MALAYSIAN STANDARD

DMS 1256:2025

Household pesticide products – Rodenticide - Chemical, physical and biological efficacy requirements (Second revision)

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Committee representation

The National Standards Committee on Chemical and Materials (NSC 02) under whose authority this Malaysian Standard was developed, comprises representatives from the following organisations:

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Department of Agriculture Malaysia
Department of Chemistry Malaysia
Department of Minerals and Geoscience Malaysia
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Department of Standards Malaysia (Secretariat)
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Ministry of Domestic Trade and Consumer Affairs
Ministry of Investment, Trade and Industry
National Water Services Commission
Universiti Malaya
Universiti Sains Malaysia

The Technical Committee on Household Pesticides (NSC 02/TC 12) which supervised the development of this Malaysian Standard consists of representatives from the following organisations:

Envu Malaysia (2022 Environmental Science MY Sdn. Bhd.)
Department of Agriculture Malaysia
Department of Standards Malaysia (Secretariat)
Fumakilla Malaysia Berhad
Institute for Medical Research
Malaysian CropLife and Public Health Association
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Co-opted members:
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Jabatan Perlindungan Tumbuhan, Fakulti Pertanian, Universiti Putra Malaysia

Foreword

This Malaysian Standard was developed by the Technical Committee on Household Pesticides (NSC 02/TC 12) under the authority of the National Standards Committee on Chemical and Materials (NSC 02).

This second revision of MS 1256 cancels and replaces MS 1256: 2010, *Household pesticides products – Rat bait – Specification.*

Major modifications in this revision are as follows:

a) the title has been changed to "*Household pesticide products – Rodenticide - Chemical, physical and biological efficacy requirements*";
b) product description has been revised for suitable active ingredient(s) compounded with suitable inert ingredients formulated in liquid or solid forms;
c) acceptable variation in active ingredient content for pesticides in Table 1 have been revised;
d) active ingredients and inert ingredients in the wax block formulation for the MS Reference Product for rat bait have been revised"; and
e) ideal weight of test rodents has been revised for each species of rodent.

Compliance with a Malaysian Standard does not of itself confer immunity from legal obligations.

CONTENTS

Page

DMS 1256:2025

Household pesticide products – Rodenticide - Chemical, physical and biological efficacy requirements (Second revision)

1 Scope

This document specifies minimum chemical, physical and biological efficacy requirements of rodenticide products intended for household use against rodents.

This standard is applicable to rodenticide products used against common rodents pest.

NOTE. Attention is drawn to the mandatory requirement that rodenticide marketed in the country is to be registered with the Pesticides Board under the Pesticides Act 1974.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Pesticides Act 1974

FAO and WHO. 2022, *Manual on the development and use of FAO and WHO specifications for chemical pesticides – Second edition*

3 Terms and definitions

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

3.1
Product description
suitable active ingredient(s) compounded with suitable inert ingredients formulated in various forms for example liquid or solid forms.

3.2
Malaysian Standard Reference Product (MS Reference Product)
household pesticides product which contains pre-defined active ingredient(s) of rodenticides and inert substance(s) which meets the minimum requirements of local needs. It is used to conduct standard tests for comparing the effectiveness of similar test products. The performance of a test product is determined to have fulfilled the requirements of a standard test if the performance is equal to or better than that of the MS Reference Product.

For the purpose of this standard, the requirements for MS Reference Products are given in Annex A.

Note 1 to entry: MS Reference Products can be obtained from the Vector Control Research Unit, School of Biological Sciences, Universiti Sains Malaysia in collaboration with relevant industries.

3.3

Mortality
Inducement of death in rodents by the application of a rodenticide

4 Requirements

4.1 Chemical requirement

4.1.1 Active ingredient

4.1.1.1 Type

The active ingredient(s) may be warfarin, coumatetralyl, bromadiolone, brodifacoum or any other suitable compounds.

4.1.1.2 Active ingredient identity and content tests

The validated method(s) of analysis or any other established methods, such as those established or recognised by authorised body shall be used.

