



Chartered
Institute of
Environmental
Health



Pest control procedures manual

Bedbugs

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Introduction

Bedbug (*Cimex lectularius*) numbers are increasing sharply in the UK and other countries. As a result, the number of requests for bedbug treatments is also increasing.

Corresponding increasing customer concerns and expectations, coupled with interim reports of UK bedbug resistance to insecticides, require that pest control technicians must be acutely aware of the methodical and detailed approach required to treat bedbugs successfully. Reliable bedbug control strategies can often be unfamiliar to many pest control technicians and therefore this manual aims to provide the standard by which such treatments should be instigated and treated as part of an Integrated Pest Management programme.

This manual is intentionally prescriptive, but it does not intend to dictate the methods by which pest control technicians organise their work, if they are able to achieve the same level of service and safety by other means - for example, the use of computerised records or ISO accredited quality systems.

It is hoped that by stating clearly the minimum requirements that a pest control technician should employ when conducting any bedbug treatment, consistent standards can be achieved throughout the industry, allowing bedbug control to develop and improve.



Identification and biology



Public health significance

The close association of bedbugs with humans means that the insect can cause substantial nuisance, as they feed at night on sleeping human hosts. Itching caused by the bites and the possibility of secondary infection are common. All stages of bedbugs take blood meals and so are equally important as nuisance pests. There is no current evidence of bedbugs being involved in the transmission of infections or diseases to humans. The presence of bedbugs can cause distress and prevent people from enjoying a sense of well-being. As the World Health Organization defines health as 'a state of complete physical, mental and social wellbeing, not merely the absence of disease or infirmity', it is clear that bedbugs are a pest of public health significance.

The reaction to a bedbug bite can vary. Some people show little or no reaction whereas others may suffer allergic or other severe reactions and sleepless nights. The biting nuisance must not to be underestimated.

Bedbugs feed on exposed areas of skin, with most bites being found on the abdomen, but also the neck, arms, shoulders, back and chest and very occasionally on the legs and feet. The lesions are varied in appearance, often recognisable as raised reddened swellings, similar to flea bites, although with no central red area.

Legal requirements

It is a legal requirement under the Protection of Animals Act 1911 (as amended) that the presence of pests is identified before a pesticide treatment can take place. Therefore, the initial risk assessment conducted as part of any pest control treatment must identify the insect pest species (involving an appropriately qualified entomologist if necessary).

Technicians should be aware that customer complaints about bites on the skin might not mean that bedbugs are present. Ticks, mites, lice or fleas can all produce similar skin lesions. Furthermore, environmental factors or medical conditions can result in bite-like reactions, which coupled with the delay in the appearance of a reaction to a bedbug bite, can cause confusion.

Therefore, the technician should aim to obtain physical evidence of bed bug activity, rather than rely solely on information provided by the customer. If evidence of bedbugs is not found, but problems persist, other causes should be investigated.

Evidence of bedbugs

Indications of bedbug activity include:

- Live or dead bedbugs, cast nymphal cuticle and hatched or unhatched eggs
- Blood spotting. This is digested blood defaecated by the insect, which may be initially observed on bed linen, but can be noticed along mattress seams and other places where bedbugs will hide. (Technicians should note that the faeces of nymphal cockroaches can have similar appearance, however bedbug blood spotting tends to occur in clusters as the insect, by its nature, will aggregate)
- A sickly, sweet, coriander / almond-like smell may be present if there is heavy activity
- Customer complaints and/or evidence of bites on the skin

Biology

Bedbugs use well defined resting sites in which the different stages in the life cycle can be found in significant numbers. Bedbugs spend the majority of their time in these harbourages, aggregated, and therefore targeted crack and crevice treatments are critical in their control.

However, research has shown that female bedbugs disperse from the established harbourages to avoid multiple traumatic inseminations and male bugs will also disperse to avoid mating competition with other males. This dispersal behaviour should be taken into account when dealing with bedbugs.

Female bedbugs generally produce around 2 to 3 eggs per day, which are deposited all around the environment in which the bedbug lives. Since they can live for several months, each female could produce around 400 - 500 eggs during her lifetime. The length of time spent in each stage of the life cycle is greatly dependent upon the food available, temperature and relative humidity.

Like all insects, bedbug lifecycle is affected by temperature. The temperature of the immediate environment can be manipulated to aid control, in two principal ways:

- 1 Increasing room temperature to 27°C can stimulate eggs to hatch after 5 – 6 days. This allows the vulnerable nymphs to come into contact with insecticide. Conversely, lower temperatures can lengthen hatching time and limit contact with insecticide. Any delay in hatching could also lead to an unsuccessful treatment as the technician may believe the insects to have been eradicated, only for the bedbugs to reappear (unhatched eggs can remain viable for 3 months and adults can also survive for more than a year without a blood meal).
- 2 On average, a bedbug will feed once every 7 days. Higher temperatures can stimulate more frequent feeding. Increasing room temperature will therefore lead to more frequent attempts to feed, increasing contact with the insecticide.

