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Aluminium and Aluminium Alloys — Part 1: Bare foil for Food Packaging — Specification

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Foreword

Uganda National Bureau of Standards (UNBS) is a parastatal under the Ministry of Trade, Industry and Cooperatives established under Cap 327, of the Laws of Uganda, as amended. UNBS is mandated to co-ordinate the elaboration of standards and is

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

(b) a contact point for the WHO/FAO Codex Alimentarius Commission on Food Standards, and

(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 19, *[Packaging and Packaging products]*.

Aluminium and aluminium alloys — Part 1: Bare foil for food packaging — Specification

1 Scope

This standard covers the requirements of annealed aluminium and aluminium alloy bare foil for food packaging. It is applicable for 0.011mm (11µm) to 0.075mm (75µm) thickness

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.

ISO 6361-1:2011(en); Wrought aluminium and aluminium alloys — Sheets, strips and plates — Part 1: Technical conditions for inspection and delivery.

DUS 1695: 2017, Wrought and Unwrought Metals — Aluminium and Aluminium Alloys — Glossary of terms

ASTM E345:16, *Standard Test Methods of Tension Testing of Metallic Foil*

3 Terms and definitions

For the purposes of this standard, the following terms and definitions and DUS 1663-3 apply

3.1
bare foil
a cold rolled product of rectangular cross-section, having thickness over 0.011mm but not greater than 0.075mm, may be either in straight length or in coil form.

3.2
dry annealed, a
foil having a test dryness 100/0 free from residual rolling oil as determined by the water test.

3.3
dry annealed, b
foil having a test dryness 90/10 having a slight film of residual rolling oil as determined by the water-alcohol test.

3.4
dry annealed, c
foil having a test dryness 80/20, having a slight film of residual rolling oil as determined by the water-alcohol test.

3.5
slick annealed
foil having a uniform film of residual rolling or applied oil as determined by the drop of water test.

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

4 Pinhole Count

Unless otherwise stated, the pinhole count per square meter of aluminium foil area shall be as given in Table 1.

Table 1 — Pinhole Count

Sl NO.	Nominal Thickness µm	Pinhole Count No. per Sq. m max
a)	≥25	0
b)	20	20
c)	18	30
d)	14	40
e)	11	60

5 Freedom from defects

The foil shall be well finished, uniform in quality, free from splits, slivers, wrinkles, ragged edges and oil staining.

6 Material

6.1 The material used for aluminium and aluminium alloy foil shall conform to the chemical composition of the Grades in the table below.

Table — Chemical composition of the grades

Designation	Aluminium	Copper	Magnesium	Silicon	Iron	Manganese	Zinc	Titanium	Chromium
19000	99.0, Min	0.1	0.2	0.5	0.7	0.1	0.1	-	-
19500	99.5, Min	0.05	-	0.1	0.4	0.05	0.05	-	-
19600	99.6, Min	0.05	-	0.25	0.35	0.03	0.06	-	-
31000	Remainder	0.1	0.1	0.6	0.7	0.8-1.5	0.2	0.2	0.2
40800	98.0, Min	0.2	0.1	0.6-0.95	0.6-0.95	0.1	0.2	0.2	-

6.2 The material shall be supplied in fully annealed ‘O’ temper. If agreed by the purchaser the material may be supplied in any other tempers.

7 Supply of material

General requirements relating to the supply of aluminium and aluminium alloy foil shall conform to ISO 6361-1.

8 Lubricants

8.1 Unless otherwise specified by the purchaser, the roll of foil shall be supplied in the pre-lubricated condition.

8.2 As the foils are to be used in food processing, food packaging and food preservation, etc, they shall be produced with rolling oils/lubricants which do not contain substances which are injurious to health or have any deleterious effect on the flavour, odour or appearance of food products.

8.3 The quality of the lubricants shall be such that surfaces of the foil will retain their brightness and shall not stick. The lubricants shall not dry up before two months of storage time from the date of manufacture.

