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# The Ultimate Bedbug Control Guide



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# Ultimate Bedbug Control – Everything you need to know about how to get rid of Bedbugs

Welcome to hsd's Guide to advanced bed bug control. This reference guide has been designed to provide you with everything you need to know about how to get rid of bed bugs, combined with a straightforward control regime that will help to guarantee results every time.

## 1: The History of Bedbugs

Bedbugs have been around for thousands of years, and in that time have changed very little. In the 1930's one third of all London homes were infested with bedbugs, and some experts believe we will soon be heading back to those days if greater levels of control are not achieved soon. Following on from this period, with the introduction of DDT as an insecticide, bedbug control made significant advances and the problem was massively reduced. It is only recently that bedbugs have started to become such a problem once again. Local authority reporting of bedbug infestations in some boroughs has doubled year on year since 1995, with hot spots being identified in most major cities throughout the UK.

There may be several reasons for this, the most likely being:

1. Loss of many effective pesticides, withdrawn as a result of recent UK or European Legislation. More 'work' to be done by fewer pesticides, from fewer chemical classes has, and will continue to challenge the effectiveness of the few products remaining, leading to –
2. Insecticide resistance. Pests with short generation times and cryptic life-styles such as bedbugs are ideally suited to withstand pesticide attack, especially where inadequate chemical coverage and sub-lethal dosing allows genetic selection of survivors.
3. Changes in patterns of home ownership, cultural changes and changes in pest management responsibilities have all exerted a modifying influence on the prevalence of domestic pests in high population density metropolitan and urban environments. This is especially true for bedbugs and fleas.
4. A huge increase in movements of the human population both on the 'micro-' and the 'macro-' scale has allowed the mechanical migration of bedbugs throughout our major cities and towns. Bedbugs by themselves do not travel long distances and are more inclined to 'hitch-hike' from one location to another, slowly spreading the infestation from one premise to another. Increases in tourist movements have allowed 'stowaway' bedbugs to colonise hotels, hostels and domestic houses far more frequently than was possible a few years ago. The good news is that this guide will provide you with the information needed about bedbugs, in respect of premise surveys, control methods and tips on how to avoid re-infestation as well as introduce an

advanced formula effective pesticide that will help to overcome any resistance issues.

## 2: Bedbugs

*Cimex lectularius* and the 'tropical bedbug' *Cimex hemipterus* are common parasites of man, but are also known to feed on chickens, rodents, bats and other mammals.

### Appearance



A common misconception is that bedbugs are not visible to the naked eye, probably because by the time the bite irritation sets in, the bedbug has long gone. Adults measure 4-5mm (6-7mm after a full blood feed)(almost ¼ inch), with females being slightly larger than the males – though as both blood feed, identification is rarely required. Bedbugs are pale yellow/brown when unfed but turn to reddish brown or 'mahogany' in colour after feeding. They are wingless, are flattened torso-ventrally and have a shiny oval shaped body. The short, broad head is somewhat 'telescoped' into the pro-thorax and carries a pair of prominent compound eyes and two simple four-segmented antennae.

A three segmented folding proboscis is used to suck up its blood meal.

## 3: Feeding and Disease

Bedbugs suck blood from the peripheral circulation system at night and reach peak activity within the few hours before dawn. Bedbugs feed relatively quickly, usually within 5-10 minutes, utilising an anticoagulant saliva to aid the flow of blood through the proboscis. It is this protein based anticoagulant which raises the characteristic 'wheal' on the skin. Bedbug 'wheals' are different to flea bites insofar as they do not have a raised and reddened centre spot. *Insert photo of bitten arm*

Some people are extremely sensitive to the bites of the bedbug, suffering intense itching with the possibility of secondary infections as a consequence of scratching the bites. Severe infestations can induce nervous illness and lead to psychological delusions brought about by constant nightly attacks.

Although bedbugs possess all the necessary prerequisites to vector diseases from one host to another, there is no conclusive evidence to prove this. There are at least 25 known pathogens that are capable of living inside a bed bug or on its mouthparts. Extensive tests have been conducted in laboratory settings which conclude that bedbugs are unlikely to pass disease from one person to another. However, bedbugs have been shown more recently to harbour viruses (such as Hepatitis B) which can be transferred back to humans through faecal deposits, potentially entering the bloodstream in the process of scratching.

