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Skin applied mosquito repellents — Specification — Part 3: Wipes

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Foreword

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(a) a member of International Organisation for Standardisation (ISO) and

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(c) the National Enquiry Point on TBT Agreement of the World Trade Organisation (WTO).

The work of preparing Uganda Standards is carried out through Technical Committees. A Technical Committee is established to deliberate on standards in a given field or area and consists of key stakeholders including government, academia, consumer groups, private sector and other interested parties.

Draft Uganda Standards adopted by the Technical Committee are widely circulated to stakeholders and the general public for comments. The committee reviews the comments before recommending the draft standards for approval and declaration as Uganda Standards by the National Standards Council.

The committee responsible for this document is Technical Committee UNBS/TC 301, Chemistry

WDUS 2296 consists of the following parts, under the general title Skin applied mosquito repellents — Specification:

- *Part 1: Lotions, creams, gels and ointments*
- *Part 2: Sprays and roll-ons*
- *Part 3: Wipes*
- *Part 4: Bathing soaps*
- *Part 5: Bracelets, wristbands and patches*
- Part 6: Jelly

Skin applied mosquito repellents — Specification — Part 3: Wipes

1 Scope

This Draft Uganda Standard specifies the requirements, sampling and methods of test for skin applied mosquito repellents prepared as wipes meant to be applied directly to the skin.

2 Normative references

The following referenced documents 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.

CIPAC 740, Determination of picaridin

CIPAC 667, Determination of ethyl butylacetamidopropionate

US ISO 1833-1, Textiles — Quantitative chemical analysis — Part 1: General principles of testing

US ISO 139, Textiles— Standard atmospheres for conditioning and testing

US ISO 9073-1, Test methods for nonwovens —Part1: Determination of mass per unit area

ISO 9073-18, Test methods for nonwovens — Part 18: Determination of breaking strength and elongation of nonwoven materials using the grab tensile test.

US ISO 3071, Textile materials; Method for determination of pH value of aqueous extracts

ISO 20743, Textiles — Determination of antibacterial activity of textile products

US ISO 21149, Cosmetics — Microbiology — Enumeration and detection of aerobic mesophilic bacteria

US ISO 22717, Cosmetics — Microbiology — Detection of Pseudomonas aeruginosa

US ISO 22718, Cosmetics — Microbiology — Detection of Staphylococcus aureus

US ISO 18416, Cosmetics — Microbiology — Detection of Candida albicans

ISO 21150, Cosmetics — Microbiology — Detection of Escherichia coli

US EAS 96, Sanitary towels — Specification

US EAS 846: 2017, Glossary of terms relating to the cosmetic industry.

DUS 2373-1, Mosquito repellents — Performance test guidelines — Part 1: Skin applied repellents

US ISO 2859-1, Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by Quality Level (AQL) for Lot-By-Lot Inspection.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in US EAS 846 and the following apply.
ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

3.1
mosquito
blood-sucking dipterous insect of the family Culicidae. Aedes, Anopheles, Culex, Mansonia, and Stegomyia are genera containing most species involved in the transmission of protozoan and other disease-producing parasites.

3.2
mosquito repellent
substance applied to skin which deters mosquito from approaching or settling.

3.3
natural repellents
repellents that contain, plant-based compounds

3.4
synthetic repellents
conventional repellents containing chemical compounds manufactured to imitate the natural compounds.

3.5
absorbency time
time taken for a liquid to be dispersed into the non-woven disposable wet wipe

3.6
acceptable
acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.7
length of piece
distance between the beginning and the end of the sample in the lengthwise or machine direction

3.8
overall width of piece
distance between the outermost edges of the sample measured perpendicular to the longitudinal edges

3.9
usable width of piece
width of the fabric excluding any selvedge materials, marks, pin-holes or other non-homogeneous areas of the fabric.