9 Preferred thicknesses

Unless otherwise stated, the preferred thickness shall be as given in Table 2.

Table 3 — Preferred Thickness

SI NO	Nominal Thickness		Nominal Covering Area
	mm	µm	m^2/kg
i	0.011	11	33.7
ii	0.012	12	30.9
iii	0.014	14	26.5
iv	0.016	16	23.1
v	0.018	18	20.6
vi	0.020	20	18.5
vii	0.022	22	16.8
viii	0.025	25	14.8
ix	0.028	28	13.2
x	0.030	30	12.3
xi	0.035	35	10.78
xii	0.040	40	9.26
xiii	0.045	45	8.34
xiv	0.050	50	7.41
xv	0.060	60	6.17
xvi	0.070	70	5.29
xvii	0.075	75	4.96

10 Average thickness

10.1 The determination of average thickness shall be carried out using a method giving repeatable results.

10.2 In case of dispute, the average thickness may be determined by the gravimetric method, based on weighing a sample of 100 mm x 100 mm area, shall be dried and weighed on a balance, accurate to at least 0.5 mg.

Thickness of the foil, in mm = $\frac{W}{27.1}$

Where; W is the mass of the foil sample (100 mm x 100 mm) in g.

11 Dimensions and tolerances

11.1 Unless otherwise agreed, the thickness tolerances shall be + 8 percent.

11.2 Unless otherwise stated, the width tolerances shall be as given in Table 3.

Table 4 — Width Tolerances

All dimensions in millimetres		
Form of Product	**Tolerance on Width**	
	<1000	>1000
Coil and Sheet	±0.5	±1.0

11.3 Unless otherwise agreed, the length tolerances shall be as given in Table 4.

Table 5 — Length Tolerances

All dimensions in millimetres			
Form of Product	**For Width**		
	<500	500-1000	>1000
Coil	-	-	-
Sheet	±2	±3	±4

12 Tensile properties

12.1 The tension testing shall be made in accordance with test method given in ASTM E345:16. The foil shall be conforming to the tensile breaking loads as given in Table 5.

Table 6 — Tensile Breaking Loads

SI NO	Nominal Thickness		Breaking Load, kg/cm of Width
	mm	µm	min
i	0.011	11	0.50
ii	0.012	12	0.54
iii	0.014	14	0.63
iv	0.016	16	0.72
v	0.018	18	0.81
vi	0.020	20	0.90
vii	0.022	22	0.99
viii	0.025	25	1.13
ix	0.028	28	1.26
x	0.030	30	1.35
xi	0.035	35	1.58
xii	0.040	40	1.80
xiii	0.045	45	2.03
xiv	0.050	50	2.25
xv	0.060	60	2.70
xvi	0.070	70	3.15
xvii	0.075	75	3.45

12.2 Number of Tests

When the tensile breaking load is to be determined, not less than two samples shall be selected from a shipment with each sample from a different roll of foil

12.3 Test specimens

All the test specimens shall be taken parallel to the direction of rolling and they shall be in accordance with Type A or Type B specimens as per ASTM E345:16.

13 Surface condition

13.1 Foil shall be tested for surface condition by spraying, as from a squeeze bottle, a continuous line of distilled water or distilled water-alcohol mixture across the web of foil inclined 30° from horizontal. Foil dryness is categorized by the distilled water or water-alcohol mixture that will support a continuous unbroken line of water or mixture across the web of the foil for 2s (the unbroken line is the top of the hand of water or mixture across the web). To ensure an acceptable water-alcohol mixture the alcohol denaturant shall be methanol (Formula 30-10 parts of ethyl alcohol and one part methanol by volume) or equivalent.

13.2 Dry annealed, A

Test dryness 100/0 foil shall support a continuous unbroken line using 100 percent distilled water. Alternatively, dry annealed (100/0) foil may be tested by a distilled water drop test in which case the drops shall spread evenly into a thin film.

