Fungal Decay In Buildings

Dry Rot and Wet Rot

Dry rot and wet rot can affect buildings of all ages and if decay is discovered it should be identified and remedial action taken without delay.

Fungal decay occurs in timber which becomes wet for some time and is the result of the attack by one of a number of wood-destroying fungi. The most well known are *Serpula lacrymans* the True dry rot fungus; *Coniophora puteana* the Cellar fungus and *Poria vaillantii* the Pore or Mine fungus. Many other fungi also occur and some have recently been particularly linked with decay in door and window frames.

Dry rot is only caused by *Serpula lacrymans* and is the most serious form of fungal decay in a building. It can spread onto and destroy much of the timber. Wet rot occurs more frequently, but is less serious; decay is typically confined to the area where timber has become and remains wet.

Fungal decay always arises because the wood has become wet, about 20 per cent moisture content. Finding the source of dampness and eliminating the ingress of moisture and promoting drying is always necessary.

Common Causes of Dampness in Buildings

The first step after discovering fungal decay is to make a careful inspection of the building to find how and where the water is entering.
The defect permitting access of moisture must be treated and further entry prevented, and the area dried out.

External Inspection

The Roof
1. Blocked gutters, especially in the hidden valleys of the roof or defective rainwater goods.
2. Defective surfacing to valley gutters and flat roofs.
3. Missing, broken, displaced or loose tiles or slates.
4. Faulty flashing around chimneys.

The Walls
1. Deterioration of mortar in brickwork joints.

2. Faulty or missing damp-proof course.
3. Bridging over the damp-proof course by soil in flower beds, plinths, etc.
4. Blocked air-bricks.
5. Cracked or broken pipes, both water-pipes and waste pipes.
6. Faulty flashing around window frames (throats to sills).
7. Continued overflow from cisterns or water tanks.

Ivy or other climbing plants may hide many of the above faults and roots may undermine foundations causing breaks in damp-courses. Roots of nearby trees may cause similar damage to foundations and damp-courses.

Internal Inspection

Look for the evidence of moisture penetration where the outside inspection has identified faults. In addition a number of potential causes of dampness will not be visible from the outside:

1. Solid stone or concrete floors with wooden skirtings and/or covered with timber where the impervious membrane is punctured or of poor quality or where no membrane is fitted.
2. Condensation - this may be caused by: a) unlagged steam pipes, especially under floors; b) steam condensate, particularly in wet process factories; c) high atmospheric moisture from normal bathroom and kitchen usage. This is especially important in uninsulated and/or poorly ventilated buildings and is the cause of much window joinery decay.
3.Trapping of flood-water in under-floor space and over concrete. 4.Old toilets, either from fracture of the pan or, more commonly, defects in the plumbing unions. 5.Close-fitting linoleum vinyl or laminate flooring laid over unventilated or imperfectly ventilated wooden floors.

Adequate sub-floor ventilation is important and careful attention must be given to clearing blocked air vents or air-holes in sleeper walls. Pockets of dead air favour fungal growth and should be eliminated. Steps must be taken to dry out existing dampness and to prevent further entry of water in addition to the eradication of the fungus and repair of damage caused.

The Wood Destroying Fungi

Outbreaks of dry rot and wet rot start in similar ways. The mature fruiting bodies of wood-destroying fungi that develop during an attack produce millions of microscopic spores and these are widely dispersed by air currents. If they fall on untreated damp wood they will germinate by pushing out a hollow tube called a hypha which grows and branches to form a mass of hyphal threads called mycelium. Mycelium develops inside the timber and breaks down the wood for food. The timber may darken in color and develop a characteristic cracked appearance. Some wet rots may result in bleaching of the wood; these are more common in doors and window frames. Eventually, the wood loses its strength and in some situations may become dangerously unsafe.

The main differences between dry rot and wet rot are the degree of development of mycelium on the wood surface and the ability of the fungus to spread into other timbers via adjacent masonry. It is important that the two types of decay be distinguished since they require different treatment. Wet rot treatment applied against dry rot is less certain of success. A dry rot treatment carried out against wet rot will be effective but will be unnecessarily expensive and could be in breach of the Control of Substances Hazardous to Health (COSHH) Regulations.

Dry Rot

The mycelium of *Serpula lacrymans* develops extensively on the surface of infected timber and in still, humid conditions produces a mass of cotton wool-like growth. Water droplets are often produced on the surface of the mycelium and this feature has given the fungus its name *'lacrymans'* (from the latin 'tears'). Bright lemon-yellow patches may also be seen, but these are more common, together with tinges of lilac, in less humid situations where the surface mycelium is reduced to a thin silken skin.

