KENYA STANDARD

DKS 2294:2024

ICS 77.150.10

Second Edition

Aluminium foil for household use — Specification

TECHNICAL COMMITTEE REPRESENTATION

The following organizations were represented on the Technical Committee:

Chandaria Industries Limited
Government Chemist's
University of Kabianga.
Kenya Industrial Research Development Institute (KIRDI)
Consumer Information Network (CIN)
Kimfay East Africa Ltd.
Royal Converters Limited
Kenya Literature Bureau
Institute of Packaging Professional of Kenya
Bilerud
Statpack Industries Ltd.
Kenya Bureau of Standards — Secretariat

REVISION OF KENYA STANDARDS

In order to keep abreast of progress in industry, Kenya Standards shall be regularly reviewed. Suggestions for improvements to published standards, addressed to the Managing Director, Kenya Bureau of Standards, are welcome.

KENYA STANDARD

DKS 2294:2024

ICS 77.150.10

Second Edition

Aluminium foil for household use — Specification

Kenya Bureau of Standards, Popo Road, Off Mombasa Road,
P.O. Box 54974 - 00200, Nairobi, Kenya


+254 020 6948000, + 254 722202137, + 254 734600471


info@kebs.org


@KEBS_ke


kenya bureau of standards (kebs)

Foreword

This Kenya Standard was prepared by the Packaging Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

Kenya Bureau of Standards (KEBS) has established Technical Committees (TCs) mandated to develop Kenya Standards (KS). The Committees are composed of representatives from the public and private sector organizations in Kenya.

Kenya Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft Kenya Standards are circulated to stakeholders through the KEBS website and notifications to World Trade Organization (WTO). The comments received are discussed and incorporated before finalization of the standards, in accordance with the Procedures for Development of Kenya Standards.

Kenya Standards are subject to review, to keep pace with technological advances. Users of the Kenya Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

This second edition cancels and replaces the first edition (KS 2294:2011), which has been technically revised.

- The title revised to include “household use”
- The scope has been revised to include catering purposes.
- The thickness ranges of the foil revised to be 10 microns – 20 microns
- The tensile breaking load ranges changed to 60 MPa - 110 MPa
- Addition of a precaution on the recommended use “not to be used for warming meals in the microwave”
- Change of size under marking to be “width by length”

During the preparation of this standard, reference was made to the following document (s):

ASTM B 479-06, Annealed aluminium and aluminium-alloy foil for flexible barrier, food contact and other applications.

ASTM E 252:2006, Standard test method for thickness of foil, thin sheet and film by mass measurement. ASTM E 345:2008, Standard test method for tension testing of metallic foil.

IS 8970:1991, Aluminium foil laminate for packaging-specification.

Acknowledgement is hereby made for the assistance derived from these sources.

1 Scope

This Kenya Standard specifies requirements for plain aluminium foil for household use and catering purposes.

2 Definition

For the purposes of this standard, the following definition shall apply

2.1

aluminium foil

a piece of thin and flexible sheet of aluminium prepared in thin metal leaves with thickness as in clause 3.3.2

3 Requirements

3.1 Composition

The foil shall conform to the chemical composition limits given in Table 1.

Table 1 — Chemical composition limits

SL. No.	Substance	Limits in %
i)	Si + Fe	1.8
ii)	Cu	0.10
ii)	Mn	0.10
iv)	Mg	0.05
v)	Zn	0.10
vi)	Ti	0.08
vii)	Others - each[D]	0.05[E,F]
viii)	Others – total[D]	0.15
ix)	Al, min.	98.00[G]

NOTES

[D] - 'Others' includes all unlisted metallic elements. Analysis of samples for trace elements not specified in the specification may be performed. However, such analysis is not required and may not cover all metallic 'others' elements. Should any analysis establish that an 'others' element exceeds the limit of total, the material shall be considered non-conforming.

Limits are in percent maximum unless otherwise noted.

[E] - For food applications, lead, arsenic and cadmium shall be less than 0.01 % each. An observed value or calculated value obtained from analysis shall be considered significant.

[F] - Food packaging shall have a maximum total of less than 100 ppm for the combined total of lead, mercury, cadmium and hexavalent- chrome (Pb, Hg, Cd and Cr^{tb}).

[G] - The aluminium content shall be calculated by subtracting from 100.00 % the sum of all metallic elements presents in amounts of 0.010 % or more each, rounded to the nearest 0.01 % prior to determining the sum. Alternatively, the aluminium content of the foil shall be determined as outlined in Annex D.

