, using a screwdriver.

Fixing above Windows, or to the underside of window reveals, can at times pose a problem, especially if there is a load bearing beam [lintel] of hard concrete over the opening. Instead of struggling to make a hole to coincide with fixing positions, say for curtain tracks, it is often simpler to attach a wooden batten to the opening. This allows greater flexibility when positioning the fixings to the wall, and may cut down the number of holes to be drilled and plugged in the concrete. Screw the track directly to wooden batten and disguise the batten with paint wallpaper to match the wall.

**Fixing to hollow walls.**

Hollow wall fixing plugs should be used to attach light weight objects to plaster board walls. Firstly, Mark the drill position, drill the hole right through the board just large enough to take a fixing device of the appropriate size. Insert the plug through the hole, making sure that it does not drop through into the stud wall cavity. Position the item you are fixing and drive in a fixing screw. For heavy fixing, screw into the supporting timber studs. If the studs are not in the right place, special fixing devices are available from your hardware shop. To locate the studs behind the plaster board try tapping along the wall and mark the fixing positions with a pencil, alternatively a stud finder can be used.

Drill a pilot hole through the plaster board and secure directly into the timber. Make sure the screw is long enough to penetrate through the plaster board [10-13 mm thick] and pass into the wooden stud behind.

**Fixing to ceilings.**

Always fix fittings to the timber joists supporting the ceiling. Firstly, decide where you want the fitting to hang, then try to locate the nearest ceiling joist by tapping the ceiling. There will be a dull sound at each joist. Mark the position with a pencil, once it has been located. If you can't locate the joist use a stud finder. Once you have worked out the width of the joist, position the hole in the centre of the joist, then drill your pilot hole through the plaster skin of the ceiling into the joist behind again attach your fitting with screws driven directly into the timber.

**Fixing to timber.**

Make a pilot hole at the position at which you wish to drill the hole. To avoid splitting the wood with the screw, make a pilot hole in the Surface you are fixing. The whole should be slightly shallower in length and slightly smaller in diameter, so that the screw will bite into the wood. If you are using countersunk screws, you may have to taper the top of the hole in the object you are fixing with a drill and countersunk bit. This will ensure that the head of the screw can be driven in flush with a Surface, particularly if the object your fixing is metal or hardwood. If it is made of softwood tightening the screw may be enough to pull the head flush into the timber. To make a screw go in easier, lubricate the screw lightly with wax or grease before tightening. Take care not to over tighten the screw. With brass screws, which are weak, use a steel screw of the same size first to open the pilot hole, then replace with the brass screw.

**SHELVING:**

Most homes need shelves of some sort - perhaps a single shelf for the telephone, or banks of shelves for a collection of books or records.

We cover three basic methods of supporting wall-mounted shelves - adjustable bracket systems, fixed brackets and wooden battens.

**ADJUSTABLE SHELVING:** The advantage of an adjustable system over fixed shelves is that once the uprights have been fixed to the wall, the shelves can be moved and added to when necessary. However, fixed shelves often look neater for display purposes. Adjustable shelving systems consist of uprights that are fixed vertically to the wall, plus brackets that dip or slot into the uprights to support the shelves. Most systems are made of aluminium with a coloured finish, but wooden ones are also available. The length of upright dictates the height of shelving, and brackets are matched to the width of the shelves. Use brackets with a lip at one end for glass shelving.

**FIXED:** shelves rest on supports screwed directly to the wall. One of the simplest supports is the L-shaped bracket, while wooden battens are Ideal for shelves in alcoves.

Brackets come in a wide range of styles and materials - from traditional scrolled Iron or wooden ones to modern designs of aluminium or bright coloured enamelled steel. Most brackets

come in sizes to take standard shelf widths with a supporting arm that is slightly shorter than the shelf depth. Some brackets are the width of the shelf with a lip to hold it.

**How much support?** The number of uprights or brackets you need, and the spacing between them, depends on the strength of the shelf material and the weight to be supported.

**SHELVING MATERIALS**

Shelves can be bought in standard sizes, or you can have them cut to length most timber merchants and large DIY stores offer this service.

The type of material you choose, depends on the weight the shelf will carry. All except plastic-faced shelves and glass should be treated with a protective finish so that they're easy to clean. Cut edges of manufactured boards need covering to give a neat finish.

**Solid wood** is strong and Ideal for heavy loads, although likely to be expensive.

**Chipboard** is the least expensive, but it is relatively weak and needs more support than other shelving.

**Wood-veneered and plastic-faced chipboard** is available ready-finished in a range of shelf-sized widths (from 150mm upwards) and lengths. Ordinary chipboard can be painted; cut edges need to be covered.

**Plywood** is sold mainly in large sheets, but you can have it cut to size or buy the next best size to suit. Plywood is also, available plain or with wood veneer or plastic facing; cut or exposed edges need to be covered.

**Glass** is popular in bathrooms and makes elegant display shelving. Order float glass at least 6mm thick and have the edges ground so that they can't cut; you'll need special brackets with a lip at one end to hold the glass in place.

Adjustable shelving easily adapts to meet changing storage needs. Also note that uprights are fitted with matching strips that conceal unused bracket slots.

**HOW TO FIX THE SHELVING.**

Screws are required for fixing the shelf supports, plus wall plugs (for solid walls) or cavity fixings (for lightweight shelves on plasterboard walls). Depending on the size of the shelf and the load it will take, you will need 50mm, 62mm or 75mm-long fixing screws: No 6 screws are suitable for light weights; No 10 for heavy weights. Fixing hardware is usually supplied with shelving kits.

If you need screws for fixing shelves to brackets, make sure their length is less than the board thickness, so they won't burst through the top of the shelf.

**FIXING ADJUSTABLE SHELVING**

Uprights come in a range of sizes, but they sometimes need shortening; if so, cut to size with a small hacksaw.

**1 Measure and mark the wall.**

To get the height of the shelves, hold one of the end uprights against the wall. Mark its top edge with a pencil, and use a spirit level and straight edge to lightly draw a horizontal line on the wall at this point

Then measure off and mark the positions of adjacent uprights along the pencil line - for maximum distances between supports, (**see Table next week**).

**2 Drill the top fixing hole:** Align the top edge of each upright with the horizontal! guide-line on the wall, and use a pencil to mark the position of the top screw fixing hole. Drill the holes, and plug with a wall-plug or cavity fixing if necessary. Then fix each upright to the wall - but without tightening the fixing screw so that the upright is free to swing to a vertical.

**3 Drill remaining fixing holes:** With the upright hanging loosely against the wall, hold a spirit level against it, to check that it is vertical and adjust if necessary. Mark the positions of all the remaining fixing holes through the upright on to the wall. Holding the upright to one side, drill holes at each pencil mark. Then fit the plugs and screw the upright tightly into place (not forgetting to tighten the topmost screw). If the wall is uneven, fill any gaps behind the uprights with small pieces of cardboard before tightening the screws.

Repeat the above procedure for each upright.

**4 Insert shelf brackets.**

Clip or slot the bracket into the uprights. With some clip-in systems you need to tap the bracket firmly into its slot with a mallet or a hammer, protect the bracket with a scrap of softwood.

If you use uprights with a continuous channel, hold the bracket at an angle so that its upper lug is engaged in the channel and the lower one is held clear. Then slide the bracket down to the required height and lower it to the horizontal! position to lock it in place.

**5 Position the shelves.**

Lay top shelf in position. Then hang a plumb line over one side edge and line up subsequent shelves with the string line.

**6 Fix the shelves.**

If there are screw holes, you can fix the shelves securely. Mark fixing hole positions through brackets on to the underside of shelves. Remove shelves and brackets, screw together and replace into uprights in one piece.

**MAXIMUM DISTANCES BETWEEN SUPPORTS**

Position end supports so that the shelf will extend on each side by about one-fifth of the total shelf length. For long shelves, the distance between supports should not exceed the distances given in the table below:

| SHELF MATERIAL | THICKNESS | MAXIMUM DISTANCE |
|---|---|---|

**Solid wood** 12mm 450mm

19mm 600mm

25mm 1000mm

**Chipboard** 12mm 400mm

18mm 450mm **Plywood** 12mm 450mm 18mm 600mm

**Glass** 6mm 450mm

**Note:** These distances between supports are suitable for medium to heavy loads (e.g. books or records). For lighter loads such as ornaments, etc, you can increase distances by up to a third.

**HINT: - TO FIT SHELVES FLUSH**

Cut small notches in the rear edge of each shelf with a tenon saw, and chisel out the waste so that it fits round the uprights. Then insert brackets and fix the shelves

**PUTTING UP FIXED SHELVING**

The easiest method is to screw the brackets to the shelf and then to the wall, but it helps to have a second person holding the shelf horizontal while you mark the fixing hole positions.

**1. Mark the wall**

Decide the height of the shelving by holding the shelf against the wall. Make a pencil mark at its top edge, and use a spirit level to draw a horizontal line on the wall at this point.

**2. Fix the brackets**

Determine spacing between brackets (see Table at top of page). Lay shelf upside down and draw a line at right angles to shelf edge for each bracket

Position one bracket, with the shorter arm centred over the marked line and the longer arm flush with the rear edge of the shelf. Mark screw positions on to the shelf through the holes in the bracket arm, drill pilot holes and drive in fixing screws. Repeat for other brackets.

**3. Drill the Fixing holes**

Hold the shelf, complete with brackets, with its rear edge aligned with the pencil line on the wall and place a spirit level on top of the shelf to check that it's truly horizontal. Mark drilling positions with a pencil through the fixing holes in the brackets; lift shelf aside, drill fixing holes, and plug if necessary.

**4. Fix the shelf to the wall**

Holding the shelf firmly in position, drive in one fixing screw per bracket and tighten it halfway. Drive in the remaining fixing screws and tighten the whole lot up.

If you’re putting up a bank of shelves, fix the top shelf in position first Then hang a plumb line over one short end and line up the shelves below with the string.

## FINISHING MANUFACTURED BOARDS

If your shelves are of manufactured board, neaten raw edges with plastic iron-on strip to match the existing veneer, or use a strip of plain or moulded timber lipping for a more attractive, durable finish.

### Timber Edging - Beading

This is available in various shapes and widths: Cover the cut edges of shelving with a strip of exactly the night width, or use a wider strip to conceal shelf fixings or display lighting fitted beneath shelf.

Glue the edge beading to the raw edge. Then reinforce with small panel pins, punching the heads below the surface with a hammer and fill with wood stopping of a suitable colour. Sand smooth before applying finish.

### iron-on edging strip

Cut a piece of edging strip a little longer than the shelf. Position it over the raw edge, protect the surface of the strip with a piece of paper and press it firmly into place with a warm iron - for a couple of seconds, no longer.

Allow it to cool. Then trim off the ends of the strip with a craft knife or Stanley trimmer, and smooth the edges with medium then fine-grade sand paper wrapped round a sanding block. Angle the block slightly as you work to bevel the edges of the newly applied strip.

## FITTING SHELVES IN ALCOVES

An alcove provides an ideal site for neat, built-in shelving. Supporting battens are fixed to all three walls to take a heavy load of books and records.

You can use brackets or adjustable shelving in alcoves, but it's cheaper and just as easy to support shelves with wood battens fixed to the walls of the alcove itself, If the side walls aren't perfectly straight you will have to trim and shape each shelf to fit,

### Mark the wall

Start by deciding the approximate position of each shelf, spacing them according to the height of the things you intend putt on them. Then draw pencil lines on the three walls of the alcove at each shelf position, using a spirit level to make sure the lines are horizontal

If shelves are to be recessed into the alcove, hang a plumb line down the wall at the point where the front edge of the shelves will come and mark the position of each with a pencil Check the width and depth measurements for each shelf then cut to fit.

### Cut the battens

Cut two battens so that they’re just shorter than the width of the shelf they’re supporting. In order so that the battens look less obtrusive when the shelf is fitted, bevel their front ends with a saw cut at about 45 degrees and sand smooth.

Pre-drill fixing holes in each batten, and countersink them if necessary for the screw heads. Two screw holes will be enough unless the shelf is very deep: drill them 50mm in from the ends; then, if necessary, at 300mm intervals.

**Fix the side battens**

Hold a batten against a side wall of the alcove with its top edge aligned with the pencil guide-line. Mark the positions of the screw holes on to the wall. Drill the wall, plug the holes, and screw batten into position. Repeat for the other side batten.

**A third batten (at the back)**

If the alcove is relatively wide and/or the shelf will be carrying a heavy load, add a third support batten along the back wall of the alcove. Cut it to fit flush with the rear edges of the side battens.

**Position the shelf**

Place shelf in position and check that it's resting properly on the battens. If the side walls of the alcove are not square, trim the side ends of the shelf with a small block plane to get a good fit - work from both edges in towards the centre to avoid splitting the wood.

Now fix the battens for the other shelves, following the previous steps.

**Back**

# Renovating Old Doors

Restoring old doors to their original condition keeps the style of a house and saves you money.

The doors in older homes reflect the style of the building as much as other fixtures and fittings, so it makes sense to try to retain them wherever possible.

However, over the years they may have suffered their fair share of wear and tear, and worse still, previous owners may have subjected them to terrible indignities such as adding extra door furniture or, worst of all, cladding them in hardboard or plywood to create the flush look so popular in newer homes. But all is not lost, and some simple repair and restoration work can often bring a thoroughly tatty-looking door back to something like its original condition.

**Panelled doors** The best thing about old doors is that they're made from solid wood - usually pine, but sometimes hardwood such as oak, jarrah or mahogany in grander houses. A typical panelled door has two main vertical members called stiles, linked together by horizontal rails - one at top and bottom, and one or two across the centre, depending on whether the door has four or six panels. These in turn are linked by central vertical members called muntin's, which divide the door up into panels. In houses built between the wars, the structure is basically the same, but the arrangement of panels may vary.

These spaces between the rails, stiles and muntin's may be filled in with fielded (raised and mitred) panels on the grandest of doors, or thinly-cut solid wood or glass on humbler types. Plywood may also be found, as a recent replacement for old panels that have split. The panel is either held in grooves in the surrounding stiles, rails and muntin's or retained in rebates by planted (pinned on) beading.

All the joints between these various members are usually of the mortice and-tenon type, so the whole construction is solid and rigid. One stile is hinged to the door frame, and is called the hinge stile; the other is referred to as the opening stile, and is fitted with a latch or lock and door handles on each face of the door.

**Ledged and braced doors** You may also come across ledged and braced doors, which were commonly used in Victorian times for back doors and outhouses, and also as internal doors in artisan homes. These consist of vertical tongued-and-grooved boards fixed to top, centre (also known as the lock rail) and bottom rails, with the boards facing outwards; these three rails were themselves linked by two diagonal braces to prevent the door from sagging. Hinges usually had long straps which were screwed to the inner face of the top and bottom rails; a surface-mounted rim lock was fitted to the lock rail.

**Flush doors** became popular only after about 1945, and any that are found in older houses are either replacements or the product of the flush-facing treatment mentioned earlier. The former can be given a panelled look by the addition of surface moulding, while the latter can be restored by the simple expedient removal of the facing board.

All modern flush doors have a frame - two stiles, two rails - which is covered on each face with hardboard or ply wood. The centre of the door is usually filled with lightweight honeycomb

packing, and there is a lock block fitted inside the frame on one or both edges of the door, about half-way up. Because of the hollow core, fixing things like coat hooks involves having to use special cavity fixing devices as plain screws simply pull out.

**Modern panelled doors**. These are fitted as replacements for the original, but with some attempt at retaining the house's style. These may be mass-produced types with a proper frame, but are more likely to be flush doors with moulded fibreboard panels.

## TOOLS AND EQUIPMENT

None of the tasks described here need any special tools. However, if you are thinking of giving a flush door a panelled look, it is a good idea to look at the various kits available in DIY stores, as well as the more traditional beading available by the metre.

## EXPOSING A PANELLED DOOR

### *Prise up a corner*

To remove a hardboard or plywood facing, try to insert a knife or scraper blade between the facing and the door itself near a corner. If the blade slides in easily once you've cut through the paint film, work it sideways until you meet the first panel pin, and try to lever the facing away. Usually the facing pulls away, leaving the pin in place.

If the knife won't go in or you can't prise up the corner of the facing, this suggests that the panel may have been glued on. Try playing heat from a hot air gun over the surface of the panel while trying to prise up a corner; this may soften the old glue enough for you to release the panel. If modern wood-working adhesive has been used, removing the panel is usually virtually impossible unless the door is immersed in water to soften the adhesive; it may be worth consulting a door stripping firm for advice.

If you can lift a corner, carry on in the same way along each edge until all are freed from the pins. Then pull off the panel - in sections if necessary; pins may have been driven into the door's centre rail and central dividers too.

### *Pull out the pins*

Use a pair of pincers to pull out all the old panel pins. Rest the pincer jaws on some cardboard to avoid denting and marking the surface of the door. If any of the pins break, use a nail punch and hammer to drive the shaft of the pin right into the door by about 2mm.

At this stage, you should decide on how you are going to re-finish the newly-exposed door surface. If you want a stripped wood door, strip the paint finish, or have the door dipped by a professional company. For a painted finish, sand down and clean the old paintwork to provide a key for the new finish.

### *Make good the door surface*

With all the pins removed (and the old finish stripped if required), make good all the pin holes and any other defects, such as cracked panels, loose beading, and scars from door handles and bolts which have been removed.

Use interior filler if you intend to repaint the door or wood stopper in a shade to match the wood colour if you plan to varnish it. You may need to experiment with wood stopper so that you tint it to a shade to match the varnished door rather than the stripped wood.

## APPLYING BEADING TO A FLUSH DOOR

### *Mark up the door face*

Plan your panel sizes on paper, then use paper templates to check the effect on your door. If you already have some panelled doors, use one of these as a model. Then use your straightedge, set square and pencil to mark the outline of each panel on the door face. This gives guide-lines for when you come to fit the beading.

### *Mitre the beading*

Start by mitring one end of your first length of beading. Then measure the width and height of each panel, and make a note of how many components you will need of each size. Mark the required length on the lengths of beading, measuring from the outer edge of the first mitre, and cut the second mitre in the reverse direction. Make a fresh mitre on the end of the stock length, and continue cutting further sections to the required lengths. Sand the cut ends lightly to remove any splinters or burrs, but take care not to round off the mitre.

### *Pin on the beading*

On your bench, drive a panel pin in near each end of the first length of beading. Then position it on to the door surface, aligning it with the pencil lines made earlier, and tap in the pins. Add intermediate pins as required.

Now position the remaining three lengths in turn to complete the first panel aligning the mitres carefully and checking that the corners are square.

Complete the other panels in the same way, checking that verticals and horizontals are aligned across the door face. Then punch in and fill all the pin heads and fill any cracks in the mitred joints, ready for painting or varnishing.