Identification

Egg

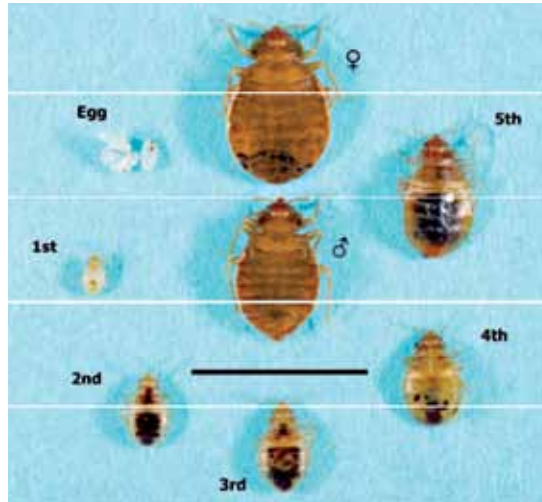
Eggs are cream in colour with a slight bend and are approximately 1mm in length. Eggs tend to be laid in crevices within dark areas.

Nymph

Nymphs are small versions (approximately 1mm in length) of the adult form and display the colour of partly digested blood.

Adult

Bedbugs are very distinctive and can usually be identified immediately. Adult bedbugs are red-brown, oval, wingless insects, which are approximately 5-7 mm in length and possess piercing mouthparts. When unfed, adults are pale yellow-brown, but after a full blood meal, they take on a darker mahogany-brown colour. The insect has three pairs of slender but well developed walking legs, with efficient tarsal claws for clinging on to the host during feeding. The head is short and broad, with a pair of prominent compound eyes, in front of which is a pair of clearly visible 4-segmented antennae.



The various life stages of the common bedbug, *Cimex lectularius*. The numbers represent the different nymphal stages. Bar = 5mm. ©2009, Stephen Doggett, Department of Medical Entomology, Westmead Hospital, Westmead.

Inspection and assessment



Preparation

An inspection to ascertain the presence of bedbugs is essential and must be conducted methodically. Bedbugs have a flat body shape and can hide in virtually any crack and crevice, preferring dark, isolated and protected areas. Bedbugs prefer wood, paper and fabric surfaces and so these materials should be concentrated on in the inspection process.

The technician will need unobstructed access to all areas of the room(s), including cupboards and drawers. In addition there may be a need to remove bed heads, lift carpets and dismantle other items to access all bedbug harbourages.

In domestic properties, it is particularly important to ensure the occupier is completely aware of the level of intrusion into their home and belongings.

To assist the inspection process, the occupier should be instructed to:

- Loosen the carpet at wall / floor junction, but do not remove it from the room
- Remove any wall-mounted items, but do not take them out of the room
- Make arrangements to isolate the supply to the room and loosen / remove electrical socket and switch plate covers
- Remove linen from bed and base. These should be bagged and laundered
- Empty wardrobes and cupboards of items, but do not remove them from the room
- Not remove any items from the room so that the extent of the bedbug activity can be assessed. Removal of items could facilitate the spread of bedbugs to other rooms

To conduct a thorough inspection, the technician will need to use several tools to gain access to the areas outlined above, including a torch, screw drivers (flat and Philips head), adjustable spanner, hammer and a suitable knife.

One of the most common reasons for ineffective treatments is the failure to identify all areas of bedbug activity. Technicians must therefore be given adequate time to conduct the inspection. Not only will this increase the chance of a successful treatment, it will also provide an indication as to the potential time required to undertake the treatment itself.

Domestic property

The technician should ascertain where bedbugs have been seen and investigate any complaints of bites. The technician should also attempt to determine how the bedbugs were brought into the home as luggage

may need to be treated. Areas where dirty clothes and linen are stored should be examined and the occupier questioned about any previous control attempts.

Block or large commercial property

Once bedbugs are introduced in high density housing or multi occupation properties (e.g. hotels) they can quickly become established and spread throughout the building. If only one room is left untreated, this can act as a reservoir for the re-infestation of the whole of the building. Similar initial questions about the distribution of complaints, sightings and the movement of guests should be asked. However, if possible, it is important that housekeeping / maintenance staff are contacted as they may have more detailed knowledge about bedbug activity than management.

In all cases, the rooms adjoining those in which bedbugs have been found should be inspected. Sufficient details must be taken to ensure accurate records can be made, noting the areas where evidence of activity has been found.

Based on the evidence from the survey confirm the existence and extent of any activity and record the details. Details of contributory factors should also be recorded.

The technician must consider the property as a whole when making any assessment. The supervisor/ manager should be involved in any assessment to ensure thorough control. Involving Environmental Health Practitioners etc., may be necessary. Such agencies may also include housing officers or representatives of any other client organisation who manages the property and representatives of the occupants of the property.

When there is a high level of activity, there is increased risk that bedbugs can be located in numerous breeding sites, including books, CDs, pictures, wall hangings, clothing, domestic appliances, under carpets, behind skirting boards and in wall cavities.

When treating larger properties and/or larger infestations, it is advisable that a supervisor/manager compiles a detailed management plan, which can be provided to all parties to assist in the coordination of resources and assessment of the treatment. Plans should be based on the criteria previously stated.

Inspection

To avoid the risk of transferring bedbugs from room to room, the technician should aim to take a minimal number of items into the infested room.