3.10
non-woven
non-wovens are structures of textile materials, such as fibres, continuous filaments, or chopped yarns of any nature or origin, that have been formed into webs by any means, and bonded together by any means, excluding the interlacing of yarns as in woven fabric, knitted fabric, laces, braided fabric or tufted fabric

3.11
wipe
piece of soft, wet cloth or paper used for wiping

3.12
DEET
N,N-Diethyl-meta-toluamide or diethyltoluamide

3.13
IR3535
ethyl butylacetylaminopropionate

3.14
picaridin
1-(1-methylpropoxycarbonyl)-2-(2-hydroxyethyl) piperidine or 2-(2-hydroxyethyl)-1-piperidinecarboxylic acid 1-methylpropyl ester

4. Active ingredients and synergists

4.1 Natural repellents

4.1.1 Active ingredients used in natural repellents shall be plant based compounds which are able to deter mosquitoes from approaching or settling. Such shall be essential oils or any other plant extract approved as mosquito repellents.

4.1.2 The manufacturer shall provide adequate data on the repellence of such ingredients.

4.1.3 The manufacturer shall have adequate data justifying the proportion of ingredient(s) used in the product, for which claims are made.

4.1.4 The essential oils and other 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) Eucalyptus oil; and

h) Cinnamon oil.

i) Neem oil

4.1.5 The proportion of single or blended active ingredient (s) in natural repellent shall be set by the manufacturer in accordance with specific standard and records shall be availed.

4.1.6 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% w/w, when tested in accordance with annex B.

4.2 Synthetic repellents

4.2.1 Synthetic repellents shall contain chemical compounds which are able to deter mosquitoes from approaching or settling on the surface.

4.2.2 If a synthetic active ingredient 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.

4.2.3 Synthetic repellents and their active ingredients shall be approved and registered by competent authority before being released to the market.

5 Requirements

5.1 General requirements

5.1.1 The product shall constitute a mosquito repellent that is formulated as wipes and shall be essentially a product which has active ingredient (s) added to a certain level.

5.1.2 The product shall be of acceptable uniform make and finish.

5.1.3 The product shall be free from defects that might impair their appearance or serviceability (or both).

5.1.4 When applied to the skin, the product shall have the benefit of repelling mosquitoes and shall not cause harmful effect to the skin.

5.2 Specific requirements

5.2.1 Active ingredients and their content in synthetic repellents shall meet the requirements prescribed in table 1.

Table 1— Active ingredients content for synthetic repellents in form of wipes.

S/N	Characteristic	Requirements	Test methods
i	DEET, % w/w.	4 – 50	Annex A
ii	Picaridin, % w/w.	5 – 20	CIPAC 740
iii	IR3535, % w/w.	7.5 – 20.07	CIPAC 667

5.2.2 The product shall comply with the specific requirements given in table 2 when tested in accordance to the methods described therein.

Table 2 – Specific requirements for skin applied mosquito repellents in form of wipes.

S/N	Parameter		Requirements	Test methods
i	Fibre composition	Cellulose, % min	20	US ISO 1833-1
		Others, % max	80	
ii	Grammage, g/m^2, min		36	US ISO 9073-1
iii	pH		5.5 – 8.0	US ISO 3071
iv	Absorbency time, sec, max (for manufacturer)		5	Annex C
v	Flushability		Pass the test	US EAS 96
vi	Number of wipes, pcs		As declared	Sensory
vii	Moisture content, %, m/m, Min		50	Annex D
viii	Size, mm	Length	As declared on the label	Annex E
		Width		

ix	Breaking strength, N, min.	Machine direction	Dry	60	ISO 9073-18
			Wet	30	
		Cross section	Dry	3.5	
			Wet	2.5	
x	Anti-Bacterial activity (A), min			2	ISO 20743

5.3 Microbiological requirements

The product shall comply with the microbiology limits specified in table 3 when tested in accordance to the methods described therein

Table 3— Microbiology limits for skin applied mosquito repellent in form of wipes.

