

SLOVENSKI STANDARD
oSIST prEN ISO 23537-1:2021
01-september-2021

Zahteve za spalne vreče - 1. del: Toplotne, masne in dimenzionalne zahteve za spalne vreče, izdelane za mejne temperature -20°C in več (ISO/DIS 23537-1:2021)

Requirements for sleeping bags - Part 1: Thermal, mass and dimensional requirements for sleeping bags designed for limit temperatures of $\geq 20^{\circ}\text{C}$ and higher (ISO/DIS 23537-1:2021)

Anforderungen an Schlafsäcke - Teil 1: Thermische Anforderungen, Masse und Abmessungen an Schlafsäcke, die für Grenztemperaturen von -20°C und höher ausgelegt sind (ISO/DIS 23537-1:2021)

Exigences pour les sacs de couchage - Partie 1: Exigences thermiques, massiques et dimensionnelles pour les sacs de couchage conçus pour des températures limites de -20°C et plus (ISO/DIS 23537-1:2021)

Ta slovenski standard je istoveten z: prEN ISO 23537-1

ICS:

97.200.30	Oprema za taborjenje in tabori	Camping equipment and camp-sites
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DRAFT INTERNATIONAL STANDARD

ISO/DIS 23537-1

ISO/TC 83

Secretariat: DIN

Voting begins on:
2021-07-05Voting terminates on:
2021-09-27

Requirements for sleeping bags —

Part 1:

Thermal, mass and dimensional requirements for sleeping bags designed for limit temperatures of -20°C and higher

ICS: 97.200.30

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ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 23537-1:2021(E)

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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).

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).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 83, Sports and other recreational facilities and equipment, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 136, Sports, playgrounds and other recreational facilities and equipment in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 23537-1:2016), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Modification of definitions;
- Made clearer that extreme climate conditions are included;
- Revision of requirements for lower temperature limits;
- Revision of the requirements and test methods;
- Revision of [Clause 7](#), labelling, and inclusion of a revised [Figure 1](#) to be clearer;
- Revision of the reference values of thermal resistance for calibration of thermal manikin;
- Deletion of [Annex F](#) “Maximum temperature”.

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

- *Part 1: Thermal, mass and dimensional requirements for sleeping bags designed for limit temperatures of -20°C and higher*
- *Part 2: Fabric and material properties*

A list of all parts in the ISO 23537 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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ISO/DIS 23537-1:2021(E)**Introduction**

This second edition of this part of ISO 23537 is based on continued development of the European Standard, EN 13537, and the first edition of the International Standard, ISO 23537-1.

This International Standard consists of two parts which allows for separate validation of thermal properties and product and material performance. This separation of parts also allows for continued development of new product combinations as it encourages manufacturers to consider new combinations of materials which for example might not be suitable to test by traditional textile physical tests, but which can still have thermal properties evaluated.

This part of ISO 23537 considers important aspects to the thermal performance of the sleeping bag.

During the development of this part of ISO 23537, consideration was given to the need to continue to reduce inter laboratory variability of the thermal testing and a number of test parameters have been tightened as a consequence.

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Requirements for sleeping bags —

Part 1:

Thermal, mass and dimensional requirements for sleeping bags designed for limit temperatures of -20°C and higher

1 Scope

This part of ISO 23537 specifies the requirements and test methods as well as provisions for labelling of adult sized sleeping bags for use in sports and leisure time activities at a limit temperature of ≥ -20 °C in regard to thermal characteristics, dimensions and mass.

This part of ISO 23537 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.

NOTE 1 No prediction model exists for the determination of the limiting temperatures based on the thermal resistance of the sleeping bag for children and babies. 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.

This part of ISO 23537 describes the method for the assessment of the performance in steady-state conditions of a sleeping bag with regard to the protection against cold.

NOTE 2 Sleeping bags without homogeneous fillings designed to provide local extra insulation in certain parts pose issues with the calibration and/or test procedure. Ongoing work continues to provide suitable means of establishing temperature ratings.

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.

ISO 139, *Textiles — Standard atmospheres for conditioning and testing* ISO 1096, *Plywood — Classification*

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 1096, *Plywood — Classification*

ISO 15831:2004, *Clothing — Physiological effects — Measurement of thermal insulation by means of a thermal manikin*

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*

3 Terms and definitions

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

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1
comfort temperature
 T_{comf}
lower limit of the comfort range, down to which a sleeping bag user with a relaxed posture, such as lying on their back, is globally in thermal equilibrium and just not feeling cold

Note 1 to entry: For more information, see C.7.3

3.2
limit temperature
 T_{lim}
lower limit at which a sleeping bag user with a curled up body posture is globally in thermal equilibrium and just not feeling cold

Note 1 to entry: For more information, see C.7.2.

3.3
extreme temperature
 T_{ext}
very low temperature where the risk of health damage by hypothermia is possible

Note 1 to entry: For more information, see C.7.1.

Note 2 to entry: This is a point of danger which can lead to death

3.4
maximum temperature
 T_{max}
upper limit of comfort range, up to which a partially uncovered sleeping bag user just does not perspire too much

Note 1 to entry: For more information, see [Annex F](#).