Mycelium spreads over the timber surface by the continued growth and branching ofthe delicate hyphal threads at the growing with time. Specialised strands develop within the mycelium and these supply water and nutrients to the growing front with time. The strands assume their real significance when the fungus spreads from infected timber onto the surface of adjacent stone or brick walls. The tiny hyphal threads penetrate the mortar joints and plaster layers and large areas of damp wall can then become infected. The fungus cannot derive any nourishment from the wall materials (although it is thought that calcium salts in such materials contribute to the success of the fungus in such situations) and the strands, which have thick walls and are resistant to moisture loss, are able to continue to supply water and food to the growing front for considerable

periods of time. The mycelium in which the strand originally developed often breaks down. In such cases, the strands alone link the food source (decaying wood) and the hyphae at the growing front and remain as the only evidence of fungal growth in the wall.

In the past, it had been thought that the fungus often wetted previously dry areas to allow further spread, but it has recently been recognised that this happens only infrequently. In most instances, the fungus is restricted to areas where both timbers and walls are damp. It should be remembered, however, that the most careful examination of a building found to be suffering from dry rot must be made as the extent of dampness may not be clear. The full extent of spread of the fungus *must* be determined before remedial treatment can be undertaken confidently.

The ability of dry rot to spread on to fresh timber has lead to serious damage in several new buildings for instance when, hardcore containing infected timber was taken from old buildings and used as a base for new concrete floors. Mycelium grew up from the timber in the hardcore and caused severe damage to skirting boards and other timbers before the dampness present during construction has dried out. If hardcore from such buildings is used, Building Regulations require it to be free of timber - in which case there is no risk.

Wet Rot

This type of rot is caused principally by *Coniophora puteana*. *Poria vaillantii* is another important wet rot fungus and a number of less common fungi also occur. While each fungus has its own unique features, the general appearance of wet rot is similar - as is the treatment. In window joinery, the fungus *Phellinus contiguus* is recognised as a major cause of decay; this fungus causes a white rot which is quite different to the usual appearance of wet rot (see table of differences). Wet rot is typically confined to the area of dampness because the mycelium does not spread into walls. In rare instances mycelium can develop extensively and most wet rot fungi produce strands - where they is *any* doubt, ask the advice of a reputable company (a list of PCA Remedial Treatment members can be seen at www.property-care.org)

TREATMENT

Refer to the PCA Code of Practice for Remedial Timber Treatment for further treatment guidance

Dry Rot

Badly decayed wood should be removed and disposed of safely. Every care should be taken to minimise the spread of spores by careful handling and spraying any fruiting bodies with a fungicidal solution.

In cutting out decayed wood, it is customary but not essential to allow a margin of safety by cutting well beyond (600mm) the portions in which the rot is present. Plaster which shows signs of fungal infection may also be cut out. Following this, any walls showing traces of fungal mycelium or fruiting bodies may be cleaned down and sterilized by applying a masonry biocide.

In most instances, a surface application of fungicide will be sufficient if all the recommended measures are undertaken. It is difficult to achieve in-depth treatment of a wall, particularly in brickwork with open joints in masonry walls with loose rubble infill cores, and in-depth treatment, often called 'irrigation', is only of value when the need for deep penetration can be demonstrated. Examples are:

1. To impose a toxic barrier, between an outbreak and woodwork as yet unaffected; in a party wall where only one side is being treated; in the base of an infected wall where the fungus may have become firmly established in timber debris in adjacent soil.

2. Where full removal of plaster from the wall surface is not desirable (as in the case of valuable decorative plaster work) irrigation could be undertaken. Whichever method is used, allow walls to dry out as much as possible after treatment and brush off any efflorescence on the surface. Efflorescence may be avoided if the infected wall is rendered with a fungicidal plaster. Fungicidal paint should then be employed around the joist ends where plaster would normally not be used. Plaster and paint containing zinc oxychloride are recommended. Only where the risk of efflorescence is unacceptable should these treatments be used alone.

Sound timber that is not removed from the vicinity should be treated *in-situ* by applying a liquid or paste preservative in accordance with the manufacturer's instructions. Timber used for replacements should always be pre-treated with an effective preservative. Today, pre-treated timber can be obtained easily from most timber merchants - remember to re-treat any cut ends or joints. In buildings where the cause of moisture ingress is not easily remedied, as in the case of old houses lacking damp proof courses, it is essential that the maximum protection be given to all replacement timbers. Modern damp proofing techniques can, however, solve most moisture ingress problems and careful consideration should be given to their employment.

Improving heating and ventilation systems, even if only temporarily, will speed up drying out of a building and do much to prevent further development of dry rot. It is of the utmost importance that measures taken against dry rot should be as complete and effective as possible because failure will likely result in a recurrence of the attack.