S/No	Characteristic.	Requirements	Test methods
i	Total viable count, cfu/g, max	1000	US ISO 21149
ii	Staphylococcus aureus (per g)	Not detected	US ISO 22718
iii	Pseudomonas aeruginosa (per g)	Not detected	US ISO 22717
iv	E. coli	Not detectable	ISO 21150
v	Candida albicans (per g)	Not detected	US ISO 18416

5.4 Biological efficacy

When tested in accordance with **DUS 2373-1**, the product shall repel 100% of the mosquitoes from approaching or settling on that surface, within protection time indicated by the manufacturer.

6 Packaging

The product shall be packaged in suitable well-sealed containers that shall protect the contents and shall not cause any contamination or react with the product.

7 Labelling

7.1 The primary packages shall be labelled with legible and indelible pre-printed marking bearing the following information:

a) name of product ‘mosquito repellent wipes”

b) name and physical address of manufacturer;

c) importer/distributors name, address (if applicable);

d) number of wipes in a pack;

e) intended use, e.g repellent;

f) size of wipe in the pack;

g) ingredients “fibre content” or “material content” and active ingredient used;

h) instruction for use, storage and disposal;

i) country of origin;

j) date of manufacture

k) expiry; or best before date;

l) batch number;

m) safety caution; and

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

o) protection time

7.2 Secondary packaging

The outside of each secondary pack shall bear the following information in legible and indelible marking:

a) the manufacturer’s name and/or registered trade mark;

b) the words “non-woven disposable wet wipes”; and

c) the number of packages.

8 Sampling

Sampling shall be done in accordance with US ISO 2859-1.

Annex A
(normative)

Determination of DEET content

A.1 General

The sample is dissolved in carbon disulfide and the difference in absorbance at 14.18 µm and at 14.48 µm is determined. The quantity of meta-isomer is obtained from this value by means of a calibration curve prepared by the use of a reference standard

A.2 Apparatus

A.2.1 Double-beam infrared spectrophotometer. Perkin-Elmer model 21 or equivalent

A.2.2 Two equivalent infrared absorption cells, with sodium chloride windows and a path length of approximately 0.4 mm.

A.3 Preparation of calibration curve

A.3.1 Weigh (to the nearest 0.1 mg) into four volumetric flasks sufficient amounts of the reference DEET standard of known purity to give concentrations of approximately 20, 40, 60 and 80 g/L when dissolved in carbon disulfide.

A.3.2 Fill the reference cell with carbon disulfide and the sample cell with each of the standard solutions in turn, and record the spectra. The spectrum may be scanned rapidly, except for the region 12 – 15 µm, where a normal speed should be used. Carry out a blank measurement with carbon disulfide to correct for any inequality in the paired cells and to determine whether a cell correction is required.

A.3.3 Measure the absorbance at 14.18 µm and at 14.48 µm and calculate the difference between these values, ΔA, for each of the solutions. Plot the values of ΔA against the concentration (g/L) of the meta-isomer.

A.3.4 If a cell correction is required, the value of ΔA is determined from the formula:

$\Delta A = [A14.18 – A14.48]ref. - [A14.48]blank$

Where ref. = determination with reference standard

blank = determination on CS2 blank

A.4 Procedure

Weigh (to the nearest 0.1 mg) about 0.5 g of the sample, transfer quantitatively to a 10 mL volumetric flask, and make up to the mark with carbon disulfide. Measure the infrared absorption at 14.18 µm and 14.48 µm using the same conditions as described in clause A.3. Determine the concentration of meta-isomer by comparing this value with the calibration curve. A standard sample should be run each day to check the calibration of the instrument.

A.5 Calculation

DEET content (g/kg) = $(C_1 \; x \; P)/C_2$

where,

C_1 = concentration (g/L) of standard DEET found from calibration curve

C_2 = concentration (g/L) of sample taken

P = purity (g/kg) of the reference standard

Annex B
(normative)

Determination of total pyrethrins

B.1 General

The active ingredients in pyrethrum extract may be determined using a HPLC system first by injecting a solution of the analyte into the chromatograph, followed by the separation and comparison of peaks areas of the analytes in the sample with that of an external standard containing a known amount of the analytes. The peaks are eluted in the following order: Cinerin II, Pyrethrin II, Jasmolin II (total Pyrethrins II) and Cinerin I, Pyrethrin I, Jasmolin I (total Pyrethrins I).