NOTE The example of authorised body is Collaborative International Pesticides Analytical Council (CIPAC) or Association of Analytical Chemists (AOAC) International Publications.

Acceptable variations in active ingredient content for pesticides are given in Table 1. The acceptable variations in active ingredient will depend on the initial active ingredient content in the formulation.

When the identity or content remains in doubt, it shall be analysed using at least an additional validated test method.

Table 1 – Acceptable variation in active ingredient content for pesticides [Adapted from the Manual for the development of FAO and WHO specifications for pesticides]

Active ingredient content (% w/w))	Acceptable variation in active ingredient content (%)
≤ 2.5	± 15 % of declared content for homogenous formulation ± 25 % of declared content for heterogenous formulation

4.2 Physical requirement

4.2.1 Average weight of bait

The average weight of the bait shall be declared in grams and when determined on the package, the average weight shall be within ± 10 % of the declared amount.

4.2.2 Product form

The rodenticide shall be in a suitable form that can be applied to increase the palatability.

4.3 Biological efficacy requirement

Performance of test product shall be compared against the MS Reference Product. The test product shall be interpreted and reported as meeting this standard if the mortality is equal to or better than that of the MS Reference Product.

The rodenticide should be evaluated using the test methods described in Annex B.

4.4 Stability of active ingredient(s)

The aim is to ensure that the active ingredient content (in original packaging) is not adversely affected by storage at different temperatures, and to assess their long-term storage stability at more moderate temperature, with respect to the content of the active ingredient. Active ingredient degradation limits in the product after accelerated ambient storage condition are given in Table 2.

Stability test should be conducted as follows:

a) At ambient temperature for 2 years or more; or

b) In accordance with the FAO Accelerated Storage Test Procedure, at elevated temperatures of (54 ± 2) °C for 14 days. Alternative conditions are: 4 weeks at (50 ± 2) ºC, 6 weeks at (45 ± 2) ºC; 8 weeks at (40 ± 2) ºC, 12 weeks at (35 ± 2) ºC or 18 weeks at (30 ± 2) ºC.

Table 2 – Active ingredient degradation limits in the product after accelerated or ambient storage condition

Active ingredient content (% w/w)	Acceptable variation/degradation in active content (%)
< 2.5	±15%

When complying with the above, the product would most likely comply with the shelf-life specification of two years or more for ambient testing and two years for the elevated temperature test.

4.5 Bait acceptance

The bait acceptance can be expressed in the following formula.

$$\text{Bait acceptance (\%)} = \frac{\text{Weight of bait eaten}}{\text{Weight of challenge diet eaten} + \text{Weight of bait eaten}} \times 100$$

4.6 Palatability ratio

The palatability ratio can be expressed in the following formula.

$$\text{Palatability ratio} = \frac{\text{Wieght of bait eaten}}{\text{Weight of challenge diet eaten}}$$

5 Sampling

A general sampling procedure for rodenticides is as described in Annex C.

6 Packaging and marking

6.1 Packaging

Rodenticide shall be packed in such a manner where the package offers suitable protection from deterioration.

6.2 Marking and labelling

For products marketed in this country, the rodenticide shall bear legible and durable labels according to the Pesticides Act 1974 and subsequent rules and regulations. For products to be exported, the rodenticide shall be marked as required by the trade practice or laws prevailing in the country concerned.

7 Certification mark

Each product may by arrangement with a recognised certification body, be marked with the certification mark of that body, provided the product conforms to the requirements of this Malaysian Standard.

Annex A
(normative)

Requirements for MS Reference Product for rodenticide

MS Reference Product for rodenticide as shown in Table A.1

Table A.1 – MS Reference Product for rodenticide

Ingredients	Content (% w/w)
Active ingredient: Coumatetralyl	0.0375
Inert Ingredients: Example: Maize, wheat, preservatives, etc	99.9625
Total	100.00

Annex B
(informative)

Method for the evaluation of biological efficacy - Rodenticide - Choice feeding test

B.1 Scope

This annex describes a method to determine the mortality, bait acceptance and palatability ratio in the presence of challenge diets.

