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**Tea sacks — Specification —**

**Part 1:**

Reference sack for palletized and  
containerized transport of tea

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*Sacs à thé — Spécifications —*

ISO 9884-1:1994

*Partie 1: Sac de référence pour le transport palettisé et conteneurisé du thé*  
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## Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9884-1 was prepared by Technical Committee ISO/TC 34, *Agricultural food products*, Subcommittee SC 8, *Tea*.

ISO 9884 consists of the following parts under the general title *Tea sacks — Specification*:

- *Part 1: Reference sack for palletized and containerized transport of tea*
- *Part 2: Performance specification for sacks for palletized and containerized transport of tea*

Annex A forms an integral part of this part of ISO 9884. Annex B is for information only.

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## Introduction

The plywood tea chest was for many years the preferred and standard shipping unit for tea. However, the growing scarcity and cost of plywood in many producing countries has led in recent years to the use of alternatives based on more freely available and cheaper materials, such as paper and cardboard.

Amongst the various alternative forms of bulk packing tested, multi-ply kraft paper sacks have found wide and growing acceptance for the palletized and containerized transport of tea. One particular type of multi-ply paper sack with a polyethylene-bonded aluminium moisture and odour barrier has been developed following a number of transport and storage trials. It has been clearly shown to:

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- withstand the handling and stresses involved in palletization, containerization, shipping and unpacking;
  - adequately protect tea from the deleterious effect of moisture uptake and exposure to taint;
  - load efficiently on to standard four-way entry pallets and into standard freight containers.

This part of ISO 9884 specifies the materials, construction and dimensions of this sack, which is intended to act as a performance reference sack against which sacks of different materials and construction may be tested. Minimum requirements and performance tests for sacks intended for palletized and containerized transport of tea are specified in ISO 9884-2<sup>1)</sup>.

It is anticipated that stronger, puncture-resistant materials (for example, cross-laminated high-density polyethylene) will permit the development and future specification of a reference sack capable of withstanding the stresses involved in handling and transport prior to palletization and containerization.

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1) To be published.

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# Tea sacks — Specification —

## Part 1:

### Reference sack for palletized and containerized transport of tea

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### 1 Scope

This part of ISO 9884 specifies the materials, construction and dimensions of a reference sack (valve-pasted, flat, hexagonal-ended sack of stepped-end construction, formed from a stepped-end tube) suitable for the palletized and containerized transport of tea:

- on a four-way entry, 1 120 mm × 1 120 mm, flat, flush-ended pallet to fit the unit load size of 1 140 mm × 1 140 mm specified in ISO 3676;
- in freight containers of the dimensions specified in ISO 668, either closed and non-vented, or closed and corner-post vented (see ISO 830:1981, 4.1.1.1).

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 9884. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 9884 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 536:1976, *Paper and board — Determination of grammage.*

ISO 668:1988, *Series 1 freight containers — Classification, dimensions and ratings.*

ISO 830:1981, *Freight containers — Terminology.*

ISO 1924-2:1985, *Paper and board — Determination of tensile properties — Part 2: Constant rate of elongation method.*

ISO 1974:1990, *Paper — Determination of tearing resistance (Elmendorf method).*

ISO 2758:1983, *Paper — Determination of bursting strength.*

ISO 3676:1983, *Packaging — Unit load sizes — Dimensions.*

ISO 4797:1981, *Laboratory glassware — Flasks with conical ground joints.*

ISO 6590-1:1983, *Packaging — Sacks — Vocabulary and types — Part 1: Paper sacks.*

ISO 6591-1:1984, *Packaging — Sacks — Description and method of measurement — Part 1: Empty paper sacks.*

ISO 7023:1983, *Packaging — Sacks — Method of sampling empty sacks for testing*.

ISO 8351-1:1994, *Packaging — Method of specification for sacks — Part 1: Paper sacks*.

### 3 Definitions

For the purposes of this part of ISO 9884, the definitions given in ISO 6590-1 apply.

### 4 Sampling

Samples shall have been taken in accordance with ISO 7023.