B.2 Reagents

B.2.1 World pyrethrum standard, 50%

B.2.2 Acetonitrile, HPLC grade

B.2.3 Water, HPLC grade

B.3 Apparatus

A liquid chromatography System equipped with an auto-sampler, a Variable Wavelength Detector (or equivalent) and a Column {Phenomenex, 250 x 4.6 mm Luna Phenyl-Hexyl 5µ Reverse Phase (or equivalent)}.

B.4 Operating conditions

B.4.1 Flow rate: 1.5 ml/min

B.4.2 Composition: 40:60 (%, v/v water/acetonitrile)

B.4.3 Elution: Isocratic

B.4.4 Oven temperature: 40 ºC

B.4.5 Wavelength: 240 nm

B.4.6 Injection Volume: 15 µl

B.4.7 Stop time: 22 min

B.4.8 Post time: 1 min

B.5 Preparation of the standard

Weigh 20 mg of the pyrethrum standard to the nearest 0.0001 g in a 100 mL volumetric flask and dilute to volume with Acetonitrile and label it. Transfer a small portion to a sample vial and label it accordingly.

B.6 Sample preparation

In a 100 ml volumetric flask, weigh 20 mg to the nearest 0.0001 g of the sample to be analyzed and dilute to volume with Acetonitrile. Sample this solution using a vial and label it accordingly.

B.7 Procedure

After the chromatograph is stable, make a minimum of three injections for the standard solution as well as for the analyte and average the area counts. The relative Standard Deviation between injections should be within 2 %.

B.8 Calculation of the % total pyrethrins (active ingredient)

The % Total Pyrethrins is calculated as follow:

$\%\ active\ ingredients$ = $(Average\ sample\ area\ X\ weight\ of\ standard\ X\ Purity\ of\ the\ standard\ (in\ \%)) \div (Average\ standard\ area\ X\ Weight\ of\ sample.)$

Annex C
(normative)

Determination of absorbency rate

C.1 Apparatus

C.1.1 **Water tub**, of a depth of at least 100 mm and maintained at room temperature.

C.1.2 **Stop watch**, with an accuracy of 0.2 s

C.1.3 **Cylindrical basket**, weighing 2.7 ± 0.3 g of height 80 mm, diameter 50 mm with square opening of 15 mm to 20 mm, made of copper wire of 0.4 mm diameter.

C.1.4 **Weighing machine**

C.1.5 **Forceps**

C.2 Preparation of test specimens

Take three test specimens, each of mass at least 1 g and composed of a number of pinches of fibres taken from widely separated parts of the conditioned laboratory sample.

C.3 Procedure

C.3.1 Compress the first test specimen to a volume of approximately 20 mL.

C.3.2 By means of the forceps, place the test specimen lightly on the surface of the distilled water and simultaneously start the stopwatch.

C.3.3 Using the stop watch, measure the time it takes the basket and its contents to sink below the surface of water in seconds.

C.3.4 Record the absorption period to the nearest 0.1 s.

C.3.5 Repeat the test for at least three test specimens.

C.4 Calculation

Calculate, to the nearest second, the arithmetic mean of the three test results.

C.5 Test report

Report the following information

a) all the data needed to identify the laboratory sample tested;

b) confirmation that the test was carried out in accordance with this standard;

c) any deviation from this standard; and

d) the mean absorbency rate, expressed in seconds, of the absorbent cotton wool

Annex D
(normative)

Determination of moisture content

D.1 Principle

A specimen of specified mass of filler material of the non-woven disposable wet wipe is dried in an oven at specified temperature and the moisture content is determined.

