BS ISO 6266:2013

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Alpine skis — Determination of fatigue indexes — Cyclic loading test

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The UK participation in its preparation was entrusted to Technical Committee SW/136/7, Snowsports equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

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INTERNATIONAL STANDARD

ISO 6266

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2013-03-01

Alpine skis — Determination of fatigue indexes — Cyclic loading test

Skis alpins — Détermination des indices de fatigue — Essai en flexion alternée

Reference number
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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.

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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.

ISO 6266 was prepared by Technical Committee ISO/TC 83, *Sports and recreational equipment*, Subcommittee SC 4, *Snowsports equipment*.

This second edition cancels and replaces the first edition (ISO 6266:1980), which has been technically revised.

Introduction

Previous investigations showed that the fatigue of an alpine ski is not easy to describe. If one understands by fatigue the remaining negative change of some characteristics of the ski, influencing the performance of the ski, as a result of normal use, several tests would be necessary to determine exactly the susceptibility of a ski to such changes. In addition, some factors may have substantial influence on the results such as ski length, spring constant, test temperature, kind of vibration, frequency etc. lt was therefore decided that a test method taking account of all these factors might be of some interest for ski research but that it should not be proposed for standardization.

Instead of this, a simplified test of the fatigue behaviour of two important characteristics of the ski (i.e. of camber height and centre spring constant) was proposed for standardization.

INTERNATIONAL STANDARD **ISO 6266:2013(E)**

Alpine skis — Determination of fatigue indexes — Cyclic loading test

1 Scope

This International Standard specifies a method for the determination of the fatigue indexes of alpine skis (i.e. the resistance of the skis to changes in shape and of stiffness) after a bending test with cyclic loading.

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.

ISO 5902, *Alpine skis — Determination of elastic properties*

ISO 6289, *Skis — Vocabulary*

3 Terms and definitions

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

3.1
camber height
h_k
distance between the running surface on the ski and a planar surface, measured with the ski resting freely under its own mass

3.2
original weighted bottom camber height
h_B
weighted bottom camber height, according to ISO 6289, determined prior to the test

3.3
final weighted bottom camber height
h'_B
weighted bottom camber height, according to ISO 6289, determined after the test

3.4
spring constant
c
ratio of the force F applied to the ski, to the corresponding deflection f:

$$c = \frac{F}{f}$$

Note 1 to entry: Depending on the individual parts of the ski on which the force F is applied, one can define:

— the centre spring constant, c_M;

— the shovel spring constant, c_S;

— the rear spring constant, c_R;

— the afterbody spring constant, c_A ;

— the forebody spring constant, c_B.

3.5
final centre spring constant
c'_M
centre spring constant, according to ISO 5902, measured after the test

3.6
fatigue index for the bottom camber height
K_h
percentage change of bottom camber height of the ski after cyclic loading and recovery

3.7
fatigue index for the centre spring constant
K_c
percentage change of centre spring constant of the ski after cyclic loading and recovery

3.8
stroke length
s
deflection of the ski during cyclic loading measured from a straight line through the supports, midway between the two supports

3.9
frequency
number of deflections of the ski per second

Note 1 to entry: The unit is the Hertz (Hz).

3.10
recovery time
time between the test and the measurement of h'_B, (see 3.3) and c'_M (see 3.5), which is necessary to eliminate temporary changes in camber height and centre spring constant

4 Principle

Subjection of the ski to cyclic loading and recovery. Determination of the fatigue indexes by calculation of the percentage permanent change in:

a) bottom camber height;

b) centre spring constant.