Key bedbug harbourage sites



Using a flushing agent, inspect the mattress first, paying attention to the edge nearer the wall where it is darkest. The technician should pay close attention to:

- The seams, under buttons, handles and labels
- If the mattress is on a divan base, this should also be examined. This examination should include the edge of the material underneath the base and hollow caster legs. (Damage may be caused to the base as the material covering the underside of the base will have to be cut and/or removed)
- If the mattress is placed on a metal frame with wooden slats, these should be inspected

The dispersal behaviour of bedbugs should be taken into account when conducting an inspection, which is why the remaining areas and items around the bed must be inspected, including:

- The bed frame, bed head and bedside furniture;
- Bedside furniture, tables, etc. should be turned over and examined
- The drawers in tables and cupboards should be removed and examined
- If bed heads are attached to the wall, they should be removed (with owner's permission)
- Other furniture in the room should be inspected, especially locations where luggage is placed
- Electrical fittings and appliances, such as telephones, clock radios, televisions, computers
- Underneath carpet edges and along the straight edges
- Floor-board joins

- Under loose wallpaper
- Architraves, dado rails, cracks and joins in the ceiling and ceiling mouldings
- Picture frames, wall mirrors, blinds, curtains and curtain rods, books, behind electrical conduit
- Lounges and common rooms of hotels, hostels etc.
- Housekeeping rooms, trolleys and laundry rooms

The aim of the inspection is to provide sufficient information for the technician to assess the extent and severity of the activity so the treatment can be planned accordingly. Sufficient details must be taken to ensure accurate records can be made, noting the areas where evidence of activity has been found. A room site plan should be drawn showing the location and degree of any activity. Adjoining rooms and spaces (either side, above and below), should also be inspected.

Based on the evidence from the inspection, confirm the existence of any activity and record the details.

Treatment methods



Non-chemical methods

Non-chemical options should be considered as management tools only. Thus, while they can be utilised to reduce the overall bedbug population as part of an Integrated Pest Management programme, complete elimination of an infestation is unlikely unless insecticides are used.

Physical removal

The overall numbers of a bedbug infestation can be reduced by discarding infested furniture, particularly torn mattresses. However, the technician must only recommend this option if it is entirely necessary and appropriate, as it will be very expensive to the occupier. Any item to be removed must be treated and sealed in plastic. To avoid others acquiring bedbugs from discarded infested items, the furniture should be destroyed or rendered unusable. Sticky tape may also be used to remove bedbugs, but only where numbers of bugs are very small.

Vacuumping

Bedbugs should be physically removed via vacuuming if numbers are low on mattresses. Always use a vacuum machine that has a disposable dust bag. Vacuum the floor and use a crack and crevice extension at wall / floor junctions, along carpet edges, bed frames, mattress seams and in ensemble bases, furniture, and other potential harbourages. Vacuuming cracks and crevices prior to insecticide treatment will not only remove the bugs but dirt as well, which will allow the chemicals to penetrate better and improve their residual effect. Vacuum cleaners with HEPA filters are recommended to prevent the spread of potentially irritating debris through the exhaust.

After vacuuming is complete, the contents of the vacuum must be sealed within a plastic bag and removed from site for suitable disposal, preferably by incineration. Insecticide dust can also be applied to the contents.

It should be noted that vacuum cleaners could spread bedbugs. The vacuum should be 'treated' by soaking plastic parts in hot water. Vacuuming will not remove all bedbug eggs, so insecticide application is essential.

Heat

Bedbugs are very sensitive to heat and are rapidly killed when exposed to temperatures over 45°C. If heat is used for bedbug control it is important that the high temperatures are applied suddenly, as a

gradual rise in temperature may cause the bedbugs to disperse. As previously stated, infested linen can be laundered in hot water followed by hot tumble drying to kill any all stages. Washing at a temperature of 60°C will kill every bedbug stage.

However, high temperature treatments will not offer any residual effect.

Steam

The use of steam is particularly effective as it kills all life stages of the bedbug, including the egg (this is important to note as most insecticides are non-ovicidal). The use of steam, rather than insecticide, may also be preferable for some customers particularly for their mattress and bed. However, steam treatments can be very time consuming and offer no residual effect. Therefore, any steam treatment should be followed by insecticide, which can provide better long-term control than the use of insecticides alone.

The technician should follow the steam machine manufacturer's instructions and vacuum all areas before treatment.

The quality of steam is important. The steam machine used for the treatment must be able to produce steam of a low vapour flow and high temperature. 'Dry' steam with less than 5% humidity, at 94°C, applied at a high pressure is recommended. The nozzle of the steam machine must come in direct contact with the surface being treated, moving the nozzle along at a rate of approximately 30cm per every 10-15 seconds. Ideally, the operating temperature of the machine should be regularly checked with the aid of an infrared thermometer. Immediately after steam treatment the surface should be recording at least a temperature of 70-80°C. Steam flow rate must be kept to a minimum and a suitable nozzle used to avoid unnecessarily distributing bedbugs (as well as any exuviae, eggs and nymphs). After completion, any dead bugs should be removed by vacuuming.

Cold

Freezing has the advantage that heat sensitive materials will not be damaged. While this method can often not be directly used by the technician, it can be recommended to the occupier for small items. Any item for freezing should be placed loosely into a bag and into the freezer operating at approximately -20°C for a minimum of 10 hours (More dense items may take several days for the centre to cool sufficiently).



It must be remembered, however, that low temperature treatments offer no residual effect.

Trapping and barriers

The use of traps, monitoring devices or barriers will not eliminate bedbugs and must therefore be used as part of an Integrated Pest Management programme.

Most traps are active devices that attempt to catch host-seeking bedbugs via the use of an attractant and/or provision of harbourage. The technician must take care in the choice and location of such traps so as to avoid spreading the bedbugs, whilst also reducing the need for frequent revisits to maintain the traps. Furthermore, the size and design of some traps will prevent their effective deployment in certain locations – e.g. under a bed or similar space with limited room. Traps are therefore best used in non-commercial privately owned residences or in rooms that are closed during the treatment process.