Wet Rot

If the decay has been caused by *Coniophora* or one of the other less virulent fungi it is not necessary to sterilise brickwork. Wood that is decayed should be cut out and replaced with treated timber or restored with resin or other reinforcement systems. Sound timber remaining in the vicinity of an outbreak should be treated with preservative as recommended for dry rot. Furthermore, where dampness is likely to persist, as in a cellar, new timber for replacements should be pre-treated. In any case, timbers should be replaced so as to prevent contact with damp walls by the use of, for example, steel joist hangers or lead-lined damp-proof course.
The source of dampness must be sought and corrected. Where wet rot has been caused by direct leakage it can often be entirely checked by removing the source of dampness and by thorough and rapid drying. Extra heating and ventilation will do much towards preventing further outbreaks of wet rot.

Prevention

Although good design and construction offer the best protection against decay, these can be nullified by bad maintenance. There are, however, some parts - even in a modern house - in which any timber used should be treated with a preservative. Wooden floors on concrete are often nailed to battens set in the concrete. It is essential that these battens be pre-treated.

Modern techniques to prevent contact between battens and concrete, such as the use of metal stirrups, provide much better protection but timber pre-treatment is still desirable in such cases.

Even when a layer of bitumen is poured over the concrete to act as a moisture barrier or damp proof course, it is still desirable that the boards themselves should be treated. The ends of joists and other timbers should

be kept out of contact with the brickwork of the outside wall, or, if for any reason this is impossible, the ends of the joists should be treated.

Where there is any possibility that dry conditions cannot be maintained, it is essential that all timber should be pre-treated. In exposed places where rain is likely to be driven by wind between brickwork and window - or door-frames then preservative treatment is necessary.

T1/1207

The information contained in this leaflet is given in good faith and believed to be correct. However, it must be stressed that of necessity it is of a general nature. The precise condition may alter in each individual case and the Association is therefore unable to accept responsibility for any loss howsoever arising from the use of the information contained therein.

For further information contact:

Property Care Association
11 Ramsay Court
Kingfisher Way
Hinchingbrooke Business Park
Huntingdon
Cambs
PE29 6FY
Tel: 0870 121 6737
Fax: 01480 417587
Email: pca@propety-care.org
Web: www.property-care.org
The Property Care Association incorporating BWPDA is a company limited by Guarantee: Registered

CHARACTERISTICS FEATURES OF THE MOST IMPORTANT SPECIES OF WOOD-DESTROYING FUNGI

Type of Decay	Fungus	Usual effect on the wood	Strands of the surface of the wood	Other growths on the surfaces of the wood	Fruit-bodies
Dry Rot	Serpula Lacrymans	Rotted wood shrinks and splits into cubical pieces by deep cross cracking. Generally occurs in damp, not wet, situations. Spore dust light rust colour, later reddish brown, may be first indication.	Strands grey, sometimes as thick as lead pencil, becoming brittle when dried.	In damp dark places, soft white cushions or silky tassels; in drier places thick silver-grey sheets or skins usually showing patches of lemon yellow and tinges of lilac.	Fleshy, soft, but rather tough; shaped like pancakes or brackets. Spore-bearing surface ochre to red-brown with wide pore labyrinthine ridges and furrows. Margin white.
Wet Rot	Coniophora pueana	Causes darkening. Longitudinal cracking often predominates. Cross cracks that form are often covered by a thin surface skin of relatively sound wood. Usually found in very damp situations especially cellars, solid floors and roofs.	Strands slender, usually thread-like at first yellowish, soon becoming deep brown or nearly black. Often there are little or no visible growths of fungus on the surface of the wood. Sometimes there are fan-like growths over brickwork in damp cellars.	Occasionally very thin skin-like growths. Yellowish or dark brown (or greyish white under impervious floor coverings)	Rarely found in buildings. Sheet-like in shape. Spore-bearing surface olive brown, bearing spores on small rounded lumps or pimples.
	Poria vailantii (and other related species of poria)	Rot similar but less widespread than that produced by Serpula. Various species of Poria occur in houses, all requiring rather more moisture than Serpula.	Strands white or whitish seldom thicker than stout twine, remaining flexible when dried.	White or cream sheets of fern-like growths. Occasional local brown coloration from contact with iron.	Shaped like sheets or plates, white in colour. Spore-bearing surface, white, showing numerous minute pores.
	Phellinus Contiguous (Found in exterior joinery) Cracking	Bleaches wood, which eventually develops a stringy fibrous appearance. There is no cubical cross.	No strands	Sometimes brown tufted growths on voids or at the surface.	Found occasionally. Tough brown growths often elongated. Surface covered with minute pores.