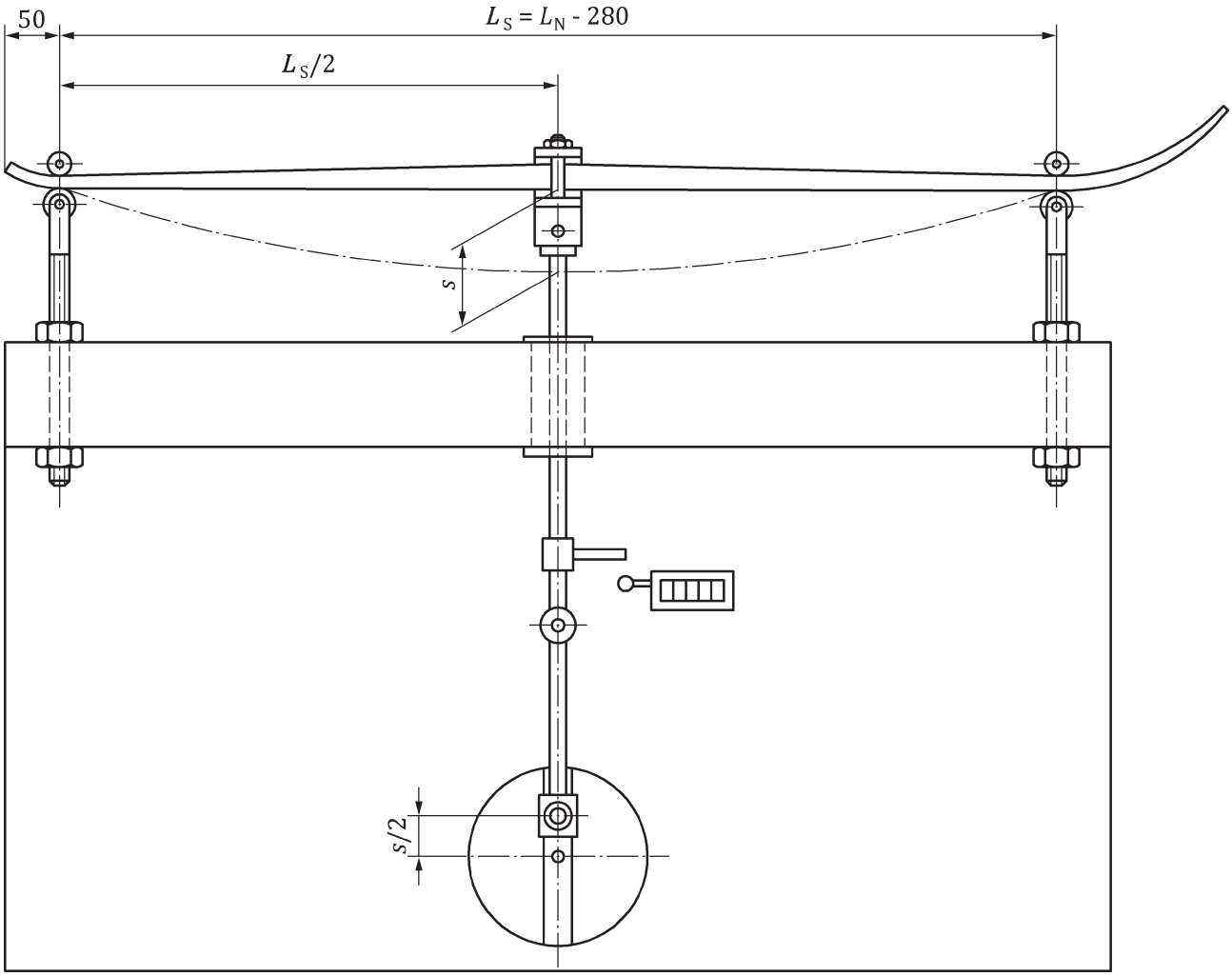
5 Apparatus

5.1 Bending machine

The bending machine shall essentially be constructed as shown in Figure 1. The machine has two supports which are vertically and horizontally adjustable. The supports of the bending machine are arranged at a distance of $L_S = L_N - 280$ mm where L_N is the nominal length. Nominal length shall be determined in accordance with ISO 6289. The support rolls shall have a diameter of approximately 50 mm. The supports shall have a spring loaded clamping roll in order to prevent lifting of the ski.

The driving mechanism consists of a disk fly wheel with adjustable crank pin, a connecting rod and a push rod with clamping fixture. The disk fly wheel shall have sufficient mass and driving power to effect a smooth sinusoidal flexing. The distance between crank pin and rotation axis shall be adjustable in order to be able to adjust a constant test load F_T by changing the stroke length s as indicated in 8.3.

Dimensions in millimetres



Key

L_S support length

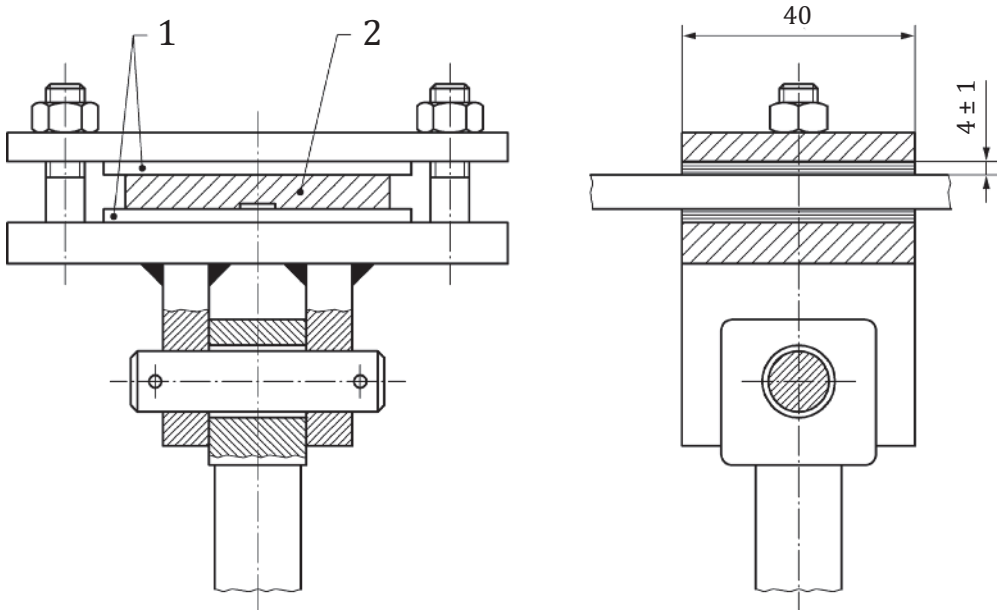
L_N nominal length

s stroke length

Figure 1 — Bending machine

The frequency of the stroke shall be between 2 Hz and 3 Hz. The clamping fixture shall have a pivoting joint and jaws with elastic rubber layers, as shown in Figure 2, in order to avoid stress concentration at the clamping point of the ski.

