

# Hand-held pressurized aerosol dispensers against houseflies —

## Part 2: Method for determination of insecticidal performance

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# Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee CII/49, Insecticidal aerosols, upon which the following bodies were represented:

- British Aerosol Manufacturers Association
- British Association for Chemical Specialities
- British Pest Control Association
- Department of Health — Health Aspects of the Environment and Food Division
- Health and Safety Executive
- Huntingdon Research Centre
- Ministry of Agriculture, Fisheries and Food

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## Foreword

This part of BS 4172 has been prepared by Technical Committee C11/49. It supersedes BS 4172-2:1993 which is withdrawn.

The principal changes in this edition are as follows.

- a) The formulation used in the reference dispensers has been revised to eliminate chlorofluorocarbons (CFCs).
- b) Appropriate changes have been made in the formulation and preparation of the reference dispensers and in the specification of the reference dispenser container valves.
- c) Terminology has been revised to improve conformity with that used in related agricultural and horticultural applications. For example, the noun “spray” is replaced by “aerosol” and “efficiency” is replaced with “performance”.
- d) The cone angle test has been deleted.

Annex A and annex E are informative. Annex B, annex C and annex D are normative.

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### Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

## 1 Scope

This part of BS 4172 describes a method for determining the insecticidal performance of hand-held pressurized aerosol dispensers (hereafter referred to as “dispensers”) for indoor use as space treatments against houseflies.

The method does not apply to metered-valve or total-release dispensers.

NOTE The principle of the method may be used for the determination of insecticidal performance of space treatments against other flying insects. However, the method may not be valid for products intended for use against strains tolerant of pyrethroid insecticides.

## 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication applies.

BS 4172-1:1998, *Hand-held pressurized dispensers against houseflies — Specification for insecticidal performance*.

## 3 Definitions

### 3.1

#### block

group of dispensers for testing

### 3.2

#### candidate

dispenser under test

### 3.3

#### dispenser

container incorporating an aerosol valve and holding a product at a pressure greater than atmospheric pressure, from which the product is discharged by means of a propellant when the valve is opened

NOTE Dispensers are intended for disposal when exhausted and not for refilling.

### 3.4

#### knockdown

measure of the percentage by number of dead and moribund flies or those unable to fly or walk in a co-ordinated fashion

NOTE Assessment can be made either by counting at a given time after spray application, or by assessing the percentage in the population.

### 3.5

#### study

tests required to compare the performance of the candidate(s) with that of the reference dispenser

### 3.6

#### KT<sub>50</sub>

time, in minutes, taken for the knockdown of 50 % of the test insects

### 3.7

#### 24 h knockdown

percentage by number of test insects knocked down 24 h after the start of the test

## 4 Principle

A dispenser is discharged into a test chamber containing an internationally recognized susceptible strain of the housefly *Musca domestica* L. under controlled conditions. Knockdown is assessed at:

- up to 15 min; and
- at 24 h after discharge.

The results of replicate determinations of knockdown (7.3) for the candidate and calibrated reference dispensers are compared statistically (see clause 8).

## 5 Materials and apparatus

5.1 *Test insects*, of adult *Musca domestica* L. of an internationally recognized susceptible strain, of mixed sex and 3 days to 6 days old at the time of test.

NOTE 1 A recommended breeding regime is given in annex A.

The average mass of at least three random samples, each sample containing a total of 100 clean and dry pupae, 1 day to 2 days old and destined for use in the test, shall be between 1.75 g and 2.5 g.

At the beginning of the study, the vigour and susceptibility of the test insects shall be checked using a reference dispenser prepared in accordance with annex B.

When determined in accordance with clause 7, the reference dispenser shall have a KT<sub>50</sub> of 6.5 min ± 2 min and 24 h knockdown between 50 % and 99.0 % at a dosage rate of 5.3 g ± 0.5 g of aerosol formulation per 50.0 m<sup>3</sup>.

If an anaesthetic is used to handle the test insects, a 12 h recovery period prior to conditioning shall be allowed.

NOTE 2 It is recommended that carbon dioxide is used as the anaesthetic.

The test insects shall be conditioned for at least 3 h before the test at a light intensity approximating to that of the test chamber (5.3), at a temperature of 26 °C ± 2 °C and at a relative humidity of 45 % to 75 %.

NOTE 3 The usual food should be provided.

5.2 *Six or more reference dispensers*, prepared in accordance with annex B and conditioned at 26 °C ± 2 °C for at least 30 min before use.