D.2 Apparatus

D.2.1 **Balance**, with an accuracy of 0.05% of the weighed mass

D.2.2 **Sample container**, waterproof when sealed, will be used for transfer of analyzed material and during weighing

D.2.3 **Oven**, well ventilated with a temperature of 102 ºC to 105 ºC

D.3 Sample preparation

D.3.1 Take a sufficient number of dry sample containers, number them and take their masses after they are held open for a short period of time so that they will have the same air pressure as the surrounding atmosphere. Then leave them open until you take the test piece.

D.3.2 Take 5 random pieces of the wet wipe. The test pieces shall weigh 5 g.

D.3.3 If the surrounding atmosphere is hot and humid, prevent water condensation on the internal and external surfaces of the container.

D.3.4 Handle the test pieces gently to prevent dirt or changes in water content. Don't touch the test pieces with your bare hands. Put the test pieces in a container just after taking them and close the container immediately.

D.4 Procedure

D.4.1 Dry the test pieces in an oven with a temperature of 102ºC to 105^{0}C. Open the containers lid and dry the specimen inside the container. Open the container for a moment, to balance the air pressure inside the container with the surrounding pressure, weigh the container that holds the specimen again and calculate the weight of the specimen.

D.4.2 First cycle of drying will last at least 30 minutes. Return the container with the test pieces to the oven, for at least half the first cycles drying time. Take the container out and take the mass with the test pieces inside. Repeat the drying and weighing cycles. When the drying time on every cycle is at least half of the total previous drying cycle times. Continue the process until the difference between two consecutive masses does not exceed 0.1 % of the original mass of the specimen.

D.5 Calculations

Calculate the moisture content using the following formula and round the results up to the nearest 0.1 %.

$V = 100((a-b) \div c)$

Where,

a is weight of the container with the specimen before drying (in grams);

b is weight of the container with the specimen after drying (in grams);

c is weight of the container (in grams); and

V is water content (in weight %).

Annex E
(normative)

Determination of length and width

E.1 Apparatus

E.1.1 Steel scale that is of a length exceeding the width of the fabric to be measured, and is graduated in centimeters and millimeters.

E.1.2 Marking pen.

E.2 Procedure

E.2.1 Procedure for width

E.2.1.1 Lay the test sample flat and full width (without subjecting it to tension) on a plane surface and condition it in that state for at least 24 hrs in accordance with US ISO 139.

E.2.1.2 Take, to the nearest 1 mm, five measurements across the overall width or between the innermost selvedge threads (as relevant) of the conditioned test sample at approximately equal intervals throughout its length.

E.2.1.3 Calculation

Calculate the arithmetic mean of the five measurements and record it as the width of the sample.

E.2.2 Procedure for length

E.2.2.1 Take a laboratory sample as specified in the relevant product specification. Where no specification exists, take the laboratory sample as agreed upon between the test laboratory and the manufacturer to ensure a reasonable and acceptable reliability at a reasonable and acceptable confidence level.

E.2.2.2 Lay the laboratory sample flat and full width (without subjecting it to tension) on a plane surface and condition it in that state for at least 24 hrs in accordance with US ISO 139.

E.2.2.3 From the conditioned laboratory sample cut a test specimen across the full width of the laboratory sample along a datum line drawn at right angles to the selvedges and as close as possible to the beginning and the end of the laboratory sample.

E.2.2.4 Take, to the nearest millimeter, five measurements (**see E.2.1.2)** of the length of the test specimen at approximately equal intervals across its width.

E.2.2.5 Calculation

Calculate the arithmetic mean of the five measurements and record it as the length, in metres (accurate to the nearest centimeter), of the laboratory sample.

Bibliography

[1] DRS 392-3: 2018, Skin applied mosquito repellents — Specification — Part 3: Wipes

[2] RS 191: 2019, Refined pyrethrum concentrate — Specification

Certification marking

Products that conform to Uganda standards may be marked with Uganda National Bureau of Standards (UNBS) Certification Mark shown in the figure below.

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