#### 4: Breeding and Lifecycle

Fertilised female bedbugs usually deposit their eggs on rough surfaces and can lay up to five eggs per day, depending on the ambient temperature and their success in blood feeding. The eggs are fertilised while still in the ovary, and the embryo has already undergone some development when the eggs are laid. Eggs are oval in shape and approximately 1mm in length, with an 'operculum' or lid at one end. The eggs are laid individually into cracks and crevices where they are held in place by a transparent 'cement'. The minimum time for development is 4-5 days at around 30°C, so usually 8-11 days at an average UK room temperature. No eggs will hatch if the temperature is above 37°C or below 13°C, and eggs which have not hatched within three months will die.

#### 5: Egg

*Photos of nymph bedbugs*

**First Instar Nymph** 1.5mm **Second Instar Nymph** 2mm **Third Instar Nymph** 2.5mm **Fourth Instar Nymph** 3mm **Fifth Instar Nymph** 4mm **Adult** 4-5mm

The juvenile bedbugs or 'nymphs' hatch by pushing off the operculum from the egg. These tiny nymphs are yellow in colour and translucent prior to their first blood feed. In between each of the five moults a bedbug nymph must go through to reach adulthood, a blood feed must be taken. Each instar looks essentially similar to the adult, but somewhat smaller (see life-cycle diagram below). The normal time taken to reach adulthood is 5-8 weeks, depending on temperature and frequency of feeding. Adult bedbugs normally live for several months but can live for longer in ideal conditions. They also have the ability to survive for long periods without a blood feed, up to 6-8 months, increasing their survival rates and making eradication difficult if treatment is not thorough and complete.

#### 6: Behaviour

Bedbugs can infest any type of human living quarters, and may not only be found in housing and short duration accommodation such as hotels and hostels, but also in cinemas, bus/truck/rail terminals, restrooms, offices, police cells and holding areas, as well as institutional dormitories like military barracks, hospitals and detention centres.

Bedbugs are poor hunters and can only recognise a food source once they are quite close, at which time thermal and chemical sensors allow them to locate their prey. Bedbugs are known to fall from the ceiling onto their victims, but such an action is not thought to be intentional or purposeful. Bedbugs are attracted by exhaled carbon dioxide and body heat, not by dirt. They feed on blood, not waste, so in short the cleanliness of their environment has an effect on the control of bedbugs but, unlike cockroaches, does not have a direct effect on bedbugs as they feed on their hosts and not on waste. Good housekeeping will certainly assist in control. Bedbugs shy away from light, this combined with positive thigmotaxis (the tendency to remain in close contact with hard surfaces) ensures that they hide away in cracks and crevices during the day. Bedbugs produce an aggregation pheromone which brings them together. This is not a sex pheromone as it equally attracts both female and male adults. It is this pheromone that explains the grouping of bedbugs and also explains why hundreds of eggs can be found laid close together. Bedbugs secrete an oily liquid from their coxal glands which, in heavy infestations, causes a distinct sweet smell. This smell combined with the presence of blood and excreta spots characterises bedbug infestations.

## **7: Identification**

Bedbugs do not move quickly enough to avoid the attention of an astute observer, when disturbed they will not move faster than around 2cm / second. Bedbugs travel easily along pipes and boards, and their bodies are very flat, which allows them to hide in tiny crevices, often avoiding detection. In the daytime bedbugs prefer to remain hidden in such places as mattress seams, mattress interiors, bed frames, nearby furniture, carpeting, baseboards, inner walls (through electrical sockets), or bedroom clutter. Bedbugs are capable of travelling to feed, but will usually remain close to the host in bedrooms or on sofas where people may sleep, generally they will only travel as far away as they need to find an adequate hiding place.

## **8 Control**

Successful bedbug control can only be achieved by a systematic approach to the problem, especially if the infestation has proved difficult to control in the past. There are four stages we can look at in a control programme:

1. Conduct a full & comprehensive
2. Appropriate and full preparation of rooms prior to treatment.
3. Treatment with advanced formula insecticides –

***We recommend the use of Protector C, Residex P 0.5% DP, Fortefog Fumers***

4. Re-infestation prevention.

## 9 Preparation

### Laundry –

all bedding including pillows should be laundered on a hot wash (60° Celcius) with a detergent and then placed in a hot dryer in order to kill all life stages of the bedbug. Mattresses, if necessary, should be treated with Protector C along with curtains and other soft furnishings.