### 5 Requirements

#### 5.1 General requirements for materials

The sack shall be made from either normal kraft paper for sacks (see ISO 6590-1:1983, 5.1 and 5.2.1) or extensible kraft paper for sacks (see ISO 6590-1:1983, 5.2.2) together with barrier-coated paper (see ISO 6590-1:1983, 5.6.1) consisting of aluminium foil bonded to kraft paper for sacks with polyethylene. Normal kraft paper and extensible kraft paper shall not be used together in the same sack.

All materials used in the construction of the sack (paper, adhesive, barrier ply) shall be free from taint.

No materials or substances containing chlorophenols or their derivatives shall be used.

#### 5.2 Dimensions

##### 5.2.1 Empty sack (lay-flat) dimensions

The empty sack dimensions shall be as given in table 1, defined and measured according to 4.2.3 and clause 5 of ISO 6591-1:1984, and with the tolerances specified in ISO 8351-1.

##### 5.2.2 Filled sack dimensions

The filled sack dimensions shall not exceed those given in table 1.

**Table 1 — Sack dimensions**

Dimensions in millimetres

Dimension	Empty sack	Filled sack
Sack length	1 120 ± 10	1 120 max.
Sack width	720 ± 5	560 max.
Width of bottom	180 ± 5	—
Valve sleeve width	180 ± 5	—
Sack depth	—	205 max.

### 5.3 Construction

The sack shall consist of:

- four plies of normal kraft paper for sacks or three plies of extensible kraft paper for sacks as specified in table 2;
- an inner aluminium-coated barrier ply with the aluminium facing the inside of the sack, as specified in table 2;
- an external valve sleeve (see ISO 6590-1:1983, 4.4.2.3) made of the same material as the inner barrier ply;

— a tuck-in valve sleeve pocket.

### 5.4 Ply grammage and strength

#### 5.4.1 Ply grammage

##### 5.4.1.1 Paper plies

The grammage of paper plies (plies 1 to 4 for normal kraft paper sacks, plies 1 to 3 for extensible kraft paper sacks) shall comply with the minimum requirements given in table 2 when determined in accordance with the method given in ISO 536.

##### 5.4.1.2 Barrier ply

The grammage of constituents of barrier (inner) ply (ply 5 for normal kraft paper sacks, ply 4 for extensible kraft paper sacks) shall comply with the minimum requirements given in table 2 when determined in accordance with the method given in annex A.

#### 5.4.2 Strength

The mean values obtained by testing the number of sacks specified in ISO 7023 shall satisfy the requirements given in table 3 when tested by the methods indicated.

Table 2 — Sack composition and ply grammage

Normal kraft paper sack		Extensible kraft paper sack	
Sack composition	Minimum grammage, g/m <sup>2</sup> on dry basis	Sack composition	Minimum grammage, g/m <sup>2</sup> on dry basis
Ply 1 (outer): wet strength kraft paper	70	Ply 1 (outer): wet strength extensible kraft paper	80
Ply 2: normal kraft paper	70	Ply 2: extensible kraft paper	80
Ply 3: normal kraft paper	70	Ply 3: extensible kraft paper	80
Ply 4: normal kraft paper	70	Ply 4 (inner): extensible kraft paper	60
Ply 5 (inner): normal kraft paper	60	polyethylene	20
polyethylene	20	aluminium	18,7
aluminium	18,7		
Total	378,7	Total	338,7

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Table 3 — Strength requirements

	Test method	Normal kraft paper <sup>1)</sup>	Extensible kraft paper	
		min.	min.	max.
Tensile index (Nm/g)	ISO 1924-2	MD 55	45	
		CD 30	35	
Stretch (%)	ISO 1924-2	MD 1,8	8,0	9,0
		CD 4,0	5,0	8,0
Tensile energy absorption index (J/g)	ISO 1924-2	MD 0,7	2,2	
		CD 0,9	1,3	
Burst index (kN/g)	ISO 2758	Wet 1,1	1,2	
		Dry 3,7	4,0	
Tear index (mN·m <sup>2</sup> /g)	ISO 1974	MD/CD 10,0	12,0	

1) MD = machine direction; CD = cross direction

## Annex A (normative)

### Method of determination of the grammage of constituents of barrier ply laminate

#### A.1 Principle

Separation of a known area of dried barrier ply laminate into its three components by dissolution of the polyethylene in hot toluene. Drying and weighing of the separated paper and aluminium and determination of the polyethylene by difference.

