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Textiles — Anti-mosquito performance test method using the attractive blood feeding apparatus

Textiles — Méthode d'essai de performance anti-moustiques au moyen du dispositif d'attraction par apport de sang

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Contents

Page

Foreword

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This document was prepared by Technical Committee ISO/TC 38, *Textiles*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

In recent years, threats of infectious diseases mediated by insects such as mosquitoes are rising. In response to consumers' concerns about this, demand for high-performance anti-mosquito fabrics has been expanding. However, there has been no standard for evaluating the performance of such anti-mosquito fabrics, and it has been difficult to provide fair technical information on their performance. Therefore, a new test method was established in order to evaluate anti-mosquito performance of fabrics.

For this purpose, an apparatus was developed for attraction and blood feeding of blood-unfed mosquitoes through fabrics without using human or animal as a feeding source.

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Textiles — Anti-mosquito performance test method using the attractive blood feeding apparatus

1 Scope

This document specifies a method for evaluating the function of reducing mosquito contact and blood feeding through the anti-mosquito fabric regardless of whether chemicals are treated or not. It provides the test method for evaluating this function without using human or animal as blood feeding sources.

In addition, this document is only concerned with evaluation of anti-mosquito performance, and not concerned with evaluation of preventive method of diseases caused by anti-mosquito performance.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
anti-mosquito fabric
fabric for preventing blood sucking by treating chemicals or processing fabric structure

3.2
landing
state of mosquito alighting and staying on a surface within an arbitrary section (on the test specimen)

3.3
blood feeding rate
percentage of the number of blood-fed mosquitoes through specimen to the total number of mosquitoes

3.4
probing behaviour
behaviour of mosquito while looking for a place to insert its proboscis for blood feeding

Note 1 to entry: This gesture is recognized as an up and down movement of the head.

3.5
blood feeding prevention
effectiveness of test sample in preventing blood feeding of mosquitoes

Note 1 to entry: In this document, it is indicated by the blood feeding prevention index.

4 Principle

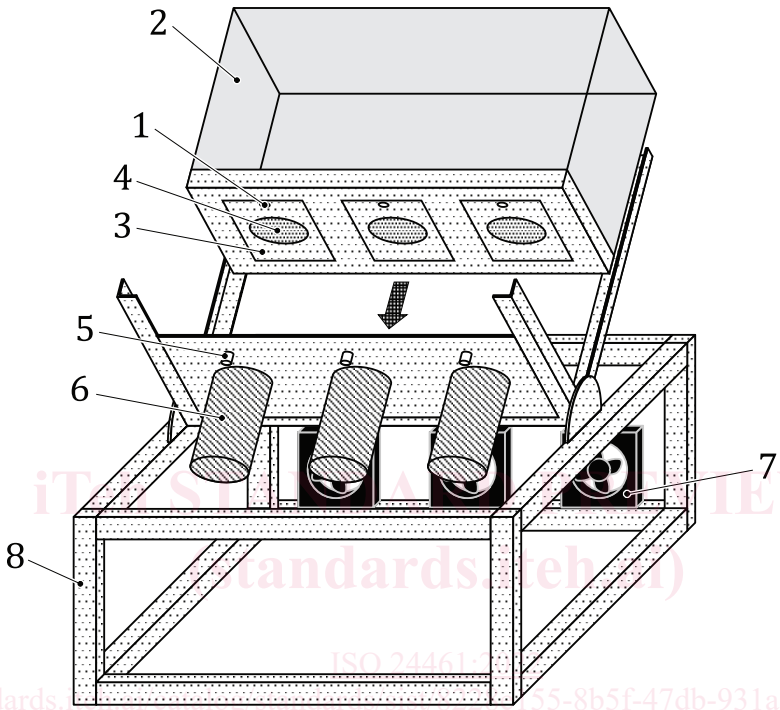
Using the attractive blood feeding device, obtain the blood feeding prevention index and determine the landing and probing behaviour of blood eager female mosquitoes when exposed to a test sample.

5 Apparatus and materials

5.1 Attractive blood feeding device

5.1.1 General

Attractive blood feeding device consists of parts described in 5.1.2 to 5.1.7. An example of the configuration of attractive blood feeding device is shown in Figure 1.



Key

1	hole for supplying carbon dioxide gas	5	nozzle for supplying carbon dioxide gas
2	test cage	6	feeding device
3	specimen holder	7	ventilation fan
4	test specimen	8	frame

Figure 1 — Configuration example of attractive blood feeding device

5.1.2 Feeding device

The feeding device is composed of a feed reservoir for pouring test blood and a thermostat temperature regulator. An example of the configuration is shown in Figure 2 and Figure 3.

5.1.1.1 Feed reservoir, composed of a metal or glass container holding test blood and membrane covering the container. The surface covered with membranes serves as the feeding surface.