B.2 General requirement

Since biological test is subjected to the variations that accompanying the reactions of living organisms, it should be conducted by trained personnel familiar with the bio-efficacy testing.

B.3 Rodent room

B.3.1 A room maintained at the temperature of 24-30°C and relative humidity of 60-90%.

B.3.2 Ensure that the room is comfortable for the rodent during the test period.

B.4 Equipment

B.4.1 Cages

With dimensions of 28 cm (W) × 36 cm (L) ×16 cm (H) and the allowance of 10 % variations, sufficient floor space room and constructed of metal and strong wire mesh.

B.4.2 Feed container

A suitable metal dish container. (Example shown in Figure B.1).

B.4.3 Water bottle

Suitable commercially available water bottle for rodents.

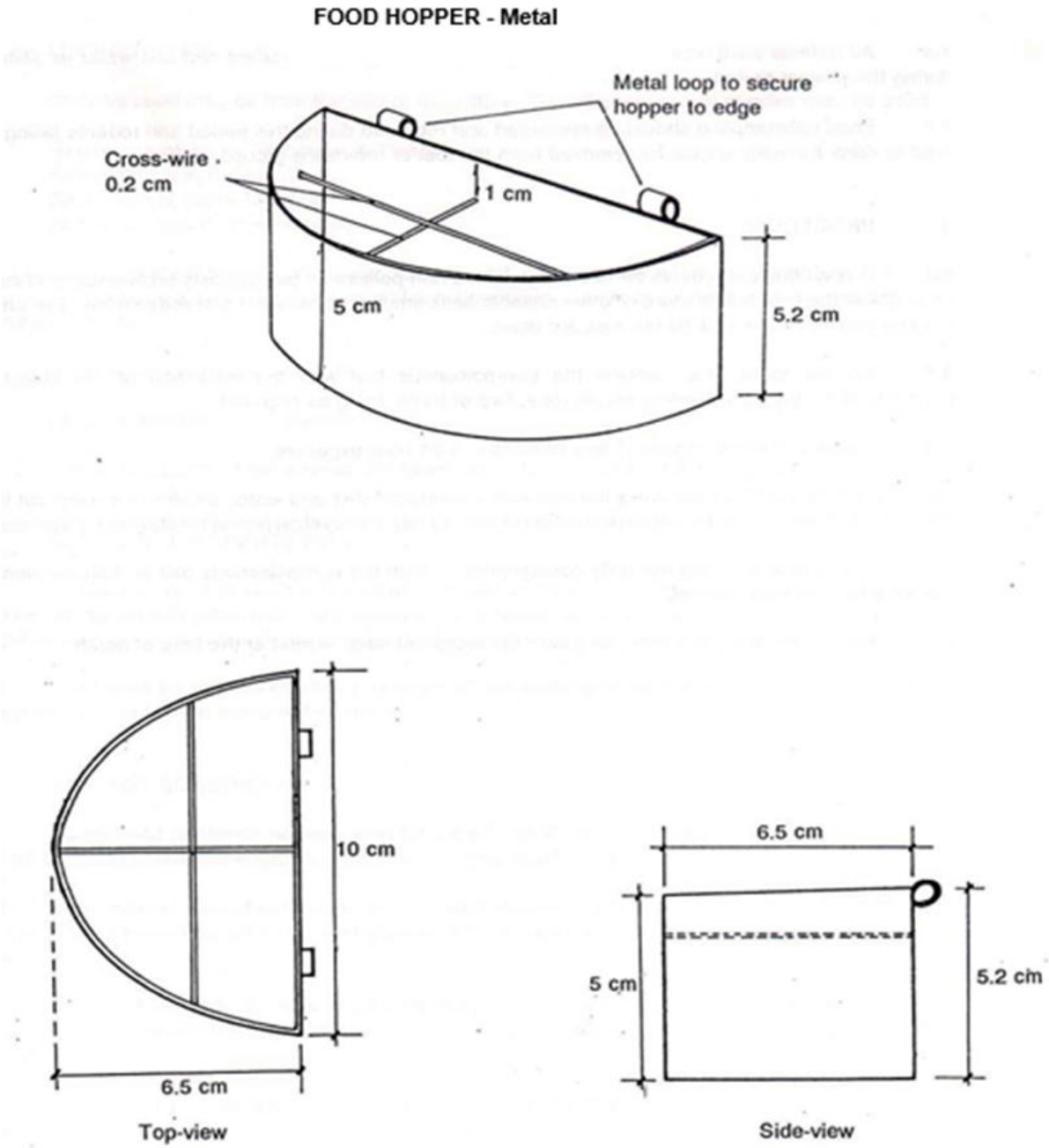

Figure B.1 – Food container for feeding test

B.5 Materials

B.5.1 Challenge diet

Consists of cereals such as broken rice or maize and edible oil (approximately 2 % of the final mixture).

B.5.2 Malaysian Standard Reference Product (MS Reference Product)

The formulation for MS Reference Product is as in Annex A.

B.5.3 Test sample

The test sample shall be the rodenticide that is under evaluation.

B.6 Test rodents

B.6.1 Rodents used can be from the laboratory or wild. Any rodent species can be used, for example:

Common rodents pest: *Rattus argentiventer* (Robinson and Kloss), *Rattus tiomanicus* (Miller), *Rattus rattus* (Linnaeus) and *Rattus norvegicus* (Berkenhout)

Test rodent shall be free from ectoparasite.

A minimum of 10 animals (5 males and 5 females) of the same species of comparable physical condition and weight may be used. The experiment shall be conducted with three replications. The animals shall be caged individually in cages in the rodent room.

B.6.2 All animals used shall be matured adult rodents of equal number in both sexes. The female shall not be in lactating or pregnant stage. The recommended weight of the test rodents is shown in Table B.1.

Table B.1 – Recommended weight of test rodents (adult size)

Species of rodent	Range of weight (g)
Rattus argentiventer	150 to 250
Rattus tiomanicus	80 to 150
Rattus rattus	100 to 200
Rattus norvegicus	250 to 350

B.6.3 The final weights of the rodents should be taken within 24 hours before the test, to the nearest 0.1 g.

B.7 Control rodents