### *Paint or paper the panels*

You can simply paint or stain and varnish the beading to match the rest of the door surface, but very attractive effects can be achieved by painting the beading (and/or the panels themselves) in a contrasting colour. Alternatively, you could echo the room's colour scheme by sticking pieces of matching wallpaper within the panels using ordinary wallpaper paste.

### *Stick on imitation panels*

As an alternative, you can buy imitation panels to stick to the face of flush doors. Start by marking their positions, then apply y the adhesive and press the panels into place. If they show any signs of slipping, hold them temporarily with masking tape. When the adhesive has set, fill any gaps between door and panels.

## USING A MITRE BOX

Position the beading (or other item to be cut) in the mitre box, with the flat side on the floor of the box, and hold the most heavily moulded edge against one side of the box. Slip a flat piece of scrap wood under the beading, so that you can cut cleanly through the beading without damaging the base of the mitre box. Check which of the slots you are using to give you the correct angle on the mitre. Saw with the spine or blade of the saw parallel to the top of the box and the blade absolutely vertical, taking care not to saw into the box itself.

When measuring subsequent lengths, measure and mark the longer, outer edge of the beading to be mitred. Position the marked length so that the mark matches the appropriate slot.

## MAKING WARPED DOORS FIT

### Prise off the old door stops

It's very difficult to correct a warped door, and an easier cure for the problem is to prise off and re-position the door stops against which the door closes in its frame (this obviously cannot be done where the stop is formed as a rebate in the frame, i.e. metal frames).

Start by running a knife down the angle where the door stop meets the frame to cut through the paint film. Then try to locate the positions of the fixing nails, and drive them through into the door frame with a hammer and nail punch. Next, insert the chisel between door stop and frame at the bottom, and prise it carefully away, working up towards the head of the frame. Repeat this movement to remove the stop across the door head, if necessary.

### Mark the door position

Rub down the damaged paintwork where the door stop has been removed, using a scraper to remove any lumps and bumps if necessary. Now close the door and make a pencil line on the frame carefully following the angle/position of the warped door edge.

### Replace the door stop

Position the old door stop (or a new length of timber the same shape as the old one, if the old stop was split or damaged during removal) and nail it into place against the marked pencil line. Use tacks to fix it just at the top and bottom to start with, and close the door to check the fit. When you are satisfied with the angle of the door stop, drive in the remaining nails, punch in the nail heads slightly and make good.

## CLOSING SPLIT PANELS

### Drill into the door edge

Central heating and old age often lead to splits appearing in solid wood panels, and it's usually impossible to replace them without dismantling the door. It's easier to close them up by driving dowels sideways into the stile next to the panel so that as you knock the dowel in it pushes the sections of the panel together.

Select a twist drill to match the dowel diameter, and drill two holes into the door edge, deep enough to reach to the edge of the split panel (usually about 5mm less than the width of the door

stile). It's a good idea to use a depth stop as a guide, and to finish off by drilling slowly so you don't damage the panel itself.

**Drive in the dowels**

First of all, use a knife to open up the split in the panel so you can spread some wood-working adhesive along the line of the split. Then cut the dowels a little longer. than the width of the stile, apply glue to the end and tap each one into the hole with a mallet. When the dowel reaches the edge of the panel, it should close up the split. Using a damp cloth, wipe off any excess adhesive that oozes out.

**Trim off the excess**

Leave the glue to set. Then saw off the excess dowel as close to the door edge as you can, and plane and sand it flush for an almost invisible repair.

**HINT: -** For a door into a kitchen or in a corridor, you can replace the wooden panels with glass. Remove the beading from round the panels, then, using a jigsaw, cut out the panels close to the stiles, rails and centre mullions.

Buy sheets of toughened glass, exactly the same size as the opening. Fix them in place with solid hardwood beading, either quadrant or square. Screw the beading in place round one side of the opening, then fit the glass into the opening, holding it in place with putty. Screw more beading in place round the other side of the glass to hold it firmly.

## PROBLEMS WITH DOORS

An ill-fitting creaky door, or one that opens the wrong way, are problems that can easily be solved.

Doors receive a lot of hard wear and over the years usually start to stick, squeak and rattle. These are all problems that can easily be put right.

Sometimes a door is inconveniently hung - on the wrong side of the frame, for example, so that it blocks the light when open or makes access to the room difficult. A simple remedy is to re-hang the door so that it opens the opposite way, but remember that you will have to fill and repaint holes and recesses left by the original door hinges and handle. Doors are fairly heavy, so you will probably need someone to help you with the job of re-hanging.

## TOOLS AND EQUIPMENT

New door **hinges** may be necessary if the old ones are in poor condition.

Ordinary butt hinges are usually used for internal doors, but rising butt hinges are useful if, for example, the door has to clear fitted carpet. They're available for left or right-hand opening doors.

**Screwdrivers**: For paint-jammed screws, use one with a large ball handle which gives a good grip. Or use a ratchet screwdriver - this is more expensive than an ordinary one but is easier to use as it can be adjusted to make half turns and you don't have to change your grip.

**A marking gauge:** a wooden rod with a moveable block that can be set at any point on it, and a pin to mark a cutting line - is useful for marking out recesses before cutting.

**Bevel-edged chisels**: for cutting recesses; the most useful sizes range from 6mm to 25mm. A mallet is normally used for tapping the end of the chisel, or you can use a hammer.

*A smart appearance*

Age and constant opening and closing take their toll on most doors. So, while a fresh coat of paint - or stripping and polishing - will work wonders on a shabby surface, make sure that any repairs are tackled first.

## RE- HANGING A DOOR

Reverse a door by swapping the hinges and handle to the opposite side. Don't try to alter Its position in the frame - if the door or the frame is at all out of square, or if the door has been adjusted in the past, it will not fit.

A door that fits well in its frame should have a 2 to 3mm clearance at top and sides and a sufficient gap at the bottom for it to clear the floor.

### 1. Support the door

Open the door so that the hinges are fully exposed and drive a couple of small wood wedges underneath to take the weight of it.

### 2. Undo hinge screws on frame

Scrape away any old paint from around the screw heads and loosen the screws that hold the hinges to the door frame. Remove all but one screw from each hinge, then take off the bottom hinge first, otherwise the door could fall on top of you. Remove the top hinge, and kick the wedges to one side to release the door.

If hinges are stuck; **If a screw is difficult to turn, place the top of an old screwdriver in the slot and give it a sharp blow with a hammer to jar the screw - repeat until you can turn the screw easily. If a hinge is paint-bound, prise it free with an old chisel.**

### 3. Remove the hinges

Prop the door up against the wall. Remove the handle and any other door furniture, and store these in a safe place until you need them again.

Then stand the door on its side and take off the hinges. If the hinges are in good condition, soak them in paint stripper and re-use. Fill the old hinge recesses and screw holes on the frame and door with wood filler.

### 4. Mark position of new hinges

Prop door in frame, and tap the wedges in underneath until they hold the door in the correct position. Using a pencil, mark the top and bottom edges of the new hinge positions on to both door and frame. opposite where the old hinges were.

**5. Outline hinges on door**

Lay the door on its side. Place an open hinge on the edge of the door – on the inside the pencil marks, and with the knuckle projecting over the edge - then outline the flap with a pencil or knife.

Set a marking gauge to the ' thickness of the hinge flap and mark the depth of the hinge recess on to the door face.

**6. Cut recesses in door.**

Use a chisel and mallet to cut hinge recesses on the door. Score round the pencil outline with the tip of the chisel, make a series of shallow cuts across the grain, then pare out the waste down to the previously marked depth.

Position hinges and check that they lie flush with the timber. Mark screw holes through flaps, drill pilot holes and fix the hinges securely in place.

**7. Cut recesses in frame**

Wedge the door in to the frame, this time in the open position. Line up the free hinge flaps with the marks on the frame. making sure that the knuckles are parallel to it. Again, outline the flaps with a pencil or knife, remove the door and cut new recesses as in Step 6.

**8. Hang the door**

Wedge the door back in position, fit the top hinge into the recess in the frame and fix with one central screw. Repeat with the bottom hinge. Remove wedges and check that the door opens and closes properly.

If it catches the frame, you've probably cut the hinge recesses too deep or too shallow - either make the recesses deeper or fill them with pieces of thin card. When the door fits perfectly, fix the remaining screws.

***RISING BUTT HINGES***

These allow a door to lift as it opens, and allows the door to be removed without taking the door off the hinges. The hinge is in two parts: one flap with a pin goes on the frame; another with a knuckle goes on the door and slides over the pin.

It's fixed in much the same way as an ordinary butt hinge (above), but first plane a shallow angle on the top edge of the door, hinge side, so that it can easily clear the door frame as it rises.

**FITTING A DOOR HANDLE**

If you are re-hanging a door - or even redecorating a room in a new style - this is a good opportunity to replace door fittings that are past their best with a new set. Use traditional china or brass knobs for panelled doors, or brightly coloured plastic or metal lever handles for a super-modern style.

Whatever the style of handle, the fitting procedure is much the same, but follow manufacturer's Instructions as to size and positioning of fixing holes.

**1. Mark latch and spindle**

Decide how high you want to position the handle and mark this height on to the two faces of the door.

Mark the position of the hole for latch on to centre of door edge. Then hold the latch against one side of the door, allowing for recess of latch face plate on door edge, then mark the position of hole for spindle. Repeat on the other side of the door.

**2. Drill holes**

Using a brace or drill and bit, bore a large hole into the edge of the door to take the latch.

Then bore a smaller hole for the spindle, drilling from both sides of the door to stop the bit from breaking through the wood and perhaps damaging the face of the door.

**3. Mark face plate**

Insert the latch into the hole in the door edge and pencil around the face plate. Remove the latch and, using a chisel and mallet, cut out a shallow recess so that the face plate is flush with the door edge. Mark the screw hole positions and drill pilot holes; fit latch and screw plate into position.

**4. Fit the handle**

Push the spindle into the hole in the face of the door and through the latch.

Fit the handles on to the spindle on both sides of the door, making sure that the vertical edge of the handle plate is parallel to the edge of the door. Mark positions of screw holes with a pencil, drill pilot holes and screw them in place.

**5. Mark striking plate**

Close door against edge of frame, and use a pencil to mark the position for the striking plate on to the frame.

Measure the distance the latch face is set back from the door face; transfer this measurement to the frame so that the striking plate and latch line up. With plate in position, mark round it with a pencil or knife.

**7. Fit striking plate**

Chisel out a deep hole to take the latch, and make a shallower recess for the plate so that it is flush with the frame.

Mark screw hole positions on to the frame through the plate. Drill pilot holes, screw the plate in place, and check that the door closes properly

## CURING DOOR FAULTS

Doors get plenty of hard wear, and over the years a door and its frame may develop Irritating defects. Below are some common problems that can be easily solved.

### The door squeaks

A door that squeaks when opened and closed needs its hinges oiled Use general-purpose oil - apply sparingly, and mop up surplus with an old rag,

Oil also works wonders for bolts and stiff handles, but do not oil locks - apply in graphite powder instead or silicone spray.

### The hinges are loose

Hinges often work loose over time as a result of general wear and tear. Re secure by tightening up loose screws and replacing worn-out ones.

Use slightly longer or thicker screws to replace any that will not tighten. If the screw holes are badly enlarged, hammer small pieces of wooden dowel into the holes, or fill the holes with plugging compound before replacing the screws.

### The door sticks

Sometimes a door sticks on the frame or on the floor because of a build-up of paint, or because the wood has swollen due to temperature changes.

Find out where it is sticking by placing pieces of carbon paper between the door and the frame to mark the spot. Then use a plane to remove just enough paint or wood off the door edge to allow it to close easily, working from the corners into the centre of the door to avoid splitting the wood. You may have to remove the door first.

### The door catches on the floor

If the door catches on an uneven floor when opened, first locate the problem places. Put a piece of coarse sand paper over them and pull the door back and forth over the sand paper a few times to remove a little wood at the bottom of the door. If possible, level out any high spots on the floor too: nail down loose floorboards and smooth the surface and re-secure any lifted tiles.

If the door makes a mark in a wide arc as it opens over the floor-covering, fit rising butt hinges (see last week) or plane the bottom edge of the door as above.

### The door won't close

If a door sticks on the hinge side of the frame before it is fully closed, it usually means the hinges have been set too deep on the door or frame.

Support the door on wedges. Unscrew one hinge at a time and insert a piece of thin card or cardboard into the recess behind the hinge. Then re-secure the screws, making sure that they fit flush with the hinge flaps. If the door still sticks, put another piece of cardboard in each recess.

**The door rattles**

If a door rattles, the wood may have shrunk so that the door no longer sits tightly against the door stop inside the frame.

The simplest remedy is to move the striking plate on the frame slightly in towards the door stop.

**How to: -**

**1. Mark the frame**

Mark where door meets frame when closed. Hold latch in (pull handle down), push door against door stop and mark the frame again.

**2. Measure up**

Measure between the two pencil points, and mark this distance behind the striking plate by drawing a vertical line parallel with its back edge.

**3. Remove the striking plate**

Unscrew the striker plate. Move it up to the pencil line and mark around it with a pencil or knife. Using a chisel and mallet, cut out a shallow recess to take the plate, and make a deeper hole to take the latch.

**4. Replace the striking plate**

Screw the striking plate in position and check that the door closes properly. For a neat finish, fill the gap left at the front of the plate with wood filler and paint over

**Back**

# Renovating Cupboard and Vanity Doors

**RENOVATING CUPBOARD DOORS** (Vanities, Kitchen etc.)

Cupboards have been popular pieces of furniture for centuries as an essential way of providing storage for the hundreds of possessions in the average home. They come in all sorts of styles, shapes and sizes, but the basic design, is a box with one or more doors on the front. The basic design remains the same whether the piece is ancient or modern, wall-hung or freestanding. The materials from which they are made may be natural timber or a man-made board, and the door style may be elaborate – i.e. miniature versions of traditional room doors, with a frame and inset panels - or plain or perhaps just a sheet of veneered or plastic-faced board.

Because cupboards are worked so hard by constant use, they tend to show their age as the years go by, and the part that suffers the most is the door itself. It's opened and closed regularly (and sometimes none too gently), so the handles, hinges and catches wear and become loose or

damaged. Worse still, the actual appearance of the door goes into a steady decline, with knocks, scratches and stains marring the finish.

If your cupboards are going downhill fast, you have three choices: you can buy new cupboards; you can fit replacement doors but keep the existing carcases; or you can refurbish the doors, adjusting or replacing worn hardware so they work properly again and perhaps re-facing the door or adding some decorative trims to cheer it up. The last course of action is by far the most economical and least drastic.

**IMPROVING THE ACTION**

Whatever type of cupboard doors you have, fixing any faults in the hardware hinges, handles and catches - should be your first step. There is nothing more annoying than a door that won't open or close easily, or is sagging on its hinges, or has a handle that keeps coming away in your hand. Hinges can be adjusted so the door closes smoothly and squarely, or can be replaced if they're worn or damaged. Similarly, catches that don't engage can be re-positioned, and old inefficient ones can be replaced with modern easy-action types featuring ball, roller, or magnetic action. Lastly, new handles can be fitted - one of the best ways of brightening up a tired old door.

**IMPROVING THE LOOKS**

The way you go about giving your doors a face-lift depends on what type they are. Doors with a solid timber frame and inset timber or glass panels will probably benefit from being thoroughly cleaned; it may be better to strip them right back to bare wood and give them a new finish. At the same time, you can attend to any dents, splits, or stains. Plain doors, with veneer or a plastic surface over chipboard, can also be cleaned down and repainted, or given a brand-new surface with stick-on facing panels in hard wearing plastic laminate. You can also add decorative edge trims, or even surface beading, to give the doors a brand-new look. Flush cupboard doors (and drawers) look particularly smart with a beading trim.

**HINT: -** Matching beading can also be used to decorate plain sections of wall as well to blend in with the beading on the cupboard face. Another effect is to drag paint towards the centre of the panels.

## MAKING DOORS FIT

If your cupboard doors don't close properly, the cause may be a simple build-up of paint or varnish on the door or frame, warping of the door itself, or a problem with the hinges or catch.

### Ease edges of door

Remove built-up layers of paint or varnish from edges that stick, either by sanding them or by stripping them completely back to bare wood, ready for refinishing. With doors that close within a frame, try to aim for about 2mm clearance all round.

### Straighten warped doors

Correct a warped frame-and-panel door by removing it and cramping it flat. Use G-cramps to cramp it to a portable or solid workbench, or cramp it to lengths of timber the width of the door if it is too large for a work bench. Insert thin packing pieces as you cramp the door up to help counteract the warp.

There is not much you can do to correct warping in flush doors with man-made cores: it's easier to make and fit a new door. Cramping may help to straighten plywood doors. Remember that doors faced with plastic laminate must have a balancing veneer of the same thickness on the inner face; if this is not fitted, the door will warp again. You can use cheap plain laminate unless you want both sides to match.

### Check the hinges

Check that the screws holding the hinges and catch are secure, tightening any that have worked loose. If the threads will no longer bite, use a slightly longer or fatter screw, but check first that it isn't so long that it will go right through the wood, or so fat that it won't pass through the fixing hole in the hinge or catch itself. Where physical damage has wrenched the screws out completely, either drill out the damaged holes and glue in a matching length of dowel to provide a firm fixing again, or else re-position the hinges so you can use new screw holes. If the hinges are modern concealed types, it may be possible to adjust them to improve the fit of the door.

## REPLACING CATCHES

Fitting a new catch is often the quickest way of curing a door that either refuses to open when you want it to, or won't stay closed. The commonest types for cupboards use magnets, rollers, or ball bearings. Both surface-mounted and inset or flush-fitting types are available. Decide where to fit the catch. Start by removing the old catch. Make good any holes, then decide on the best fixing position for the new catch; generally, you can fit it to the side, base, or top of the cupboard, with the striking plate or keeper attached to the door itself. Some roller catches have to be fitted to the door, with the striking plate on the cupboard.

### Fit catch and plate

Mount the catch body on the cabinet or door, as recommended in the fitting instructions. With surface mounted types, check that you fit it the night distance from the cabinet or door edge; with magnetic types, the magnet must be able to make physical contact with the striking plate; ball and roller types must be set back slightly to allow the striking plate to engage properly. With flush-fitting types, the catch body and striking plate can be fitted either way round, although ball types can only be used on doors closing within a frame. Both involve drilling a blind hole to accept the catch body; the keeper or striking plate is surface mounted with small screws or pins.

## ADJUSTING HINGES

Many modern cupboards, especially fitted kitchen and bedroom units, have concealed hinges that allow precise adjustment of the door action. The hinge itself is actually in two parts, with a base-plate attached to the sides of the cupboard and the hinge body recessed into a round hole milled in the inner face of the door.

**Adjusting to left and right:** To move the door slightly to the left or right, adjust the screw on the base-plate nearest to the front edge of the cupboard. This moves the hinge arm in a horizontal plane, towards or away from the cupboard side, and so moves the door sideways. You may need to adjust the other hinge(s) too.

