

# Best Practice Guidance

## Wood Destroying Insects in Buildings



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## Insect Pests of Converted Timber

The more important insect pests, the larvae of which attack felled and converted timber, are beetles of the genera ANOBIIDAE, LYCTIDAE, CERAMBYCIDAE, CURCULIONIDAE and SCOLYTIDAE. They are very numerous and extremely varied in their general appearance and feeding habits. They include some of the largest and most minute of adult insects, but relatively few species infest converted timber in the UK. The larvae of some beetles, such as LYCTIDAE AND BOSTRYCHIDAE, derive their nourishment from the starch or other carbohydrates which are present in the sapwood cells of wood for some time after the trees are felled. Others, such as the Common furniture beetle of the genus *Anobium* and the Death watch beetle, genus *Xestobium*, actually feed on the wood substance, consuming the cellulose and other constituents of the cell walls.

## Preventive Measures

Attack by any of the wood-destroying beetles found in the UK can be prevented by adequate treatment of the wood, with an approved insecticide/biocide. Pressure 'pre-treatment' gives the maximum protection to any timber. Dipping, brushing and spraying with a suitable insecticide/biocide can give effective protection if the preservative is thoroughly applied and the surfaces are clear of dust.

## COMMON FURNITURE BEETLE - *Anobium punctatum*

The Common furniture beetle naturally inhabits dead stumps and fallen branches in woods and hedgerows, but is more abundant in building timbers and furniture and is the most common of the wood destroying insects found in buildings in the UK. Most damage is found in timber which has been in use for 10 years or more.

## Description of the Beetle

The adult beetles are 2.5mm-5mm in length and are reddish to blackish brown in colour. The first body segment (prothorax) is hood-shaped and when viewed from above almost completely hides the head. The upper parts of the body are clothed with a fine covering of short yellow hairs, and rows of small pits or punctures on the wing cases are well defined. The females lay eggs in grooves on the surface of the wood, in joints which have opened slightly, or on the surface where the grain has been torn in machining. The eggs hatch into white larvae having six minute legs and when mature are about 6mm long. The terminal segment of the larva is rather bulbous and the whole larva is bent into a crescent shape.

As the larvae feed on the wood they bore galleries which become partly filled with granular wood bore dust (frass), similar to fine sand. When fully developed, after 3 – 5 years, the larvae approach the surface of the timber and pupate. After the pupation period, the adult beetles bore small round exit holes about 1.5mm in diameter. The adult beetles are capable of flight and this enables them to travel and infest other timbers. In the period from March to September, adults can be found on the window ledges of houses containing infested timber.

## Treatment

1. All timber should be investigated to determine evidence of current activity to justify any form of treatment. Some timbers may show signs of historic activity however the insect may be extinct due to unsuitability of the timber, decreased moisture content or due to previous treatments whereby re-treatment is not justified.
2. Furniture and small wooden articles may be 'target' treated by brush or hand-spray using a preparatory 'amateur' use approved insecticide/biocide.
3. The most convenient way of treating infested timber whether in furniture or in buildings, is by the application of an approved insecticide/biocide solution to all parts showing signs of infestation, as well as to the adjacent timbers. Special attention should be paid to the undersides and surfaces with limited accessibility whether in furniture or in structural timbers and all surfaces should be evenly treated. With structural timbers, dust and dirt should be cleaned off and floor coverings, such as carpets and linoleum, should be removed so as to give access to the timber. The beetle does not lay eggs on painted or polished surfaces but may use old flight holes.
4. Where the attack is so severe that the strength of the timber is affected it may be necessary to replace the infested parts with new timber which should be treated before use.
5. The most effective time for application of insecticides is from early Spring to late Summer when adults emerge.
6. The insecticide may be applied by brush or coarse low pressure spray.
7. In some circumstances the use of fumigation, heat or freezing techniques can be considered. These procedures must be conducted by properly trained and competent technicians.

### **DEATH WATCH BEETLE – *Xestobium rufovillosum***

The natural habitat of the Death watch beetle is in decayed parts of old trees, especially willows and oak: timber which is free from decay is rarely, if ever, attacked, the eggs being laid almost invariably in decayed timber. The larval period is influenced by the extent of decomposition resulting from fungal activity although the length of the life cycle is 4 – 5 years but can extend to 10 years. The condition of the wood appears to be important both to the Common furniture beetle and the Death watch beetle, sometimes infested wood will become deserted due to changes in the condition of the timber or the action of predatory insects.

