



Standard Test Methods for Laboratory Testing of Non-Commercial Mosquito Repellent Formulations On the Skin¹

This standard is issued under the fixed designation E 951; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These test methods apply to repellent compounds and formulations that can be appropriately diluted with ethanol, acetone, or a similar inert carrier for test purposes. The test methods described are not suitable for testing powders, sticks or other solid formulations, or for testing thixotropic or other fluids whose physical properties would be modified by dilution.

1.2 These test methods are designed and intended for use as a research standard to develop data on the efficacy of repellents applied to the skin of humans against laboratory-reared or field-collected mosquitoes. The use of these test methods will provide for the development of a data base whereby all investigators generate comparable data. Modifications of the equipment or procedures, or both, may be needed for tests against other kinds of biting arthropods.

1.3 The test methods are intended for use in testing materials that are in an advanced stage of development, for which human-use trials can be fully justified on scientific and ethical grounds. The test methods are not designed for the testing of commercial formulations where registration or advertising claims data are required.

1.3.1 A repellent should not be considered for testing on humans before its efficacy has been demonstrated in *in vitro*, animal, or other nonhuman test systems.

1.3.2 A repellent should not be applied to the skin before its safety has been established in appropriate toxicological tests on animals or other test organisms.

1.3.3 No repellent should be tested on humans without the written consent of the test subjects and prior approval of competent authority, as designated in the applicable laws and regulations governing experimentation on humans.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appro-*

priate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Document

2.1 ASTM Standards:

E 939 Test Method of Field Testing Topical Applications of Compounds as Repellents for Medically Important and Pest Arthropods (Including Insects, Ticks, and Mites): I Mosquitoes²

2.2 Other Documents:

Directions for Abstractors and Section Editors of Chemical Abstracts³

Consolidated List of Approved Common Names of Insecticides and Other Pesticides⁴

Common Names of Insects and Related Organisms⁴

3. Apparatus

3.1 *Test Cage*—The following design and materials have been found suitable for construction of the mosquito cage (see Fig. 1):

3.1.1 The cage is rectangular in shape, length, width, and height is approximately 7.2 by 2 by 1.6 in. (18 by 5 by 4 cm). The top of the cage (5 by 18 cm) is made of metal or plastic mosquito screening, and the sides, ends, and floor are made of 1/8 in. (3.2 mm) clear acrylic plastic.

3.1.2 Five 1 1/8 in. (29 mm) circular openings are drilled in line on 1 3/8 in. (35 mm) centers in the floor of the cage.

3.1.3 The two sides and one of the ends of the cage are grooved and slotted to receive a flexible rectangular slide made of 0.012 in. (0.3 mm) cellulose acetate sheeting. The slide should move freely over the floor of the cage to open and close the five openings.

3.1.4 One end of the cage is fitted with a No. 3 stopper in a 1/2 in. (13 mm) hole for insertion of the test mosquitoes.

3.2 *Harness*—Two belts are used to secure the test cage to the forearm during the test. These should be approximately 1 in. (2.5 cm) wide by 12 in. (30 cm) long. If an elastic material is used for the belts, snap or friction type fasteners should be provided for joining the ends. If an inelastic material is used,

¹ These test methods are under the jurisdiction of ASTM Committee E35 on Pesticides and are the direct responsibility of Subcommittee 35.12 on Insect Control Agents.

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² *Annual Book of ASTM Standards*, Vol 11.05.

³ Available from the American Chemical Society, 1155 16th St., N.W., Washington, D.C. 20036.

⁴ Available from the Entomological Society of America, College Park, MD 20740.