**Cleaning** – as previously stated insanitary conditions do not necessarily contribute to bedbug infestations but cleanliness will help in the control process. Thorough vacuuming of all areas/furniture may not remove eggs but will help remove the active insects. If possible, ~~recommend the use of~~ a HEPA filtered vacuum cleaner and ensure that all waste is immediately incinerated or double bagged and placed directly in an external bin. Thorough cleaning, before treatment, is also recommended as once the treatment has been completed cleaning and vacuuming will shorten the residual effect of the insecticide.

## 10 Room Inspection

A useful checklist for inspection will include the following, but beware, bedbugs will hide anywhere they can find, so nothing should be overlooked in the inspection or treatment process:

**Mattresses** – including the buttons, folds and tufts.

**Bed's** – frames, headboards, covers etc. In many cases it is advisable to dismantle frames. With divan style beds this may not be possible and extra care must be taken as this may be a possible failure point in the treatment programme.

**Furniture** – everything ranging from sofa's, to bed side tables and wardrobes – every crack and crevice in a piece of furniture is a possible harbourage, be sure to turn tables and chairs upside down for inspection and treatment. Also check all soft furnishings such as curtains and cushions.

**Wooden fittings** – behind skirting boards, around door frames and handles, between and even under floor boards.

**Electrical installations** – plug sockets and switches, even electrical devices such as stereo's, TV's, telephones, table lamps etc.

**Walls and carpets** – behind loose wallpaper, cracks in plaster, under the edge of carpets etc. It may be necessary to pull back carpets at the edges and treat any possible hiding places underneath.

## 11 Treatment

Advanced formula insecticides form the basis of any chemical control programme. Growing insecticidal resistance means that control with a single active ingredient is increasingly difficult. This is why we recommend Protector C, Residex P and Fortefog fumers. If mattresses and bedding are severely infested then it may be necessary to destroy such items. Prior to destruction these items should be chemically treated to limit the premises re-infestation potential using a product approved for this use. Be careful when removing anything from the infested area – always cover and bag items to ensure infestations are not accidentally spread to other parts of the building/house.

When mattresses are not discarded, it is recommended to place them inside a hypo-allergenic sealed/zippered mattress cover for 24 months to ensure no eggs / bedbugs survive – these are available from HSD Online?. Identify any sources of infestation and begin treatment away from these 'hot-spots', moving inwards to the centres of infestation. This will ensure that insects do not disperse to untreated areas during treatment, and if any dispersal does occur, it will be toward the previously treated areas.

## **Bed Bug Control**

### **How to carry out the treatment**

#### **Read all the product label instructions before use.**

1. Measure the rooms to be treated, use one Fortefog P Midi fumer per 25m<sup>3</sup>, ensure all windows are closed, all cupboards are open and the bed is prepared as per the above instruction. Place the required fumers on a heat resistant surface, such as a baking tray or large plate, place this on top of a 500mm square of aluminium foil. Light the fumers and leave the room, close the door and leave undisturbed for at least two hours. After re-entering the room open all the windows and doors and aerate the room for about 45 minutes. Dispose of the used fumers in a responsible manner.
2. Use the Residex P dusting powder puffer pack to apply insecticidal dust to all cracks and crevices, under skirting boards, in floor voids and under cupboards, apply a fine covering of dusting powder to all areas required.
3. Apply the Protector C insecticidal spray to all soft furnishings, mattresses, carpets, bed frames, headboards, skirting boards, wooden furniture etc, 350ml will cover an area approximately 7m<sup>2</sup>.
4. If necessary, and safe to do so, remove kicking boards under built in beds, cupboards etc. Remove, or at least loosen wall fitted head-boards before treatment. Treat behind picture frames close to the sleeping area. Check and treat bookcases and furniture (being careful to check the spines of the books for bedbugs. Search for and treat behind any loose wall of floor coverings and identify these to the client for remedial work. Avoid treatment of

electrical fixtures/fittings when using water based sprays. Be careful not to allow spray run-off to enter conduits or under floor ducting. Treat infested electrical fittings with an approved dust i.e. Residex P 0.5% dusting powder

## 4. Re-Infestation Prevention

Once a room has been aired and any treated areas have had time to dry, rooms can be re-occupied. As with all particulate pesticides the residual life of Protector C and Residex P may be severely affected by cleaning and vacuuming. Leave this for as long as possible – ideally a minimum of seven days (preferably longer) to help ensure the majority of the bedbug population comes into contact with the residual insecticide.