**Adjusting distance from carcase:** To move the door closer to or further away from the carcase, loosen the screw holding the hinge arm to the base-plate. Then slide the hinge arm into or out of the cupboard as required, and tighten up the fixing screw again.

**Adjusting up and down:** Some hinges allow the door position to be adjusted up and down as well, and this is carried out by adjusting the screw beside one of the base-plate fixing screws. Slacken these off slightly first, then make the height adjustment and tighten the fixing screws up again.

## RESURFACING DOORS

You can give flush cupboard doors a new lease of life by giving them a fresh outer face. You can do this yourself using paint or wallpaper, but for modern kitchen cupboard doors one of the easiest methods is to use special peel-and-stick plastic laminate which is available in standard door widths and a range of colours.

### Start at the top

The panel should be a centimetre or so larger all round than the door. It is easier to handle if it is trimmed to this size. Clean the door surface thoroughly. Then peel a couple of centimetres of backing paper away from one end of the panel and position the top edge of the panel at the top of the door, aligning it to leave a small trim allowance.

### Peel and smooth panel

Gradually peel off a little more of the backing paper, and smooth the panel down into place with a dry sponge or cloth pad to ensure good adhesion and eliminate any air bubbles.

### Trim edges

Peel off the last of the backing paper and rub down the panel once again. Then use a sharp knife to trim all-round the edges of the panel, flush with the door edges. Cut with the right side facing you. Cut strips to finish edges if necessary.

**Try Wall paper**

You can give cupboard doors a quick and inexpensive face-lift by wallpapering them - perhaps to match an existing colour scheme. Any wall covering can be used within reason, although in kitchens and bathrooms it's a good idea to use a washable type. Or varnish over the wallpaper.

With panelled doors, simply cut the wallpaper to fit each panel and stick it in place with wallpaper paste. Wash down the door surface first, then sand it lightly. With flush doors, it's best to apply the paper, cutting it slightly larger than the finished panel area, and then pin on a slim decorative beading so it covers the edges.

## ADDING TRIMS

With plain flush cupboard doors, it's usually the edges that get damaged. If they are made of plastic-faced chip board the edging strips can be knocked off completely. These can then be refaced with peel-and-stick edging strips, or iron-on edging, which comes in rolls.

To make a plain wooden door more interesting, you can add wooden beading - either, around the very edge of the door, or set in a few centimetres from the edge to create decorative panels to imitate traditional panelled doors.

**Using stick-on trims.**

Cut the pieces to length, peel off backing and stick in place. If the strip is not self-adhesive, use the recommended adhesive, holding the trims in place with lengths of strong tape until the adhesive has dried. Wipe off any excess adhesive that oozes out.

**Adding wooden edge trims.**

First check that there is room to add a trim. If the door is too tight, you may be able to plane a few millimetres off the edge to accommodate the beading. Otherwise, resort to laminate or veneer trims (see above). Choose a beading with a recess deep enough for the door Glue and pin in place.

**Adding surface-mounted trims.**

Moulded beading can be added round the edge of flush doors to give them a more sophisticated look. It can also be added set in about 10cm from the edge of the door, to imitate traditional-style panels. Check that the beading does not catch on the door or the frame before fixing. Measure and cut the beading carefully, mitring the corners. Apply glue to the beading, then pin in place. Punch the heads of the panel pins below the surface, and fill with the appropriate filler.

## CHANGING DOOR FURNITURE

When you've finished restoring your cupboard doors to good health, fitting new knobs or handles adds the finishing touch. There is a huge range of fittings available in both period and modern styles; all you have to do is decide which type to go for.

**Fit new handles**

Fit the new handles, using adhesive, screws, or pins as appropriate. Check that bar handles are level, and that rows of knobs or handles on a run of cupboards are all at the same height using a level.

**Prepare the door**

Remove the old handles, and make good old fixing holes with wood stopper. If possible, choose new handles that will conceal the old screw holes. If you are fitting handles or knobs that are secured by small bolts or screws driven through the door from behind, you may be able to use the existing fixing holes.

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# Replacing Woodwork – Skirtings and Architraves

## REPLACING WOOD WORK

Replacing skirting, architrave and other woodwork can make all the difference to the character of a room.

Wood mouldings are widely used in the home for both decorative and practical purposes. The most common are skirting boards around the foot of walls, and architraves round door and window openings. Older houses may have a chair rail fixed to the wall at roughly waist level, and a picture rail about three-quarters of the way up the wall.

Woodwork can make a big difference to the character and appearance of a room, and is often worth reinstating, if the original features are missing or replacing, if they have been damaged.

This is easy to do as the woodwork is not part of the house's structure. However, as cutting accurate joints - particularly in large, ornately shaped mouldings such as skirting is not always so straightforward, it is sensible to choose plain, small-section mouldings for your first attempts. If mouldings are just loose, they can be nailed or screwed back in place.

## CHOOSING TIMBER MOULDINGS

Any good timber merchant carries a wide choice of timber mouldings in a range of sizes and fancy profiles. They are available in soft and hardwoods, but the latter are more expensive.

Softwood mouldings are usually primed and painted or stained and varnished; hardwood mouldings are normally just varnished. It is generally easier to sand the mouldings so that they're ready for decorating before cutting and fixing.

**Skirting boards** are generally between 100 and 175mm high, and 19 or 25mm thick. They can be plain, or have a decorative shape along the top edge see overleaf.

**Architraves** are usually 75 or 100mm wide, although wider mouldings were quite common in Victorian times. Profiles on architraves are similar to those found on skirting boards.

**Chair rails** carry a decorative moulding on both edges, with a flat section in between. They are between 38 and 62mm high, and project by 25mm.

**Picture rails** have a deep groove running along the top edge in which picture hooks can be fixed. Most are about 38mm high, and project by up to 25mm.

## TOOLS AND EQUIPMENT

A **bench hook** is a small piece of wood, with a batten along its top at one end, and another along its underside at the opposite end. It is a simple and useful tool for holding work secure while sawing, and can be easily hooked on the edge of a work-bench, if you have one, or a work table.

A **tenon saw** is used for making straight cuts - freehand or with a mitre box.

A **coping saw**, which takes very fine blades, is the best tool for cutting out the curved shapes of scribed profiles.

A **mitre box** is an essential aid for f making accurate 45° cuts for mitred joints. It can, however, be used only with mouldings up to about 100 mm high as the base of the box must be wide enough for the moulding to lie flat.

A **powered jig saw** or circular saw with an adjustable sole-plate can be used to cut accurate mitres in skirting that is too wide for a mitre box.

**Fixing nails** use masonry nails for fixing mouldings to masonry, and oval wire nails if fixing to timber. Use panel pins for reinforcing mitred joints.

**Making a Bold statement: -** Consider; skirting, chair-rail or architrave can be picked out in a bright colour for a cheerful, modern look. The chair-rail makes an attractive visual break between two contrasting wallpapers.

**FIXING NEW SKIRTING**

How you fix new skirting depends on what is behind the old skirting.

In older houses, the plaster often finishes at skirting-board level and the boards are nailed to timber dowels, drilled or bricked into the masonry at about one metre intervals round the room, in more modern houses, the plaster usually extends to the floor and boards are nailed through into masonry behind. On hollow walls, boards are fixed with nails driven into the timber studs.

**Remove the old skirting**, skirting is usually nailed in place but look out for screws. To remove the old skirting, start at a corner where the boards overlap - an external corner if there is one, an internal one otherwise - and use a hammer and bolster to lever it off the wall. If the plaster overlaps the top edge of boards, drive the bolster in horizontally to make a clean break. Then drive it downwards and carefully lever the board away from the wall. As soon as there is a gap between wall and skirting, place a block of scrap wood behind the bolster to protect the wall.

If the fixing nails are visible, it may be quicker to free the skirting by driving the nails right through the boards in to the wall with a hammer and nail punch. Once the boards have been lifted away, prise out the nails or cut them off with a cold chisel and hammer.

**Plan Ahead.** Fix boards in a clockwise order paying particular attention to mitred or scribed corners. Wherever possible, fit a single length of board on each wall. If joins cannot be avoided position them near an inconspicuous corner. For neatness and a good fit, external corners are mitred; for internal corners, one board is scribed with the profile of the adjacent board. Try to arrange the boards so that one end is left plain and fits into an internal corner of the room.

**Measure and cut the first board.** Measure the length of the wall against which the first board will fit, and allow about 50mm extra for ends to be scribed or mitred, use a tenon saw to cut the board.

If one end is to be scribed to fit into an internal corner, do this first. Then prepare a mitred end for an external corner, or mark up a straight cut with a square. Make sure that the board is

cut to the correct length - if it is to be butt-jointed, subtract the thickness of the board from the wall measurement.

**Fix the board.** Check that the board fits the wall, then drill pilot holes for the fixing nails in the flat surface of the board. Where you position the fixings depends on what is behind the skirting. If there are timber plugs already in position, make sure that you drive the nails into these by marking the position on to the face side of the skirting. If plaster extends to floor level, drill through the skirting into the wall followed by a timber dowel and then followed by a nail.

On timber stud walls nail directly on to the timber frame. If possible, get someone to hold the skirting board in place while you are working.

**Fix remaining boards**. Continue round the room, measuring and cutting each board after fixing the adjacent ones in position. At external corners, drive light nails or panel pins through the mitred joints to prevent them from opening.

Punch in the nail heads with a hammer and nail punch and cover them with wood filler. Then make good any damage to the plasterwork: fill small cracks and holes with all-purpose filler, larger holes with plaster. Finally, paint or varnish the new skirting.

**DEALING WITH CORNERS**. On internal corners, one board must be cut to match the profile of the board at right angles to it. External corners are always mitred.

**Internal corners.** Fit a board with a straight cut end into the corner first. Using an off-cut of skirting, trace the shape of the moulding on to the board that is to be fitted against it. Cut the board carefully along the line with a coping saw, and fit it against the board on the adjacent wall

**External corners**

If you have a jig saw or circular saw, use it with its sole-plate set to a 45°angle to cut a mitre across the end of the board.

If you must do this by hand, use a combination square or set square to mark the board with the angle at a fraction over 45° so that, when the two halves of the mitre are put together, any gap will be on the inside of the joint rather than on the outside. Then cut the mitred end very carefully with a tenon saw.

## FITTING NEW ARCHITRAVE

Architraves are set slightly away from the edge of the door or window frame, and neatly cover the join with the surrounding wall finish.

They are usually fixed to the frame of the door or window with small nails that are driven through the moulding's inner edge.

**Remove old architrave.** Start by prising off the vertical sections of the architrave (the uprights) with a hammer and bolster. Work from the door edge of the architrave to avoid excessive damage to the wall surface, and look out for nails securing the mitred top corners together.

Carefully prise off the top section of the architrave (the head section) in the same way. Then use a claw hammer to lever out any fixing nails that have gone through the architrave into the door frame.

**Cut new uprights.** Measure the height of the door frame and cut two new pieces of moulding for the uprights slightly longer than necessary for mitring.

Position one upright against the door frame, butting the bottom end against the floor and skirting board. At the top end, carefully mark off the height of the opening on the inner edge of the upright, this will be the inside edge of the mitred cut Then use a mitre box to cut the top end at a 45° angle. Repeat with the other upright.

**Fix uprights in position.** Position each of the two uprights against the door frame, parallel with its inner edge and away from it by about 6mm; fit the bottom ends against the floor and skirting. Lightly nail into position through the inner edge of the architrave into the door frame, don't drive the nails fully home at this stage in case you need to re-position the uprights.

**Cut the head section.** Measure across the top of the door opening, and cut a piece of moulding for the head section slightly over-length to allow for mitring the ends. Hold the moulding upside down across the tops of the uprights, and mark off both ends.

Cut one mitre. Then hold the head section into place, and check the position of the other mitre before cutting it.

**Fix the head section.** Check that the head section fits exactly, and adjust if necessary - by adjusting the positions of the up-rights slightly, and cutting the mitres carefully, making sure they meet exactly. Then nail all three pieces firmly into position, and drive pins into the outside edge of each mitred joint to prevent them from opening up.

**USING A MITRE BOX.** The only way to get moulded pieces of wood to meet properly in a right angle is to make a mitre joint by cutting the joining ends at 45°. With small section mouldings - such as architrave, dado and picture rails - the best way to do this is with a mitre box.

Hold the mitre box steady, using a bench hook or cramp if you have one. Place the moulding in the box - lay architrave flat in the bottom, face up; hold a dado or picture rail vertically against the wall of the box, facing away from you. Place a flat piece of scrap wood under the moulding so that you can saw right through into the scrap and get a clean cut. Position your tenon saw at an angle between corresponding slots on opposite sides of the box, making sure that the cut slopes the correct way. Hold the moulding firm and cut. If you don't have a mitre box, use a combination square or set square to mark the 45° cutting line, then cut very carefully with a tenon saw.

**FIXING DADO AND PICTURE RAILS.** Dado and picture rails are usually fixed on top of plaster, and should not be too difficult to prise off the wall. In older houses, however, you may find that they were positioned before the walls were plastered so that the plaster overlaps the edges. If this is the case, be prepared for some fairly extensive repair after removing them, as you're likely to dislodge quite a bit of plaster.

**Remove the old rail.** Starting roughly in the centre of the rail, insert a thin piece of an old timber. Chisel between the rail and wall and carefully prise it away. If it snaps at the positions of the fixing nails, prise the nails out later using a claw hammer, using a piece of scrap wood behind the hammer to protect the plaster. If the nails won't budge, use a hacksaw to saw them flush with the wall.

If you can't get a chisel behind the rail, then it was probably fixed before plastering. To minimize damage, run a trimming knife along both edges of the rail to break the bond with the plaster. Split the rail into sections with a chisel and lever off. Repair any damage to the wall with filler or new plaster.

**Draw a horizontal guide line.** Measure the distance up from the top of the skirting board (for a dado rail) or down from the ceiling (for a picture rail), and mark where the rail is to be fixed at several points. Then, using a spirit level, draw a horizontal line on the wall right round the room. Make sure that your start and finish points coincide, and adjust if necessary.

**Measure and cut the first rail.** As with skirting (see last week's article), internal angles are scribed, and external angles are mitred. Fit straight cut ends against windows and doors.

Measure the length of the wall against which the first rail will fit and cut the rail about 50mm over length. Then prepare the ends as necessary, making sure that the rail is exactly to length.

**Fix the rail into position.** Check the rail for fit, then drill pilot holes in the rail, mark with a pencil the pilot hole position on the wall, drill the pilot hole positions with a small masonry drill and insert thin timber dowel, then fix the rail in place with slim pin head nails at 600mm intervals. The pilot holes in the rail should correspond with the dowelled holes in the wall. In addition, 'Liquid nails" can be used between the back of the rail and the wall. If possible, get someone to hold the rail in place against the pencil guide line while you drive in the pins. To stop the rail from wandering off line, drive a pin at one end, then fix the other end before driving in the intermediate pins.

**Fix the remaining rails.** Work round the room, measuring and cutting each rail after the adjacent one has been fixed in position.

Punch in the fixing nails to just below the surface of the wood with a hammer and nail punch, and fill the holes with wood filler. Fill any small gaps between rail and wall with filler, and finally decorate the rails with paint or varnish.

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# Cladding or Panelling Walls with Timber

## CLADDING WALLS WITH TIMBER

Wooden tongued-and-grooved cladding gives to any room a warmth and richness that few other materials can offer.

Wooden panelling of one sort or another has been a popular way of decorating interior walls for centuries. It is good-looking, hard wearing and warm to the touch, and can be crafted and finished in several different ways.

One of the easiest panelled effects to install is tongued-and-grooved (t-and-g) cladding. Softwood, including knotty pine, is an obvious choice, but other more exotic woods such as ramin, meranti, jarrah and MFD can be used instead. A visit to a good timber merchant will reveal the choice available, and if you want something a little unusual he may be able to prepare a particular wood specially for you.

Apart from its looks, cladding has other advantages. For a start, it's the perfect cover-up for walls with defective (or missing) plaster. It is warm to the touch, so helps to cut down condensation, and if insulation is fitted behind it the result is a much warmer room - solid walls are difficult to insulate.

It also helps to reduce noise transmission between rooms. The only drawback is that the room is made slightly smaller as a result, and some re-positioning of fittings such as wall lights, switches and power points may be required.

It is not necessary to clad complete rooms - or even complete walls: you can panel below the dado rail height, or up to the height of a picture rail (or plate shelf).

**Fixing cladding**: The boards are usually fixed to the walls by nailing them to a network of sawn timber battens. For vertical cladding, these are fixed at floor and ceiling (or dado rail/picture rail) level and horizontally at intervals of about 600m in between, while for horizontal cladding the intermediate battens are fixed vertically. If insulation is to be incorporated, then this is placed between the battens before the boards are fixed in place.

**Finishes**: Once the boards have been fixed, the surface can be finished with paint (prime and undercoat first), varnish, stain or polish, according to the final effect you want to achieve.

## SHAPES AND SIZES

Cladding of this sort is usually sold in the form of planks 100 to 150mm, wide and 12 to 19mm thick and in lengths of 2.4 to 3.6m. One edge of each board has a tongue machined along it, while the other has a mating groove; these allow adjacent boards to interlock without a gap being visible between them.

Cutting the tongue reduces the actual face width of the board by up to 6mm, a point worth remembering when you are estimating how many planks are necessary to cover a wall.

Plain T & G boards look rather like narrow floorboards when butted together, but the addition of chamfering along each face edge emphasizes the joint line and gives a more attractive overall effect. Such boards are usually described as tongued, grooved and vee-jointed (TGV in the timber merchant's jargon). You can also get TGV boards with a concave outer face, or with grooves in the surface to give a reeded or piped effects. Have a good browse around and select your preference.

**PANELLING LIMITED AREAS**

There is no need to feel you have to panel a whole room - or even a whole wall. Panelling up to dado rail height, panelling an alcove, or panelling a section of a wall where a feature (such as a fireplace) has been removed can be very effective.

**Panelling a chimney breast:** When fireplaces are removed it is difficult to get a good, even finish on the old chimney breast where renovation work has been carried out, even if you call in a professional plasterer. There is no reason why you shouldn't consider to panel over the bumps. There are no rules about how high you should take the panelling; you could just panel a fireplace shape, finishing it with a shelf, to look like a mantel-shelf. Another suggestion, is to continue the panelling up the wall to picture-rail height, and add nosing at the top of the panelling or a wider shelf to take an arrangement of plates, or a collection of ornaments.

**Panelling the lower half of a room:** You can panel the lower half of a room, to what is called, chair-rail height. Use a piece of hockey stick moulding or nosing to give a neat finish along the top edge. This is ideal for covering damaged plaster.

**Panelling an alcove:** If plasterwork in an alcove is crumbling, for example where cupboards or shelves have been removed, line the alcove with T&G to create a built-in dresser effect, with an architrave surround, this will hide and beautify the old opening.