Dimensions in millimetres



Key

1 rubber
2 ski

Figure 2 — Clamping fixture

The dimensions of the rubber layers shall be as follows:

thickness: 4 mm ± 1 mm

width: 40 mm

hardness: (95 ± 5) Shore A

In addition, a counter shall be fixed to the push rod in order to record the number of cycles.

5.2 Measuring device for bottom camber height

For measuring the bottom camber height, a flat surface plate and a dial indicator with indicator holder are required.

5.3 Measuring device for centre spring constant

For measuring the centre spring constant, a device as described in ISO 5902 is required.

6 Test specimens

6.1 Lengths

To ensure the comparability of the published test results, the following ski lengths shall be used for tests:

1 800 mm or 2 000 mm

1 600 mm

1 300 mm

6.2 Number

The test shall be carried out on 10 skis of the same type.

7 Temperatures for conditioning and testing

The fatigue properties of the ski as described in this lnternational Standard can be affected by the test temperature to a greater or lesser extent, depending on the particular material configuration of the ski. Therefore, two different test temperatures are specified:

— A, standard laboratory test: 23 °C ± 2 °C;

— B, cold chamber test: −5 °C ± 2 °C.

All measurements shall be carried out on a ski conditioned to the test temperature for at least 2 h.

8 Procedure

8.1 Measurement of original bottom camber height, h_B

Measure the original bottom camber height h_B prior to the bending by cyclic loading. Press the ski against the flat surface plate (see 5.2). Place the dial indicator at the measurement point on the top surface of the ski and set to zero. Remove the flatting load, and read the bottom camber height from the dial indicator to an accuracy of ± 0,03 mm.

8.2 Measurement of original centre spring constant, c_M

Measure the original spring constant c_M prior to the bending with cyclic loading, in accordance with ISO 5902, to an accuracy of ± 0,2 N/mm.

8.3 Determination

Place the ski in the bending machine (see 5.1) and adjust the supports in such a way that the connecting line between the upper points of the lower support rolls and the surface of the clamping jaws, touching the running surface of the ski, is a straight line, when the push rod is in the upper dead centre.

Adjust the stroke length s by shifting the crank pin to its proper position. The stroke length, expressed in millimetres, is calculated from the following formula:

$$s = \frac{F_T}{c_M}$$

where

F_T is the test load, in newtons;

c_M is the original centre spring constant, in newtons per millimetre.

The permissible tolerance for stroke length is ± 2,5 mm.

The following loads shall be used:

1 800 mm or 2 000 mm: 450 N

1 600 mm: 350 N

1 300 mm: 250 N

Subject the ski to 20 000 loading cycles at a frequency of 2 Hz to 3 Hz.

Remove the ski from the machine and place against a wall in a vertical and stress-free (relaxed) position. The recovery time for the elimination of temporary deformation is 24 h.

8.4 Measurement of final bottom camber height, h'_B

Measure the bottom camber height h'_B after the recovery time as specified in 8.1.

8.5 Measurement of final centre spring constant, c'_M

Measure the centre spring constant c'_M after the recovery time as specified in 8.2.

8.6 Assessment of damage

Visually inspect the ski for damage caused by the test (for example, cracks or stress marks in the surface of the material, cracks at steel edges, delaminations).

9 Expression of results

9.1 Fatigue index for bottom camber height

The fatigue index K_h for the bottom camber height of the ski, expressed as a percentage, is given by the formula

$$K_h = \frac{h_B - h'_B}{h_B} \times 100$$

where

h_B is the original camber height, measured in accordance with 8.1;

h'_B is the final camber height, measured in accordance with 8.4.

Express the result as the mean of the 10 determinations.

9.2 Fatigue index for centre spring constant

The fatigue index K_c for the centre spring constant of the ski, expressed as a percentage, is given by the formula

$$K_c = \frac{c_M - c'_M}{c_M} \times 100$$

where

c_M is the original centre spring constant, measured in accordance with 8.2;

c'_M is the final centre spring constant, measured in accordance with 8.5.

Express the result as the mean of the 10 determinations.

10 Test report

The test report shall include the following particulars:

a) reference to this International Standard, i.e. ISO 6266;

b) complete identification of the ski (brand, model designation, nominal length and manufacturer's registration number);

c) test temperature (A or B);

d) fatigue index far the bottom camber height;

e) fatigue index for the centre spring constant;

f) damage to the ski caused by the test with exact description;

g) any deviation from this International Standard with an explanation of the reason for the deviation.

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