Death watch beetles prefer to infest decayed hardwoods (although softwoods are not immune) therefore infestations are less commonly found than those due to the Common furniture beetle. The larger larval size and the longer larval period results in more serious infestations which can lead to breakdown in structural timbers that may then require replacement. In churches and other older buildings damage by both Death watch and Common furniture beetles may be present in the same timber component.

#### **Description of Beetle**

The Death watch beetle, the largest of the genus ANOBIIDAE family of insects, measures from 5mm-8mm in length. Its colour is dark chocolate brown with patches of short yellowish hairs, which give the insect a variegated appearance. In old specimens these hairs may have been rubbed off, in which case the mottled appearance is less obvious. The eggs, which are white, lemon-shaped and measure about 0.5mm in length, are laid in open joints between adjacent timbers, in cracks or crevices in the surface of the wood, and sometimes within old tunnels and exit holes.

The larvae are curved and white, covered with long fine yellowish hairs and are over 6mm in length. The phases of the life cycle are the same as for the Common furniture beetle, but the beetles commonly emerge in April, May or June, leaving a round exit hole about 3mm in diameter. Infestations by Death watch beetle can easily be distinguished from that of other wood boring insects by the presence of small bun-shaped pellets in the bore dust (frass) produced by the larvae.

#### **Treatment**

Timber infested by the Death watch beetle should be very carefully inspected, before any treatment is undertaken. Such inspection should, if possible, take place during the period April to June whilst the beetles are emerging. The source of moisture that encourages fungal decay and continuation of the infestation should be removed and the timber dried out. Treatment with an insecticide by brush or spray during the emergence period of the beetle is useful in destroying eggs and young larvae before they enter the wood, but it is doubtful whether such treatment will kill older larvae working below the surface at any appreciable depth.

#### **The following is a summary of the recommended stages of treatment in an infested building:**

1. Investigate the source of moisture that has contributed to the infestation and take measures to reduce the dampness and dry out the infested areas.
2. A competent person should determine the extent of damage and the amount of heavily infested timber that can be retained. Strengthening may be considered to avoid removal of timbers by using other materials (i.e. Resin). Determine the risk of continued activity and spread of attack unless insecticidal treatments are applied to both existing infested and replacement timber. The age of affected buildings often will require Listed Building Consent for this work.
3. Preparation by removal of bore dust and debris from timber by scraping/defrassing and the use of a vacuum cleaner to remove all loose infested timber and debris before treatment with an insecticide.
4. Two applications of an insecticide by brush or spray during the period of April to June supplemented by targeted application using an appropriate insecticidal paste. It is advised that further annual applications for at least four consecutive years are considered.
5. Search for any further evidence of infestations and damage caused by Death watch beetles to exposed timbers during treatment.
6. Ongoing monitoring of previously infested timbers should be undertaken every Spring for a period of years after treatment to detect any evidence of continued activity in the form of fresh exit-holes or bore dust, in which case continued insecticidal treatments may be necessary as long as any activity remains.

New or replacement (hardwood) timber should be sound, adequately seasoned and free from sapwood which is particularly liable to attack by fungi and insects. When oak heartwood is used, treatment with a preservative is not

necessary. If replacing with softwoods, which are less resistant to decay, these should be pressure treated in accordance with BS8417: 2011 and any cut ends locally treated. 'Period' replacement timber showing evidence of even slight decay or infestations should not be used unless the user is confident the decay/infestation is extinct.

### **POWDER POST BEETLES - *Lyctus* (LYCTIDAE) and BOSTRYCHIDAE**

Of the LYCTIDAE, two species namely *Lyctus brunneus* and *Lyctus linearis* occur in the UK. The former is slightly the larger and by far the more numerous. Lyctus beetles are found in unseasoned or recently dried hardwood timbers, the pores of which are large enough to admit the ovipositor of the female for egg laying. Oak, Ash, Elm, and Sweet Chestnut as well as some imported timbers are commonly infested. The life cycle is short and completed in a 12-month period with emergence between May and September.

Only the sapwood is attacked as it is the starch in this portion of the wood which provides the food for the larvae. In timber which has been cut for some time, the starch may be so depleted that the larvae are unable to feed. Hence these beetles are never found in old wood, but may be encountered in timber yards, fencing and also in comparatively new furniture if any sapwood has been included. Lyctus powder post beetle has become more widespread in recent years due to the increased use of imported hardwood timber for engineered flooring and timber frame construction, especially French Oak, often green, that contains a higher starch content due to the "fresh" sapwood content. Many cases of infestation have been reported by merchants holding stocks of susceptible timbers and the presence of the beetles is often revealed by small piles of fine 'flour-like' powder on boards in the stacks. Kiln drying the timber before use will sterilise it if it has been infested, but whilst any starch remains in the sapwood cells renewed attack is possible.