**PREPARATION FOR CLADDING:** Preliminary planning

Cladding can be fixed over any existing wall surface or decoration, even to bare brickwork, so no formal preparation is needed. However, there is some preliminary planning to be done.

First, you have to decide on which way the cladding is to run, and whether to remove the existing skirting boards. You can use the existing skirting as the floor-level fixing, if you wish, adding chipboard or Masonite packing to its surface if it's thinner than the battening, but if it's an ornate type of skirting, you may prefer to remove it, so you can replace it when the cladding is in position. Prise the skirting off carefully using a brick bolster or similar tool. Work out how many boards you will need, and make sure that if you start at one end of the wall with a full width board you don’t end up with an awkwardly narrow space to fill at the far end.

**Dealing with electrics:** Next, you will have to re-position any flush-mounted light switches and power points on the wall to be clad so that once you have finished, the face plates can be mounted on the new cladding. If you don't have a thorough understanding of electrics, call in an electrician. Ask him to leave the power to the room disconnected and to leave the face plates off, ready for re-fitting over the new cladding.

**PREPARATION FOR CLADDING:**

Preliminary planning (**STEP by STEP**)

**VERTICAL CLADDING** (Fix the battening)

Start by fixing battens at the top and sides of the wall to be clad, and at floor level if you have removed the skirting. It's quickest to fix them with masonry nails at about 300mm intervals, but if the wall surface is very uneven it's better to use screws and wall plugs so you can add slivers of ply as packing where necessary behind the battening. Avoid driving nails or screws in directly above or below switches and sockets, where cables may be buried; it's a good idea to use a small metal detector to track down cable runs if you're not sure where they are.

**Intermediate battens:** Add intermediate battens at about 600mm intervals across the wall, running horizontally for vertical cladding. Again, add slivers of ply if the wall is at all uneven.

Finally, fix short battens round re-positioned switch or socket mounting boxes; turn off the power while working and take care not to damage the buried cables as you do this.

If the wall contains a door or window opening in a reveal and this is to be clad too, add battens to the faces of the reveal as well.

**Fit the insulation:** If you plan to fit polystyrene insulation boards behind the T&G, it should be added next. Simply cut the polystyrene sheets into strips to match and fill the spaces between the battens and wedge them into place. Use adhesive tape to hold any that are a loose fitting until you fix the cladding over them.

**Position and Fix the first board:** It's important that the boards are fixed to a true vertical (or horizontal). With vertical cladding, cut the first board to length and position it to one edge of the area to be clad with the grooved edge in the corner. Use a spirit level to ensure that it is vertical and pin it temporarily in place. Then scribe the profile of the side wall and its skirting board on to the face of the cladding with a scribing block and pencil.

**Pin the board in place:** Take the board down and use a coping saw to cut along the marked scribing line. Then place the board back into position, check the vertical again and nail it to the battens with panel pins driven at an angle through the exposed tongue close to the shoulder. Add extra pins level with each batten, driven through the face of the board, near the scribed edge, and punch the heads in just below the board surface. The holes will be filled later.

**Fix the remainder of the boards:** Fix the second board by sliding its grooved edge over the tongue of the first board; note that this conceals the pins completely to give a concealed fixing. If the boards are a tight fit, use a scrap of T&G to protect the tongued edge while you knock each one in place. Then drive pins through its tongue as before. Repeat this process to fix all the other full-length boards to the battens. Leave the last length, which needs to be scribed to fit.

**Fix cladding round points:** To fix cladding round a light switch or power socket outlet, small cut-outs have to be made in the adjacent boards. After fixing the last board before the obstacle, hold the next one in place and mark the mounting box position on it. Make the cut-out with a coping saw and fix the length in place, nailing it to the battens round the box. Then place,

mark, cut and fit the second length to frame the box. Re-fit the face plate to the light or power point when decorating is complete.

**Coping with external corners:** At window reveals, chimney breasts and other external corners you should aim to get a neat finish, without the groove or the tongue showing. After fitting the last full-width board, measure the distance left to be clad. Cut down the length of the tongued edge of the last board on the main wall surface so it protrudes beyond the battening by an amount equal to the thickness of the board. Then butt the grooved edge of the first board round the external corner up against this overlap, and fix the board in place. Add a decorative corner beading if you wish to conceal the join.

**Internal corners:** At internal corners, the last length must be scribed and cut down to width. Pin or hold it on top of the last whole board fitted, and use an off-cut of cladding to scribe the wall profile on to the board. Cut along the scribed line, place the board up into position and fix it to the battens with pins driven through the board face. If the adjoining wall is also being clad, simply butt the grooved edge of the first length to be fixed to this wall against the surface of the last, scribed board on the other wall. Fix in place close to the grooved edge by knocking pins straight through the board face and the tongue.

## FIXING HORIZONTAL CLADDING

**Fix the battens:** Horizontal cladding has to be fixed to vertical battens. Fix the battens round the edge of the wall first, as for vertical cladding, then fix vertical battens every 600mm or so across the wall. Add plywood packing and insulation if necessary in the same way as described for vertical cladding.

**The first board:** The lowest board is the first board to be fitted. Scribing is usually unnecessary, since you will probably be covered with a skirting board. Fit the board with the tongued edge at the top, using a spirit level to make sure that the board is level. Pin the board to the vertical battens through the tongue as before.

**Add the remaining boards**: Continue fixing boards, working up to the ceiling. At the top, cut the tongued edge to fit neatly. You may need to scribe the top board to make a tidy line with the ceiling if you are not going to cover the angle with a cornice or coving.

## THE FINISHING TOUCHES

**Neaten the edges:** However carefully you work, the cut ends of the boards always look a little ragged. Neaten them off by adding a slim quarter round or scotia beading at ceiling and wall edges, and replace the skirting board at floor level. Where cladding finishes on an external corner, pin a thin moulding to the edge of the last batten to hide it and the board edge. If the cladding doesn't reach up to the ceiling, or a cornice is present, pin scotia moulding or quarter round beading to the top edge of the battening to give a neat finish. Punch any pinheads which show into the wood and fill with wood filler if you are varnishing the boards, or an all-purpose filler if you are painting the boards.

**Sand the cladding:** With all the boards and trims in place, sand the wall surface down lightly to remove the odd splinter and any marks made during installation. Use either a sanding block or an orbital sander for this. Then wipe down the board surfaces with a clean, lint-free

cloth dampened with white spirit (methylated spirits) to remove dust, ready for the final finish to be applied. On horizontal or diagonal cladding, make sure you blow any sawdust out of the grooves in the cladding first.

**Decorate the cladding:** All that remains is to apply the finish, if you are using paint, apply primer, undercoat and one or two top coats, rubbing down lightly between each coat.

If you are applying varnish, thin the first coat with about 10 per cent white spirit and follow this with two more full-strength coats.

If you want to stain the wood, experiment on off-cuts first to get the depth of colour you want. Then apply the stain, leave to dry and sand down very lightly with very fine-grade sand paper if the stain has lifted the grain. Finally, varnish as before.

Complete the job by reconnecting the switch and socket face-plates removed earlier.

**Panelling round a bath**: Cladding is also perfect for panelling round a bath. Start by constructing a simple supporting framework using 50 x 25mm battens fixed to the floor and side walls. Add one or two 50mm sq. corner posts as required, notched to fit over the floor batten at the bottom and wedged underneath the lip of the bath at the top, and finish off by fixing top rails between the side battens and the corner post(s).

Add the cladding using the same technique as for fixing to walls, with a removable section to allow you to get to the plumbing when necessary.

**CHOOSING MOULDING BY THE METER?**

Wood mouldings are a mostly sold by the meter, although many come in standard lengths. They are used as decoration or to finish off wood work or building work. Some of the smaller mouldings, such as quadrant or Scotia, are used to cover gaps or joins to or to add in a decorative finish to bare edges. Larger mouldings, such as architrave or skirting, are used as part of the normal building of a house (but primarily to cover of up on a join). Other mouldings have their own specific purpose: glazing bead for holding in pieces of glass or weather bars for throwing water off the bottom of doors. There is a very wide range of mouldings available.

**Fixing:** mouldings are usually either nailed or glued in place. As they are often decorative, screws should not normally be used unless they, too, are decorative (there are dome - head screws in chrome and brass finishes, for example, or screws which have snap - on caps, available in various finishes to hide the screw head).

When nailing on mouldings usually panel pins are used (or nails with small heads). The heads should be punched below the surface and the tiny holes filled. (TIP --- by blunting the sharp end of the nail, by tapping gently with a hammer, stops the nail from splitting the wood, as it cuts its way through, rather than forcing the timber fibres a part).

Large mouldings are usually made of softwood, as found mainly in period homes, but then again some of the smaller mouldings can also be made from hardwood.

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# Looking After the Outside.

A smart well-maintained exterior keeps your home weather proof and the increases its value.

As building inspectors, probably the most obvious common complaint that we have, would be the lack of maintenance to the exterior of older period style homes.

The outside of the home faces daily damage from the weather. An annual check helps to keep in good repair and avoids the problems of penetrating damp, rotting window frames and leaking roof. if problems are spotted early expensive work can be avoided. As well as preventing rot and another damage.

Exterior decoration can add to the value and appearance of your home, but only if you choose carefully. Window frames, doors and exterior paint-work must be in sympathy with a style and character of the house. A house which looks radically different from others in the street, painted in a garish, (or worse still, covered in the artificial cladding), with windows and doors which do not match the architectural style of the original building may prove difficult to sell.

**Keeping the Style**

When replacing parts of the house, such as bricks, tiles, doors, windows and perhaps chimney pots, try to match the original. Many modern materials, although excellent in themselves may be out of keeping with the period of the home. Before you start work, visit architectural salvage yards and look at supplier's catalogues and leaflets.

**Up on the roof**

The roof is the most important part of the exterior of your home. Leaks can cause interior damp, mould and fungus. When checking the roof, stand outside your home and study the tiles and chimney through binoculars or if you wish to get closer by climbing on top of the roof but be careful. If it is not possible to see the roof, ask a professional roofer to check it for you.

**Chimneys.** Check that the chimney stacks are straight, not leaning over to one side. look for cracks down the brickwork. If you find either of these problems, seek professional advice. Check whether the mortar joins between the bricks on the chimney stack are in a good condition. Look at the mortar around the chimney pots to make sure that all is sound. If it is cracked, then it must be replaced. Chimney pots can be bought new or second-hand. Replacement is best left to a builder. Unused pots can be capped but leaves space for ventilation.

**Fault finding**. At least once a year you should make it checklist covering the following items.

Loose and cracked rendering, blocked gutters, wet rot, in timber windowsills seals, paving, bridging damp course, air bricks block, cracked down pipes, sand or soil piled against the exterior walls, balconies are not draining, slipped roof tiles, defective flashing, missing ridge tiles, broken gutters, and so on.

**Tiles.** Look for damp patches inside the ceilings or on the underside, this usually indicates that there are tiles loose broken or missing. Tiles usually slip because the nail holding them, or the wire have corroded away. They can also suffer from a condition called fretting, which is caused by water entering the tiles and the drying and wetting action causes the salt in the air to slowly erode the back of the tiles, this applies only to clay tiles. affected tiles should be replaced by are roofing expert. If the problem is widespread, a new roof may be needed.

**Ridge tiles**; Check the ridge and hip tiles and the mortar or under the tiles at the edge of the roof. Re-fix or re-cement loose tiles and replace cracked mortar.

**Flashing**: Check the flashing around chimney stacks and between flat roofs and the walls of the house. If it is faulty, there will be damp patches inside the house. DIY flashing is inexpensive and easy to apply.

**Rain water chattels:**

Damaged or blocked rain water chattels (the name for gutters and down pipes) can result in internal damp.

**Blockages.** Once or twice the year check that gutters are free from leaves, check for split or sag is in the guttering by running water through them via a hose-pipe.

**Repairs.** New length of guttering can be used to replace badly damaged sections. Old houses have detailed rain water chattels, which are sometimes quite ornate. It would spoil the appearance of the house to replace these with plastic or another style, so visits and architectural salvage yard to find something suitable.

**The walls.** Serious faults in walls can include bowing and cracking, both of which may require professional attention. More common faults include the failure of mortar joints between bricks and sometimes failure of the bricks themselves.

**Replacing bricks** Individual bricks which are damaged can often be replaced by a matching brick or by removing the brick and turning it round to the undamaged side. If damage is extensive, the answer may be to apply some sort of rendering.

**Repairing mortar** Where mortar joints between bricks are crumbling or missing, they must be replaced. The old mortar must be removed so that there is a sound surface to work on. Use a ready-mixed mortar and make sure that the colour matches the old surrounding joints. The joint should be finished to match the others too. Straight weather-struck joints look odd if the rest are rounded.

**Renewing mortar joints** Make sure new mortar joints match those already in place. They can be curved or straight and flat or even racked.

**Rendering** is the top surface which covers the bricks. It can be painted, or an effect like pebble-dash which needs no painting. Rendering can often lose its key and break away from the wall in chunks or sheets. While small cracks can be effectively covered by a coat of exterior paint, larger scale damage needs

professional attention. If the damage is widespread, all the rendering must be removed and replaced.

**Cladding** Some houses have cladding on the top half of the walls. Timber ship-lap/weather boards or shingles can be replaced with new timber or with one of the new low-maintenance plastic ranges.

**Damp course** When checking walls, look carefully around the base of the house to make sure the damp-proof course is not bridged by garden soil or other material. Sometimes the damp-proof course has a row of air bricks below it, so it is reasonably easy to spot. These air-bricks must never be blocked up as they supply ventilation to the cavities and to suspended timber floors inside the house.

**DOORS AND WINDOWS**

Many houses have been built with doors and windows made from un treated softwood - resulting in rot on a grand scale.

**Checking for rot** To check for wet rot, push a pointed tool into the door and window frames at intervals. If you feel resistance, all is well. If the point goes right in, rot is present. Small scale rot can be dealt with using a proprietary wood repair system. These small kits contain filler for the hole left when the affected part has been cut away, and a rot inhibitor. Gaps between the window or door frame and the surrounding wall can be filled with waterproof mastic.

**Replacing doors and windows** Doors and windows in the wrong style can spoil the exterior of your house. There is a very good selection of replacement doors and windows from recycled architectural suppliers, so finding something in the right style should not be too difficult. Choose hardwood doors as they last longer than the softwood type especially if they are to be used on the outside.

Replacement windows are available in a choice of aluminium, hard wood or softwood frames and double or single glazed panes. You should consider the price range, the size of window openings and the age and style of the property and its neighbours. It may well be worth paying the extra to fit double glazed panes if you have to replace a window, but make sure the new window is in style with the house.

**ARTIFICIAL STONE CLADDING** Think twice before applying artificial 'stone' cladding. It can have a disastrous effect on the appearance and the value of your home.

You may like the cladding, a potential purchaser may not, especially if it spoils interesting features.

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# Exterior Decorating

Proper maintenance of the woodwork and rendering on the outside of your house will protect the fabric as well as keep the house looking smart.

Decorating the outside of a house involves very similar techniques to those used inside, with two important differences. First, you will have to work at high levels, and must have suitable and safe equipment to do so. Second, the main objective is not to make the house look better, but to protect it from water penetration, so it is vital to use the right materials, and preparation work is even more important than indoors.

**Plan ahead**: Decorating a house is a large task, so plan the job carefully. If you have your own equipment, you can spread the work over many weekends, but if it is hired you may need to spend a week or more of your holidays on it. Don't work in wet, windy or frosty weather, as this will spoil the finish or reduce its life. Follow the sun round the house, so that the surface is dry and you are not working in a glare. Make a shopping list of every item you will need and shop before you start so you don't waste good decorating time.

**Order of work**: Get any repair work out of the way before starting preparation. Start at the top, cleaning out the gutters, and work down. Prepare and paint all roof-level woodwork, and gutters if in galvanized iron. If painting walls, prepare the remaining woodwork and any metalwork next, to avoid messing up the fresh paint. Then do the walls, dividing each one into manageable sections, Continue by painting upstairs windows, any downpipes, then the remaining woodwork.

**Access equipment**: As this will only be needed infrequently, hiring may be a better option than buying, Local hire shops can provide everything you need, but book it in advance. The basic item is a ladder: to calculate how high it has to reach, add together the ceiling heights of your home and add one metre, then add an extra 2-3m to allow you to lean the ladder at a convenient angle. You may also need accessories: ladder stays to hold them away from the wall; bolt-on adjustable legs for use on uneven ground; tool trays and clamps for holding paint cans.

If you have a big house on which large areas of masonry have to be painted, a scaffold tower may make the job much easier as you work standing on the platform rather than balancing on the rungs of a ladder.

**Putting up a good front:** Maintaining woodwork, rendering and masonry not only gives your home a smart appearance but also protects it from the weather.

**Paints for woodwork**: Use knotting solution to seal the knots in any new wood and primer on all areas of bare wood (quick-drying acrylic ones speed up the work). Then proceed just as you would indoors, but make sure everything is suitable for exterior use.

If your house is new and the wood work has been treated with a low sheen natural timber finish, re-coat with a similar product, ideally the same one used by the builders.

If the paintwork is in such bad condition that it has to be completely stripped off, take the opportunity of using one of the new micro-porous or 'breathing' paint systems. These allow

moisture to escape from the timber but not to penetrate the paint. This prevents the main cause of paint break down - cracking caused by moisture underneath, leading to further water penetration and more cracking.

**Paints for masonry** Previously painted stone, brickwork or rendering is best redecorated with exterior grade emulsion or reinforced emulsion containing mineral or fibre particles (Texture Coatings). The particles make the finish very long-lasting; but it is more expensive. They also give a rough, matt look, whereas ordinary emulsion is smooth, which may be more desirable on some types of house. Cheaper brands of reinforced emulsion only come in a limited range of popular pastel colours, but some of the more expensive ones are also made in strong traditional colours.

A third possibility is a cement based paint, which is relatively cheap but comes as a powder which you have to mix yourself. It is not suitable for walls previously finished with smooth emulsion or gloss paint, which do not provide sufficient adhesion.

All these paints are water-based. In most cases two coats are needed. Oil-based paints suitable for masonry, giving a glossy or satin finish, are obtainable, but they have to be thinned with white spirit.

If you are considering painting brick work for the first time, think twice: remember that it will just create more maintenance work, as it should be re-painted every five years.

**Paints for metal** Items such as metal windows, gates and gutters should never be decorated with any water based products as this would promote rusting. Use metal primers and oil-based paints, or one of the all-in-one finishing paints designed especially for metals. Galvanized metal gutters should be coated inside with gloss or bitumen paint.

**How much paints** The quantity of paint required to do the woodwork will obviously depend on how many windows, doors and other timber elements there are.

Don't forget to allow for the barge boards, fascia boards and soffits (eaves); also, rain-water components like gutters and down pipes, if they are plastic ones they don't need painting.