B.7.1 A minimum of 10 animals (5 males and 5 females) of the same species of comparable physical condition and weight as the test group may be maintained as a control and will serve to monitor mortality which might occur in a group not receiving the toxicant.

B.7.2 Control rodent shall be free from ectoparasite.

B.7.3 They shall be caged individually in cages of the same type as those used for the actual test group and housed under the same environmental conditions as the rodent room.

B.8 Acclimatisation condition

B.8.1 All test and reference animals shall be caged individually. The reference animals should be in cages of the same type or kind that are to be used in the test.

B.8.2 Laboratory strains of rodents obtained from a supplier or from other sources shall be acclimatised to the test laboratory for a minimum of seven days prior to the start of a test regime.

B.8.3 The rodents shall be separated by sex and caged individually. Treat ectoparasite infested rodents accordingly and withheld for a minimum of seven days.

B.8.4 The ectoparasite-free rodents shall be acclimatised in the testing room for at least seven days.

B.8.5 All rodents shall receive a nutritionally balanced commercial rodent diet and water *ad libitum* during the acclimatisation period.

B.8.6 Food and water consumption should be measured and recorded during acclimatisation period and rodents failing to feed or drink in normal range shall be removed from the test and replaced accordingly.

B.9 Choice Feeding Test

B.9.1 Equip the test cages with two identical food containers (Figure B1), one for the bait and the other for the challenge diet, to provide each rodent with a free-choice feeding situation.

B.9.2 Position the food containers on the right and left sides of the cage or side-by-side.

B.9.3 To reduce feeding position biases the following precautions can be taken:

a) During the acclimatisation period, offer a commercial rodent diet, in excess of daily requirements, in both food containers. Food consumption may also be measured during this period to establish baseline consumption for each animal.

b) On the day of the test, remove the food containers and replace with two clean containers, one containing the challenge diet and the other containing the rodenticide.

c) During the test period, do not change the position of the cages and the racks.