Bedbug dispersal behaviour should be taken into account when monitoring for bedbugs and it is advisable to use a number of bedbug monitors placed strategically throughout a room - do not just place the monitors near the bed.

Barriers are simple units that aim to prevent bedbugs reaching the bed legs. They should be placed either underneath the bed legs/casters or on top of the casters of ensemble bases, ensuring that no aspect of the bed (or bed linen) touches the wall or floor. The technician should consider barriers as an effective means of monitoring an infestation only.

Mattress encasements

Mattress encasements are typically a smooth polyester fabric, fitting snugly to the mattress or box spring. Encasements are designed to prevent bedbugs from accessing the mattress and to contain any bugs that may already be there. The seamless surface created by encasements provides fewer available harbourage sites than an unprotected mattress. Therefore, an encased mattress is less likely to harbour bedbugs. Quality encasements should also be impenetrable to bedbugs, so the bugs cannot penetrate, escape from underneath, or ‘bite’ through the cover. Zips of mattress encasements, an area potentially vulnerable to bedbug access, should also be ‘bug proof’.

The use of mattress encasements is beneficial because it avoids the need to dispose of mattresses that are harbouring bedbugs.

If insecticide treatment of mattresses is necessary and approved, it is recommended to protect the mattress post-treatment, in order to give longer-term protection while also minimising insecticide use after the initial application.

It is important to remember that mattress encasements alone cannot stop bedbugs and should be used as part of an integrated bedbug management programme.

Laundering procedures

The following is an extract from work by Naylor & Boase (2010) University of Sheffield, UK.

Treatment Method	Temperature & Duration	Control Level
Washing machine (non-biological detergent) 3.2kg	Cool – 30°C – 30 minute wash	Did not kill Egg stages
	Hot – 60°C – 30 minute wash	Killed all life stages
Tumble Dry 3.2kg	Cool dry – 30 minutes	Did not kill all stages
	Hot dry – 30 minutes – 40/45°C	Killed all stages
Cold Soak 3.2kg	Cold water – 30 minutes	Killed adults/nymphs only
	Cold soak – 24 hours	Killed adults/nymphs only
Dry cleaning (perchloroethylene)		Killed all life stages
Freezing 2.5kg	2 hours at -17°C (8 hours to get clothes and items to -17°C, takes total 10 hours of treatment)	Killed all life stages

Please note that when tumble drying, the dryer should be operated on the ‘hot’ setting for 30 minutes for dry clothes, in order to kill all bedbug life stages. If clothes are wet, then they should be left in the machine until completely dry.

Tests with domestic tumble dryers have now been undertaken. When dealing with wet bedding, the recommended total cycle time (80-120 minutes as indicated on the dryer) for ‘dry cotton’ was enough to meet the time/temperature requirements for elimination of all bedbug life stages i.e. 40°C and above for 30 minutes (Isabel Jowett, Killgerm Chemicals, personal communication, February 2011).

The same study also noted that the time dial on domestic tumble dryers includes a 10 minute cooling cycle, inclusive of the total drying cycle.

Therefore, a 30-minute cycle under ‘high’ setting will only consist of 20 minutes of heat treatment, followed by 10 minutes cooling. This is not always sufficient to kill all bedbug life stages.

It is important to specify that when using a domestic tumble dryer, the treatment time of 30 minutes on the ‘high’ setting should be exclusive of the 10 minutes cooling time near the end of a cycle. It is necessary to follow this procedure for all life stages of the bedbugs to be killed by exposure to temperatures of 40°C and above for 30 minutes.

Bedding and clothing containing bedbugs should be bagged, prior to being transferred to the tumble dryer. If the bedding and clothing can remain bagged during tumble drying, this may help to contain the bedbugs.

Ironing items slowly with a hot iron may kill bedbugs if the lethal temperature is reached.

Chemical methods

Choice of formulation and active ingredient

The type of formulation selected for the treatment will depend on its usage patterns. For example, dusts can be used in areas occupied by electrical equipment and/or wall voids if the bugs are penetrating such areas, whereas liquid formulations can be utilised in more obvious locations. Suitable active ingredients would include bendiocarb, deltamethrin, alphacypermethrin, lambda-cyhalothrin.

Aerosol insecticides can be used for 'quick kill' and as a flushing agent. Products such as synergised synthetic pyrethroids act very effectively to knockdown and kill bedbugs when applied directly to the insect.

Application and use of insecticide

Only approved products must be used.

The insecticide must be directed at all harbourages identified in the inspection and applied in accordance with manufacturer's instructions. The carpet and underlay should be peeled back and the wall/floor junction treated.

Suitable application methods

The use of extension nozzles allows the insecticide to be applied accurately to areas such as beading on mattresses and cracks and crevices in furniture. For wall hangings and delicate or antique furniture, aerosols may be more appropriate than other formulations, after vacuuming. When applying liquid formulations, fan spray nozzles should be used along carpet edges and pin stream nozzles for cracks and crevices.

Resistance Management

Technicians should avoid selecting for resistance by refraining from repeated use of the same insecticide or related products in the same class of insecticides. Choose insecticides from all the available classes on a rotational basis to slow resistance development. For example, if pyrethroids are used in the first treatment, use a carbamate in the second treatment or vice versa. Also involve insect growth regulators and desiccant dusts, where appropriate.



Treatment processes

Domestic properties

As previously stated, thorough prior planning is essential for a successful treatment. In deciding the approach the technician will take to control the infestation, it may be helpful to provide a plan as to how the treatment will be undertaken. The treatment methods contained in the previous section in addition to the information contained in the following sections will be of assistance in this process.