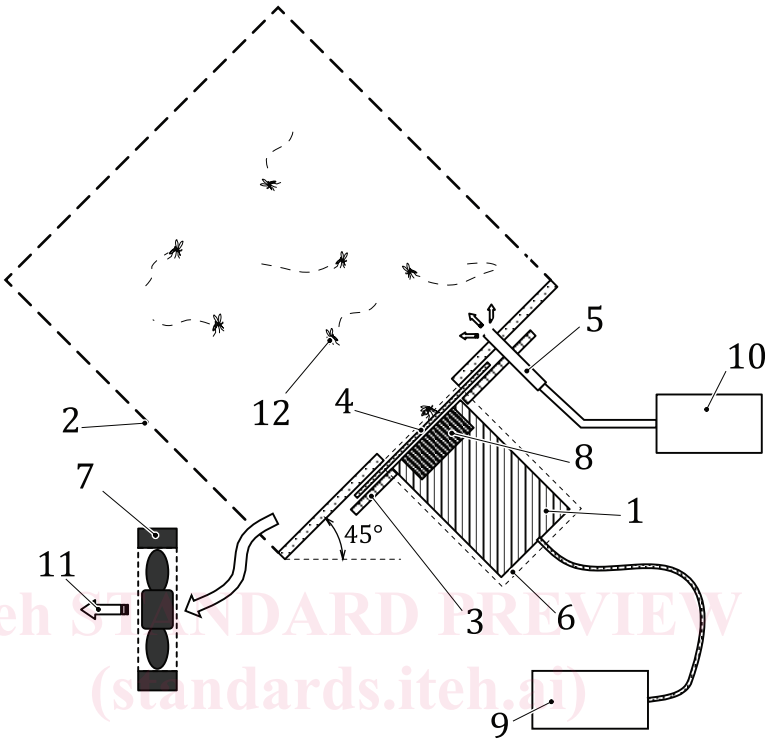
The diameter of feeding surface of feed reservoir shall be 35 mm ± 2 mm. The capacity of feed reservoir should be at least 3 ml.

5.1.1.2 Membrane

An animal intestine, animal skin, collagen film, sausage casing, or artificial skin to be used as a membrane through which a test mosquito can blood feed. Selected membrane should be agreed upon between the interested parties.

5.1.1.3 Thermostat temperature regulator, device connected to feed reservoir that can control temperature to a constant temperature ±0,5 °C.

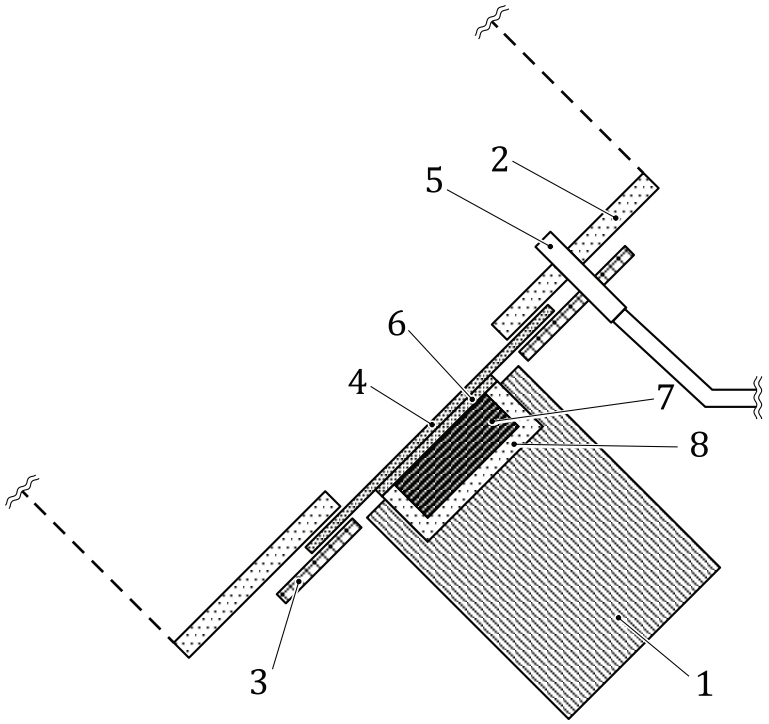
An electrically controllable heater, a constant temperature water circulation device, and the like are examples.