3.5
thermal manikin
dummy with human shape and heated body surface which allows the determination of thermal transfer through the sleeping bag under steady-state conditions

Note 1 to entry: i.e. constant heat flux and temperature gradient between body surface and ambient air.

3.6
thermal resistance
 R_c , **thermal insulation**
property of the sleeping bag which is related to the dry heat loss of the sleeping bag user, effected by the difference of temperature between the skin and the ambient air, as measured with a thermal manikin

Note 1 to entry: The dry heat loss of the sleeping bag user is a combination of conductive, convective and radiative heat transfer

Note 2 to entry: This thermal resistance represents the insulative property of a sleeping bag, which includes the effects of the shell fabrics and filling materials, air volume in the cavity inside the sleeping bag, boundary air layer on the outer face of the sleeping bag, mattress underneath the sleeping bag and garments worn by the sleeping bag user. It is considered to be the total thermal insulation (see ISO 15831).

4 Requirements

4.1 Thermal properties for lower temperature limits

Depending on the thermal resistance posture 1 $R_c(1)$, the values for the extreme temperature (T_{ext}), limit temperature (T_{lim}) and comfort temperature (T_{comf}) as given in [Table 1](#) shall be used. If the thermal resistances posture 1 $R_c(1)$ measured for the sleeping bag is in between the values in [Table 1](#), a linear interpolation shall be performed on the basis of the nearest upper and lower values of the thermal resistances posture 1 $R_c(1)$

Test in accordance with [5.1.6](#).

Table 1 — Lower temperature limits of the range of utility

Thermal resistance posture 1 $R_c(1)$ $m^2 \cdot K/W$	Extreme temperature T_{ext} $^{\circ}C$	Limit temperature T_{lim} $^{\circ}C$	Comfort temperature T_{comf} $^{\circ}C$
0,500	+5,0	+14,2	+17,2
0,540	+2,8	+12,7	+15,9
0,580	+0,6	+11,2	+14,6
0,620	-1,5	+9,7	+13,3
0,660	-3,7	+8,1	+12,0
0,700	-5,8	+6,6	+10,7
0,740	-7,9	+5,1	+9,4
0,780	-10,1	+3,6	+8,1
0,820	-12,2	+2,2	+6,9
0,860	-14,3	+0,7	+5,6
0,900	-16,3	-0,8	+4,3
0,940	-18,4	-2,3	+3,1
0,980	-20,5	-3,7	+1,8
1,020	-22,5	-5,2	+0,6
1,060	-24,5	-6,7	-0,7
1,100	-26,5	-8,1	-1,9
1,140	-28,5	-9,5	-3,1
1,180	-30,5	-11,0	-4,4
1,220	-32,5	-12,4	-5,6
1,260	-34,4	-13,8	-6,8
1,300	-36,4	-15,2	-8,0
1,340	-38,3	-16,7	-9,2
1,380	-40,2	-18,1	-10,4
1,420	-42,2	-19,5	-11,6

4.2 Water vapour permeability index

The material specific water-vapour permeability index (i_{mt}) of the sleeping bag shall be $\geq 0,45$.

NOTE The water-vapour permeability index is dimensionless, and has values between 0 and 1. A value of 0 implies that the material is water-vapour impermeable, that is, it has infinite water-vapour resistance, and a material with a value of 1 has both the thermal resistance and water-vapour resistance of an air layer of the same thickness.

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Test in accordance with [5.2](#).

4.3 Inside dimensions

4.3.1 Inside length

The inside length of the sleeping bag shall be given with a tolerance of ± 3 cm. Test in accordance with [5.3.1](#)

4.3.2 Maximum inside width

The maximum inside width of the sleeping bag shall be given with a tolerance of ± 2 cm. Test in accordance with [5.3.2](#).

4.3.3 Inside foot width

The inside foot width of the sleeping bag shall be given with a tolerance of ± 2 cm. Test in accordance with [5.3.3](#)

4.4 Total mass

The total mass of the sleeping bag shall be given with a tolerance of ± 5 % for synthetic and down sleeping bag. Test in accordance with [5.4](#)

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5 Test methods

5.1 Testing of the thermal properties

5.1.1 Principle

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The thermal resistance of the sleeping bag is measured with a thermal manikin which meets the requirements and test procedure of ISO 15831 and which is inserted into the sleeping bag and placed in a controlled atmosphere.

A physiological model is then applied which uses this thermal resistance to determine ambient temperatures corresponding to a range of utility of the sleeping bag.

The manikin test of this part of ISO 23537 is suitable for mummy shaped bags which appropriately fit to the manikin so to be accurate. The temperature rating result can be applied to other sized mummy bags that uses the same materials and insulation construction which is proportionally scaled up or down from the tested bag.

5.1.2 Thermal manikin

5.1.2.1 General

A thermal manikin according to ISO 15831 with the body height of $(1,70 \pm 0,15)$ m shall be used. During the test, the manikin shall be dressed with the following garments:

- two-piece suit (upper part with long sleeves, trousers) with a material specific thermal resistance tested (R_{ct}) in accordance with ISO 11092 of

$$R_{ct} = (0,040 \text{ m}^2 \cdot \text{K/W to } 0,060 \text{ m}^2 \text{ K/W}) \quad (1)$$

- knee-length socks with a material specific thermal resistance tested in accordance with ISO 11092 of