### 12 Second treatment

A second treatment (10-14 days after first treatment) may be necessary to ensure complete eradication.

### Products

HSD recommends Protector C for use as the main insecticide for bedbug control. For use around electrical voids etc Residex P dusting powder is

recommended - as these are not an area to miss during treatment.

The next few pages provides you with the essential information on these products. For any additional information, sample labels or MSDS's, please contact HSD. - details on reverse cover.

## Protector C

**(A Nano-emulsion formulation)**

*A new technology giving an environmentally friendly and cost effective ready to use water based insecticide surface spray for use as a*



*Crawling Insect Killer for amateur and professional use that is completely free of organic solvents*

### **Description**

**Protector C (RTU)** contains an extremely cost effective active ingredient, but in addition, comes in a water based micro-emulsion formulation offering significant advantages.

**Protector C (RTU)** is designed for long residual activity when used as a surface spray and is especially suitable for use in homes, schools, hospitals, and food preparation premises etc. where safety, lack of smell and high efficacy are required. Patriot C can also be used as a space spray. **Protector C (RTU)** is normally non-staining in domestic situations but a test should be made first. For delicate surfaces **Protector C (RTU)** is preferred.

Nano-emulsion formulations offer advantages when compared to either emulsion concentrate formulations or micro-encapsulated formulations.

These advantages include:-

- No odour during or after use** - but it controls insects
- No fire risk during use or storage** - but it protects domestic and industrial premises
- No solvent pollution** - but a full strength ready to use product
- No headache from solvents after use** – no organic solvents
- Smaller particle size in solution** – faster penetration into surfaces and insect cuticle for better control

### **Active ingredient**

**Protector C (RTU)** contains cypermethrin at 0.1% w/v (1g/litre). Cypermethrin is a highly

active synthetic pyrethroid highly effective for the control of domestic insect pests.

#### **Environmental risk evaluation**

**General Population:** When applied as directed, exposure of the general population to **Protector C (RTU)** formulations is negligible and is unlikely to present any hazard. **Protector C** formulations are significantly less irritant than solvent based pesticides to people handling the product.

**Occupational exposure:** With reasonable work practices, hygiene measures and safety precautions the use of **Protector C (RTU)** products is very unlikely to present hazard to those exposed occupationally.

**Environment:** When properly applied at the recommended application rates it is unlikely that **Protector C (RTU)** or its degradation products will attain levels of environmental significance. Despite the high toxicity to fish and honeybees this is only likely to cause a problem in cases of gross misuse or spillage. By using **Protector C**

**(RTU)** water based formulations environmental contamination by organic solvents is eliminated.

#### **General Use Recommendations**

**Protector C (RTU)** is a new technology to improve ease of use, safety, and efficacy, reduce risk of damage and staining and to reduce environmental pollution.

As **Protector C (RTU)** contains no organic solvents, it is non-flammable and has no chemical smell during or after use. It does not cause skin irritation or headaches due to organic solvents.

It is primarily designed as a surface spray for the control of many insects including **ants**,

**bed bugs, beetles, cockroaches, flies, mosquitoes, moths and wasps** but ***Protector C (RTU)***

can be also used as a space spray for the control of flying insects.

***Protector C (RTU)*** contains 1g of cypermethrin per litre as an active ingredient. This is

one of the most cost-effective and stable pyrethroids available.

***Protector C (RTU)***

is supplied as a nano-emulsion formulation is therefore ideal for use in the home.

### **Practical use instructions**

#### **As a space spray for flying insects (flies, mosquitoes etc.):**

Use undiluted and spray the

air in all areas of the room at a rate of 1 to 4 ml of product per cubic meter.