Bedbugs not present

Explain to the occupier that there is no evidence of bedbugs and reassure the occupier that a revisit can be arranged if any activity reoccurs. If bites are evident, there may be other reasons. Consideration must be given to any environmental factors and/or medical conditions. Technicians must not advise on any medical conditions. The occupier must contact their doctor if they have any further concerns.

As a minimum, the following details must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- The areas surveyed
- The result of the survey confirming that bedbug activity was not identified
- Any other information that may be of relevance (for example, any previous history of bedbugs at the premises)

Close down the complaint making comments on the job sheet or electronic record.

Uncertain conclusion

If there is no evidence of any bedbug activity and either the occupier will not accept the situation, or there are reasons that may give the technician concern that bedbugs may be present, then consideration must be given to either using monitoring devices and/or revisiting with supervisor/manager.

Provide information and advice to the occupier on improving standards of hygiene and housekeeping if necessary.

Inform the occupier that a revisit can be made within 2 to 3 weeks.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of officer who attended
- The date of visit
- The areas surveyed
- The evidence of potential infestation
- The location, amount and type of monitoring devices
- Any other information that may be of relevance (for example, any previous history of bedbugs at the premises)

Report circumstances to relevant supervisor/manager.

Bedbugs confirmed

The aim of the treatment is to achieve complete eradication of the bedbugs and therefore the plan should include:

- The findings of the inspection (including where bedbugs were evident, the degree of activity etc.)
- The treatment process itself including the integration of non-chemical means and the insecticides to be used
- Any instructions to the occupier relating to the treatment (including if and when they will need to vacate the premises) which may include:
 - The need to loosen carpet around the perimeter of the room(s) to be treated
 - Removal of cover on the base of any bed(s)
 - Removal of any items that are mounted to the walls i.e. pictures, mirrors, light fixtures
 - Loosening of electrical outlet and switch plate covers
 - Ensuring that any items are not removed from the room(s)
 - Covering of fish tanks, removing pets and ensuring children do not have access to treatment areas etc.
- Any requirement to inspect adjoining rooms
- Any recommendations to the occupier, including housekeeping/hygiene improvements, need for removal of carpets, bed heads etc.
- The requirements for follow up inspections and treatments





Method of treatment

Supplementing the plan, and before any treatment is applied, a full written on-site risk assessment must be carried out. As a minimum, the risk assessment should take into account the nature of the treatment as well as the presence of young children, pets and elderly, infirm people.

The technician will also require suitable personal protective equipment, the type and nature of which will depend upon whether the technician is assessing potential bedbug activity or conducting an insecticide treatment. Any personal protective equipment must therefore be provided in accordance with the insecticide manufacturer's instructions and following a suitable and sufficient risk assessment. As a minimum, coveralls, nitrile gloves and suitable respirator should be provided.

It is important to note that not all surfaces can be treated by all chemical and non-chemical means. The instructions on product labels should be carefully followed and the effect of heat / cold treatments carefully considered, thereby avoiding damage to furniture, bedding etc. Care should also be taken around electrical equipment and the use of water based insecticides and/or steam avoided in these areas.

The technician should explain the nature of the treatment and any specific safety requirements to the occupier. The technician should provide an appropriately annotated advice sheet - highlighting the premises address, the date, what product has been used and what action to take in cases of an emergency. Safety data sheets may also be provided.

Following the treatment, the occupier should be advised to undertake the following:

- Occupants should be encouraged not to re-enter the treated area until after the insecticide has dried completely. Manufacturer's instructions must be followed where any re-entry period is stipulated
- The occupier should be asked not to vacuum floors and upholstered furniture for at least 10-14 days
- Ideally, the room should remain vacant until the technician declares the area free of bedbugs in a follow up visit

If the occupier continues to sleep in the treated room, bedbug activity may be stimulated by the presence of the resident host. This may result in bedbugs contacting insecticide at an earlier stage. However, the priority must be to protect occupiers from exposure to bedbugs. Having the occupant sleep elsewhere in a domestic situation may result in a wider spread of bedbugs in the property.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- The areas surveyed
- The evidence of bedbug activity, including any contributory factors
- Relevant site information including the presence of young children, pets and elderly infirmed people
- The location, amount and type of insecticide used (including suitable diagram)
- Any other information that may be of relevance (for example, any previous history of bedbug activity at the premises)
- Proposed date of follow up visit

Identify and survey any adjacent premises either immediately above or below or immediately to either side which may be 'at risk' of bedbug activity. If this is not possible due to time or other constraints record details of property numbers, street or block to identify them for future survey and treatment as necessary.

The time taken for eggs to hatch is dependent upon the ambient temperature and a revisit within 7 days of the first treatment is appropriate at higher temperatures. Treatments should be spaced at 2 to 3 week intervals at typical 'room temperature' e.g. 21 - 23°C. With heavy bedbug activity, several revisits will be required before complete control is achieved.

Second or subsequent visits

Carry out inspection of the affected area for evidence of bedbug activity. Inspection procedures should follow those stipulated earlier in this manual.

Confirm continued activity by visual verification of evidence of bedbugs as previously indicated.

Re-evaluate hygiene and housekeeping standards within the premises.

If substantial changes have occurred that could affect the safety or success of the treatment, a new on-site risk assessment should be completed. Similarly, if a different technician attends the premises, a record must be kept as to whether the technician agrees with the on site risk assessment. Where the technician disagrees with the assessment, a new on-site risk assessment must be completed.

