Spatial application mosquito repellents —

Specification —

Part 1

Coils
In order to match with technological development and to keep continuous progress in industries, standards are subject to periodic review. Users shall ascertain that they are in possession of the latest edition.
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Foreword

Rwanda Standards are prepared by Technical Committees and approved by Rwanda Standards Board (RSB) Board of Directors in accordance with the procedures of RSB, in compliance with Annex 3 of the WTO/TBT agreement on the preparation, adoption and application of standards.

The main task of technical committees is to prepare national standards. Final Draft Rwanda Standards adopted by Technical committees are ratified by members of RSB Board of Directors for publication and gazettment as Rwanda Standards.

DRS 393-1 was prepared by Technical Committee RSB/TC 015, Pharmaceutical Products.

In the preparation of this standard, reference was made to the following standard:

1) KS 654, Mosquito coils — Specification

The assistance derived from the above source is hereby acknowledged with thanks.

DRS 393 consists of the following parts, under the general title: Spatial application mosquito repellents — Specification:

— Part 1: Coils
— Part 2: Spray
— Part 3: Candles
— Part 4: Papers
— Part 5: Liquid vaporizers
— Part 6: Vaporizing Mats
— Part 7: Tablets
— Part 8: Liquid detergents

Committee membership

The following organizations were represented on the Technical Committee on Pharmaceutical Products (RSB/TC 015) in the preparation of this standard.

National Industrial Research and Development Agency (NIRDA)

National Pharmacy Council (NPC)

University of Rwanda/College of Sciences and Technology (UR/CST)
Pharmacie NOVA

Rwanda Development Board (RDB)

AGROPY LTD

IKIREZI NATURAL PRODUCTS

HORIZON/SOPYRWA

Rwanda Social Security Board (RSSB)

Pharmavie

University of Rwanda/College of Medicine and Health Sciences (UR/CMHS)

Rwanda Biomedical Center/ Malaria and Other Parasitic Diseases Division (RBC/MOPDD)

Society for Family Health (SFH) – Rwanda

Rwanda Biomedical Center/Medical Procurement and Production Division (RBC/MPPD)

INES - RUHENGERI

Rwanda Standards Board (RSB) – Secretariat
Introduction

Insecticides are used either for killing or controlling harmful insects. The insecticides which are applied for repelling insects are termed as “Repellents”. Mosquito is one of the most harmful insects for mankind. To destroy them, many preparations are available on the market in various recipes like pest killer spray, soap, oil, powder, repellent etc. Out of these, mosquito repellent is the most popular as it has germicidal and disinfectant properties and is able to repel mosquitoes and is convenient to use.

The mosquito repellent is used for warding off mosquitoes which is the most harmful insect. Nowadays, mosquito repellents are used for controlling mosquito and are becoming most preferably than other mosquito destroyers gradually. With the rise in the standard of living, increasing urbanization and population, the demand of mosquito repellent mat is constantly increasing particularly in tropical places. It is a convenient method for protection against mosquito, so it has a tremendous market potential. Thus, there is a very good scope for development of such units in the country.

Spatial repellent are chemical products designed to be ‘active’ (requiring heat or electricity) or ‘passive’ (requiring no heat or electricity) and release volatile chemicals into the air within the treated space. Product examples that are currently available include mosquito coils, spray, candles, papers, liquid vaporizers, vaporizing mats, tablets, liquid detergents, among others. However, many more types of spatial repellent products are waiting to be developed.

Spatial repellents elicit ‘spatial repellency’ which refers to a range of insect behaviours induced by airborne chemicals that result in a reduction in human-mosquito contact. These behaviours include: movement away from a chemical stimulus, attraction-inhibition and/or, and feeding inhibition.
Spatial application mosquito repellents — Specification — Part 1: Coils

1 Scope

This Draft Rwanda Standard prescribes the requirements, sampling and methods of test for spatial application mosquito repellents formulated and prepared as coils.

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.

RS 337-2, Mosquito repellents — Specification — Part 2— Coils containing allethrin
RS 91, Labelling and marking of pharmaceutical products — Specification
RS 191, Refined pyrethrum concentrate — Specification
AOAC 973.12, d-trans-Allethrin in pesticides formulations
CIPAC 741, Determination of transfluthrin content
CIPAC 743, Determination of prallethrin (etoc) content
CIPAC 993, Determination of Metofluthrin (S1264)
CIPAC 742, Determination of d-allethrin
CIPAC 977, Determination of Meperfluthrin
DRS 394-2, Mosquito repellents — Performance Test Guidelines — Part 2: Spatial repellents
RS ISO 24153, Random sampling and randomization procedures

3 Terms and definitions

For the purposes of this standard, the terms and definitions given in RS 337-2 and the following apply.