NOTE The elements shall be determined using AAS, XRF or any other appropriate technique.

3.2 General quality

3.2.1 The foil shall be free from splits, slivers, wrinkles[1], ragged edges and excessive pinholes.

NOTE Foil in thickness of about 0.002 in. (0.05 mm) and heavier is virtually free of pinholes. With decrease in thickness, the number of pinholes and variability in their number increases. Present methods of determining pinholes do not permit the establishment of quantitative limits in thin foil.

3.2.2 Rolls shall be wound firmly on the cores so as to prevent slipping or telescoping and to permit free unwinding without sticking or tearing.

3.2.3 The dryness shall be determined in accordance with Annex A.

3.2.4 Foil shall be produced with rolling lubricant which meet Food and Drug Administration requirements.

3.3 Sizes

3.3.1 Aluminium foil shall have the following minimum sizes:

Minimum Size = 30 cm by 5 m

3.3.2 Aluminium foil shall have a thickness ranging from 10 microns to 20 microns

3.4 Tensile properties

3.4.1 The tensile breaking load shall be in the range of 60 to 110 MPa as determined in accordance with Annex C.

NOTE Tensile breaking loads define the strength properties good quality foil is capable of meeting.

3.5 Covering area

3.5.1 Limits

The covering area per pound shall be in accordance with the limits given in Table 2.
The covering area shall be determined in accordance with Annex B. clause 3.

3.6 Dimensional tolerances

3.6.1 Rolls shall be wound on paper cores having an inside diameter of between 30 mm to 76 mm

1 wrinkles may appear at the end of the rod due to winding.

Table 2 — Minimum, maximum and nominal covering areas

Nominal thickness		Nominal covering area		Permissible range of covering area [A]			
				min.		max.	
in	(mm)	in 2/lb (10^3)	(m^2 /kg)	in²/lb (10^3)	m²/kg	in²/lb (10^3)	(m^2/kg)
0.00020	(0.0051)	51.3	(72.9)	46.6	(66.3)	57.0	(81.1)
0.00025	(0.0064)	41.0	(58.3)	37.3	(63.0)	45.6	(64.8)
0.00030	(0.0076)	34.2	(48.6)	31.1	(44.2)	38.0	(54.0)
0.00035	(0.0089)	29.3	(41.7)	26.6	(37.8)	32.6	(46.4)
0.00040	(0.0102)	25.6	(36.4)	23.3	(33.1)	28.5	(40.5)
0.00045	(0.0114)	22.8	(32.4)	20.7	(29.4)	25.3	(36.0)
0.00050	(0.0127)	20.5	(29.1)	18.6	(26.4)	22.8	(32.4)
0.00055	(0.0140)	18.6	(26.4)	17.0	(24.2)	20.7	(29.4)
0.00060	(0.0152)	17.1	(24.3)	15.5	(22.0)	19.0	(27.0)
0.00065	(0.0165)	15.1	(22.5)	14.3	(20.3)	17.6	(24.9)
0.00070	(0.0178)	14.6	(20.8)	13.3	(18.9)	16.3	(23.1)
0.00075	(0.0190)	13.7	(19.5)	12.4	(17.6)	15.2	(21.6)
0.00080	(0.0203)	12.8	(18.2)	11.7	(16.6)	14.2	(20.2)
0.00085	(0.0216)	12.1	(17.2)	11.0	(15.6)	13.4	(19.1)
0.00090	(0.0229)	11.4	(16.2)	10.4	(14.8)	12.7	(18.1)
0.00095	(0.0241)	10.8	(15.4)	9.81	(13.9)	12.0	(17.1)
0.0010	(0.0254)	10.3	(14.6)	9.32	(13.2)	11.4	(16.2)
0.0015	(0.0381)	6.83	(9.71)	6.22	(8.84)	7.60	(10.8)
0.0020	(0.0508)	5.13	(7.29)	4.66	(6.63)	5.70	(6.11)
0.0030	(0.0762)	3.42	(4.86)	3.11	(4.42)	3.80	(5.40)
0.0040	(0.1016)	2.56	(3.64)	2.33	(3.31)	2.85	(4.05)
0.005	(0.127)	2.05	(2.91)	1.86	(2.64)	2.28	(3.24)

A range of covering area based on the standard thickness tolerance of plus and minus 10 % per roll or shipment.