**5.3 Test chamber**, of a volume not less than 25 m<sup>3</sup> and not greater than 60 m<sup>3</sup>. The ratio of the length to the width shall be not greater than 1.2:1.0. The chamber shall be 2.4 m to 2.8 m in height.

The floor shall be covered with non-glazed paper which shall be replaced for the start of each day (see 7.1). Other surfaces shall be of a cleanable material or covered by a replaceable lining such as cling film wrap. Illumination shall be by fluorescent lighting sited to eliminate shadows.

The chamber shall be maintained at a temperature of 26 °C ± 2 °C and at a relative humidity of 45 % to 75 % during the period of testing. Temperature gradients shall be avoided and any air-conditioning apparatus present shall be turned off. If mobile equipment is used, it shall be removed before commencing the test. The chamber shall be designed not to give rise to convection currents during the test. The extract vent shall be covered during the test period to prevent flies gaining access. The chamber shall be ventilated after each test to ensure a minimum of four complete air changes before the start of a subsequent test.

**5.4 Storage containers**, typically 0.5 l to 1 l, with clear lids, having the same size and construction for each study.

## 6 Sampling and treatment of the candidate

### 6.1 Sampling

Select at least six dispensers at random from those available for the test.

### 6.2 Treatment

Ensure that each candidate contains a mass of 50 % to 60 % of its declared contents, the estimation for which shall be made by weighing against a previously weighed empty can and valve assembly of similar size. Attain this level of fill by discharging the dispenser repeatedly for periods individually not exceeding 10 s. Shake the dispenser to restore equilibrium before each discharge.

Condition the candidate for at least 30 min at 26 °C ± 2 °C then calibrate the candidate for its discharge rate by weighing before and after discharge over a measured time interval of approximately 5 s.

## 7 Procedure

**WARNING.** Operators discharging dispensers in test chambers should be equipped with fully effective personal protective equipment.

### 7.1 Test chamber contamination checks

Check the test chamber for insecticidal contamination before the commencement of the study and at the end of every day.

Release at least 100 test insects (5.1) of mixed sex into the chamber and leave them there for 15 min with the ventilation turned off and the extract vent covered. Collect and hold the test insects in accordance with 7.3.

If there is more than 5 % knockdown within 15 min, or more than 10 % after 18 h ± 6 h, clean the chamber and replace the floor paper (see 5.3). Repeat the contamination test procedure and invalidate the results of all tests carried out during the previous 24 h period.

### 7.2 Conduct of study

Perform one valid determination (see 7.1) for at least six of the reference dispensers, (5.2) and the same number of candidates (see clause 6) in the study. Use a randomized block design to determine the order of testing within each day.

**NOTE** A block design ensures that the same number of candidates and reference dispensers are tested on each day. It also ensures that the ordering *CCRRRR*, which has potential for bias, never occurs, where *R* is a reference dispenser and *C* is a candidate dispenser.

Two possible randomizations are given below for the case of six determinations per day:

*CRRRCR* (with one candidate);

*C<sub>1</sub>RC<sub>2</sub> RC<sub>1</sub>C<sub>2</sub>* (with two candidates).

### 7.3 Determination

Weigh the reference dispenser (5.2) and the candidate (6.2) to the nearest 0.01 g.

Either discharge the reference dispenser at a rate of 5.3 g ± 0.5 g per 50.0 m<sup>3</sup> or discharge the candidate at the dosage recommended on the product label, or by the manufacturer.

Hold the dispenser upright and, walking backwards, continuously discharge it down the longer axis of the test chamber (5.3), moving it from side to side at a height of approximately 1.8 m, for the time necessary to give the required dosage as described in the paragraph above. Do not discharge the dispenser at a distance of less than 1 m from any vertical surface.

Release a minimum of 100 mixed sex flies (5.1) at floor level in the centre of the chamber over a maximum period of 10 s, beginning at 20 s after commencement of discharge of the dispenser. Take at least five counts of knockdown, at regular intervals during a period of 10 min from the time of release of the flies. Should there be less than 70 % knockdown at 10 min, make a further two counts at 12 min and 15 min. Ventilate the chamber after completing the final count.

At the end of the exposure period, collect all the flies, both knocked down and flying, by gentle suction or other means, into clean containers (5.4). Avoid overcrowding of flies. Re-weigh the dispenser to the nearest 0.01 g.

If the required dosage rate is not achieved, invalidate the test result.