If bedbug activity remains

Extend inspection to other areas of the premises to verify that bedbug activity is contained and extend treatment regime as required.

Retreat affected areas as appropriate following manufacturer's instructions. A record must be kept of all insecticide used when retreating any area.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- Any changes in the premises that could affect the safety or success of the treatment (completing a new on-site risk assessment if necessary)
- The evidence that the bedbug activity still exists
- The degree of activity observed and the amount of new insecticide used
- The location, amount and type of insecticide used (including amendments to the site plan)
- The nature of any hygiene housekeeping carried out or still outstanding
- Any other information that may be of relevance (for example, any previous history of bedbug activity at the premises)
- Proposed date of follow up visit

Explain nature of treatment, hygiene/housekeeping requirements and any safety requirements to occupier.

Estimate timing of next visit and inform occupier, this will generally be within 7 days.

If control has not been achieved after 3 visits, a revisit with supervisor/manager should be arranged and the control strategy examined and reassessed. Further discussions should also take place with the occupier to ensure that bedbug activity is not being inadvertently prolonged.

Completion

When no further signs of activity are observed or reported by the occupier explain the situation to the occupier and restate any outstanding preventative works or hygiene/housekeeping issues that require attention.

Close down the complaint and maintain suitable permanent record of all notes, on-site risk assessments, insecticide treatment records, copy letters and other relevant documents.



Treatment processes

Block or larger commercial properties



The methods of treatment discussed in the previous sections can be applied to block or larger commercial properties. Accordingly, this section highlights the processes to be applied when conducting treatments in these types of properties.

Bedbugs not present

Explain to the occupier(s) that there is no evidence of bedbug activity and reassure the occupier and/or owner that a revisit can be arranged if any activity reoccurs. If bites are evident, there may be alternative reasons for such lesions and consideration must be given to any environmental factors that may give rise to such problems. Technicians must not advise on any medical condition and the occupier advised to contact their doctor if they have any further concerns.

As a minimum, the following details must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- The areas surveyed
- The result of the survey confirming that bedbug activity was not identified
- Any other information that may be of relevance

Close down the complaint making such comments on the job sheet or electronic record.

Uncertain conclusion

If there is no evidence of any bedbug activity and either the occupier will not accept the situation, or there are reasons that may give the technician concern that bedbug activity may be present, then consideration must be given to either using monitoring devices and/or revisiting with supervisor/manager.

Provide information and advice to the occupier on improving standards of hygiene and housekeeping if necessary.

Inform the occupier that a revisit will be made within 2 to 3 weeks.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of officer who attended
- The date of visit
- The areas surveyed
- The evidence of potential bedbug activity

- The location, amount and type of monitoring devices
- Any other information that may be of relevance (for example, any previous history of infestation at the premises)

Report circumstances to relevant supervisor/manager.

Bedbug activity confirmed

Notes will need to be comprehensive to manage the treatment. Consider the need for enforcement action if no cooperation is afforded to permit an effective treatment for the entire property. A coordinated approach of treatment and enforcement may be required to eliminate the infestation.

As a minimum, the following information must be recorded:

- Details of each individual dwelling and/or common parts (including any specific job reference)
- Name of technician who attended
- The date of visit
- Details of all areas surveyed
- The evidence of potential bedbug activity, including any contributory factors
- Relevant site information including the presence of young children, pets and elderly infirmed people
- The location, amount and type insecticide used (including suitable diagram)
- Any other information that may be of relevance (for example, any previous history of infestation at the premises)

Report circumstances to relevant supervisor/manager.

Method of treatment

Supplementing the plan, and before any treatment is applied, a full written on-site risk assessment must be carried out. As a minimum, the risk assessment should take into account the size and nature of the treatment as well as the presence of young children, pets and elderly infirm people.

It is important to note that not all surfaces can be treated by all chemical and non-chemical means. All product labels should be carefully followed and the effect of heat/cold treatments carefully considered to avoid damage to furniture, bedding etc. Care should also be taken around electrical equipment and water based insecticides avoided in these areas.

Explain the nature of the treatment and any specific safety requirements to the occupier(s). Provide an appropriately annotated advice sheet to the occupier



highlighting the premises address, the date, what product has been used and what action to take in cases of an emergency. Safety data sheets may also be provided.

Vacuuming should supplement the discarding of infested items as the preferred form of non-chemical control. Control will therefore be achieved through insecticide treatment, preferably using at least two products from different insecticide groups.

Higher bedbug activity represents a greater risk to the technician and therefore PPE and decontamination procedures must be strictly adhered to in order to avoid spreading bedbugs to other parts of the property.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- The areas surveyed
- The evidence of infestation, including any contributory factors
- Relevant site information including the presence of young children, pets and elderly infirmed people
- The location, amount and type of insecticide used (including suitable diagram)
- Any other information that may be of relevance
- Proposed date of follow up visit

Identify and survey any adjacent premises either immediately above or below or immediately to either side which may be 'at risk' of infestation.

The time for eggs to hatch is dependent upon temperature. However, a revisit should be within a minimum of 7 days. Where high bedbug activity is present, several revisits will be required before complete control is achieved.

Second or subsequent visits

Carry out inspection of the affected area for evidence of bedbug activity. Inspection procedures should follow those stipulated earlier in this manual.

Confirm continued activity by visual verification of evidence of bed bugs as previously indicated.

Re-evaluate hygiene and housekeeping standards within the premises.

