



**RWANDA
STANDARD**

**DRS
583:2024**

First edition

2024-mm-dd

**Aluminium and aluminium alloys — Bare
foil for food packaging — Specification**

ICS 77.120.10

Reference number

DRS 583: 2024

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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 583 was prepared by Technical Committee RSB/TC 20, *Packaging and packaging materials*.

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

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

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

Committee membership

The following organizations were represented on the Technical Committee on *Packaging and packaging materials* (RSB/TC 20) in the preparation of this standard.

BRALIRWA-Heineken company

Dorcas Consolation Family 396 V + VPM, Rwamagana

Rwanda Inspectorate, Competition and Consumer Protection Authority (RICA)

Skol Brewery Ltd

Star Overseas Ltd

University of Rwanda - College of Science and Technology (UR - CST)

Rwanda Standards Board (RSB) – Secretariat

Introduction

Bare foil for food packaging is well known because it represents a specialized type of aluminum foil that meets stringent standards for food safety, packaging integrity, and consumer convenience, making it a trusted choice in the food industry worldwide.

Efficient packaging is of great importance for the distribution and the protection of goods to ensure food safety. Insufficient or inappropriate packaging can lead to damage or wastage of the contents of the pack.

Copy for public review

Aluminium and aluminium alloys — Bare foil for food packaging — Specification

1 Scope

This Draft Rwanda Standard specifies requirements, sampling and test methods for annealed aluminium and aluminium alloy bare foil for food packaging.

It is applicable to 0.011 mm (11µm) and 0.0750 mm (75.0µm) of thickness.

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.

ASTM E345, *Standard Test Method for Tension Testing of Metallic Foil*

ASTM B419, *Standard Specification for Annealed Aluminum and Aluminum-Alloy Foil for Flexible Barrier, Food Contact, and Other Applications*

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

RS ISO 6361-1, *Wrought aluminium and aluminium alloys — Sheets, strips and plates — Part 1: Technical conditions for inspection and delivery*

3 Terms and definitions

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

3.1

bare foil

cold rolled product of rectangular cross-section, having thickness over 0.011 mm but not greater than 0.075 mm, 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

3.6

aluminium alloy

alloy based on aluminium to which other elements are added to bring about an improvement in mechanical, physical and/or chemical properties to meet particular end uses

4 Requirements

4.1 General requirements

4.1.1 General requirements relating to the supply of aluminium and aluminium alloy foil shall comply with RS ISO 6361-1.

4.1.1 Lubricants

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

4.1.1.2 As the foils are to be used in various aspects including food processing, food packaging and food preservation, 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.

4.1.1.3 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.

4.1.2 Pinhole count

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

Table 1 — Pinhole count

| S/N | Nominal thickness μm | Pinhole count number $\text{m}^2 \text{ max}$ |
|------|------------------------------------|--|
| i. | ≥ 25 | 0 |
| ii. | 20 | 20 |
| iii. | 18 | 30 |
| iv. | 14 | 40 |
| v. | 11 | 60 |

4.2 Specific requirements

5 Material

5.1 The material used for aluminium and aluminium alloy foil shall comply with the chemical composition of the grades in the Table 2.

Table 2 — Chemical composition of the percent 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 | - |

NOTE Designations defined in Table 2 or their equivalent grades from other standards should comply with the mentioned specifications.

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

6 Freedom from defects

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

7 Preferred thicknesses

Unless otherwise stated, the preferred thickness shall be as given in Table 3.

Table 3 — Preferred Thickness

| S/N | 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 |

8 Average thickness

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

8.2 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.

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

where

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

27.1 is specific gravity of aluminium.

9 Dimensions and tolerances

9.1 Unless otherwise agreed, the thickness tolerances shall be $\pm 8\%$.

9.2 Unless otherwise stated, the width tolerances shall be as given in Table 4.

Table 4 — Width tolerances

Dimensions in millimetres

| Form of product | Tolerance on width | |
|-----------------|--------------------|-----------|
| | <1000 | >1000 |
| Coil and sheet | ± 0.5 | ± 1.0 |

9.3 Unless otherwise agreed, the length tolerances shall be as given in Table 5.

Table 5 — Length tolerances

Dimensions in millimetres

| Form of product | For width | | |
|-----------------|-----------|------------|---------|
| | <500 | 500 - 1000 | >1 000 |
| Coil | - | - | - |
| sheet | ± 2 | ± 3 | ± 4 |

10 Tensile properties

10.1 The tension testing shall be made in accordance with test method given in ASTM E345. The foil shall comply with the tensile breaking loads as given in Table 6.

Table 6 — Tensile breaking loads

| S/N | Nominal thickness | | Breaking load, kg/cm of width min |
|------|-------------------|---------------|--------------------------------------|
| | mm | μm | |
| 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. | 0.023 | 23 | 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 |

10.2 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.

10.3 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.

10.4 Surface condition

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.

10.5 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.

10.6 Dry annealed, B

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

10.7 Dry annealed, C

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

10.8 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.

11 Sampling

11.1 General

11.1.1 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.

11.1.2 Tests for determining the conformity of the lot to the requirements 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

| S/N | Number of rolls of foils in the lot | Number of rolls of foils to be selected | Permissible number of defectives |
|------|-------------------------------------|---|----------------------------------|
| i. | Up to 15 | 5 | 0 |
| ii. | 16 to 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 |

11.1.3 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 Table7

11.2 Number of tests for tensile properties

11.2.1 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 11.1.2 may be made use of

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

11.2.3 The test pieces required for various tests shall be cut off from each of the sample selected as in 11.1.3 when cold and shall receive no further heat treatment before being tested.

11.3 Re-test

11.3.1 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.

11.3.2 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.

11.4 Criteria for conformity

A lot shall be considered to have conformed to the requirements of the standard, if 11.1.2 to 11.3 are satisfied.

12 Labelling and marking

12.1 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.

12.2 Each "retail" package of aluminium and aluminium alloy bare foil shall be suitable marked for identification with the name of the manufacturer, grade, condition of the material, Batch No., Date of Manufacturer, Length, Width and Thickness, Usage guidelines with Do's and Dont's.

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Price based on 8 pages