#### **Description of the Beetle**

The beetles are of slender form, distinguishable from the ANOBIIDAE and from the BOSTRYCHIDAE by the thorax which does not protrude over the head. *Lyctus brunneus* is 4mm-6.5mm long and is of a brownish colour. The widest part of the thorax is almost as wide as the abdomen. *Lyctus linearis* is slightly shorter, the wing cases are more definitely marked by parallel ridges and the thorax is distinctly narrower than the abdomen. The eggs are spindle shaped and usually several are laid in a single pore. The larvae are similar in shape and size to those of the Common furniture beetle, but are less bulbous at the ends and have more prominent breathing pores along the sides. The larvae are curved and white with a yellowish head and dark brown jaws and when fully grown measure approximately 6mm in length. The exit holes are about 1.5mm in diameter and are usually filled with a fine flour-like bore dust (frass) – which differs from Common furniture beetle where the frass is coarser, lemon shaped and gritty.

#### **Treatment**

Treatment is largely preventive, directed toward discouraging the female beetles from laying eggs in wood containing starch. This is achieved by spraying the adult beetles and/or the emerging larvae with an insecticide if found in wood which has been taken into the factory or workshop. It is not advisable to use sapwood for furniture or interior woodwork such as panelling unless it has been effectively treated with an insecticide and is known to be free from infestation. Treatment normally involves applying an organic solvent insecticide to sapwood surfaces, however this can be ineffective due to lack of access and finish coatings. As treatment is often impossible or uneconomic it may be necessary to request replacement of the timber material from the supplier. Fumigation may be the only other alternative for high value objects or when replacement is impractical.

### **BOSTRYCHIDAE**

BOSTRYCHIDAE are more prevalent in tropical countries and are of minor importance in the UK, but may be found in some timbers imported from West Africa and the Far East. Increasingly they are discovered emerging from items of furniture manufactured in these regions.

#### **Description of the Beetle**

The adult beetle may be from 3mm long, usually dark brown or black in colour. The body is cylindrical, the antennae fairly short ending in a three-jointed club. The upper part of the thorax or second segment of the body projects over the head and is rough with short spines. Both the male and female adults bore into the wood, preferring the sapwood of ring-porous and large pored hardwoods, but by far the greatest damage is caused by the larvae.

### **Treatment**

Any severely infested timber should be destroyed, but infestation can be controlled by sterilising the timber by heat treatment in a kiln or by fumigation. Preventative measures are the same as for *Lyctus* beetles.

### **HOUSE LONGHORN BEETLE - *Hylotrupes bajulus***

This was originally a forest insect, breeding in dead branches of conifers in Southern Europe. As climatic conditions changed the insect gradually spread northwards, at least as far as the countries bordering the Baltic, and at the same time spread into the timbers of buildings to breed and feed.

The larvae are most active in the sapwood of softwoods and restricted to certain localities such as Surrey and West London. The larval period in England can be as long as 11 years but is on average 6 – 7 years. The damage caused in a roof member or structural roof timber may be so extensive that only a thin outer veneer of sound timber is left. There is very little external evidence of infestation except that sometimes the outline of the larval borings may be detected by an unevenness of the wood over them.

### **Description of the Beetle**

The House longhorn beetle is somewhat flattened, measures from 8mm to 25mm in length and is brown or black in colour. The head and prothorax (the first body segment) are thickly covered with grey hairs except for a smooth central line on the prothorax, on each side of which is a shiny black prominence. On each wing case the grey hairs are grouped in patches which are often fused to form two transverse bands. The larvae are straight-bodied fleshy and white, clearly divided by deep transverse folds into a number of rings or segments. The head is sunk in the prothorax segments so that only the dark brown jaws are visible. When fully grown the larvae are commonly 18mm long but may attain a length of about 30mm. The larvae feed for a relatively long time, which, however, varies to some extent with temperature and the moisture content of the wood.

### **Treatment**

Special care must be taken to deal effectively with house longhorn beetle infestations. Any control strategy should take into account the inherent difficulty of treating such infestations and the limitations of the chemical treatments that are available. Eradication of the beetle is not straightforward and requires a competent person to undertake an assessment of the infested timbers to determine where timber is structurally compromised by the infestation and requires replacement, or can be retained and effectively treated. Replacement timbers must be pre-treated in accordance with BS8417: 2011. To ensure immunity from continued attack, all retained timber should be prepared, cleaned, defrased and treated with ideally a solvent based approved insecticide or a water based insecticide supplemented with an insecticidal paste resulting in complete penetration of the sapwood.