Here is a rough formula for working out how much wall paint to buy. Start by measuring the length of each wall and multiply by the height (about 5.5 metres on an average two-storey house). Ignore doors and windows and allow one litre for every 6.5 sq. metres if the surface is smoothly rendered; or one litre for every 3 sq. metres for rough finishes such as texture coating.

## PAINTING WOODWORK AND METAL

If the paintwork is still reasonably sound, the procedure is exactly the same as for indoor painting: sand down to provide a key for the new paint, then apply an undercoat and topcoat, or two finishing coats. The weather usually takes its toll on the exterior, so some repair work may be needed on exposed surfaces prior to painting.

Remove flaking paint and rust wherever the old paint is cracked or flaking, remove it. If it does not come away easily with a wire brush or sharp tool, use a hot air stripper or a blowlamp (but not on windows - a chemical stripper is best here).

Remove rust from galvanised rainwater goods or steel windows using a wire brush, preferably a rotary power tool attachment.

**Make good rotten wood**

A Rain penetrating under flaking paint causes wet rot which weakens timber, making it first feel spongy, then disintegrate in patches. If you encounter the former, strip off the remaining paint and clean down the surface. If it is crumbling away, buy some two-part resin filler (like “Builders Bog”). Cut back to sound wood, then fill with the resin/Bog. Even quite large sections can be restored in this way.

Fill holes Small cracks and holes can be filled in the usual way, using an exterior grade filler. Gaps between door or window frames and surrounding masonry are best repaired with one of the gun applied mastics, which remain flexible to cope with seasonal expansion. Also use mastic if there are gaps in the joints of a window or door.

Re-putty windows Check all the putty round panes of glass in windows and doors and prise out any which is loose or cracked. Paint the rebate with primer and allow to dry. Apply a 'sausage' of putty round the edge of the panes and shape to match the rest with a putty knife. Allow to dry for two weeks before painting.

Rub down and clean Rub down any filled areas, and patches of bare wood, with abrasive paper to obtain a smooth surface. Brush surface grit and dirt off the paintwork and rub it down all over with wet and dry abrasive paper, used wet. Rinse well and leave to dry.

Apply primer and base coat Put down decorator’s polythene or dust sheets to collect drips and splashes, making sure that all plants are protected. If any new wood has been used, first seal any knots in it to prevent the resin bleeding. Prime all areas of bare or filled wood. Allow two hours for acrylic primer to dry, 24 hours for other types. Then apply the undercoat or first coat of gloss. Use a 50mm brush for relatively large areas like fascia boards and barge boards, a 25mm brush for door and window frames and a cutting in brush for any glazing bars.

**Apply finishing coat** Rub the base coat down lightly with, fine abrasive paper to remove any 'nibs or other blemishes. Apply the top coat with even brush strokes to get a smooth finish. Do not paint too thickly, or excess paint will build up and form into sags. On windows, allow the paint to lap fractionally on to the glass to form a waterproof seal.

**Dealing with downpipes** When painting downpipes, protect the wall behind with a large piece of cardboard or thin rigid sheeting.

**Painting doors** Paint doors early in the day so that they can be left open for as long as possible afterwards. If shut before the paint hardens it will stick round the frame and spoil the finish.

**PAINTING WALLS**

To ensure paint remains in good condition, repair texture coating, rendering and rainwater goods before you start any decorating. You may also have to call in professionals to deal with

any problems caused by rising damp. (Wait until the walls dry out before painting. This may take some months.

**Prepare for action** Before starting work, clear away all obstructions from the walls: trellis panels, shutters, hanging baskets etc. Clinging plants like creepers will have to be cut down to the ground (they will soon grow back); flexible climbers can be partly cut back, then laid on the ground.

**Clean the surface** Brush the entire wall surface to remove flaking paint, dirt and mould growth. Use a stiff hand-brush (not a wire brush as particles of metal could cause rust marks in the paint), and a paint scraper. If the surface is chalky, apply a stabilizing primer before painting. If it has been stained by rust from rainwater goods, or tar filtering out from a chimney, seal the stained areas with an aluminium primer.

**Treat mould growth** Mould growth and lichen may indicate damp, which should be treated, but also occurs where no sunlight falls. To sterilize and kill off the mould, use a fungicide, or a 1:4 solution of household bleach and water. Apply with an old paint brush, leave for 48 hours, then scrub off with clean water.

**Prepare to paint** Fill any cracks revealed by the cleaning processes with a proprietary external filler. Cover the ground where you are working and nearby shrubs with decorators' polythene or dust sheets. Transfer the paint into a plastic bucket or a paint trough; do not fill more than about one-third full.

**Painting with a roller** This is the quickest, cleanest way to work but, unless working from a platform, you cannot use an ordinary paint tray and will need a special trough which hooks on to the ladder. (Alternatively, use a large brush when working above ground level, and switch to the roller once you can work from a stepladder or the ground.) Use a long-pile roller for heavily textured walls; a medium one for lightly textured or smooth ones. Some rollers have a hollow handle so you can extend their reach by inserting a length of dowel.

Start at the top and work from right to left (unless you are left-handed). If you are not able to finish the complete wall in one session, try to stop at a natural break - an architectural feature, corner or downpipe - so that any slight variation in colour or texture will not be noticeable.

**Painting with brushes** Dip the brush no more than halfway into the paint and apply it with vertical strokes, then criss-cross with horizontal ones to get even coverage. Use the bristle ends to knock paint into rough areas, and to cut into window frames or against the fascia board.

To get behind downpipes without smearing paint on them, tape on a sleeve of newspaper and push it down as you go. Wipe off any splashes on woodwork or window panes with a damp sponge as you go along. If left to dry they are very hard to get off.

**Painting Texture Coating** - With very deeply textured surfaces – graffito, roughcast or Tyrolean you need to apply the paint with a stiff dustpan brush. Have the paint in a roller tray or large bucket and dab the brush in to load it with paint. Apply it to the wall using a circular scrubbing motion.

**Keep it clean** If your house is on a busy road, dirt and fumes from the traffic can quickly make the paintwork shabby. While you still have the ladder or access tower in use, spray the gloss-painted woodwork with silicone polish and buff up to repel dirt.

**Final Checklist**

**A** Chimneys and roof: check for repairs

**B** Rainwater goods: clean out gutters and repair where necessary. De-rust and paint galvanised-

iron components; do not paint plastic.

**C** Soffit/eaves (board under overhang): clean and apply two coats of exterior paint.

**D** Barge boards, fascia boards: prepare, prime, apply base coat and finishing coat.

**E** Painted brickwork, stonework or rendering: brush down, fill cracks, stabilize if chalky, sterilize

mould, seal stains, apply two coats of good quality exterior wall paint.

**F** Brickwork: brush down, re-point as necessary. Then paint.

**G** Cladding: if stained or varnished, rub down and apply a similar finish. If painted, treat as for

doors and windows. Wash PVC cladding.

**H** Porches and subsidiary roofs: protect from spilled paint with dust sheets.

**J** Timber windows, doors: prepare, prime and paint; or re-coat natural timber finish.

**K** Metal windows, garage doors: de-rust, prime and paint. Do not paint aluminium door or window

frames.

**LADDER SAFETY REMEMBER:** Falls are one of the major causes of DIY accidents.

**DO** Use a ladder at least 60cm taller than the highest point to be painted.

**DO** Secure the ladder - with stakes, a sandbag or rope.

**DO** Wear lace-up boots or shoes with a proper heel. Avoid getting them slippery with mud by placing a door mat at the foot of the ladder.

**DO** Overlap ladder sections by at least one quarter of their length.

**DO** Use a ladder stay to hold the ladder away from the wall if you have to paint overhanging

eaves or guttering, otherwise you will have to lean back dangerously.

**DON'T** Place the ladder less than 30cm away from the wall for every 120cm of its height.

**DON'T** Climb higher than four rungs from the top; you must always be able to hold on to the ladder.

**DON'T** Lean the ladder against gutters, drainpipes, or glass.

**DON'T** Lean out sideways when painting - move the ladder.

**DON'T** Work on a windy day.

**Back**

# Laying Sheet Flooring

Sheet flooring can be trickier to lay than tiles, but gives a beautiful seam-free finish in all but the largest rooms.

Smooth sheet floorings are ideal for kitchens and bathrooms, where spills occur, and easy cleaning is essential. They are also popular for halls and kid's rooms where wet feet, muddy pets, and accidents can be dealt with quickly, including asthmatics.

Sheet floorings are fitted wall-to-wall. This is useful in small bathrooms, where water spills on the floor and seeping between tile joints, causing tiles to lift, prompting rotten floorboards and damage to the ceiling below. Sheet floorings are quicker to lay than tiles, as they don't have to be stuck down all over, indeed, 'lay-flat' types can be loose-laid after trimming. However, manipulating the sheet into position can be tricky, so for your first attempt lay a cheap material in a small area.

## TYPES OF SHEET FLOORING

Sheet vinyl is the most common material around, and comes in two main varieties. Un-backed vinyl’s are made by sandwiching a PVC pattern between a clear protective surface and solid vinyl. The surface may be smooth or textured to match the printed pattern with grout lines on a tiled pattern, or wood grain on a simulated timber base.

Cushioned or backed vinyl’s, have an extra layer of foam between the patterned layer and the backing, making them soft and warm underfoot. Some of the brick and marble imitations available are remarkably realistic. Linoleum is a tough natural material and is no longer as brittle as it used to be. It can be loose laid on concrete or hardboard.

### PREPARING THE SUB-FLOOR

Whether you're laying sheet vinyl, linoleum or rubber, the floor preparation is the same. All can be laid on solid concrete or suspended timber floors. Preparing the floor properly is important, a bad job brings poor results.

**You should:**

Lift existing floor-coverings (well stuck tiles can be left in place, as can sheet materials that have been firmly stuck down all over, as long as the surface is smooth and even.

**a)** Drive in nails on boarded floors.

**b)** Put down a hardboard underlay if boarded floors are full of gaps or uneven.

**c)** Seal dusty concrete floors with diluted PVA bonding agent. (“Bondcrete” or similar)

**d)** Apply a self-levelling compound if concrete floors are uneven or pitted.

## ESTIMATING QUANTITIES

Sheet floorings are usually sold in 4m widths although you may find most brands in 3m widths. They are sold by the linear metre. Choose a width that will cover the floor without seams if possible; obviously these will be unavoidable in rooms more than 4m wide, and in L-shaped rooms, the best way of estimating your needs (and minimising unnecessary and expensive waste) is to draw a floor plan of the room, complete with alcoves and other irregularities.

Work to a scale of say 1:100 which means measurements taken in mm should be divided by 100, so one large squares on the floor plan equal one metre. Make sure all dimensions are marked on the plan and take it to your supplier for advice on the best choice of cut.

## TOOLS AND EQUIPMENT

There are no special tools or equipment required for laying sheet flooring. You do need a scribing block for marking a line on the flooring before cutting but you can make this yourself. It is used to mark the longest straight edge of the sheet, so it fits neatly against the skirting board. It can also be used for drawing around obstacles such as pedestals or irregular shapes. All you need is a piece of scrap wood about 50 x 25mm in cross section and around 300mm long. Drill a hole through it about 50mm from one end, making sure it is large enough to accept a ball-point pen or pencil.

## LAYING THE FLOORCOVERING

Unlike tiles, sheet flooring doesn't need much planning before you start laying. Your main aim is to avoid having seams in areas of heavy wear such as doorways, and to align the pattern so that it runs parallel with the longest straight wall in the room. When your flooring supplier has looked at your scale plan he should be able to tell you which way to lay your length.

Note that some sheet floorings have a definite self-edge along each side of the length; this has to be trimmed off at edges or when butt joints are made between lengths. Ask about this when buying the flooring and remember to allow for this if your room width closely matches the width of the material you're laying.

### Prepare the surface

Clear the room of furniture and prepare the floor surface as necessary (as mentioned last week). Then leave the new flooring in the room where it is to be laid for 48 hours to acclimatise; it's best to unroll it when it's delivered and either lay it out flat (with a fold or two across the width) or roll it up again loosely and stand it on its end.

### Scribe the edge

Unroll the sheet parallel with the longest straight wall in the room, and push up one edge against the skirting board. Let the other edges lap up the other walls at this stage. Then slide the length away from the skirting by about 25mm, and position your scribing block on it with the end holding the pen nearest the skirting. Keep this end pushed firmly against the skirting, and with your left hand holding the pen and your right hand gripping the block draw the block towards you so the pen scribes the profile of the skirting on the sheet.

### Cut the edge

Using a Stanley Trimming knife, cut along the scribed line, following it as closely as possible, and discard the off-cut. Now slide the sheet back against the wall to check its fit. Trim locally as necessary.

**Trim the waste**

If there is more than about 50mm of waste riding up the skirting boards along the other three walls, trim it off roughly to leave about 50mm all round ready for the final trimming. Make sure you leave enough waste material across door openings to allow the floor-covering to reach to the position of the threshold strip.

**Cut internal corners**

Next, make cuts into the waste at an angle of 45 degrees at all internal corners to allow the rest of the sheet to lie flat. Do this in stages, so you don't cut too far in. You can't put it back if you make a mistake.

**Cut external corners**

Approach external corners with care. At a chimney breast, for example, press the sheet into the angle across the face of the breast wall, fold the surplus back and mark the position of each external corner on the underside of the sheet. Then cut in from the waste edge of the sheet towards this mark at an angle of about 95 degrees, extending the cut until the sheet lies flat around the corner with the waste material lapping up the skirting on each side. It's easy to make mistakes, so think before cutting.

**The final trimming**

When the flooring is lying flat, it is time to do the final trimming round the rest of the room. First trim a side adjacent to the scribed edge. Start at one end of the wall you scribed earlier, and with your metal rule/straight edge, press the sheet into between the floor and skirting. Then push the knife blade through the sheet and draw it along the metal rule/straight edge, holding the knife against the skirting to follow the floor-skirting profile. Trim in this way to remove waste from other edges. Check that the flooring fits all round, make further cuts if necessary.

**Cutting awkward shapes**

At awkward obstacles, such as door architrave’s, use a profile gauge (available at most hardware shops) to take an impression of the architrave's profile and use this to mark and cut the sheet to fit.

Where gas pipes rise through the floor, make a short right angled cut in from the edge of the sheet in line with one side of the pipe and then trim out a circle to match the pipe diameter. If you have over-cut edges, disguise the gap by pinning lengths of slim beading to the bottom of the skirting board and paint.

**Joining lengths**

In very wide rooms, you can't avoid having a seam across the room between two lengths of flooring. Lay the first length as described along one half of the room. Then lay the second length

parallel to it, and overlap the edges so you can align the pattern carefully. Tape the two lengths together temporarily with adhesive tape, across the join, and cut through both layers with your knife using your metal rule as a guide. Remove the two off-cut strips and check that the edges meet neatly, and the pattern matches correctly.

Then slide the second length back out of the way and fold back the meeting edge of the first (fitted) length.

Stick a strip of double-sided tape to the floor beneath the joint line and peel off the backing paper. Bed the edge of the first length on to it, realign the cut edge of the second length with it, matching the pattern accurately. Then, stick it down well with a steam roller (also used for wall papering) You can then trim the other three edges of the second length as described earlier.

**Cutting around obstacles**

In bathrooms and WCs, you may be faced with the problem of having to cut round basin and WC pedestals. The best way of coping with these is to make a paper template of the room and to cut the entire sheet on a flat floor, elsewhere in the house.

Tape sheets of paper to the floor of the room, which you're going to cover with the sheet flooring and to each other, so that their edges are about 25mm in from the skirting all round.

Use a craft knife to cut the sheets so that they fit roughly round pedestals and other obstacles. Then use your scribing block (noted in our previous column) to draw the room outline (and the outline of any obstacles) on the paper.

Now lift the paper template, lay it on to the unrolled floor covering in another room and reverse the scribing procedure. Let the end of the block follow the line on the template, and the pen will trace out the room's outline on the vinyl. It may be easier to do this with a compass (set to match the distance between the end of the block and the pen tip). You can then cut along the outline with a knife or scissors (easier on curves) and discard the waste.

If you are cutting round a pedestal base, make a straight cut in from the edge of the sheet, so that you can slide the two 'tongues' behind the pedestal. If you carried out the two scribing stages carefully, you should get a perfect fit.

**Securing the edges**

All that remains is to stick down the edges of the sheet (this isn't necessary with some 'lay-flat' brands) and to fit a threshold strip across the doorway, if there isn't one there already.

Use either flooring adhesive or double-sided tape for the edges. Lift back each edge in turn and spread adhesive or bed tape on the floor surface. Then press the edge down firmly all the way along. Repeat the process for the other edges of the room.

Finally, at the doorway tuck the edge of the sheet under the threshold strip. You may have to lift the old one and fit a new one if the previous floor covering was carpet as the jaws of the strip are likely to be too wide and could pose a trip hazard.

**MAINTENANCE -** Before cleaning your floor study the manufacturer's instructions.

**Vinyl flooring:** Sweep or use a damp-mop daily. Wash regularly with a cloth, wrung out in soapy water. Polish with self-shine finish or floor cleaner/polisher.

**Linoleum**: Sweep, dry-mop or wipe over with a cloth, wrung out in soapy water. Polish with wax, self-shine polish or floor cleaner/polisher.

Take advantage of the waterproof nature of the sheet floorings in bathrooms by taking the material up on to the skirting or wall, so that water cannot seep behind them.

**WORDS OF CAUTION**

Never place hot objects on vinyl - they can damage it. Similarly, corrosive liquids such as paint-stripper leave marks.

Never lay sheet flooring near solid fuel fires or boilers - heat discolours flooring.

Mats laid on sheet flooring need a non-slip backing.

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# Rejuvenating Hardwood & Softwood Floors

## RENOVATING WOODEN FLOORS

A natural timber floor can look beautiful if it's sanded, sealed and polished and it's cheaper than laying new carpet.

Timber floors which have been covered with carpet or lino for years, or have varnish or paint which is wearing thin, can be renovated and given a long lasting protective finish. First identify the type of floor you have.

**Softwood floorboards:** You may have plain, softwood floorboards - either square-edged or tongued-and-grooved planks up to 25mm thick and 150 to 230mm wide, nailed to the floor joists.

**Hardwood flooring:** Another type is a decorative hardwood floor. Jarrah, Oak, Mahogany and Teak are the most commonly-found woods, although other more exotic types are also used, but rare.

There are several kinds of hardwood floor. The first consists of slim hardwood planks that are either nailed to the floorboards beneath or are held in place by a system of metal clips. Cheaper versions use veneered ply wood strips instead of solid timber.

The second type is hardwood block flooring, often referred to as parquetry. This consists of small blocks of wood up to 230mm long and 75mm wide which are usually laid in a herringbone or basket-weave pattern. Older or more expensive types are blocks up to 25mm thick, bedded in a bitumen adhesive. Cheaper imitations are again veneered.