B.9.4 The amount of rodenticide and challenge diet shall be in excess of daily requirements.

B.9.5 Expose the test animals to the free-choice feeding of the rodenticide and challenge diet for the duration of the 6 days of testing.

B.9.6 Measure and record the daily consumption of both the rodenticide and challenge diet separately for each animal, to the nearest 0.1 g.

B.9.7 Replace the rodenticide and the challenge diet daily with clean containers at interchangeable positions.

B.9.8 All rodents shall receive a nutritionally balanced commercial rodent diet and water *ad libitum* after the testing period.

B.9.9 Maintain remaining survivors for a maximum of 21 days observation period or when total mortality occurs. At the end of the test, animals that survived should be euthanised and disposed accordingly.

B.9.10 Record the date of death and the weight of each animal at the time of death.

B.9.11 Compare the performance of the rodenticide against the MS Reference Product for rodenticide. Its performance shall be comparable to or better than that of the MS Reference Product.

B.10 Results

B.10.1 For test purpose, the mortality value, bait acceptance and palatability ratio can be expressed as follows:

$$\text{Mortality (\%)} = \frac{\text{number of dead rodents}}{\text{total number of rodents tested}} \times 100$$

$$\text{Bait acceptance (\%)} = \frac{\text{Weight of rodenticide eaten}}{\text{Weight of challenge diet eaten} + \text{Weight of rodenticide eaten}} \times 100$$

$$\text{Palatability ratio} = \frac{\text{Weight of bait eaten}}{\text{Weight of challenge diet eaten}}$$

B.10.2 Differences between the rodenticide and MS reference product are statistically analysed using suitable statistical test.

B.10.3 If the control mortality equals to or more than 20 %, the experiment shall be terminated. When control mortality is greater than 5% but less than 20%, then the observed mortality has to be corrected using Abbot's formula (1925).

$$\text{Corrected mortality} = \frac{\%\ \text{test mortality} - \%\ \text{control mortality}}{100 - \%\ \text{control mortality}}$$

Annex C
(informative)

Sampling

C.1 General requirements

Any established and appropriate sampling procedure can be used. Sampling can be done as below:

C.1.1 Samples shall be stored in such a manner that there is no deterioration of the material.

C.1.2 The sampling instrument shall be clean and dry.

C.1.3 Samples shall be protected against contamination.

C.2 Sampling, testing and acceptance

C.2.1 In any consignment, the master cartons containing containers of the same type shall constitute one lot.

C.2.2 Samples shall be drawn from each lot and individually tested to ascertain whether the material complies with the specified requirements.

C.2.3 Any sampling failing to comply with the specified requirements shall be termed as defective. The acceptance number shall be the maximum number of defective samples permissible for one lot to be accepted.

C.2.4 The number of containers to be drawn from the lot and the acceptance number is shown in Table C.1However, in the event that a bigger number of samples are required to perform the tests, the number of containers to be sampled should be increased accordingly.

Table C.1 – Sampling lot

Total number of containers in one lot	Minimum number of containers to be sampled	Acceptance number
300 or less	3	0
301 to 1 200	6	1
1 201 to 2 000	13	2
2 001 to 7 000	21	3
7 001 to 15 000	29	4
15 001 to 24 000	48	6
24 001 to 41 000	84	9
above 41 000	126	13

C.2.5 Each of the containers to be tested shall be drawn from a different master-carton which shall be selected at random. In order to ensure randomness of selection, random number tables shall be used. If such tables are not available, the following procedure may be adopted:

Starting from any master-carton, count the master-cartons as 1, 2, 3, ...*r* in a systematic manner. Every r^{th} carton shall be drawn, *r* being the integral part of *N/n*, where *N* is the total number of master-cartons in the lot and *n* the number of master-cartons to be selected.

C.3 Preparation of test samples

Sufficient samples are randomly taken from each individual box of a reduced sample for examination for compliance with physical and chemical requirements.

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DMS 1256:2025

Acknowledgement

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