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## Requirements for sleeping bags —

### Part 2: Fabric and material properties

*Exigences pour les sacs de couchage*

ICS: 97.200.30

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### ISO/CEN PARALLEL PROCESSING

This draft has been developed within the European Committee for Standardization (CEN), and processed under the **CEN lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel five month enquiry.

Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month approval vote in ISO and formal vote in CEN.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 83 "Sports and other recreational facilities and equipment", the secretariat of which is held by DIN, Germany.

ISO 23537 consists of the following parts under the general title *Requirements for sleeping bags*:

- *Part 1: Thermal and dimensional requirements*
- *Part 2: Fabric and material properties*

## Introduction

This International Standard has been substantially revised. The objectives of the revision were to simplify the standard by deleting requirements and test methods which had not been proven to be sufficiently reproducible or which did not contribute to the safety and quality performance of sleeping bags. The revision was also conducted in order to improve the inter-laboratory variability and repeatability of the test method for determination of the thermal properties of a sleeping bag.

Since the last edition of this International Standard, products in the market have evolved to reflect the changing needs of the user. It was the intention of the committee during this revision that the standard would reflect these continuous and changing needs and not become restrictive in respect of future technology and advances in the manufacturing industry.

In buying a sleeping bag, the consumer expects (along with other aspects such as functional design, good fit, low weight and volume and durability), information regarding which temperature range the sleeping bag can be used. This temperature range serves to prevent the person in the bag feeling too cold on the one hand or too hot, combined with unpleasant sweating, on the other. The primary aim of this International Standard is to provide this information to the consumer by specifying a test procedure and an evaluation model to quantify the thermophysiological function of sleeping bags (see also Annex E).

An inter-laboratory test, involving six different laboratories, was organised within the present CEN working group on a set of six sleeping bags filled with feathers and downs and synthetics. Six human shaped thermal manikins were used, consisting of 6 to 35 independent segments and corresponding to the requirements for testing protective clothing against cold.

The test showed the following conclusions:

- even with multi-sectional manikins, the design and especially the number of independent sections can influence the value of thermal resistance by up to 20 %;
- yet the test results of thermal resistance with all manikins showed a maximum difference of 10 % (leading e.g. to a difference in  $T_{lim}$  of 3,0 °C for a sleeping bag with  $T_{lim} = 0$  °C);
- the weight of the manikin did not significantly effect the test results.

# Requirements for sleeping bags — Part 2: Fabric and material properties

## 1 Scope

This International Standard specifies the the fabric and material properties as well as provisions for labelling of adult sized sleeping bags for use in sports and leisure time activities. Thermal and dimensional requirements are specified in ISO 23537-1.

This International Standard does not apply to sleeping bags intended for specific purpose such as military use and extreme climate zone expedition. It does not apply to sleeping bags for children or babies: no prediction model exists for the determination of the limiting temperatures based on the thermal resistance of the sleeping bag for these demographics. Moreover, such a model for testing cannot be developed because the necessary controlled sleep trials with children or babies in climatic chambers are, out of ethical reasons, not permitted.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12130, *Feather and down — Test methods — Determination of the filling power (massic volume)*

EN 12132-1, *Feather and down — Methods of testing the down proof properties of fabrics — Part 1: Rubbing test*

EN 12934, *Feather and down — Composition labelling of processed feathers and down for use as sole filling material*

EN 12935, *Feather and down — Hygiene and cleanliness requirements*

EN 13088, *Manufactured articles filled with feather and down — Method for the determination of a filled product's total mass and of the mass of the filling*

EN 13538-3, *Determination of dimensional characteristics of sleeping bags — Part 3: Volume under load and easiness of packing*

EN 15586, *Textiles — Methods of testing the fibre proof properties of fabrics: Rubbing test*

EN 29073-1, *Textiles — Test methods for nonwovens — Part 1: Determination of mass per unit area*

ISO 105-B02, *Textiles — Tests for colour fastness — Part B02: Colour fastness to artificial light: Xenon arc fading lamp test*

ISO 105-C06, *Textiles — Tests for colour fastness — Part C06: Colour fastness to domestic and commercial laundering*

ISO 105-E04, *Textiles — Tests for colour fastness — Part E04: Colour fastness to perspiration*

ISO 105-X12, *Textiles — Tests for colour fastness — Part X12: Colour fastness to rubbing*

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

ISO 3758, *Textiles — Care labelling code using symbols* ISO 11092, *Textiles — Physiological effects — Measurement of thermal and water-vapour resistance under steady-state conditions (sweating guarded-hotplate test)*

ISO 12947-1, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 1: Martindale abrasion testing apparatus*

ISO 12947-2, *Textiles — Determination of the abrasion resistance of fabrics by the Martindale method — Part 2: Determination of specimen breakdown*

ISO 13937-1, *Textiles — Tear properties of fabrics — Part 1: Determination of tear force using ballistic pendulum method (Elmendorf)*

ISO 15831, *Clothing — Physiological effects — Measurement of thermal insulation by means of a thermal manikin*

### 3 Terms and definitions

For the purposes of this document, the following term and definition applies.