NOTE The covering area in Table 2 is based on a nominal density of 0.0975 lb/in.^{3} (2.700g/cm^3) for a composition containing 99.35% or greater aluminium. For a composition having less than 99.35% aluminium, a nominal density of 0.098 lb/in^3 (2.71g/cm^3) and the covering areas in Table 2 shall be adjusted accordingly by dividing by the density factor 1.005.

4 Packaging

The material shall be packaged to provide adequate protection during normal handling and transportation and each package shall contain only one size of material The packaging shall be made of material free from contaminants, such as to maintain the integrity of the foil.

5 Marking

Aluminium foil shall be marked legibly and indelibly with the following information:

i) The name and/or registered trademark of the manufacturer

ii) Address of manufacturer or importer.

iii) “Made in Kenya” or country of origin where applicable.

iv) Recommended use not to be used for warming meals on the microwave.

v) Instructions for disposal.

vi) Size in Width by length

Annex A

(normative)

Test for foil dryness

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 dry ness 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 2 s (the unbroken line is the top of the band of water or mixture across the web). To ensure an acceptable water-alcohol mixture, the alcohol denaturant shall be methanol (Formula 30 to10 parts of ethyl alcohol and one part methanol by volume) or equivalent.

Dry Annealed A – Test dryness 100/0 foil shall support a continuous unbroken line using 100 % 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.

Dry Annealed, B – Test dryness 80/20 foil shall support a continuous unbroken line using 80 % distilled water-20
% alcohol mixture.

Annex B

(normative)

Determination of Thickness of Aluminium Foil

B.1 Procedure

Prepare samples of aluminium foil of known area of approximately 500 cm^2 from flat uncreased sheets by cutting round a metal template with beveled edges by means of a sharp knife. Clean the sample with a suitable solvent to remove all coatings, inks, traces of impurities on foil. Dry the sample of foil to constant mass at 105 ^oC.

B.2 Calculation

Calculate the thickness of the foil as follows:

Thickness of the foil, in cm = $\frac{m}{d \times a \times b}$

where,

m = mass, in g of the sample of foil;

d = density, of aluminium (2.71g/cm^3);

a = length, in cm of foil test piece;

b = width, in cm of the foil test piece.

B.3 The covering area shall be determined by means of a direct reading basis weight scale. In case of dispute, the covering area shall be determined by weighing to the nearest 1 mg a piece of unsliced foil not less than 10ft (3m) long and calculating the average area per gram by use of the following equation:

Covering area, cm^2/g = 453.6×area of sample (cm^2) / weight of sample (g)

Annex C

(normative)

Tensile strength

C.1 Significance and use

Tension tests provide information on the strength and ductility of materials under uniaxial tensile stresses.

The results of tension tests from selected portions of a part or material may not totally represent the strength and ductility of the entire end product of its in-service behaviour in different environments.

These test methods are considered satisfactory for acceptance testing of commercial shipments since the methods have been used extensively for these purposes.

Tension tests provide a means to determine the ductility of materials through the measurement either of elongation or reduction of area. However, as specimen thickness is reduced, tension tests may become less useful for the determination of ductility.

C.2 Apparatus

C.2.1 Testing machines

C.2.1.1 Gripping devices

C.2.1.1.1 General

Various types of gripping devices may be used to transmit the measured load applied by the testing machine to the test specimen. To ensure axial tensile stress within the gage length, the axis of the test specimen must

coincide with the center line of the heads of the testing machine. Any departure from this center line may introduce

bending stresses that are not included in the usual stress computation (load divided by cross-sectional area).

C.2.1.1.2 Wedge grips

Testing machines usually are equipped with wedge grips. These wedge grips generally furnish a satisfactory means of gripping long specimens of ductile materials in the thicker foil gages. If, for any reason, one grip of a pair advances farther than the other as the grips tighten, an undesirable bending stress may be introduced. When liners are used behind the wedges, they must be of the same thickness and their faces must be flat and parallel. For proper gripping, it is desirable that the entire length of the serrated face of each wedge be in contact with the specimen. A buffer material such as 320-grit silicon carbide paper may be inserted between the specimen and serrated faces to minimize tearing of specimens.

C.3 Calculation

Calculate the tensile strength by dividing the maximum load carried by the specimen by the original cross-sectional area of the specimen.

Annex D

(normative)

Determination of aluminium in aluminium foil

The purity of aluminium foil shall be determined using X-Ray Fluorescence Spectrometry or any other appropriate technique

BIBLIOGRAPHY

KS 2294:2011 Aluminium foil – Specification.

IS 8970:1991, Aluminium foil laminate for packaging-specification.

