

Treatments to Eliminate Bed Bugs

Bed bugs are challenging pests to control. In most cases, it will be prudent to enlist the services of a professional pest management firm. Experienced companies know where to look for bed bugs, and have an assortment of management tools at their disposal.

Steam treatment

Steam treatments, when properly and directly applied, kill all life stages of bed bugs, including the eggs. Combined with pesticides and other methods, steam is very effective and will also reduce allergens and dust mites in the immediate area.

Steam can be used on mattresses and plush furniture, such as couches and chairs. However, steam will only kill bed bugs in places where the steam can reach. Contact time for heat is critical. Move the steam cleaner nozzle slowly (20 seconds per linear foot) to maximize depth and time of exposure.

The best choice in a steam machine is a professional type with a large water-holding capacity, many types of attachments, and variable output rates. Dry-steam or low vapor steamers are better because they use and leave behind less moisture. Steam cleaning should be done before vacuuming because steam will flush bed bugs out of their hiding spots, allowing them to be killed or later vacuumed up. By reducing the number of live bed bugs vacuumed up, it also reduces the chance that the vacuum will become infested and spread bed bugs to new areas. Details of the use of steam for controlling bed bugs can be found in the book "*Bed Bug Handbook*" (Pinto et al. 2008).

Thermal Remediation Using Ambient Heat (Convection Heat)

Heat treatments come in many forms from clothes dryers to heating units capable of treating an entire house. Heat has the advantage of killing all stages of the bed bug's life cycle. Whole unit heat treatments use a series of heat generating equipment and fans to circulate super-heated air. The entire unit is brought up to a temperature that does not harm most belongings, but is deadly to bed bugs and their eggs. In multiple-unit facilities, however, room/unit inspections must be done on adjacent units to prevent bed bugs from re-infesting the unit following heat treatment.

Freezing and the Use of Dry Ice or Liquid CO₂

The use of cold temperatures or freezing is often recommended as a method to kill bed bugs; however, its effectiveness can vary. The literature has examples of bed bugs that can recover from being frozen if the temperatures are not too low or too long. Studies have shown that freezing bed bug infested items at <0°F for two or more hours is effective. Using this method, it takes approximately 8 hours for 5 pounds of dry laundry to REACH 0°F. Many items, however, cannot be treated with this method due to size or item type. A new rapid freeze technology called Cryonite™ has been developed. This

method uses carbon dioxide snow to rapidly freeze and kill bed bugs. It is applied in much the same way that steam is used, primarily as a crack/crevice treatment.

Pesticides

Pesticides are an important tool in the fight against bed bugs. However, they should be applied by a certified and well-trained PMP.

Residents of multi-unit housing **SHOULD NOT** attempt to do their own pest control, but should contact their building management to report pest problems. The PMP will provide residents with guidelines for cleaning and room preparation. Incorrect use of pesticides for bed bugs poses several risks (contamination, unnecessary exposures, permanent damage, and/or serious health concerns).

Summary of Bed Bug Treatment Processes

Management Method	Primary Responsibility	Commentary	Compatibility with other methods
Laundering *	Resident	Laundered fabrics will be free of bed bugs as long as they are kept isolated from infested areas.	Include in every control effort.
Unit Preparation*	Resident	Poor housekeeping and sanitation are not necessarily conducive to bed bug infestations, but bed bugs are more likely to remain undetected and pest management efforts are more likely to fail in a cluttered home.	Include in every area so that the PMP can properly inspect the property.
Encasements *	Resident	Bed bugs that are trapped in an encasement designed for use in bed bug control will not be able to feed or escape and will eventually die. Encasements keep bed bugs from infesting mattresses, box springs, and other furniture.	Use encasements either after treatment or before an infestation is found.

Management Method	Primary Responsibility	Commentary	Compatibility with other methods
Monitors	PMP, resident, or staff	Monitors will catch bed bugs, but are not meant to control infestations.	Monitors can be used alone or in combination with other detection and control methods to confirm active bed bug infestations
Vacuuuming*	PMP, trained staff, or trained resident	Vacuuuming is not reliable as an exclusive control method.	Vacuuuming may be used with other treatment methods.
Steam	PMP	Steam wand must be moved at a rate that heats the area to a lethal temperature.	Use with other methods such as insecticidal dust for voids that steam cannot penetrate. Mattresses and box springs must be dry prior to placing in encasements.
Thermal Remediation Using Ambient Heat	PMP	Lethal temperatures must penetrate all items for the treatment to kill all stages of bed bugs.	Heat treatment is a good option for cluttered homes where preparation is not realistic.
Bed Bug Detecting Canine	PMP	Dogs are effective for bed bug detection.	Use with visual inspection. Inspect, then treat in areas where the dog alerts.
Pesticides	PMP	Selected for a situation based on location of application, effectiveness, residual, and ovicidal properties.	Pesticides are used as a treatment method or as needed in combination with other treatment methods.
Freezing Using Dry Ice/Liquid CO2	PMP	Not widely used in the USA, but widely used in Europe. Insufficient information for adequate assessment at this time.	More research is needed comparing the penetration of both heat and cold.
* Should be incorporated into every treatment plan for optimal success			

Post-Treatment Evaluation

Bed bug management is a time-consuming and difficult task. To rid a household of bed bugs in a timely manner, it is important to evaluate the effectiveness of the treatment methods being used and adjust accordingly. After physical repairs, cleaning, and treatment have been conducted it is important to monitor for surviving bed bugs. Whatever treatment method(s), there may be surviving eggs that will hatch. This does not mean the treatment was ineffective. As eggs hatch it will be necessary for continued monitoring and follow-up treatments. Expect the treatment to progress over several weeks. Monitors (sticky traps, bed bug interceptors) are useful in these situations. If a significant reduction in bed bugs is not observed after the first treatment, it may be necessary to consider a combination of methods or an alternative to the one being used. Reasons for treatment ineffectiveness may be:

- All sources of bed bugs were not treated. Consider re-inspecting adjacent units (they should be inspected prior to treatment).
- Ineffective pesticides or insufficient contact time by heat methods.
- Re-introduction by infested items – Do not move items out of the home or area to be treated before you consult your PMP. They may harbor bed bugs which may not be treated.