#### 3.1

##### **manufacturer**

organization responsible for designing and manufacturing a sleeping bag covered by this International Standard

### 4 Requirements and test methods

#### 4.1 General

For test procedures that refer to ISO 139, the default conditions of 20 °C and 65 % relative humidity shall be used.

#### 4.2 Fabrics

##### 4.2.1 Down proofness

When testing the fabric/fabric combinations of the shell or lining of the sleeping bag in accordance with EN 12132-1, the number of feather and/or down particles counted as required in EN 12132-1 shall not exceed ten for each fabric/fabric combination.

##### 4.2.2 Synthetic fibre proofness

When tested in accordance with EN 15586, the number of synthetic fibres protruded through the fabric of the sleeping bags shall not exceed 30 for each cushion.

##### 4.2.3 Mechanical properties

###### 4.2.3.1 Abrasion

When tested in accordance with ISO 12947-1 and ISO 12947-2, the fabrics for sleeping bags shall withstand at least 20 000 test cycles.

#### 4.2.3.2 Tear strength

When tested in accordance with ISO 13937-1, the tear strength of lining and shell fabrics shall be a minimum of 10 N.

#### 4.2.3.3 Colour fastness

- a) When testing the colour fastness to rubbing according to ISO 105-X12 wet and dry, the requirement for staining shall be a minimum of 3-4.
- b) When testing the colour fastness to washing according to ISO 105-C06 at care label temperature, the requirements for staining and change of colour shall be a minimum of 4.
- c) When testing the colour fastness to perspiration according to ISO 105-E04, the requirement for staining and change of colour shall be a minimum of 3-4.
- d) When testing the colour fastness to light according to ISO 105-B02, the requirement for change of colour shall be a minimum of 4-5.

### 4.3 Filling material

#### 4.3.1 Feather and/or down

##### 4.3.1.1 Composition

The composition of the filling material shall be determined in accordance with EN 12934.

##### 4.3.1.2 Hygienic state

The filling material shall conform to the requirements according to EN 12935.

##### 4.3.1.3 Filling power

The filling power shall be tested in accordance with EN 12130.

The filling power shall not deviate by more than  $\pm 5\%$  from the declared nominal value.

##### 4.3.1.4 Filling material mass

The filling material mass, in g, shall be measured according to EN 13088.

The filling material mass shall not deviate by more than  $\pm 7\%$  from the declared nominal value.

#### 4.3.2 Filling material other than feather and/or down

##### 4.3.2.1 Mass per unit area

The mass per unit area, in  $\text{g}/\text{m}^2$ , shall be measured according to EN 29073-1.

The mass per unit area shall not deviate by more than  $\pm 7\%$  from the declared nominal value.



## 4.4 Finished articles

### 4.4.1 Inside dimensions

#### 4.4.1.1 Inside length

To enable labelling of the sleeping bag, the inside length of the sleeping bag shall be measured within  $\pm 3$  cm. The measurement is made by turning the sleeping bag inside out and measuring the length from the position of the seam where the heel of the foot is placed to the top of the sleeping bag (excluding any vertical components of the hood), without applying any force to extend the sleeping bag length.

#### 4.4.1.2 Maximum inside width

To enable labelling of the sleeping bag, the maximum inside width shall be measured within  $\pm 2$  cm. The measurement is made by turning the sleeping bag inside out and measuring the circumference at the widest point without stretching the fabric. If the maximum inside width of the sleeping bag is not in the chest area, then the position of the widest point of the sleeping bag shall be indicated on the label. The circumference is halved to provide the width of the sleeping bag. If the sleeping bag has elastic seams, a force of  $(10 \pm 1)$  N may be used to extend these seams prior to measurement, for instance by using a spring balance.

#### 4.4.1.3 Inside foot width

To enable labelling of the sleeping bag, the foot width shall be measured within  $\pm 2$  cm. The measurement is made by turning the sleeping bag inside out and measuring the circumference at a distance  $(30 \pm 1)$  cm towards the hood from the position where the heel of the foot is placed. The circumference is halved to provide the width of the sleeping bag. If the sleeping bag has elastic seams, a force of  $(10 \pm 1)$  N may be used to extend these seams prior to measurement, for instance by using a spring balance.

### 4.4.2 Total mass

The total mass of sleeping bags filled with feather and/or down shall be determined in accordance with EN 13088.

For sleeping bags filled with materials other than feather and down, samples shall be conditioned according to ISO 139 and the mass of the sleeping bag (without stuff sack) shall be determined. The total mass shall not deviate by more than  $\pm 7$  % from the declared nominal value.

### 4.4.3 Volume under load

The volume of the sleeping bag shall be determined according to EN 13538-3.

The volume shall not deviate by more than  $\pm 5$  % from the declared nominal value.

## 5 Test report

The test report shall include at least the following:

- a) reference and description of the sleeping bag sample;
- b) reference to this International Standard, i.e. ISO/DIS 23537-2:2015;
- c) details of deviations from this International Standard, if applicable;
- d) date of test.