### **OAK LONGHORN BEETLE - *Phymatodes testaceus***

Another species of longhorn which causes slight damage to the sapwood of hardwoods (particularly Oak) and may spread in a timber yard to stock, on which the bark is still present. This beetle is sometimes confused with the House longhorn beetle, but is not a serious pest and does not attack timber in buildings. It is frequently found infesting hardwood logs brought in for boilers and open fires.

### **WOOD-BORING WEEVILS - *Pentarthrum huttoni* and *Euophryum confine***

Wood-boring weevils are restricted in their activities to damp and at least partially decayed timber. Often found behind skirting boards and decaying wall plates when fungal decay is present. Thus they are normally brought under control by the measures taken to deal with outbreaks of wet rot.

### **Description of the Beetle**

Adults are 2.5 – 5mm in length, reddish brown to blackish, with a snout (rostrum) and long flattish body. Life cycle is short at around 12 months and unusually, the adult beetle also lives for around 12 months. Adults therefore feed and leave characteristic 'striations' (channels) on the timber surface.

### **PIN-HOLE BORERS - *Scolytidae* and *Platypodidae***

Pin-hole beetles attack freshly felled timber and in some cases, sickly standing trees. They are found chiefly in tropical and sub-tropical forest regions, and appear in a matter of a few days or even hours when felling in an area begins. These beetles do not continue their life cycle or extend the damage in seasoned timber.

The adults are responsible for the bore holes which are used to receive the eggs, which are deposited in niches along the galleries. The beetles carry into the borings the spores of certain fungi from which mycelium develops in the galleries and provides the food for the larvae. The growth of fungus in the galleries often causes staining in the surrounding wood, seen on the surface in the form of dark rings round the opening of the bore holes. The peculiar feeding habits of the larvae of pin-hole borers have given rise to the name "Ambrosia Beetles". It is characteristic that the tunnels seldom contain any bore dust. The tunnels are always straight and a pin can be used as an identification aid.

#### **Description of the Beetle**

The beetles vary in size, the smaller species making galleries of the diameter of a fine needle, whilst those of the larger species may be 6mm or more across. It is important to be able to recognise these peculiarities because the adult beetles do not appear in converted seasoned timber, manufactured wood or furniture. Although the borings are regarded as a serious defect by the timber merchant, it is quite safe to use timber having ambrosia beetle damage, i.e. pin-hole borings, for purposes where the surfaces marred by the pin-holes are not visible, it is unusual for the damage to be sufficiently extensive to reduce the strength of the wood to any significant extent.

#### **Treatment**

Not necessary, as the larva and adults are rarely found. The life cycle is completed before the timber is dried or is killed by drying and re-infestation does not occur.

#### **BARK BORER BEETLE - *Ernobius mollis***

It sometimes happens that building timbers, particularly rafters, are used with the bark adhering to them. If holes are found in the bark it may lead householders to think that Common furniture beetle is present. The beetle responsible is *Ernobius mollis*. The workings are confined to the bark and there is no risk to other parts of the wood from attack.

#### **PTILINUS BEETLE - *Ptilinus pectinicornis***

Infests European Hardwoods and damage often originates in the sawmill or timber yard. In buildings mainly found in furniture. Emergence holes are 1-2mm in diameter. Bore dust is densely packed in tunnels and not easily dislodged. Treatment with approved insecticide when replacement is impractical.

#### **Insect Pests of Standing Trees**

Standing trees, particularly if unhealthy or damaged, may be infested by a number of types of insect. Certain moths infest and breed in trees. The Goat Moth infests Oak, Ash, Elm and other hardwoods; the Leopard Moth infests Pear and other fruit woods and some Clearwing moths prefer Alder. The damage is unseen until the trees are felled and it is too late to take action. Poplars are often damaged by the large poplar longhorn beetle, the larvae of which bore vertical galleries about the size of a pencil, from near the base of the tree upwards to a height of 2.4m – 3.5m (8 to 12ft) or more.

Sickly conifer stems, e.g. Larch and Spruce, are frequently found to be the breeding ground of either the giant wood wasp or the steel blue wood wasp. Occasionally adult insects of these species emerge from scaffold planks, ladders and even timber in buildings. Their larvae are rarely seen except when infested logs are being converted and the galleries in which they are feeding are exposed.

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