3.1 mosquito
any of numerous arthropod animals of the class mosquito, having an adult stage characterized by three pairs of legs and a body segmented into head, thorax, and abdomen and usually having one or two pairs of wings. Mosquito include flies, crickets, insects, beetles, butterflies, and bees

3.2
mosquito repellent

substance applied to skin, clothing, or other surfaces which discourages mosquito (and arthropods in general) from landing or climbing on that surface

3.3
natural repellents/biopesticides

repellents that contain natural, plant-based active ingredients

3.4
synthetic repellents

conventional repellents containing synthetic chemical active ingredients and carrier synthetic chemical compounds as approved by a competent authority conventional

3.5
Transfluthrin

(1R,3S)-3-(2,2-Dichlorovinyl)-2,2-dimethyl-1-cyclopropanecarboxylic acid (2,3,5,6-tetrafluorophenyl)methyl ester

3.6
Etoc

Prallethrin. (S)-2-methyl-4-oxo-3-prop-2-ynylcyclopent-2-enyl(1R)-cis, trans-2,2-dimethyl-3-(2-methylprop-1-enyl) cyclopropanecarboxylate

3.7
Metofluthrin

C_{18}H_{20}F_{4}O_{3}, 2,3,5,6-Tetrafluoro-4-(methoxymethyl)benzyl 2,2-dimethyl-3-(prop-1-en-1-yl) cyclopropanecarboxylate

3.8
d-Alethrin

(RS)-3-allyl-2-methyl-4-oxocyclopent-2-enyl (1R)-cis, trans-chrysanthemate

3.9

Meperfluthrin

C_{17}H_{16}Cl_{2}F_{4}O_{3}, \quad [2,3,5,6-tetrafluoro-4-(methoxymethyl)phenyl]methyl \quad (1R,3S)-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane-1-carboxylate

4 Requirements

4.1 General

4.1.1 The product shall be in the form of a pair of separable coils.

4.1.2 The product shall consist of active ingredient(s) together with organic fillers capable of smouldering well, a binder and additives such as synergists and dye and fungicide, formulated in the form of a coil.

4.1.3 The product shall burn without producing any flame except at the beginning, and shall be readily extinguishable after ignition.

4.1.4 Upon ignition, the product shall produce smoke that is capable of repelling insects.

4.1.5 The product shall be provided with a mosquito coil stand which shall be made of a thin metal plate or any other suitable non-inflammable material which is able to support a mosquito coil by itself.

4.1.6 The product shall be stable and shall not be easily toppled.

4.1.7 The product shall remain intact after being dropped from a height of 1.5 metres with the plain of the coil horizontal to a smooth concrete surface. This is to ensure that the coils are not unduly brittle so as to prevent easy breakage when handled.

4.2 Active ingredients

4.2.1 Natural repellents

4.2.1.1 Active ingredients used in natural repellents shall be natural plant based compounds such as essential oils or any other plant extract approved as mosquito repellents.

4.2.1.2 The manufacturer shall provide adequate data on the repellence/efficacy of such ingredients/product.

4.2.1.3 The manufacturer shall have adequate data justifying the proportion of ingredient(s) for which claims are made, used in the product.
4.2.1.4 The essential oils and plant extracts used in natural repellents shall be, but not limited to:

a) Cedarwood oil;
b) Tea tree oil;
c) Geranium oil;
d) Rosemary oil;
e) Lemongrass oil;
f) Citronella oil;
g) Soybean oil;
h) Eucalyptus oil; and
i) Cinnamon oil.

4.1.2.5 The proportion of single or blended essential oil in natural repellent shall be set by the manufacturer in accordance with specific standard of the essential oil used and records shall be availed.

4.1.2.6 Pyrethrum extracts such as pyrethrins shall be considered in natural repellents. The limits of pyrethrins in natural repellents shall not be less than 0.5 % and the extract used shall meet the requirements of RS 191.

4.2 Synthetic repellents

4.2.2.1 Synthetic repellents shall contain synthetic chemical compounds which are able to discourage mosquitoes and send them flying or crawling away.

4.2.2.2 If the synthetic chemical compound is blended with other active ingredient(s), either natural or synthetic, the proportion shall be set by the manufacturer based on scientific research and records shall be availed.