If substantial changes have occurred that could affect the safety or success of the treatment, a new on-site risk assessment should be completed. Similarly, if a different technician attends the premises, than from the previous treatment, a record must be kept as to whether the technician agrees with the on-site risk assessment. Where the technician disagrees with the assessment, a new on-site risk assessment must be completed.

If bedbug activity remains

Extend inspection to other areas of the premises to verify that infestation is contained and extend treatment regime as required.

Retreat affected areas as appropriate following manufacturer's instructions. A record must be kept of all insecticide used when retreating any area.

As a minimum, the following information must be recorded:

- Details of the premises (including any specific job reference)
- Name of technician who attended
- The date of visit
- Any changes in the premises that could affect the safety or success of the treatment (completing a new on-site risk assessment if necessary)
- The evidence that the infestation still exists
- The degree of activity observed and the amount of new insecticide used
- The location, amount and type of insecticide used (including amendments to the treatment diagram)
- The nature of any hygiene housekeeping carried out or still outstanding
- Any other information that may be of relevance
- Proposed date of follow up visit

Explain nature of treatment, hygiene/housekeeping requirements and any safety requirements to occupier(s).

Estimate timing of next visit and inform occupier(s), this will generally be within 7 days.

Larger properties may require several visits before treatment is successful. Revisits with a supervisor/ manager may be required to ensure the ongoing success and coordination of the treatment. Further discussions should also take place with the owner and/ or occupier(s) to ensure that bedbug activity is not being inadvertently prolonged.

Completion

It can often be difficult to determine when eradication has been achieved following a high amount of bedbug activity. Only through repeated treatments and follow up inspections, including one visit conducted at least 2-3 months after the initial course of treatments, can the treatment be considered completely effective.

Therefore, when no further signs of activity are observed or reported by the owner and/or occupier(s) explain the situation and restate any outstanding preventative works or hygiene/housekeeping issues that require attention.

Close down complaint and maintain suitable permanent record of all notes, on-site risk assessments, insecticide treatment records, copy letters and other relevant documents.

Health and safety



Health and safety of technicians

Pest control technicians should be aware of health and safety issues when inspecting for bedbug activity and applying treatment measures.

While working in areas where bedbugs are present, pest control technicians may be at risk of transporting bedbugs to different sites via clothing and equipment. In order to minimise the risk of this, there are a number of precautions that can be taken:

- Assume beds and other items harbour bedbugs and inspect with caution
- Minimise contact of clothing and equipment with items harbouring bedbugs
- Avoid sitting on or leaning over beds or items that harbour bedbugs
- Only take the minimum amount of equipment into a room and place it in an open area
- Inspect clothing and equipment for bedbugs before leaving
- Upon returning home, launder clothing in accordance with the laundering procedures described in this document
- Consider wearing disposable coveralls if there is particular concern over transporting bedbugs
- The coveralls can be removed and disposed of after undertaking inspections or treatments, to minimise the risk of transferring bedbugs
- Consider carrying a spare set of clothing to change into after working in areas where bedbug activity exists



The manual lifting of heavy furniture, mattresses and box springs may present a risk of strains and back injuries to pest control technicians. It is advised that technicians are trained in manual handling.

When working in domestic settings where dirty clothes, dirty linen and personal possessions may be encountered, there could be a risk of pest control technicians being exposed to pathogens. Precautions may need to be taken, such as wearing appropriate personal protective equipment and using caution when reaching into or behind furniture.

Health and safety of occupiers

Prior to insecticide treatment, consult the occupants to determine if they have any health concerns that may be affected by the use of insecticides. Consult product labels for advice and contact the manufacturer and / or health professionals if further details are required. For post-treatment advice relevant to the health and safety of occupiers, see 'Treatment processes - domestic premises'.

Storage of insecticides

All pest control storage facilities should be designed to the standard outlined in HSE Advice Sheet CS19 and maintained in a clean and orderly condition.

All pest control materials need to be kept in the pest control store from the time they are delivered, until they are needed by the operatives concerned. Materials should be used by the operatives from their original containers, or in containers which are suitable and appropriately labelled. Waste materials may only be disposed of in the approved manner from the pest control store.

All insecticide received into the storage facility, and the quantities distributed to technicians, must be recorded.



Disposal of insecticides



Legal background

The safe disposal of insecticides and their containers is an important aspect of the work of pest control technicians. The legislation covering this area is complex and all pest control operators are recommended to obtain suitable advice to ensure that their disposal routes are satisfactory.

Such disposal routes may exist within the resources of the pest control technician or by the use of a third party. Whichever option is chosen, pest control operators are advised to satisfy themselves that all the necessary permission, as required by the legislation, is in existence. For example, the disposal routes for spent insecticides are different from unused or obsolete products.

Under the Environmental Protection Act 1990 and the Pollution Prevention & Control Act 1999 local authorities must dispose of controlled and special waste in accordance with the Pollution prevention and Control (England and Wales) Regulations, the Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991, the Environmental Protection (Duty of Care) Regulations 1991 and the Waste Framework Directive 75/442/EEC as enacted under the Waste Management Licensing Regulations 1994.

The Landfill (England and Wales) Regulations 2002 amended the Duty of Care Regulations to require transfer notes to identify waste by reference to the Consolidated European Waste Catalogue (EWC) 6 digit code, and also to restrict the types of waste accepted at certain sites.

Specific hazard classification and disposal advice is contained on each individual product safety data sheet. Pest control technicians must comply with this information when disposing any product. However, the following guidance provides an outline of the disposal method.

