

# **CONFIDENTIAL REPORT**

**PREPARED**

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## **BACKGROUND**

There is a national epidemic of bed bugs, *Cimex lectularius*, so professionals and consumers are searching for safe and cost-effective ways to deal with them. These bloodsucking insects transmit no known diseases and thus are considered nuisance pests. Despite this benign-sounding name they have become a scourge to many. One solution has been to dispose of bedding in order to get rid of the insects. Unless the bed is the only infestation site this remedy usually provides only brief if any relief. Traditional mattress and box sets present a special challenge because of their size and ample bed bug harborage. Once the set has been treated then encasement can provide 'insurance' that any remaining bed bugs, especially those that may hatch from eggs, will be entrapped and unable to feed. Encasements also prevent infestation of the mattress and/or box springs. Most of the encasements on the market are made of woven fabric, often with an inner treatment, that prevents escape and feeding through the fabric. A zippered non-woven fabric similarly has the advantage of providing no feeding access between fibers.

## **PURPOSE:**

The BugShield™ zipper closure on an SMS non-woven fabric was the subject of this scientific evaluation to determine if bed bugs can feed through the fabric or enter and exit through the zipper.

## **PROTOCOL & RESULTS:**

A vial containing approximately 100 bed bugs of all developmental stages (nymphs and adults) with the opening covered by a nylon mesh (Fig. 1) was firmly placed against the inner surface of the product for 15-20 minutes to test the fabric's ability to block feeding (Fig. 2). This was replicated three times and no feeding occurred. The same bed bug vial was placed on the inner surface of the zipper to see if they could feed through it and likewise none were successful in feeding (Fig. 3). The protocol was repeated on the sewn seams with the same result, bed bugs were unable to penetrate the non-woven fabric (not shown). The vial was placed on human skin and fed readily, demonstrating their ability to blood feed (Figure 4).

The zipper was inspected for its ability to securely contain bed bugs (Figs 5 & 6). Although no bed bugs were placed inside to determine whether they could escape, based on how the zipper is sewn and the placement of an internal flap I believe that it is highly unlikely that even the smallest nymphal instar could escape through the zipper. That the pin-lock zipper prevents the zipper from disengaging provides added assurance of closure.

There should be no concern for the smallest stage, the egg, from passing though the fabric or zipper because the female bed bug actually glues the egg to whatever substrate it is

standing. Not even vacuuming can dislodge the egg from its attachment site. Thus there is virtually no chance for the egg to pass through the fully-zippered encasement.

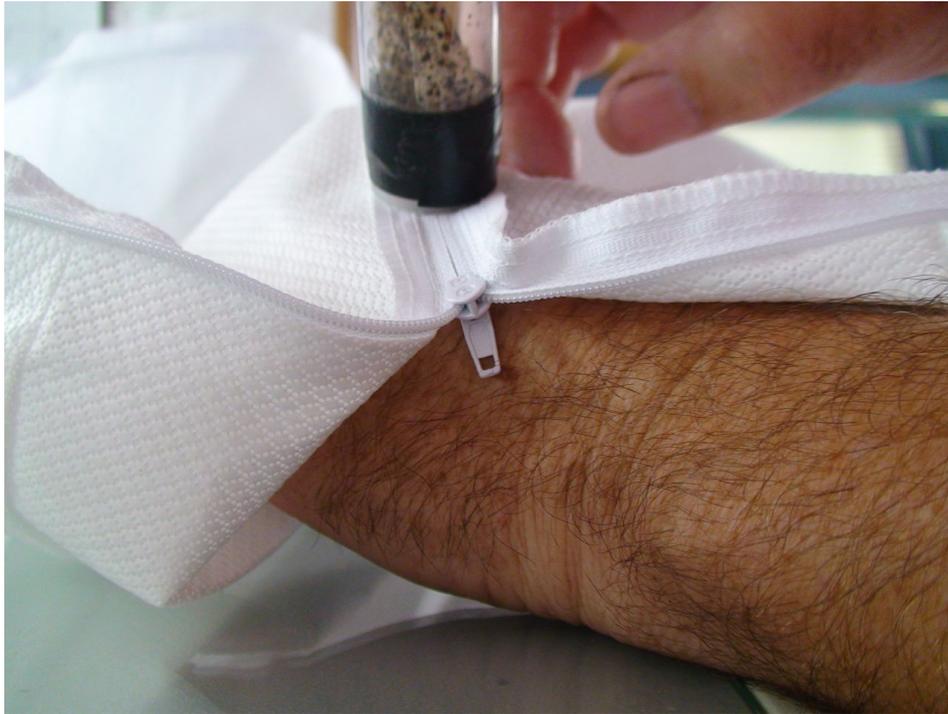
**Figure 1.** Bed bugs in glass vial with fabric covering opening. This fabric allows bed bugs to stand on the lid and readily feed.



**Figure 2.** Bed bug vial placed on non-woven BugShield™ encasement. No feeding occurred after 15-20 minutes of exposure.



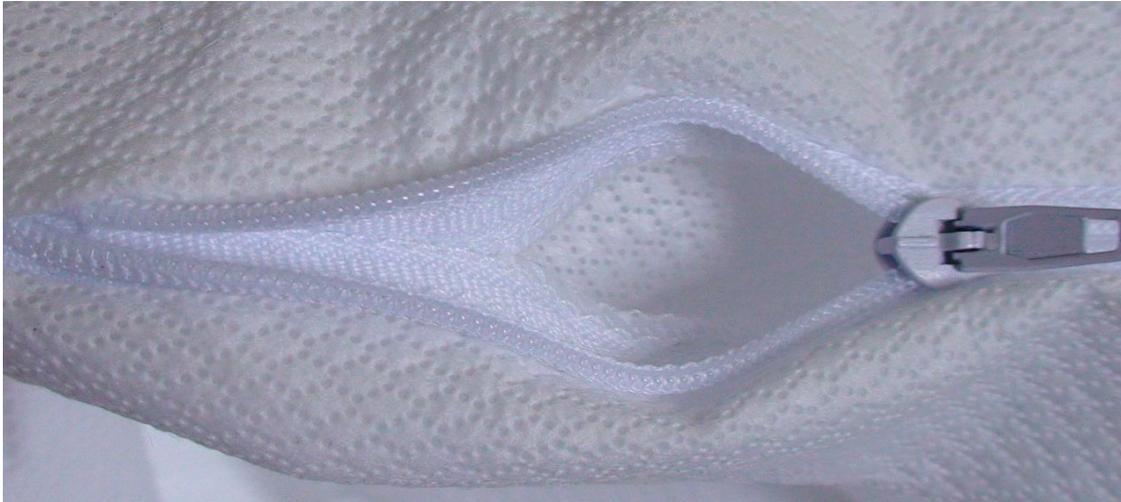
**Figure 3.** Bed bug vial placed on the zipper of non-woven encasement with BugShield™ zipper closure. No feeding occurred after 15-20 minutes of exposure.



**Figure 4.** Bed bugs readily fed in 15 minutes without the barrier, demonstrating that they would have readily fed through the fabric.



**Figure 5a & b.** Close-ups of pin-lock zipper showing the internal flap and tight-fitting, secure position that should prevent even the 1<sup>st</sup> instar bed bug nymph from escaping the box springs.



**In Summary,** based on these laboratory experiments, the BugShield™ closure and box spring cover should effectively encase bed bugs securely, preventing feeding and escape. Eggs would not pass through the zippered encasement because the female bed bug glues that stage to the fabric.