The third type is the mosaic panel - a floor tile made up by gluing small fingers of wood on a backing sheet to make up a panel 300 or 450mm square. These are laid like any floor tile, either on an adhesive bed or loose on top of a special underlay.

**Deciding on the treatment** the usual treatment involves sanding the floor with a powered sanding machine to remove the old finish and expose clean, fresh wood ready for sealing and polishing. Any solid wood floor can easily tolerate this, but if the surface is only a veneer then power sanding with a coarse abrasive could go right through it. In this case, gentler methods such as a hand-held belt or orbital sander are advisable.

## BEFORE YOU START

Check the floor structure for signs of woodworm or rot. If you find wood worm, tackle it by lifting the floorboards and spraying water-based woodworm fluid over the affected surfaces before re-laying the boards. If you find rot, call in an expert to assess the problem; DIY treatment is often possible, but may not be effective if dry rot is present.

If the floorboards need lifting during preparation you could put in under-floor insulation. This can be done by stapling plastic netting between the joists to support fibre glass (bats) insulation, or by resting strips of rigid polystyrene insulation on nails driven into the sides of the

joists. With suspended timber ground floors, make sure that air bricks are clear, so the under-floor void is well ventilated, or rot can get a hold.

## TOOLS AND EQUIPMENT

The only specialist tools you'll need for this job are two powered sanding machines, which you can hire. The larger machine is called a drum or floor sander; It resembles a cylinder lawn mower and drives belts of abrasive round a large drum. It has a built-in sawdust extraction unit. The smaller machine is needed for sanding the parts the larger one cannot reach; you may be offered a belt or a disc type. The former Is better because it will not leave scratch marks across the grain.

When you take delivery of the machines, make sure that you are shown exactly how to operate them, and get plenty of abrasive sheets and belts in coarse, medium and fine grades. Buy or hire a face mask at the same time, so you don't choke on the sawdust. Safety goggles and ear muffs are also a good idea, though not essential.

## SAFE SANDING

When using a floor sander, always wear a face mask so you don't inhale the clouds of fine dust which always seem to escape the machine's dust bag. Wear goggles and ear muffs.

**Common sense hints:**

1. Seal the door with masking tape to keep dust out of the rest of the house, and open windows for ventilation.
2. Don't wear loose clothing; close fitting overalls are best. Protect your hands with gloves when handling the abrasive sheets and belts. Always unplug the machine when changing them.
3. Keep the sander's electric cord out of harm's way by draping it over your shoulder.
4. Never start the machine with the drum in contact with the floor, or it will snatch away from you uncontrollably. Stop it immediately if the abrasive tears, or you may jam the drum.
5. Lastly, don't let children touch the machines under any circumstances.

**Next Prepare Softwood Floors**

**Getting a good surface: -** With softwood floors, using a nail punch and hammer, check that all nail heads are punched at least 3mm below the surface. Remove any tacks which have been used to hold down any previous flooring. Fix any loose boards by driving in shorter flooring nails close to existing nail positions, to minimise the risk of piercing hidden pipes or electric cables. Use deeply-countersunk screws if warped boards keep pulling the nails up.

**Filling large gaps: -** If there are substantial gaps between boards, fix them with slim strips of timber planed to width, glued and hammered into place. Gaps everywhere suggest that it would be far quicker to lift all the boards, to re-lay them so they butt together tightly, and to add one or two new boards as necessary to make up the gap when all the old boards have been replaced. Check the measurements of your floorboards before buying new ones: there is a range of standard sizes, but if you have old or unusual boards, you may need to order planks cut to size.

**Replacing rotten boards: -** If you find boards that are split or otherwise badly damaged, replace them with new boards. To lift tongued-and grooved boards, first cut through the tongues along each edge with a pad saw (a long slim saw which looks rather like a knife) or a powered jigsaw. Beware of electric cables and pipes running under the boards. Then nudge the board up from one end with a crowbar or similar lever, using a scrap of timber to protect the end of the adjacent sound board. Cut the new board to fit and nail it in place. If it's not as thick as the others, add cardboard packing under it.

**Turning the boards: -** If the surface is badly damaged, for example through repeated layers of linoleum being tacked down or badly stained, you can try turning over the floorboards. The undersides will be marked where they cross the joists, but apart from that they should be in a better condition (woodworm and rot permitting) than the top surface. Lift just one or two boards first to check their condition.

**Cleaning up: -** Finally, sweep the floor. Then make sure you've got all your tools and equipment with you, close the door to the rest of the house and seal round it with masking tape to stop dust from spreading everywhere. Open the room windows for ventilation, and to help the dust clear as you work.

## PREPARING HARDWOOD FLOORS

With hardwood floors, check for loose blocks or panels, and stick down any that you find with flooring adhesive. Hardwood flooring is often secret nailed in place, particularly the narrow plank types and some of the mosaics. If sections have worked loose they should be re-fixed in the same way, by secret nailing through the tongue into the floor joist. Watch out for pipes and electrical installations.

## NOW WERE READY FOR SANDING THE FLOORBOARDS

**Starting to sand: -** Fit a coarse abrasive sheet to the sander, plug in and switch on to test that it's working. Then start sanding with the machine in one corner of the room. The arm is to work diagonally to begin with, to ensure that all the boards are sanded level with one another, so start by heading for the opposite corner of the room. Then turn around and run back over the same strip. Continue sanding the whole floor diagonally in this way, taking care not to damage skirting’s as you reach the end of each run. Replace abrasive sheets as they become worn.

**Getting a good finish: -** Next, change to medium-grade abrasive and sand the floor parallel with the board direction, again going over each strip in both directions. Work as close to the skirting boards as you can without scoring them with the side of the machine. Then switch to fine abrasive and repeat the whole process again. Empty the dust bag regularly into heavy-duty plastic refuse sacks. It's also a good idea to vacuum the floor from time to time to cut down on the amount of fine dust flying around. Also change the filter in your face mask regularly so it doesn't get clogged up.

**Down to details: -** You can now tackle the edges, and any other parts that the drum sander couldn't reach, using the belt or orbital sander. Work through coarse, medium and fine grades of abrasive paper. Finish off by hand sanding any bits that have been missed.

**Cleaning up: -** When you've finished sanding, sweep and vacuum-clean thoroughly to remove as much dust as possible. Pay attention to joints between the boards, and to the corners. Then use a clean cloth soaked in white spirit - to wipe over the boards.

***Try a different type of finish on your new floor: -***

If you don't like the yellowing effect of varnish, experiment with one of these techniques.

Bleach the wood first with a proprietary wood bleach or a mixture of oxalic acid and methylated spirit. Alternatively, prime the boards with a 50/50 solution of white emulsion paint and water, rubbing it into the grain.

Any water-based solution will raise the grain slightly, so apply this before the final sanding. You can also add 10 per cent white eggshell paint to 90 per cent varnish.

## SANDING HARDWOOD FLOORS

A floor of hardwood timber planks does not usually require quite such drastic treatment as a softwood floor. You should find that simply sanding up and down the planks with first medium and then fine abrasive is sufficient to remove the existing finish and any slight irregularities. Don't forget to check that the floor is not veneered - you may have to lift a splinter of wood from a corner of the room with a penknife.

A hardwood mosaic (block) floor should also be easy to tackle. The main problem is deciding in which direction to sand the floor. You should avoid sanding across the grain of the wood. So, a herringbone pattern should be sanded up and down the room, while a basket-weave pattern should be sanded diagonally. You will then have sanded the grain of the wood diagonally (as close as you can get to sanding with the grain, which gives the best finish). Depending on the condition of the floor, only medium and fine abrasives should be necessary.

Any hardwood mosaic borders round the edge of the room should be sanded with a belt or orbital sander.

## SEALING THE FLOORS

**Filling holes: -** Now with clean, freshly sanded wood exposed, it is time to fill nail and screw holes, plus any other gaps between the floorboards which have not been filled with wood strips. Use wood filler, adding wood dye to the filler if necessary to match the shade of the wood more accurately. Use wood bleach on any deep stains that have not been removed by the sanding. When the filler is hard, sand down locally and wipe up dust with a rag using white spirits as before.

**Adding colour: -** You can change the colour of the floor if you wish by using wood dyes. Follow the manufacturer's instructions carefully; in most cases a single coat of dye is wiped on to the floor with a lint-free cloth, working along the grain.

Test the effect of the dye on an off-cut first, then working over a larger area to develop the application technique. The porosity of wood varies, so test the dye on new wood to see that it matches. Also check the finished effect by varnishing the test pieces. After you have done the whole floor, wipe with a clean dry cloth to remove surplus dye.

**Apply varnish: -** Thin the first coat of varnish with about 10 per cent white spirits, when used on softwood, use it straight from the tin on hardwood. If the wood is porous, it may be quicker to wipe the first coat on with a cloth, rather than using a brush. Allow it to dry for as long as the manufacturer recommends; then sand the surface lightly with fine abrasive on a sanding block, and wipe over with a rag to remove the dust. Apply two further coats using a 75mrn brush, cutting in at the edges with a smaller one. Sand as before. Always work back towards the door so you can get out easily.

**Using coloured varnish: -** You can also apply coloured varnishes. For an even finish, it is best to prime the boards with clear varnish first, as above, before building up two or three coats of coloured varnish. A final protective coat of clear varnish can be added for extra protection.

**Polishing it up: -** Finish the job by polishing the floor surface - either by hand or using a hired floor polisher. Make sure that any rugs or carpets laid over the floor have non-slip pads on their undersides.

**Back**

# Renovating Brass, Copper and Bronze

Brass, copper and bronze are useful and decorative. Treat them with care and they will last for centuries. Proper treatment and regular polishing of brass and copper will keep them looking warm and bright. The treatments needed depend on the age and condition of the items and the finished effect that you want to achieve. A polished finish is one of the most popular, and this can be protected with a lacquer to save on housework. In some situations, you may need to paint in these metals (particularly copper). If so, it is essential to use the correct type of primer to ensure the paint adheres and you get a long-lasting finish.

**Uses for copper, the brass and bronze.**

Traditionally, brass had many functional uses in the home. Because it is durable and does not rust it was used for taps, stop cocks and other plumbing fittings. Indeed, the most modern taps are still made from brass, but they are chrome plated so that you don't continually have to polishing the brass. The now brass taps are making a comeback, particularly in period style homes, where fittings are chosen to be decorative as well as functional.

Another frequent use for brass is as door furniture, on both old and new houses. On the older houses knobs and knockers may have been painted over, often to save on cleaning. You may well pick up brass desk accessories and clock and such items as candle sticks, light fittings and brass plates that have never lost their appeal.

A particularly attractive use for brass is in bed heads and you may find small areas of brass on other furniture, such as the drawer handles, decorative plates, cupboard key holes and so on. The main use for copper in modern homes is in water service piping. Traditionally, it had a use in the kitchen: copper bowls for beating egg whites, copper pans and jelly moulds as examples.

The copper is a pure mental which is easy to bend and shape. It is easily recognizable when untarnished by its attractive reddish-brown colour. Exposure to damp causes it to develop a green deposit called Verdigris. Brass is made by mixing copper with 20-40 % Zinc. New and or well-polished brass glistens like gold. Exposure to air causes it to darken to the point where it is more most unrecognizable. Bronze is another alloy of copper, this time with the addition of 10% tin. Tin does not have any traditional uses in the home, but you may find bronze statues or other ornaments and traditionally it is allowed to tarnish to a deep golden brown known as patina bronze.

**Renovating copper and brass.**

Copper which has been exposed to heat and fumes, and old cooking utensils and brass which has been neglected may have turned quite black. The following are cheaper than proprietary cleaners. Salt and vinegar or lemon and salt. For cleaning small brass items, as a last resort, using harsh abrasives risks scratching the metal, but in bad cases you may have to resort to a nylon pad or scourer and some fine scouring powder. Rinse in warm water and dry immediately or it will darken again.

**Stripping paint from Copper, Brass and Bronze.**

A conventional liquid paint stripper normally used for stripping paint from woodwork, a can be used. As paint stripper is very corrosive make sure you wear protection and the surfaces upon which you a working are well protected. Use an old paint brush a to apply a liberal coat of stripper, following the manufacturer's instructions. Leave for 20 minutes, to let the chemicals take effect. For small items, pour the stripper into a metal or ceramic container and dip the items to be stripped into it.

**Checking the progress.** Use a paint scraper to lift off stripper and softened paint and check that the stripper has worked right through all the layers of paint. Following the manufacturer's instructions apply more stripper if necessary.

**Remove the paint**. Use a paint scraper to lift off all the stripper and paint. Use and old tooth brush to work the softened paint out of corners. Finally, wash the items thoroughly to remove all traces of stripper.

**Applying a new lacquer finish**. Modern brass door furniture and decorative accessories are usually clear lacquered, so they need no polishing. But with time this breaks down, moisture gets underneath and the mental darkens.

**Clean off existing lacquer**. Remove the items and strip the lacquer off with liquid paint stripper; do not used paste stripper which will turn the brass black; or abrasive methods, which would scratch the mental.

**Apply the new lacquer**. Use a clear mental lacquer rather than polyurethane, this can be obtained in liquid form or spray form. Work in a warm room, or the lacquer may go cloudy, and make every effort to banish dust beforehand. Use a new, dust free brush if painting.

**Finishes for copper, brass and bronze.**

**Polished finish**. Once cleaned up, copper, brass and bronze can be left as is and simply polished or buffed up from time to time.

**Lacquered finish**. Special clear lacquers are available, which allow the colour of the mental to show through.

**Paint.** In some situations, you may want to paint these metals. Before painting, clean off any tarnish and any grease with fine steel wool dipped in white spirits, then prime with an all-purpose primer or zinc chromate primer before undercoating and top coating. If you are using emulsion paint, primer is unnecessary.

**Maintenance.** To keep brass and copper looking clean, use a proprietary mental polished and polish regularly.

**Liquid brass polish** is best used for items with a lot of detail as it can be applied with a tooth brush, but it can also be very hard to remove.

**Impregnated wadding** is convenient to use and good for smooth items.

**Heavy duty polish** is available in a tube for neglected copper.

**Powders Polishes** are also available for cleaning metals. They are either mixed to a paste, or come ready mixed and are applied and then polished when dry.

**Traditional brass cleaner**. Brass can also be cleaned using two items that you probably have already at hand in the kitchen. Vinegar and oats or oat meal. This method has been used by the Portuguese for generations. Mix 3 to 4 tablespoons of oats with enough vinegar to form a thick paste. Spread the paste over the item with your hands, work it well into any decorated or indented areas. Leave to dry for a few minutes then wipe off with a soft cloth.

**Cleaning brass door furniture or Fittings in situ**. This is very difficult to do effectively without damaging surrounding paint work or wood. For a really thorough clean it is well worth unscrewing the fittings. Otherwise protect the surrounding area with strips of masking tape. Do not press the masking tape in place too firmly and lift it gently when you have finished polishing, to avoid damaging the paint work.

**Renovation and maintenance of bronze**. Bronze requires a slightly different treatment to copper and brass, as part of its attraction lies in the depth of colour of the patina. Bronze should not need much attention, unless it has been left out side and allowed to get badly corroded. Corrosion can be treated with a mixture of 9 parts of water and 1-part vinegar. Dip a sponge in the mixture and wipe over the item then dry thoroughly. Once the item is cleaned it should be dusted and rubbed with a soft cloth, never polish bronze. If bronze ornaments are in a room where they get a build-up to of greasy dirt (in a kitchen) you can wash them occasionally in hot water with a mild detergent.

**Tips**. To change the colour of brass to an antique green look, use a solution of 100 grams of copper nitrate dissolved in 100ml of water. Heat the solution to 60-degree C and brush over the item to be antiqued every few hours, then leave overnight to dry, then rinse and dry.

**Back**

# Rejuvenating Iron & Steel

Iron and steel are used much more widely in the average home than you might at first think, for they feature both in its construction and furnishing, with polished, painted, or lacquered finishes.

## IRON IN THE HOME

Iron and steel crop up in many places. Some houses have metal window frames; others may have cast-iron fire places inside, gutters and downpipes and perhaps railings outside, and wrought-iron gates. Modern heating systems feature mild steel radiators; old ones have steel pipes and cast-iron radiators.

These metals are not widely used for furniture nowadays, but they still crop up: old iron bedsteads, modern tubular steel beds, high-tech storage systems, chairs and light fittings.

In the kitchen metal is the most common material used for cooking utensils. There are likely to be tin-plated mild steel baking pans, frying pans and woks; and cast-iron casseroles. The sharpest knives are made of carbon steel.

Mild steel is the basic metal used to make nails and screws, brackets, hooks and other fittings, utility door and window furniture and the cabinets of white goods like cookers and fridges.

## KNOW YOUR METALS

Iron is a pure metal. Cast iron is iron mixed with a small amount of carbon and traces of other metals. It is hard and heavy, but brittle, and breaks if dropped on a hard surface. Wrought iron is iron mixed with silicate slag. It is very malleable and so used for decorative but durable items like gates. Galvanised iron has a coating of zinc to prevent rust.

Steel Mild steel (also known as carbon steel) is iron mixed with a minute percentage of carbon which makes it easier to work. This is the basic all-purpose utility metal formed into bars, rods and sheets.

The simplest way of recognising iron and steel is that if unprotected by a decorative finish or by oil and grease, they develop rust spots almost immediately when exposed to water or damp air. Slight surface rust can be removed easily with abrasive paper, but if left untouched it eats into the metal,

## CHOOSING A FINISH

Because iron and steel rusts so easily, it is essential to give them a moisture-proof coating after renovation. You can either keep the look of the metal, with oil, or varnish, or use a proprietary paint finish, specifically designed for metal. You can also prime the metal using a metal primer and then under coat and top coat the metal with ordinary household gloss or satin finish paints - to match the woodwork in the room, for example.

## TOOLS AND EQUIPMENT

There are no specialised tools needed for renovating iron and steel, but you will need plenty of rags, old brushes (including toothbrushes) and a wire brush and some steel wool. Many of the materials (paints, rust treatments and so on) are more expensive than the equivalent materials for treating wood, so limit yourself to small items to start with.

## CHOOSING A TREATMENT

There are various treatments you can give iron and steel fixtures and furniture, depending on the condition of the item and the type of finish you want. Paint can be rubbed down or completely stripped off if it is in bad condition or if you want a metallic finish. Most important, however, is to get rid of any rust; this can be done in a number of ways, depending on the extent of the rust and the shape of the item being treated.

## STRIPPING PAINT FROM IRON WORK

Stripping paint from metal is usually easier than from wood because there is no grain for the paint to sink into and get a tenacious grip. It can still be quite time-consuming if the area has multiple layers to get through, but it is well worth doing with decorative items because only stripping will reveal the original outlines long obscured by paint. There are several different techniques and you may find you need to use a combination of the following methods.