**As a surface spray for crawling insects:** Use undiluted and apply 20 ml of product per

square meter using any suitable spray equipment, slightly wetting the surfaces to be protected.

Subsequently, make a maintenance treatment on a monthly basis, treating all surfaces as above.

### **Precautions**

KEEP OFF SKIN.

WASH HANDS AFTER USE.

KEEP IN ORIGINAL CONTAINER, tightly closed, in a safe place.

### **REGISTERED APPLICATIONS**

INSECTICIDE FOR AMATEUR AND PROFESSIONAL USE  
AGAINST FLYING

AND CRAWLING INSECTS SUCH AS ANTS, BED BUGS,  
BEETLES, COCKROACHES,

FLIES, MOSQUITOES, WASPS AND MOTHS. FOR USE  
INDOORS ON HARD NON

POROUS SURFACES IN DOMESTIC SITUATIONS AND  
PUBLIC HYGIENE AREAS

SUCH AS HOSPITALS (NOT OCCUPIED WARDS), OFFICES,  
INDUSTRIAL PREMISES,

MUSEUMS, AIRCRAFTS, SHIPS AND MILITARY  
INSTALLATIONS. ALSO FOR USE

OUTDOORS ON ANTS AND WASPS NESTS.

## **Residex P 0.5% Dusting Powder**

### *Description*

***RESIDEX P DUSTING POWDER is formulated as an exceptionally safe residual treatment for control of crawling insects in all situations.***

**RESIDEX P provides long term protection against a wide range of crawling insects and also against flying insects when the powder is dusted onto breeding or resting sites.**

**RESIDEX P has the following advantages:**

- Broad-spectrum activity against a wide range of pests.**
  
- Safe for use in the home, food factories and animal houses, without risk of contamination.**
  
- Long lasting effect.**
  
- Does not pose an environmental threat by entering the food chain.**
  
- Easy to apply.**

*Active ingredients:*

**Contains a safe photostable pyrethroid – permethrin 0.5% w/w**

**Permethrin: 3-phenoxybenzyl (RS)-cis-trans-3-(2,2-dichlorovinyl)-2,2-dimethyl-cyclopropanecarboxylate**

*Specification:* **Base carrier: inert talc and china clay dust**

*Safety:*

***RESIDEX P may be used freely in the presence of man and animals. It can be used in the presence of foodstuffs and in areas such as kitchens where food is being handled.***

***The safety of the product derives from the inherently safe nature of the active ingredient and also from its low rate of inclusion in the formulation.***

***LD50 mg/kg bodyweight***

**Acute Oral Toxicity      Female Rat**

***Permethrin*** ***4,000 (in corn oil)***

**Acute Dermal Toxicity**

***Permethrin*** ***4,000***

*Recommendations:*

***RESIDEX P DUSTING POWDER is recommended for use in factories, warehouses, farm buildings, hospitals, schools and other public buildings.***

***It may also be used on refuse tips, skips, dustbins and refuse collection equipment.***

*Directions for Use:*

**For the control of crawling insects: Initial treatment in situations where professional control is not available; sprinkle 10 grams of powder onto each square metre of surface. (One 100g pack is sufficient to treat an area of 10m<sup>2</sup>). Ensure that the powder is sprinkled into cracks and crevices.**

**Maintenance treatment where infestation is seen between treatments by professional pest controllers – the rate of application may be reduced to 5 grams per m<sup>2</sup>.**

**This rate of application will also be sufficient to maintain control in buildings where a monthly treatment programme is implemented.**

**Brush floor to remove debris before dusting. Ensure that dust is sprinkled at the margins of**

**rooms and in areas of difficult access, e.g. behind shelving and doors and cupboard space.**

**For control of flying insects: Apply 6 grams of dust per m<sup>2</sup> to refuse tips and other breeding sites. Sprinkle at the same rate onto floors in areas to which flies may be attracted**

**due to food processing operations.**

**Pre-treatment may be required at intervals of 3-4 weeks if infestations persist or re-infestation**

**may be expected.**

**Application Equipment: Use either a mechanical duster for large-scale operations, or more**

***conveniently for small-scale operations, shake the powder onto the surface from the sprinkler***

***provided.***

## Forte Fog P Midi Fumer

### **Technical Product information**

#### **The product**

The powerful and easy to use Fumer for effective control of crawling and flying insects such as fleas, bed-bugs, ants cockroaches, stored product insects etc. and flying insects such as houseflies, cluster flies, fruit flies, wasps, moths in the situations shown below. Forte Fog Fumers are easy to use multi-purpose products using an insecticide of low mammalian toxicity for insect control in enclosed spaces in hard to treat areas without the need for additional spray equipment. Forte Fog Fumers are the strong Fumer alternative. Forte Fog Fumers are ideal for use in areas that are difficult to control by normal spraying methods or where the spraying of water or solvent-based insecticides is not possible or desirable.