13.3 Dry annealed, B

Test dryness 90/ 10 foil shall support a continuous unbroken 90 percent distilled water and 10 percent alcohol mixture.

13.4 Dry annealed, C

Test dryness 80/20 foil shall support a continuous unbroken line using 80 percent distilled water and 20 percent alcohol mixture.

13.5 Slick annealed

Foil shall exhibit no areas wet table by a distilled water drop test, that is, the drops shall remain as spherical drops.

14 Sampling

14.1 General

14.1.1 In a consignment the foils of same width and thickness and of the same surface condition and manufactured by a single firm under essentially similar conditions of production shall be grouped together to constitute a lot.

14.1.2 Tests for determining the conformity of the lot to the requirement of this standard shall be carried out on each lot separately. The number of rolls of foils to be selected for this purpose at random over the whole lot shall be in accordance with column 2 and 3 of Table 7.

Table 7 — Scale of Sampling and Permissible Number of Defectives

Sl NO	No. of Rolls of Foils in the Lot	No. of Rolls of Foils to be Selected	Permissible No. of Defective
i	Up to 15	5	0
ii	16 t0 25	8	1
iii	26 to 50	13	1
iv	51 to 100	20	2
v	101 to 300	32	3
vi	Above 300	50	5

14.1.3 All the rolls shall be individually examined for manufacturing defects, surface defects and dimensional tolerances. A sample failing to meet any one of these requirements shall be called defective. The lot shall be considered as conforming to the corresponding requirements of this standard. If number of defective satisfy the freedom from defects and dimensions in less than or equal to the permissible number given in column 4 of Table 6.

14.3 Number of tests for tensile properties

14.3.1 From each lot, the number of rolls of foils, to be subjected to, tension test shall be one for lots weighing 250 kg or less, and shall be in proportion of one per 250 kg or part thereof for lots weighing more than 250 kg. For the selection, the sample selected in 14.2.1 may be made use of.

14.3.2 In case of lot weighing more than 250 kg one sample shall be taken from each lot, to provide the necessary test pieces.

14.3.3 The test pieces required for various tests shall be cut off from each of the sample selected as in 14.3.1 when cold and shall receive no further heat treatment before being tested.

14.3.4 Re-test

14.3.4.1 If any sample fails to comply with any of the requirements/tests, then two additional samples from the same roll or sheet shall be selected, one of which shall be from the material from which the original test sample was taken, unless that roll or sheet has been withdrawn by the supplier.

14.3.4.2 Should both the additional samples satisfy the requirement tests, then the lot represented by these samples shall be deemed to comply with this standard. Should either of the two samples fails, then the lot represented shall be deemed not to comply with this standard.

14.4 Criteria for conformity

A lot shall be considered to have conformed to the requirements of the standard, if 14.2.1 to 14.3.4 are satisfied.

15 Labelling and marking

15.1 The bulk package shall be legibly and indelibly marked with the following information:

a) product name as “Aluminium foil”;

b) Quantity, in pieces or kg, where applicable;

c) Nominal thickness in micrometres or millimetres;

d) Dimensions (length and width in millimetres);

e) In case of thickness less than 15µm winding direction of the roll shall have to be indicated that is either dull side or bright side out; and

f) Surface condition.

15.2 Each package of aluminium and aluminium alloy bare foil shall be suitably marked for identification with the name of manufacturer, grade, condition of the material, batch No, and date of manufacture.

Bibliography

[1] IS 15392 (2003), *Aluminium and Aluminium Alloy Bare Foil for Food Packaging*

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.

The use of the UNBS Certification Mark is governed by the Standards Act, and the Regulations made thereunder. This mark can be used only by those licensed under the certification mark scheme operated by the Uganda National Bureau of Standards and in conjunction with the relevant Uganda Standard. The presence of this mark on a product or in relation to a product is an assurance that the goods comply with the requirements of that standard under a system of supervision, control and testing in accordance with the certification mark scheme of the Uganda National Bureau of Standards. UNBS marked products are continually checked by UNBS for conformity to that standard.

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