#### A.2 Reagent

**A.2.1 Toluene**, analytical reagent grade.

#### A.3 Apparatus

Usual laboratory apparatus and, in particular, the following.

##### A.3.1 Steam bath

**A.3.2 Round-bottomed flask**, of capacity 500 ml, and with ground glass joint size 29/32 or 34/35, complying with ISO 4797, with condenser and any required adaptor.

**A.3.3 Aluminium or silica dishes**, of nominal capacity 100 ml.

**A.3.4 Oven**, capable of operating at  $103\text{ °C} \pm 2\text{ °C}$ .

**A.3.5 Desiccator**, containing silica gel.

#### A.4 Test sample

**A.4.1** Remove and smooth until flat the inner barrier ply from each sack sampled. Cut from each a square test sample measuring  $10\text{ cm} \times 10\text{ cm}$  ( $0,01\text{ m}^2$ ).

**A.4.2** Heat the test sample in the oven (A.3.4) set at  $103\text{ °C}$  for 1 h. Remove from the oven, cool in the desiccator (A.3.5) for 1 h and weigh to the nearest 0,005 g.

#### A.5 Procedure

**A.5.1** Heat two of the dishes (A.3.3) in the oven (A.3.4) set at  $103\text{ °C}$  for 1 h. Remove from the oven and cool in the desiccator (A.3.5) until ready for use.

**A.5.2** Cut the test sample (A.4.2) into four pieces, and place them in the flask (A.3.2). Using a measuring cylinder, transfer 150 ml of the toluene (A.2) to the flask. Place the flask on the steam bath (A.3.1), fit the condenser and leave for 3 h.

**A.5.3** Remove the flask and condenser from the steam bath and allow them to cool to room temperature. Take off the condenser, then remove the separated paper and aluminium foil from the flask with tongs. Hold each above the surface of the toluene in the flask, and rinse with fresh toluene into the flask. Then place the paper and the aluminium into the separate dried dishes, each previously weighed to the nearest 0,005 g. Dry the dishes and their contents in the oven set at  $103\text{ °C}$  for 1 h. Allow them to cool in the desiccator, then weigh them to the nearest 0,005 g.

**A.5.4** Discard the toluene solution containing the polyethylene.

#### A.6 Expression of results

Report the individual results obtained for each sack sampled, together with the arithmetic mean.

##### A.6.1 Grammage of paper

The grammage of the paper, expressed in grams per square metre, is given by

$$100(D_p - D_1)$$



where

$D_p$  is the mass, in grams, of the dish and dried paper (A.5.3);

$D_1$  is the mass, in grams, of the empty dish (A.5.3).

### A.6.2 Grammage of aluminium

The grammage of the aluminium, expressed in grams per square metre, is given by

$$100(D_a - D_2)$$

where

$D_a$  is the mass, in grams, of the dish and dried aluminium (A.5.3);

$D_2$  is the mass, in grams, of the empty dish (A.5.3).

### A.6.3 Grammage of polyethylene

The grammage of the polyethylene, expressed in grams per square metre, is given by

$$100M_s - (G_p + G_a)$$

where

$M_s$  is the mass, in grams, of the dried sample (A.4.2);

$G_p$  is the grammage of the paper (A.6.1);

$G_a$  is the grammage of the aluminium (A.6.2).

NOTE 1 The thickness of the polyethylene layer in samples taken from sack wall laminate can vary by up to  $\pm 20\%$  of the mean, depending upon the equipment used in its manufacture.

### A.7 Precision

Details of the interlaboratory test to determine the precision of the method are summarized in annex B.

### A.8 Test report

The test report shall specify

- the method in accordance with which sampling was carried out, if known;
- the method used;
- the test result(s) obtained, expressed in accordance with A.6.

It shall also mention all operating details not specified in this annex, or regarded as optional, together with details of any incidents which may have influenced the test result(s).

The test report shall include all information necessary for the complete identification of the sample.