The safe use of insecticides and the avoidance of operator contamination are becoming more and more important to professional and private pest control operators. With Forte Fog Fumers, operator contamination is eliminated and risk of spillage removed completely. Forte Fog



Fumers are ready to use. They are completely self-contained. No additional chemicals are needed. No mixing or complicated calculations are required. Light the fuse and walk away; it couldn't be easier.

Forte Fog Fumers are at least 25% more powerful than comparable products on the market. The additional killing power is a security cushion to provide extra confidence to the user that the right product has been chosen.

Forte Fog Fumers do not have a lingering smell and whilst the smoke should not be breathed, it is not pungent nor does it leave any residual smell or deposit once the treatment is complete.

**Uses** The fog will control insects present at the time of treatment by direct contact action (space treatment). Forte Fog Fumers may be used in the following situations:

Area of Use	Examples
Domestic	Private housing          kitchens, attics, lofts, garages, garden sheds and stores etc.
Food handling	Processing:          food manufacture, kitchens, slaughterhouses, etc.  Storage:                  food retailers, warehouses, raw material stores etc.
Public Buildings	Preparation:          restaurants, commercial kitchens, etc. Hospitals, hotels, public baths, municipal buildings, churches, halls, community centres, cinemas, etc.
Animal Premises	Small scale pet shops, kennels, veterinary practices, laboratory animal houses etc.

Grain Stores Silos, etc.

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### DIRECTIONS FOR USE:

Forte Fog Fumers may be used to treat empty bins and stores, or in spaces where stored foodstuffs are protected from deposits of the insecticide by means of a simple covering. Delicate fabrics such as silk or rayon (viscose) should not be exposed to the smoke.

When fumers are used in the control of fleas or bed bugs, the following additional measures are recommended.

**Fleas:** to ensure control of infestations associated with domesticated animals, the animal(s) should be treated with a suitable dust, shampoo or dip, and their bedding and other infested areas should also be treated with fumers or insect powder, following thorough cleaning of the premises.

**Bed bugs:** thorough cleaning, including laundering of bedding, will also assist the control of bed-bug infestations. In addition, the bed and mattress should be treated with fumers or insect powder.

### FUMERS: INSECTICIDAL PERFORMANCE

**Spectrum of Activity:** Fumers control a wide range of insects. The list given is not exhaustive and insects not on the list may also be controlled

Common Name	Order	Specific Name
House Cricket	Orthoptera	<i>Acheta domesticus</i>
Earwig	Dermaptera	<i>Forficula auricularia</i>
German cockroach	Dictyoptera	<i>Blattella germanica</i>
American cockroach		<i>Periplaneta americana</i>
Oriental cockroach		<i>Blatta orientalis</i>
Surinam cockroach		<i>Pycnoscelus</i>