Methodology: spent insecticide, waste packaging and contaminated PPE

All interim waste should be stored in a suitable storage facility designed to the standard outlined in HSE Advice Sheet CS19 and handled in accordance with appropriate risk COSHH assessments.

All such waste arising from pest control activities should be consolidated in a systematic way, for example unused insecticide should be stored separately from other container wastes, and accumulated in such quantities as to allow economic and efficient disposal.

Such waste should be bagged for interim storage and transported in bags having the necessary strength to withhold the weight of the waste and provide resistance to puncture. 300 gauge clear polythene bags with plastic pull tags are recommended for this purpose.

It is a statutory requirement of the Control of Pesticides Regulations 1986 (as amended) to empty containers completely, which is important not only from a legal standpoint, but also from a waste reduction perspective. Therefore where containers have held hazardous classified formulations, and have not been completely emptied, then the container must also be treated as hazardous waste. Any waste residues should be disposed of legally. Similarly, it may be possible for the disposal operator to seek, re-use, re-cycle or recover products that are contained within a plastic bag within a bucket. These buckets should be emptied completely and stacked inside each other. The contaminated polythene bags should be packed into a separate sack.

Disposal operators cannot accept waste unless it is in accordance with the Regulations, and therefore consideration should be given whether a licensed carrier is required to transport the waste products; however such materials may be transported to the disposal operator in the pest control vehicle. Where pest control technicians consider the use of a waste carrier, these must hold a valid waste carrier's licence.

The 'duty of care' obligation under Environmental Protection Act 1990 requires that all parties involved in any waste transfer must keep records (for example, transfer notes and waste descriptions) for at least 2 years.

Methodology: excess, out of date, obsolete unusable stock

The responsibilities and principles to be applied when disposing of these products are the same as those described in the previous section, however the type and quantity of the waste product may require specific disposal. Pest control technicians are advised to seek suitable professional opinion from their nominated disposal operator as to the most viable disposal option for all such products.

Useful addresses

British Pest Control Association

1 Gleneagles House
Vernongate
South Street
Derby
DE1 1UP
Tel: 01332 294288
www.bpca.org.uk

Chartered Institute of Environmental Health

Chadwick Court
15 Hatfields
London
SE1 8DJ
Tel: 020 7928 6006
www.cieh.org

Chartered Institute of Housing

Octavia House
Westwood Way
Coventry
CV4 8JP
Tel: 024 7685 1700
www.cih.org

Chemicals Regulation Directorate

2.3 Redgrave Court
Merton Road
Bootle
Merseyside
L20 7HS
Tel: 0845 345 0055
www.hse.gov.uk/biocides

CIEH National Pest Advisory Panel

c/o PO Box 2
Ossett
West Yorkshire
WF5 9NA
Tel: 01924 268433
www.cieh.org/npap

Department for Environment, Food & Rural Affairs

Nobel House
17 Smith Square
London
SW1P 3JR
Tel: 08459 335577
www.defra.gov.uk

Environment Agency

National Customer Contact Centre,
P.O. Box 544
Rotherham
S60 1BY
Tel: 08708 506506
www.environment-agency.gov.uk

Environment Planning and Countryside

Welsh Assembly Government
Cathays Park
Cardiff
CF10 3NQ
Tel: 0845 0103300 (English)
or 0845 0104400 (Welsh).
www.countryside.wales.gov.uk

Greater London Pest Liaison Group

(Good practice guides for bedbug control)
www.londonpestgroup.com

Health and Safety Executive

Redgrave Court
Merton Road
Bootle
Merseyside
L20 7HS
Tel: 020 7556 2100
www.hse.gov.uk

Homes and Communities Agency

110 Buckingham Palace Road
London
SW1W 9SA
Tel: 020 7881 1600
www.englishpartnerships.co.uk

National Housing Federation

Lion Court
25 Procter Street
London
WC1V 6NY
Tel: 020 7067 1010
www.housing.org.uk

National Pest Technicians Association

NPTA House
Hall Lane
Kinoulton
Nottingham
NG12 3EF
Tel: 01949 81133
www.npta.org.uk

Natural England

Enquiries:
Natural England
Northminster House,
Peterborough,
PE1 1UA
Tel: 01733 455000
www.naturalengland.org.uk

Northern Ireland Department of Environment

Department of Environment Headquarters
Clarence Court
10 - 18 Adelaide Street
Belfast
BT2 8GB
Tel: 028 90540540
www.doeni.gov.uk
Alternatively, please contact your local council

Northern Ireland Environmental Agency

Klondyke Building, Cromac Avenue,
Gasworks Business Park,
Lower Ormeau Road
Belfast BT7 2JA
Tel: 0845 3020008
www.ni-environment.gov.uk

Royal Society for Public Health

3rd Floor, Market Towers
1 Nine Elms Lane
London
SW8 5NQ
Tel: 020 3177 1600
www.rsph.org

Scottish Environment Protection Agency

SEPA Corporate Office, Erskine Court,
Castle Business Park, Stirling
FK9 4TR
Tel: 01786 457700
www.sepa.org.uk
See web site for Regional SEPA offices

Scottish Natural Heritage

Great Glen House
Leachkin Road
Inverness
IV3 8NW
Tel: 01463 725000
www.snh.org.uk



Chartered
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Health

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Chadwick Court, 15 Hatfields, London SE1 8DJ
Telephone 020 7928 6006 **Fax** 020 7827 5831
Email npap@cieh.org.uk **Web** www.cieh-npap.org.uk