### Using chemical strippers

Conventional semi-liquid paint strippers work well on metal, particularly small items like over-painted door furniture which can be soaked in a bath of the stuff. (Do not use a plastic container - it will quickly dissolve! Old baking tins or foil pie dishes are ideal.) Use as directed. An old toothbrush is good for working paint out of crevices, even though the stripper will eventually attack the plastic and cause the bristles to drop out. If the product is washed off with water make sure to dry it quickly and thoroughly, otherwise rust will get a hold. (A hair dryer is useful for large items; stand small ones over radiators or put them in a cool oven.)

Unfortunately, the new paste strippers, which are so good at removing multiple layers of paint, in one go, are not recommended for metal as they turn it black. But if discoloration does not matter- say on an old cast-iron fireplace - go ahead.

### Abrasion

Removing paint with abrasive paper, even in a power tool, is the least effective method of completely stripping an item. But if the paint is flaking badly and not too thick, scraping off the worst and finishing with a sander is a simple way of tackling small flat areas, especially if only part of the item needs stripping. If a painted item is to be re-painted, then a light rubbing down with sand-paper is all that is needed, unless the paint is badly pitted.

### Using a blowtorch

Burning the paint off with a blowtorch is a good method for metal and it will not get scorched, as tends to happen with wood. If possible work in a garage or out of doors; if indoors be very conscious of the risk of fire: have the immediate area completely bare of furnishings and furniture, and never leave a blowtorch lit and unattended. If working on a fireplace surround,

strip off any wall paper around it. Protect the floor from the falling paint, which is very hot, dampen floorboards, and, if a fitted carpet cannot be removed, cover it with dampened hardboard, not newspaper.

Do not use a blowtorch on metal window frames; the heat will invariably crack the glass. If you are using a blowtorch on cast iron, be careful not to overheat any spots as this can cause the cast iron to crack.

**Put it on the bonfire!**

In some cases, heat can be applied by simply sticking the item in a bonfire. For example, burning an old timber gate gets rid of the rotten wood but preserves any decorative metal fittings, completely free of paint.

**Using a hot air blower**

Hot air blowers work at much lower temperatures than blow-torches and are safer, but even so use them with caution. They are less effective on metal than on wood as metal is a good conductor and dissipates the heat.

**REMOVING RUST**

Whatever the original finish and the new finish you choose, it is essential to get rid of all traces of rust at this stage. Again, there are several techniques to choose from, according to the finish you want.

**Using a wire brush**

Using a wire brush in a power tool is a drastic treatment, suitable only for coarse, mainly flat,

items such as window frames. If the rust is not very extensive a hand wire brush, or hand-sanding with emery paper will do the trick. Just brush the item first in one direction and then in another until all signs of rust have gone. Try to avoid scratching the metal more than is necessary. Steel wool will help to get the final shine.

**Using a patent rust remover**

For ornamental items with lots of curves and crevices, brush on patent rust remover; wipe or wash off following the manufacturer's instructions and allow the article to dry thoroughly before refinishing. With wrought-iron garden furniture, or anything that stands on the ground, take special care to remove all rust from underneath, as if it is left, the rust will continue to develop under the new finish and soon spoil it.

**Using a special paint**

There are special paints available which are formulated to chemically de-activate the rust. If you can't find them at your DIY store, try a good car accessory shop.

First, use a wire brush to remove any loose rust. Then apply the paint, following the manufacturer's instructions. Some types act as a primer/ undercoat, to be followed by any normal

gloss or satin finish top coat; others are complete paint systems in one coat. “Hammerite” is an anti-rust primer, an undercoat and a top coat which dries quickly to a smooth or hammered metal finish. Ask your DIY store as there are many other proprietary brands available.

## REPAIRING DAMAGED IRONWORK

Glass fibre (or, more strictly speaking, glass fibre reinforced plastic) can be used to repair small dents or holes in iron surfaces if you are going to apply a paint finish.

### Choose a suitable kit

There is a wide range of fibreglass kits available, each suitable for different types and sizes of repairs. If your local DIY store does not stock a suitable kit, try a car accessory and repair shop. Some kits include mats of glass fibre, together with resin and hardener, for a strong repair (e.g. to splits, cracks and holes in metal drain pipes or water tanks).

For small repairs, ready-mixed metal pastes are available: this consists of a paste which once exposed to air dries to a hardness like metal. It is suitable for making small repairs, where strength is important - on cast iron fire surrounds, for example.

### Using the two-part epoxy mix.

Prepare the area to be mended, Clean the area of paint and rust first, and ensure it is thoroughly clean and dry.

Mix the ready-mix paste, following the manufacturer's instructions, squeeze equal lengths of paste and hardener on to a scrap sheet of cardboard.

Use the spatula to mix the paste and hardener thoroughly. Work them together for about 30 seconds. Apply to the damaged ironwork.

Spread the paste on the damaged area, and use the spatula or an old chisel or similar instrument to shape the filler to match the existing moulding or pattern. The filler will start to dry in about five minutes, so work quickly and sand down the filled area. Leave the filler to set hard - this will take about ten minutes. You can then sand the filler smooth if there are any irregularities.

### Paint over the work

Ensure that the rest of the repaired item is dry and free from dust and grease. Use a metal primer to paint over the surface of the bare metal and the filler, followed by undercoats and top coats as appropriate.

## FINISHES FOR IRON

**Oiling the surface:** with household mineral prevents the metal from rusting. Apply it with a soft cloth, working in a circular movement to ensure all the surface is covered. This finish is mainly used for tools, rather than furniture and fittings, as it rubs off on clothes.

**Applying a primer:** if you want a painted finish, you will have to prime the surface (unless you use an all-in-one paint. Be sure to use a metal primer, not ordinary wood primer. For iron

and steel (ferrous metals) use red oxide or zinc chromate primer. Note For galvanised metal use a calcium plumbate primer.

**Applying oil-based paints:** Standard gloss and satin-finish oil paints are all suitable for metal. It is useful to be able to use these paints if you want to paint an item (such as a fire surround) to match the woodwork in a room. Satin black is usually used for door and window furniture and matt black for items like garden gates if preferred. Applying emulsion paints. Vinyl emulsions, being water based, are not suitable for painting metal. But they can be applied to radiators if desired to match the wall, provided these have a perfect factory paint finish.

**Heatproof enamels:** These stand up to the very high temperatures reached on fire grates or ranges being used - usually sold as stove black.

**Metallic paint:** These rust-resisting paints dry to a glossy finish with either a hammered or crazed appearance. They are very tough, also heat resistant, and come in a range of colours. Only one coat is required; no primer or under coat. They are useful for exterior metalwork, and for re-finishing metal furniture.

**Black lead** (grate polish) Housemaids in Victorian days used this to smarten up fireplace surrounds and grates, and may still available. It is a black cream which is applied with a soft cloth (use a tooth brush for crevices) and then buffed with another cloth to build up a soft, silvery shine and moisture-proof finish. As it contains carbon, take care not to get any polish on surrounding wallpaper or woodwork.

**MAINTAINING IRON AND STEEL** When these metals are painted. no maintenance is required beyond normal dusting or on occasions, wipe with a damp cloth. But keep an eye on painted metals for signs of any breakdown in the paint film, as once this happens the way is open for moisture to get in and rust to build up. A light rub-down and a fresh coat of paint may be all that is necessary if you act quickly.

**Oiling polished metals** Metals which have been oiled should be re-treated from time to time. Rub down with emery paper if there are any traces of rust, then apply mineral oil as before. Work in a circular movement so that all the surface is covered.

**Care of kitchen utensils** Clean carbon steel knife blades with scouring powder, and dry

thoroughly. To prevent cast iron frying pans and woks from rusting, dry thoroughly after washing and then put them on a warm radiator or in a hot oven. If you are not going to use them for some time, rub them over with cooking oil to prevent rust forming.

**Using black lead** to maintain a silvery finish on stripped cast iron fire surrounds, polish as regularly as possible with black lead (grate polish if available). It comes in a tube, and contains carbon and graphite, which together give an almost pewter-like finish, and is available from most good fireplace stockists or hardware stores. If you are polishing a fireplace which is made totally of iron, without a wooden surround, hold a large piece of card against the wall at the edge of the fire surround to prevent the black-lead marking the wall.

**Back**

# Wood Finishes (The Traditional Looks)

Both new wood and renovated furniture take on extra warmth when properly stained and polished.

New wood looks almost unnaturally clean, while old wooden furniture often must be so heavily treated to remove unwanted finishes that it too, can look sparkling. However, part of the charm of wood is the rich colouring which comes with years of careful polishing. The depth of colour enhances the grain, and the patina which builds up over the years is quite different from the brash glossiness of modern polyurethane varnish. To re-create a traditional look (or give an antique look to new furniture) the wood must be stained before the final finish is applied.

## KNOW YOUR WOOD

It is useful, when working with wood, to have some idea of the texture and quality of the wood obtained from different types of tree.

**Softwood** Most of the wood available from your local timber merchant is likely to be softwood, particularly pine. Softwoods come from coniferous trees, which have a particularly fast growth period during the spring. This gives the tree wide rings, and wide bands of marking on the wood cut from it - paler wood for the spring growth, getting gradually darker. If you are buying softwood, avoid pieces with large knots: the knots will darken with age and may even fall out. Furthermore, because the grain in knots runs in a different direction to the grain in the surrounding wood, you will have difficulty both working and finishing the surface. Although they are called soft woods, some are quite hard (and some hardwoods are very soft).

Many ordinary pieces of Victorian furniture were made of pine which was then painted. During the 1970s the fashion was to strip away the layers of paint and polish the furniture with a beeswax polish. Now, however, the trend is again towards the painted finish which was originally intended.

**Hardwood** At your local timber merchant, the most frequent use of hard wood (ramin or jarrah) is for fine mouldings and headings, which are difficult to produce from pine because of its knots and open grain. For new hardwood you will have to go to a specialist timber merchant. However, you may have renovated a piece of furniture made of hardwood, or you may want to polish shelves which have a hardwood finish, such as teak-veneered chipboard.

Hardwoods most commonly used for old furniture include oak, mahogany, ash, elm and beech. There are also more ornate woods, such as maple, walnut, cherry and rosewood, which have always been kept for better pieces because they are more expensive woods.

## CHOOSING STAINS

Professional woodworkers have developed their own recipes for staining wood, but there are also many proprietary brands available at good DIY stores. The type of stain you choose depends on the type of wood you are staining and the effect you are after, as well as cost and ease of use of the stain. Most dyes come in screw top tins, and you should always follow the manufacturer's instructions. Water-based stains are available ready mixed, although some professionals prefer to

use powders that they mix themselves. They are reasonably priced and penetrate the wood well. Water based stains go a long way in terms of the area covered, and they can be mixed together to create a wide range of colours.

However, because of the water content, they tend to raise the grain of the wood when applied, which means that the stain is taken up unevenly. The best solution to this is to dampen the surface to be stained first, then rub down very well with sandpaper so that when you do apply the stain, there is less chance of the grain rising.

**Oil-based stains**: - These have the advantage that they don't raise the grain, but on the other hand the colour does not penetrate so deeply into the wood. They are not suitable if you want to apply a wax polish, as the wax may draw out the stain.

**Spirit stains**: - Dry quickly and they do not raise the grain. They can be used on a surface which is slightly greasy or waxy. However, because they dry quickly it is difficult to keep a 'wet edge' going, and you may find that you get a blotchy finish if you do not work confidently. They also fade more than water - or oil-based stains.

When staining wood, the closer the grain, the more evenly the wood will take up the stain. Open-grained pine, for example, will take up more stain in the soft, pale (spring growth) areas than in the closer grain. With highly figured wood it is advisable to use a stain which is less penetrating (such as an oil-based stain).

**FINAL FINISH**

After staining (or indeed without staining), there is a wide choice of finishes you can apply. Here we look at preparing the surface for the final finish and the techniques involved in one traditional finish: French polish.

Alternatives to French polishing, such as oiled and waxed finishes as well as coloured and plain polyurethane varnishes for wood will be discussed later.

**It is always good to make a check list of what is required, when you want to: -**

Strip Furniture of previous finishes or (new wood to be treated)

For preparation you need: Wire wool and White spirit. Sanding block and fine sand paper. Power sander or attachment for electric drill (optional). Wood filler (putty) and some cloth

**For staining:** Water- or oil-based stain. Cloths for cleaning and polishing. Cloth or brush to apply stain

**For French polishing:** French polish. Cotton wool. Cotton cloth or handkerchief. Linseed oil. Methylated spirit.

**PREPARATION**: Whatever finish you intend to apply, careful preparation is essential. On old furniture, any existing finish should be removed first: use one of the heavy-duty paint removers for painted furniture, or a specialist paint and varnish remover which removes all finishes (paint, polyurethane, cellulose varnish, French polish, etc.

**Cleaning with wire wool:** After you have stripped the existing finish, rub the surface down with fine grade wire wool dipped in white spirit, this removes any stripper which is left on the surface without raising the grain. Work with the grain.

**Using a sanding block**

For a good finish, on both renovated and new surfaces, a thorough sanding is essential. For hand sanding, use progressively finer grades of sand paper, wrapped around a sanding block.

If you do not want to buy a special sanding block, you can easily improvise with a block of cork, or an off-cut of wood with a piece of foam or fabric wrapped around it to make a sanding block with a bit of give.

Always rub in the direction of the grain.

**Using a power sander**

On flat, new, wooden surfaces and furniture which is not valuable, you can use an orbital sander. This has a rectangular sanding surface which moves in an orbital motion. Replace the sheets of sand paper as they become clogged, start with a medium grade and progress to finer grades.

For very heavy work, professionals generally use a belt sander, which has a removable belt of sand paper which runs over rollers at each end of the sander. Always work with the grain.

**Using a disc sander**

If you do not have (and do not want to buy or hire) any specialist power tools, you can get a sanding attachment to use with a power drill. Avoid using disc sanders on large, flat areas such as doors or table tops, as it is difficult to get an even finish - swirls tend to appear where the edge of the disc bites into the surface. If you decide to use a disc sander, hold it at a slight angle, so that only part of the abrasive disc comes into contact with the wood. Apply a minimum of pressure and keep the machine moving with the direction of the grain, so that it does not create marks in the wood.

**Drum attachment for drill**

You can also get drill-mounted drums, which have the advantage of sanding only in one direction. They are useful for curved surfaces, such as banisters or chair backs.

**Grain filling**

If you want a smooth finish, and the wood has natural lumps and unevenness along the grain, you can use a wood filler before staining or applying other finishes. Wood filler is a proprietary paste, which is thinned with white spirit and then rubbed into the surface with a canvas or cotton cloth. Choose between natural, mahogany, oak and teak shades.

**Clear the surface**

When the wood filler has gone dull, rub off the surplus with a clean cloth, working across the grain. The surface, whether it is new or old wood, is now ready for a new finish. Note that if

you intend to use wax polish on the surface, you do not need to fill the grain, as the polish will do this over the years.

## USING PROPRIETARY STAINS

Always test proprietary stains first on off-cuts of similar wood, to check that you will achieve the right effect before you start work. You should also test the effect of the final finish you intend to apply over the stain, most finishes tend to darken stained - or unstained surfaces. Below we will try to give instructions for water- and oil-based stains. -Spirit stains are less popular and are consequently not so readily available.

**Choose the colour** Decide on the colour you want the finished article to be, most commonly, you are likely to be staining new or freshly stripped pine, to give it a mellow finish. For pine, avoid red tones of stain, such as mahogany, which are better for close-grained woods. Several manufacturers produce 'antique' pine tones - but you may find these are not quite what you had in mind. Test them, and, if necessary, mix different tones until you get the right effect.

**Raise the grain** If you are using a water-based stain, it is a good idea to raise the grain and sand before staining. Wipe the surface with a damp cloth so that a little water soaks into the wood. Allow to dry thoroughly, then sand the surface by hand.

**Apply the stain** Whatever type of stain you are using, start with a clean, dust and grease-free surface. Pour some stain into a saucer or small dish and apply it with a brush or a cloth. Work with the grain, and work quickly so that the stain does not dry out before you have started on the adjacent area. (If it does, you will get a blotchy line where you have applied two coats of stain.

**Remove excess stain** with a water-based stain, wipe off the excess stain immediately by rubbing a clean, dry rag over the surface.

**Leave to dry**

Leave the stained surface to dry (a couple of hours for a water-based stain, at least six hours for an oil-based stain). Then check the effect and apply a further coat to darken the colour if necessary, until you have the shade you want.

## FRENCH POLISHING

French polishing is normally used to give a high gloss finish to fine (hardwood) furniture: it's not a finish you would want to apply to a modern pine dresser, for example, or a renovated pine chest. It was introduced in the early 19th century, and gives a very attractive finish, showing off the grain of the wood well, but it is not resistant to either heat or knocks. The polish used for French polishing is made from shellac, which is derived from lac insects in the East. Several thin coats of the polish are applied with a pad of material. It takes a certain amount of practice to get a perfect finish, so try out the technique first on a small, less valuable piece of furniture, before starting on the family heirlooms!

When applying French polish, it is important to work in a clean, dust-free environment. It should also be a warm, dry room, as coldness will stop the polish 'flowing' and dampness will make it go cloudy when it is applied.

**Make a rubber**

Take a handful of ordinary cotton wool, and place it in the middle of a square of clean, fluff free cotton cloth a gent's handkerchief is ideal. Fold the edges of the cloth over the cotton wool and roll them together, the folded edge side goes in the palm of the hand, giving a smooth surface on the other side which is known as the sole of the 'rubber'.

**Charge or fill the rubber**

Open the rubber, and pour French polish on to the cotton wool so that it is well soaked. Then wrap the cloth round the cotton wool again. When you squeeze the rubber slightly the polish should ooze out through the cloth. Lubricate the rubber by dipping your finger in linseed oil, and dabbing it on to the sole of the rubber.

**Apply the polish**

The polish will set into ridges, if it is allowed to flow freely on to the surface of the furniture: it is important to keep the rubber moving at all times, working in an oval and figure eight movements, and gliding the rubber on and off the surface so there is no hard edge. You will find that the polish flows freely through the rubber at first but as you continue, you will have to apply more pressure to the cotton wool inside the rubber to make the polish flow out. Once the surface is thinly coated, finish the ends working across the grain and then work in long even strokes with the grain. When you have covered the surface, leave it to dry.

**Build up further coats**

The polish will take about 20 minutes to dry. When it is dry, apply a further coat in the same way. Apply up to five coats in one day, then leave to harden overnight before repeating the process, you should build up about 15 coats altogether.

**Finish with methylated spirit**

The next stage is known as 'spiriting off'. When you are happy with the polish, apply a few drops of methylated spirit to the rubber. Polish up and down the grain with long, even strokes. The methylated spirit dissolves the polish slightly, so the rubber should slide easily over the surface. Never let it rest in one place, or it will take off too much polish. If it starts to drag, apply more methylated spirit. This process removes the linseed oil from the surface. Finally, rub up the surface with a soft duster, then leave to harden for a week.