Key

1	thermostat temperature regulator	7	ventilation fan
2	test cage	8	feed reservoir
3	specimen holder	9	temperature control unit
4	test specimen	10	carbon dioxide gas supply unit
5	nozzle for supplying carbon dioxide gas	11	exhaust direction
6	feeding device	12	test mosquito

Figure 2 — Configuration example of periphery of attractive feeding device (cross sectional view)



Key

1	thermostat temperature regulator	5	nozzle for supplying carbon dioxide gas
2	test cage	6	membrane
3	specimen holder	7	test blood
4	test specimen	8	feed reservoir

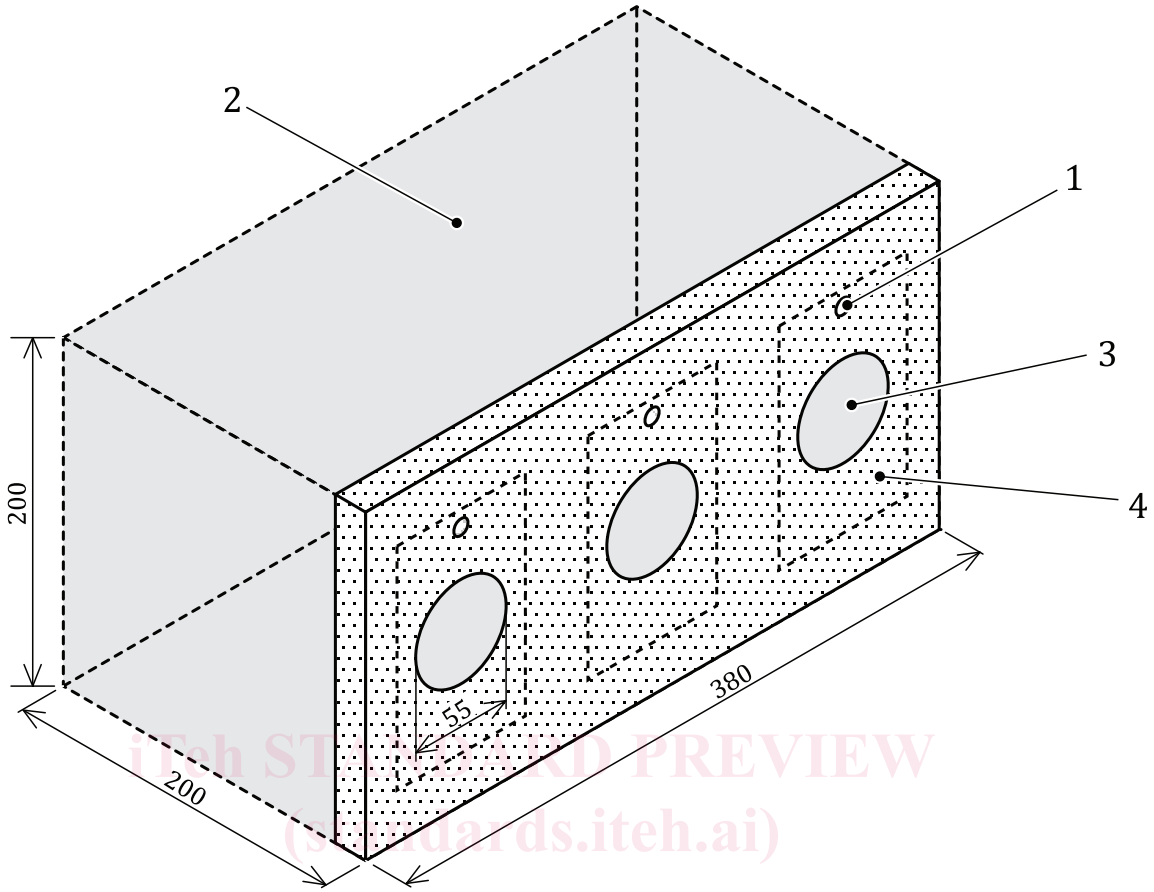
Figure 3 — Configuration example of periphery of feed reservoir (cross sectional view)

5.1.3 Test cage

The test cage is a cuboid (width: 380 mm ± 10 mm, height: 200 mm ± 5 mm, depth: 200 mm ± 5 mm) with three openings on one side that can be connected to a feeding device having a structure designed to allow test mosquito to be released inside. Three openings with diameter 55 mm ± 2 mm are jointed to feed reservoirs via specimen holder which size is such that feeding surface is sufficiently exposed through the openings. Three openings should be covered with lids before and after the test, and should be tightly connected with specimen holder during the test to prevent the test mosquitoes from escaping from the cage. Mesh is used for five faces of test cage. Mesh is fine enough so as not to allow test mosquitoes to escape, but not too tight so that the behaviours of test mosquitoes inside can be observed.

An example of test cage is shown in Figure 4.

Dimensions in millimetres



Key

1 hole for supplying carbon dioxide gas
2 mesh (5 faces)
3 opening
4 fitting part of specimen holder

Figure 4 — Example of test cage

NOTE In order to reduce the effect of the examiner's exhalation on the test mosquito, for example, a face shield may be worn or a transparent acrylic sheet may be placed on the observation surface.

5.1.4 Specimen holder and lid

The specimen holder is used for immediate removing of test specimen (or validation specimen) after test. The lid is used for avoidance of escape of test mosquitoes from test cage before and after test. The specimen holder is quickly removed from test cage immediately after completion of test and opening of test cage is immediately closed by lid. An example of specimen holder and lid is shown in Figure 5.