Brown-banded cockroach		<i>surinamensis</i> <i>Supella longipalpa</i>
Booklouse	Psocoptera	<i>Lepinotus patruelis</i>
Cat flea	Siophonaptera	<i>Ctenacephalides felis</i>
Dog flea		<i>Ctenocephalides canis</i>
Bed-bug	Hemiptera	<i>Cimex lectularius</i>
Grain weevil	Coleoptera	<i>Sitophilus granarius</i>
Rice weevil		<i>Sitophilus oryzae</i>
Lesser grain borer		<i>Rhyzopertha dominica</i>
Saw-toothed grain beetle		<i>Oryzaephilus surinamensis</i>
Fur beetle		<i>Attagenus pello</i>
Varied carpet beetle		<i>Anthrenus verbasci</i>
Carpet beetle		<i>Anthrenus flavipes</i>
Biscuit beetle		<i>Stegobium paniceum</i>
Tobacco beetle		<i>Lasioderma serricorne</i>
Australian spider beetle		<i>Ptinus tectus</i>
Yellow mealworm		<i>Tenebrio molitor</i>
Lesser mealworm		<i>Alphitobius diaperinus</i>
Rust-red flour beetle		<i>Tribolium canstaneum</i>
Small-eyed flour beetle		<i>Palorus ratzeburgii</i>
Rust-red grain beetle		<i>Cryptolestes ferrugineus</i>
Mosquitoes	Diptera	<i>Aedes spp.</i> <i>Culex spp.</i>
Fruit flies		<i>Drosophila spp.</i>
Bluebottle		<i>Calliphor erythrocephala</i>
Housefly		<b><i>Musca domestica</i></b>
Lesser housefly		<i>Fannia canicularis</i>
Cluster fly (Face fly)		<i>Musca autumnalis</i>
Tropical warehouse moth	Lepidoptera	<i>Ephestia cautella</i>
Indian meal moth		<i>Plodia interpunctella</i>
Common clothes moth		<i>Tineola bisselliella</i>
White-shouldered house moth		<i>Endrosis sarcitrella</i>
Brown house moth		<i>Hofmannophila pseudospretella</i>
Domestic ant	Hymenoptera	<i>Formica sanguinea</i>
Black ant		<i>Lasius niger</i>
Pharaoh's ant		<i>Monomorium pharaonis</i>
Common wasp		<i>Vespula vulgaris</i>

## Treatable volume

<b>Insect type</b>	<b>One Forte Fog Mini Fumer will treat</b>
Flying insects	up to 120m <sup>3</sup> (7,000 ft <sup>3</sup> )
Crawling: Fleas and Bed-Bugs	30m <sup>3</sup> (1000 ft <sup>3</sup> )

Ants, cockroaches, stored product insects etc      7.5m<sup>3</sup> (250ft<sup>3</sup>)

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## Use Instructions

### **General:**

For best results fumigate in the late afternoon and leave the treated area closed overnight.

Make the area to be treated as smoke tight as possible by closing all windows, doors and by turning off all ventilation. An airtight seal is not necessary.

1. Place the fumers as low as possible throughout the area to be treated as the smoke rises.
2. Remove the plastic lid and place the can on a heat resistant surface. Light the fuse and retire from the treated area. Ignite fumers furthest away from the door first.
3. For severe infestations, fumigate three times at 5 to 7 day intervals.

## **FUMERS**

**Formulation:** Forte Fog Fumers will smoulder quickly when ignited, yielding copious, dense white fumes of permethrin smoke. No sparks, flame or fire is generated although the container becomes hot. Forte Fog Fumers each contain 3.5g of powder in a canister with a perforated lid and give off 0.525g of permethrin fog when ignited.

**Storage:** Store in a cool, dry, clean safe place away from food and drink, animal foodstuffs and sources of ignition and out of reach of children. When correctly stored, tightly closed in their original containers, Fumers are stable for at least 2 years at temperatures below 35°C.

**Chemical Features:** Permethrin (the active ingredient in the Forte Fog Fumers) is non-tainting, non-staining, non-irritant and virtually odourless. It has a very low mammalian toxicity and can safely be used in areas frequently used by people. Forte Fog Fumers do not pose a risk to the environment. Other fumers in the market use chemicals that are significantly more toxic to mammals than permethrin

**Flush out:** Fumers will expel cockroaches rapidly from their hiding places making them more susceptible to the smoke. Laboratory test results demonstrate a relatively short time is required to flush out 50% of German cockroaches (*B. germanica*) using permethrin - almost half that required when using other active ingredients:

### Knockdown and Kill

**Flying insects:** Permethrin gives better control than lindane of flying insects, with almost twice the potency of the other insecticide in terms of kill activity:

**Crawling Insects:** Superior and highly potent knockdown and kill activity is also shown when permethrin is used for crawling insect control. In direct spray tests against the make German cockroach (*B. germanica*) permethrin was found to be five times more effective than lindane in terms of knockdown activity and twice as potent in terms of kill:

### FLYING INSECT CONTROL

In large-scale trials when various flying insects were exposed to Fumers treatments applied to give dose rates of 2.5 or 5mg ai/m<sup>3</sup> for four hours. High levels of mortality were recorded after 24 hours

Insect	Control at 2.5 mg ai/m <sup>3</sup>	Control at 5.0 mg ai/m <sup>3</sup>
Housefly ( <i>Musca domestica</i> )	98%	100%
Tropical warehouse moth ( <i>Ephastia cautella</i> )	90%	96%

Mosquito ( <i>Aedes aegypti</i> )	100%	100%
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The results demonstrate that Forte Fog Fumers, used as recommended will provide highly efficient control of a variety of flying insects.