4.2.2.3 Active ingredients and their content in synthetic repellents shall meet the requirements prescribed in Table 1.

<table>
<thead>
<tr>
<th>S/N</th>
<th>Active ingredient</th>
<th>Limits (%, w/w)</th>
<th>Identification method</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Transfluthrin, max</td>
<td>1</td>
<td>CIPAC 741</td>
</tr>
<tr>
<td>3</td>
<td>Eto,</td>
<td>0.5 – 1.5</td>
<td>CIPAC 743</td>
</tr>
<tr>
<td>4</td>
<td>Metofluthrin (S1264)</td>
<td>1.82</td>
<td>CIPAC 993</td>
</tr>
</tbody>
</table>
4.2.2.4 Synthetic repellents and their active ingredients shall be approved and registered by competent authority before being released to the market.

4.3 Specific requirements

The product shall comply with the specific requirements given in table 1 when tested in according to the methods described therein.

Table 1 — Specific requirements for mosquito coils

<table>
<thead>
<tr>
<th>S/N</th>
<th>Parameter</th>
<th>Requirement</th>
<th>Test method</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Moisture content</td>
<td>120</td>
<td>Annex A</td>
</tr>
<tr>
<td>2</td>
<td>Average weight, g</td>
<td>24</td>
<td>Annex B</td>
</tr>
<tr>
<td>3</td>
<td>Length, cm, min</td>
<td>70</td>
<td>RS 337-2</td>
</tr>
<tr>
<td>4</td>
<td>Burning time</td>
<td>6h</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Strength of coil, g</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Separation of twins, max</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

4.4 Biological efficacy

When tested in accordance with DRS 394-2, the vapour in the normal course of burning of the mosquito coils shall repel 100 % of the mosquitoes available in space, after protection time indicated by the manufacturer.

5 Packaging and labelling

5.1 Packaging

5.1.1 Mosquito coils shall be packaged in a container which offers sufficient protection from breakage and contamination of the coils. Each unit container shall contain at least one mosquito coil stand.

5.1.2 The mosquito coil stand shall be made of metallic material or other suitable non-inflammable material which can hold the burning coil horizontally till the total length is burnt.

5.2 Labelling

The containers shall be securely closed and in addition to the labelling requirements of RS 91, the following information shall be indelibly and legibly marked on the container:

a) name of the product;

b) name and full address of the manufacture;
c) batch number;

d) date of manufacture and expiry;

e) total number of coils in the box;

f) active ingredient content, percent (% m/m);

g) protection time;

h) net mass of content;

i) directions for use;

j) Safety caution;

k) special population whose exposure is prohibited (children and pregnant women);

l) out of reach of children; and

m) storage conditions.

6 Sampling

Random samples of the product shall be drawn for test in accordance with RS ISO 24153 from the market, factory or anywhere else.
Annex A
(normative)

Determination of equilibrium moisture content

A.1 Reagent

Toluene or a mixture of toluene and xylene (1:1)

A.2 Apparatus

A.2.1 The Dean and Stark apparatus, as shown in figure 1 shall be used. The apparatus consists of the following:

a) round-bottom flask;

b) tap;

c) condenser; and

d) receiving tube, graduated in 0.1 ml.

The above apparatus is joined together by ground glass joints.

A.2.2 Source of heat

a) electric heater with rheostat control; or

b) oil-bath

A.3 Determination

A.3.1 Cleaning of apparatus

Clean the receiving tube and the condenser with chromic acid cleaning mixture. Thoroughly rinse with water and dry in the oven.

A.3.2 Preparation of reagent

Shake a suitable quantity of reagent with a small quantity of distilled water. Separate the water and distil the reagent.

C.3.3 Procedure
Take an accurate amount of sample as indicated in appendix C, weighing 50g. Transfer the sample into round-bottom flask. If the substance is likely to cause bumping, add enough dry, washed sand or other suitable dry material to cover the bottom of the flask. Connect the apparatus and fill the receiving tube with the reagent poured through the top of the condenser. Heat the flask gently first and when the regent begins to boil, distil at the rate of 2 drops per second until most of the water is has passed over. Then, increase the rate of distillation to about 4 drops per second. Reflux for about 5 hours. Allow to cool and ensure that any droplets of water adhering to the sides of the receiving tube are removed. When water and reagent separated completely, read the volume of the entrained water in millilitres.

A.4 Calculation

Moisture in samples = \( \frac{V}{W} \times 100 \)

Where,

\[ V = \text{volume in ml entrained water in receiving tube.} \]

\[ W = \text{Weight in g of the sample} \]
Annex B  
(normative)

Determination of the weight of a single coil

B.1 Apparatus

Analytical balance with an accuracy of 0.1 g

B.2 Procedure

Separate the mosquito coils and weigh them on the balance. Report the average weight of two coils as the weight of a single coil.
Bibliography