## LIMING WOOD

Liming is a traditional finish for wood which lightens the tones rather than darkening them as stain does. It is traditionally applied to oak and is really a specialised method of grain filing. Work outside to prevent the lime splashing any surfaces and to allow any fumes to disperse.

First bring out the grain by wetting the wood. Brushing it with a wire brush first will open the grain even further. Then mix ordinary garden lime with water to make a creamy solution which you can paint on to the surface. Leave it to dry, then rub down lightly so that you clean the lime off the surface where the grain has been raised. Finish with thinned white shellac; polyurethane yellows the wood.

**Vinegar Graining** (continued from last week)

Before tackling a piece of furniture, it is advisable to try the technique on a sample board. You can experiment with the proportions of the glaze and check on the drying time. More important, though, sample boards give you the opportunity to test different ways of making patterns in the glaze. Common techniques include making a sausage of putty or plasticine and rolling it over the wet surface for a rope effect; stamping a blob of putty over the surface, either regularly or at random; patting the surface with crushed or folded paper, or a screwed-up polythene bag; or combing the paint with a cardboard comb for a dragged effect. You can improvise with anything that comes to hand: pieces of string, feathers, or even your fingers. Bunch your fingers tightly together and use just your fingertips in some areas, and soften the effect by dabbing the surface with the fleshy pads of your fingers in other areas.

As with bambooing, the painted item must be varnished to protect the finish. In fact, vinegar graining will simply rub off if it is not protected. Use gloss or semi-sheen polyurethane varnish. Three coats are the minimum for vinegar grained furniture: apply two extra coats on pieces which are likely to be subjected to heavy wear.

**VINEGAR GRAINING (try it out)**

Try out the technique and decide exactly how you are going to apply the pattern before you start to work on a piece of furniture.

**Prepare the surface:** Rub down the surface thoroughly have pieces of furniture stripped professionally in a caustic tank if there is a build-up of layers of paint. It is important to start with a dust- and grease-free surface. Apply a base coat if necessary, and prime any bare wood: Apply undercoat and finish with a flat, oil-based paint, this could be undercoat, or an oil-based eggshell paint, rubbed down with wet-and-dry paper and soapy water to reduce the sheen. When dry, wipe with vinegar.

**Mix the glaze:** In a small bowl or jam jar, mix together 100mI vinegar, 5ml sugar and a squeeze of washing-up liquid. Put a couple of teaspoons of powder colour in another bowl and slowly stir in the vinegar mixture to make a thin glaze, mixing thoroughly so there are no lumps, until you think the consistency is about right - it should be something like thickened cream.

**Test the glaze:** Brush the glaze on to a sheet of scrap paper, brushing it out quite thinly. Pick up the sheet and hold it vertically. If the colour doesn’t run it is too thick and you will need to thin it with more vinegar.

**Apply the glaze:** Use a clean 2cm-wide paint brush to apply the glaze thinly and evenly over the surface. Leave for a couple of minutes to become tacky. Do not worry if brush strokes show at this stage - this will only add to the finished broken effect.

**Add the pattern:** Using putty, your fingers or whatever you find works well, start to roll or print the pattern on the fresh paint. If you aren't happy with the effect wipe off the paint and start again, or apply more vinegar glaze. Also apply more glaze if it dries too quickly.

**Allow to dry:** When you are happy with the effect, leave the item to dry out thoroughly: this should take about an hour. The colours will deaden as they dry.

**Protect the finish:** To protect the finish, apply at least three coats of semi-matt polyurethane varnish, rubbing down lightly between coats. The varnish will bring life back to the colours of the graining.

**USING WOOD DYES**

Use wood dye to colour a bleached-out stain or to give the whole piece a richer colour before sealing with the intended finish. The colour of the wood will affect that of the dye - as the dye is not removable, test an inconspicuous part of the furniture first.

Sand down Use medium grade glasspaper wrapped round a sanding block, and rub gently along the grain of the wood. Finnish with fine-grade sandpaper in the same way, then remove all the dust with a dry paint brush.

End grain (a surface cut across the grain) will absorb more dye and show up darker than the rest of the wood. To avoid, seal end grain with two coats of white or transparent wood sealer

Apply wood dye: - Shake the dye tin well, then pour a little dye into a glass dish or a tin with a wide top. Apply the dye liberally with a lint-free cloth and rub along the grain of the wood. When staining a large area, start at one edge and work quickly and evenly across to the other edge. Make sure that you don't go over the same area twice - overlapping will produce a dark line.

Remove surplus dye Following manufacturer's instructions, use a clean cloth to remove surplus dye and even out the colour. Leave to dry for recommended time before sealing with your choice of finish - varnish, oil or wax.

**POLYURETHANE VARNISH**

Seal the wood first with a coat of clear varnish thinned with 10% white spirit, before finishing with one or two full coats of clear or coloured varnish.

A varnish finish takes several days to really harden so don't put ornaments or other objects on top too soon or it will mark. Once dried hard, a thin coating of wax can be applied to mellow its appearance.

Prepare the surface If necessary, sand all surfaces smooth with medium then fine-grade sandpaper in the direction of the grain, and round off the edges. Dust off with a dry paint brush, then wipe over with a cloth dampened with white spirit, leave to dry thoroughly.

Prepare to varnish For best results, make sure you are working in a clean, dust-free room. For the first sealing coat, pour some varnish into a glass jar and thin with l0% white spirit. Apply subsequent full coats straight from the tin.

Apply the varnish  Dip the brush into the varnish up to about half the length of the bristles. If the brush is overloaded press it against the inside of the jar or tin - don't drag it across the rim as this causes bubbles in the finish. Varnish one complete area at a time. Starting in the middle of the surface, brush along the grain towards the edges. Then brush lightly across the grain to spread varnish evenly; finish off with the grain. Avoid over-brushing.

**Wood shades** Wood dyes come in various standard wood colours - from palest pine to darkest ebony - but dyes of the same make can also be mixed together to get just the colour you want.

**Sand down between coats** Leave each coat to dry hard overnight, and rub very lightly with tissue paper after each coat except the last. Wipe with a cloth dampened with white spirit to remove dust before applying the next coat of varnish.

**Cleaning up**  Clean varnishing brushes with white spirit. Then wrap up tightly in paper so that the bristles are held in place while drying - splayed out bristles make varnishing more difficult.

**AN OIL FINISH**

Apply two to three coats of teak or Danish oil to stripped wood. Once oiled, refresh the wood with just one coat of oil when necessary or apply a thin coat of wax for a softer, more subtle sheen.

**Apply the oil**

First prepare the surface as for varnish, Then, using a clan soft cloth, apply oil liberally to the wood and rub it in well and hard along the grain. After a few minutes, wipe off excess oil with a new cloth.

Leave for 4 to 8 hours until the oil has completely dried. Then apply two or more coats of oil to build up a good hard coating - allow each coat to dry thoroughly before applying the next one.

**A WAX FINISH**

For a more durable finish, first apply a sealing coat of white or transparent French polish with a soft doth. Then finish with wax, to keep a wax finish looking good, apply a very fine coating of wax every couple of months.

**Apply the wax**

Prepare the wood surface as for varnish, and make sure that the wood is completely dry before waxing. Then spread wax polish sparingly on to the wood with a cloth - or use an old toothbrush where there are carvings and mouldings. Polish with a soft cloth, working the wax well in, and leave for a few days to harden before applying a second coat in the same way. Finally, buff up well with a duster for a good shine.

**USING LIQUID STRIPPER**

Protect the floor by standing the furniture to be stripped on a sheet of plastic covered with plenty of newspaper.

Remove all fittings. Pull out drawers, unscrew hinged doors and remove metal fittings such as handles and knobs; strip separately if necessary and store in a safe place until the job is finished.

**Apply stripper** Pour some stripper into an old tin or glass jar. Using an old paint brush, stipple a thick layer of stripper on to the surface and work it well into carvings and mouldings.

Most finishes will start to lift and bubble; some simply soften so test with a scraper after about 10 minutes. Don't leave longer otherwise it will dry and be difficult to remove.

**Scrape flat surfaces** Use a paint scraper to remove the softened paint off large flat surfaces work with the grain and take care not to scratch or gouge the wood. Put your paint scrapings in an old paint tin as you work rather than letting them drop on the floor. Finally, dip a piece of steel wool (grade 3) in the stripper and rub along the wood grain to remove any residue paint.

**Clean awkward surfaces** Use (grade 3) steel wool to clean up any carvings or mouldings. A small pointed tool - an old nail file or a toothpick - is handy for digging softened paint or varnish out of cracks and carvings.

**A second coat** If the old finish is very thick, several applications of stripper may be necessary. Don't try digging too hard at stubborn areas with the scraper as you can easily damage the wood which has also been softened by the liquid stripper.

**Wipe down** Following manufacturer's instructions, wipe the wood down with a rag dipped in white spirit or water to remove any trace of chemicals. Do not use water on veneers.

**SAFETY** When using stripper or bleach, wear protective vinyl gloves and old clothing. Work in a well-ventilated room (a garage is ideal), make sure there are no naked flames and don't smoke.

**BLEACHING**

After stripping, use a proprietary wood bleach to remove any dark stains or to lighten the overall colour of the wood.

Apply first solution (A) Using a 2-part bleach, pour some of the first solution (A) into a glass jar Then apply the solution liberally to the wood with an old paint brush and leave as recommended. Rinse the brush out in water.

Apply second solution (B) Pour the second solution (B) into another jar. Brush on to the wood then rinse the brush out in water. The reaction of B on A bleaches the wood. Leave until the wood is pale enough but not longer than the manufacturers recommend. If the wood is very stained or not as pale as you’d like, you can always repeat the bleaching process - re-applying both solutions, A and B.

Wash off bleach  Wash the wood down with a sponge and a solution of one teaspoon white vinegar to ½ l of cold water to neutralise the bleach. Repeat using a clean sponge with a fresh solution and leave the furniture to dry.

**FILLING THE WOOD SURFACE**

If necessary, sand surfaces smooth with fine-grade sandpaper before filling. Always use a sanding block on flat surfaces and sand in the direction of the grain - never across it.

**Fill cracks and holes** Press wood-stopping into the crack or hole, using a knife or your finger, and scrape off any excess from the surrounding wood. When dried hard, sand it smooth with fine-grade sandpaper. Fill deep holes in layers, allowing each layer to dry before applying the next.

**Fill open grain**  Follow manufacturer's instructions for applying grain filler. Normally, you apply the filler using a coarse cloth and work over the surface with a circular polishing movement. Remove any surplus filler with a clean cloth and allow to dry hard.

**Tinting the grain-filler**  Mix grain filler with wood dye before using to get a good match with more unusual wood colours. Scoop a little filler on to a clean flat surface - an old tile or pane of glass - then add stain gradually Tint the filler slightly darker than the wood as it lightens as it dries. Do a test so that you can check the final colour before applying to the wood: mix a small sample, leave to dry, then coat with your chosen finish.

**STRIPPING AND REFINISHING WOOD** old wooden furniture can be dramatically altered when stripped of layers of peeling paint or varnish.

Stripping old paint or varnish is a messy business but the result is usually worth the time and effort. If the surface underneath is reasonably good, a clear finish can be used to enhance the colour and the grain of the wood; and even if it is to be covered up, you will still have the best possible surface for a plain or decorative paint finish.

**R-staining stripped wood** with wood dye and/or sealing it with a clear finish - polyurethane varnish, oil or wax - to enhance and protect it.

**Stripping for action**: - Using a chemical solvent paint or varnish remover is the least damaging method of stripping furniture that is to have a clear finish.

Blow lamps and hot air strippers are best avoided as there is a danger of scorching the surface of the wood.

You can also get furniture stripped commercially using caustic soda, (there is one good and cheap company in east Victoria park - Google). This is fine for old doors and perhaps pine kitchen furniture, but too harsh for really good pieces as it can leave the wood looking slightly grey and dulled.

**After stripping**: - Before applying a clear finish you can alter the colour of the wood completely by bleaching it lighter or staining it darker with dye/stain.

Any repairs, such as filling, should be, made before you stain and re-finish the furniture.

## TOOLS AND EQUIPMENT

Paint/varnish remover to strip furniture back to bare wood: some remove both paint and varnish; others just one. Use a liquid stripper that can be washed off with white spirit. The caustic pastes that need washing down with water tend to darken the wood and are not suitable for veneers.

**Proprietary wood bleach** removes stains revealed by stripping, or lightens the wood colour so you can apply a lighter coloured stain. It usually comes as two solutions, A and B.

**Wood-stopping** for filling holes and cracks is available in various wood shades. Stopping will show through a dear finish so use sparingly - a small crack or two may look better unfilled.

**Grain filler** to fill the pores on coarse grained wood - such as oak - and provide a smooth surface for the finish; no filler is needed on close-grained wood such as pine. Grain fillers are available in wood shades or can be tinted to the right shade with wood dye before use.

**Wood dye** can be used to tint grain filler, or to give stripped wood a richer colour while still leaving the grain clearly visible. Dyes based on white spirit are easy to use; colours range from pale pine to darkest ebony, or can be mixed to the exact shade you want. Remember dye can only be used to darken, not lighten, the wood.

**Polyurethane varnish** is a tough, durable finish, but it requires more careful application than oil or wax. Available in matt, semi-gloss and gloss finishes, it comes in clear, wood shades and various colours now.

**A varnish brush** has thick bristles for smoother application, but an ordinary paint brush will do: use a 50 or 75mm brush for large areas, a 25mm one for small pieces. Keep these brushes for varnishing only.

**Oil** deepens the colour and enhances the grain of the wood. Modern oils are more durable and dry quicker than linseed oil: use Danish oil) for a low lustre; Teak oil for a higher sheen.

**Wax** provides a soft subtle sheen. It's not a very durable finish, so is often used on wood sealed with another finish such as French polish. Available in a clear, or a coloured one can be used to give a dark 'antique' look to unstained wood.

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# Asbestos - What's All the Fuss

**ASBESTOS**

Asbestos was first used during the days of the Romans. The Roman restaurant owners would purchase table cloths made from this fireproof product. As the story goes, after each customer left his table, the table cloth was cleaned by putting it in a fire.

The food burned off the cloth and it was ready for the next guest. In modern times, asbestos has been used widely in-home insulation, floor and ceiling tiles, and plaster.

Asbestos is a naturally occurring fibrous mineral found in Australia, Canada, Africa, Eastern Europe and the United States. Asbestos fibres are long narrow and bind with materials often used in construction. Asbestos is also used in fireproofing. In addition, it was used extensively in residential and commercial buildings between 1920 and 1978. You cannot truly determine if a suspect material contains asbestos by visual inspection. Only examination of a bulk sample under a microscope can truly identify asbestos fibres.

There are several types of asbestos fibres that may be found in a home. In the past, asbestos fibres were added to a variety of products to add durability, insulation properties and fire resistance.

The mere presence of asbestos materials in a home is usually not a serious problem or hazard. The scientific community debates the hazards of non-occupational exposure, which include exposure in houses, schools and offices. Thus, the health effects of non-occupational exposure are unknown. The danger is that asbestos materials may be, or become damaged, or disturbed over time. Damaged asbestos referred to as (friable by EPA definition) may release asbestos fibres and become a health hazard. Asbestos is most likely to release fibres when it is in a friable condition. Friable means that under hand pressure, the material can be crushed into a powder. A certified inspector can evaluate whether materials are friable or damaged, how accessible they are, the potential for damage in the future, and the best way to keep the material from becoming airborne.

Asbestos materials that would crumble easily if handled, or that have been disturbed by sawing, scraping or sanding into a powder, are considered friable and are a potential health hazard.

Asbestos should not be disturbed, sampled, removed or repaired by anyone other than a qualified and state licensed asbestos professional.

Studies have shown that exposure to asbestos fibres can lead to an increased risk of:

**Lung cancer:** - Mesothelioma, a cancer of the lining of the chest and abdominal cavity and Lungs being scarred with fibrous tissue. (asbestosis)

The risk of these cancers may increase with the number of asbestos fibres inhaled. Smokers are even greater risk when inhaling these fibres. Smoking has been the common denominator in most asbestos related diseases. EPA warns that the dangers of asbestos exposure multiply for

smokers. A smoker exposed to asbestos fibres is at least 50 times more likely to develop lung cancer than a non-smoker exposed to asbestos.

Asbestos represents a very minimal health threat as long as the material is in an encapsulated and good condition & is not disturbed.

The symptoms of the diseases have a latency period and do not usually appear until 20 to 30 years after the first exposure of the inhaled asbestos fibres. People who develop asbestosis have usually been exposed to high levels of asbestos fibres for an extended period. However, no dose relationship has been established. Any exposure could lead to illness. Most people are exposed to small amounts of asbestos fibres daily and usually do not develop these health problems.

## ASBESTOS SOURCES IN THE HOME

Asbestos may be found throughout the home in materials such as insulation around pipes, ducts, linings (siding), ceiling tiles, fibre insulation, some old plasters, vinyl flooring, spray-on acoustical insulation, artificial fireplace ashes and embers, and some wallboard patching compounds. Outside uses of asbestos include exterior gable roofing lining, siding and concrete water mains.

Asbestos is also found in the lining of brake shoes. Asbestos type materials can be found on, or in: old Heating Equipment, Fireplaces, Wood/Coal Burning Stoves and their components.

Resilient Floor Tiles, their backing’s and adhesives. Cement Sheets, and insulation around fireplaces and stoves. Soundproofing or Decorative Materials sprayed on walls and ceilings.

Patching and Joint compounds for walls and ceilings, and Textured paints. Roofing and Siding Shingles. Artificial Ashes and Embers in gas fired fireplaces.

### Encapsulation

Encapsulants are used to prevent fibre release and hold asbestos containing material intact. There are several types of encapsulants on the market today including penetrating and bridging compounds. A penetrating encapsulant can be applied like paint. It seals the surface but does nothing to bind the asbestos containing material. Therefore, special care must be taken to add a thick layer of encapsulant which will weaken that bond and cause the material to delaminate.

### Enclosure

If the asbestos-containing material is in an area where it will not be disturbed, the area can be sealed off from surrounding areas. An example of this is asbestos-insulated pipes in a crawl space which can be sealed off from the main living space. The crawl space entrance should be labelled so that future owners will know to use caution when entering such an area.

### Removal

This should be considered as a last resort (unless the asbestos is significantly damaged) due to its high cost and should only be performed by a certified and insured asbestos professional. When a removal operation is in progress, the work space is isolated with plastic and put under negative pressure using negative air machines utilising high efficiency particulate air (HEPA)

filters. The asbestos is removed after wetting with amended water. These steps prevent asbestos fibres from migrating out of the work area into other areas of the building. Small amounts of material can sometimes be removed by the glove bag method.

After all the material is repaired or removed a clearance air sample is taken by an independent third party to verify the success of the abatement.

## WHO IS QUALIFIED TO TEST AND REMOVE ASBESTOS

Your local shire would be able to recommend suitably qualified technicians who require certification for any asbestos-related work performed in your area, disposal

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