## CRAWLING INSECT CONTROL

Forte Fog Fumers have also proved a valuable aid in the control of many crawling insect infestations when applied as direct contact (space) treatments.

**Fleas and bed bugs:** The high susceptibility of fleas and bed bugs to permethrin formulations is well established. It gives excellent control of cat fleas (*C. felis*) and dog fleas (*C. canis*). Trials with Forte Fog Fumers have also indicated that satisfactory control of both fleas and bed bugs can be achieved with this formulation at half the dose rate of 125mg ai/m<sup>2</sup> normally applied for initial treatment of crawling insect infestations.

**Fleas:** Accordingly, in large-scale trials to assess the performance of Fumers against dog fleas, the results showed that when applied at recommended dose rates to give a rate of application at 10mg ai/m<sup>3</sup>, these formulations could likewise make a useful contribution to the control of flea infestations in premises:

Dose Rate (mg ai/m <sup>3</sup> )	Control after exposure for 5 hours (% kill at 24 hrs)
10	>90
7	93.5

**Bed Bugs:** Similarly, in other large-scale trials with Fumers against bed bugs, the results demonstrated highly efficient control of these insects as the following table shows:

Dose Rate (mg ai/m <sup>3</sup> )	Control after exposure for 4 hours (% kill at 6 days)
10	>90

**Other Crawling Insects:** The value of Fumers in the control of other crawling insects was also demonstrated in large-scale trials when applications at the dose rate of 40mg ai/m<sup>3</sup> recommended for species other than fleas and bed bugs produced the following mortalities:

Dose Rate (mg ai/m <sup>3</sup> )	Control after exposure for 4 hours (% kill at 6 days)		
40	German Cockroach	Grain Weevil (S. <i>granaries</i> )	Saw-toothed grain beetle (O. <i>surinamensis</i> )
	( <i>B. germanica</i> )	90	89

### SAFETY PRECAUTIONS:

Permethrin, the component insecticide of Fumers is “unclassified” by the World Health Organisation. This group contains insecticides “unlikely to present any acute hazard in normal use”. However normal precautions should be followed as with all insecticide treatments.

#### Precautions:

**Do not breathe smoke. Wash hands and exposed skin** before meals and after work. **Remove or cover all foodstuffs before application.** Protect food-preparing equipment and eating utensils from contamination during application. **Exclude all persons and animals during treatment. Ventilate treated areas thoroughly** when smoke has cleared. **Extremely dangerous to fish.** Do not contaminate ponds, waterways or ditches with used generators/containers. **Keep in a safe place**, out of reach of children and away from sources of ignition. **Dispose of used Fumers and containers safely.**

#### Hazards:

Toxic: The product is harmful if swallowed

The smoke is harmful by inhalation and in contact with skin

**First aid in event of accident:**

Eyes: rinse immediately with plenty of water and seek medical advice.

Inhalation of smoke: remove to fresh air. If breathing has stopped apply artificial respiration.

Ingestion (swallowing): wash out mouth. Give plenty of bland fluids seek medical advice

Skin: wash off skin with plenty of water.

**Fire:** formulated to smoulder when ignited, evolving copious white fumes of permethrin.

**Fire fighting:** for fires involving this product use foam. Careful use of water spray will extinguish smouldering fumers. Avoid watercourse contamination.

**Spillage:** Transfer closed container for disposal. Do not contaminate ponds, ditches or waterways with the product or used containers.

**TRANSPORT RESTRICTIONS:**

Sea: IMO Class 4.1 Inflammable Solid n.o.s.

Air: ICAO Class 4.1 Flammable Solid n.o.s.

**DISPOSAL:** This material and its container must be disposed of in a safe way.