INTERNATIONAL STANDARD

ISO
5355

Alpine ski-boots — Safety requirements and test methods

Chaussures de ski pour skis alpins — Exigences de sécurité et essais

Contents

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Alpine ski-boots — Safety requirements and test methods

1 Scope

This International Standard specifies the safety requirements, test methods and marking of ski-boots which are used with current systems of alpine ski-bindings with attachment at the boot toe and boot heel, the proper release function of which depends on the dimensions and design of the interfaces.

For ski-binding systems that function irrespective of the sole shape or that have different requirements for the sole dimensions, it is not always necessary for the ski-boot soles to comply with this International Standard in order to achieve the desired degree of safety.

It applies to ski-boots of sizes 15,0 and larger (types A and C) in the Mondopoint system (see annex A).

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard 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/R 527:1966, *Plastics — Determination of tensile properties*.

ISO 1183:1987, *Plastics — Methods for determining the density and relative density of non-cellular plastics*.

ISO 2039-1:1987, *Plastics — Determination of hardness — Part 1: Ball indentation method*.

ISO 9407:—[1], *Mondopoint system of shoe sizing and marking*.

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1) To be published.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 interface: That part of the ski-boot intended for contact with the ski-binding.

3.2 front interface: That part of the ski-boot intended to fit with the front binding.

3.3 free space: Space intended to avoid contact between ski-boot and binding, especially during step in/step out or release.

3.4 median plane: Middle plane of the sole, longitudinal and perpendicular to the bearing surface.

3.5 bearing surfaces: Front and rear surfaces of the boot sole which are in contact with a plane on which the boot is standing.

3.6 ski-brake: Device to stop the ski after release of the binding.

4 Safety requirements

4.1 Dimensions

Only the dimensions given in this International Standard shall be respected. Other boot dimensions need not correspond to the figures.

Fundamentally, all dimensions shall be within the indicated tolerances. However relevance to safety varies in importance depending on the indicated dimensions.

Looking at several dimensions ("dimensions of the 2nd degree") a deviation from the tolerances can be accepted, provided that the following requirements are respected.

— The deviations shall remain exceptional.

— The deviations shall be small.

— No limitations of function shall arise with all marketable and critical bindings.

— The tolerances shall be respected at the next possible chance (e.g. reconstruction of a tool).

See annex D.

4.2 Design

4.2.1 Sole length

The sole lengths of the two ski-boots in a pair shall not differ by more than 2 mm.

4.2.2 Symmetry

The sole dimensions in the toe and heel interface areas shall be symmetrical about the median plane within an admissible deviation of 1 mm.

4.2.3 Side walls at boot toe

The side walls of the sole at the boot toe, up to a distance of at least 25 mm from the toe end, shall be perpendicular to the bearing surface within an admissible inward deviation of 1 mm.

If the side walls of the sole are built in two parts, it shall be ensured that no part of the lower area of the sole protrudes beyond the upper profile (see annex E).

4.2.4 Side walls at boot heel

The side walls of the sole at the boot heel, up to a distance of at least 70 mm for type A and 50 mm for type C from the heel end, shall be perpendicular to the bearing surface, or tapered inwards between 0° and 10° up to a height of 14 mm.

Between 70 mm and 85 mm for type A and 50 mm and 65 mm for type C, up to a height of 14 mm, no part of the sole shall project beyond the 10° side wall limitation.

If lateral grooves of more than 2 mm depth are incorporated at the heel, supports at least complying with figure 7 shall be present.

4.2.5 Free spaces

4.2.5.1 The boot shall in the front of the boot along the radius 41,5 mm ± 3,5 mm for type A and 35 mm ± 3 mm for type C shall lie outside the free space 1 (see figure 3).

4.2.5.2 Within the free space 2 (see figure 3), the radius 41,5 mm ± 3,5 mm for type A and 35 mm ± 3 mm for C (see figure 1 and figure 2, section A-A) shall be continued as an arc without discontinuity, providing a smooth transition from the radius to the sides of the shaft, between 25 mm and 50 mm for type A, and between 25 mm and 44 mm for type C. This condition is fulfilled when the curvature of the shell within free space 2 remains convex (no flex point) in both longitudinal and vertical planes.

Symmetry is not required.

4.2.5.3 The boot shell at the rear of the boot along the radius 37 mm ± 4 mm for type A and 27 mm ± 3 mm for type C, shall lie outside the free spaces 3 and 4 (see figure 4), available for the ski-binding and for handling boot and binding.

4.2.6 Interfaces

4.2.6.1 At the front interface (see figure 5):

a) no material in the sole shall protrude perpendicular to the vertical surfaces;

b) the coefficient of dynamic friction between boot material and a low-friction element of polytetrafluoroethylene (PTFE) shall be ≤ 0,1;

c) the profile of the shell in the 82° to 90° space can be straight or convex in any vertical plane providing the profile stays within the 82° to 90° limit.

4.2.6.2 On both sides of the boot soles, an interface for the adjustment device pushing rod as shown in figure 5 shall be available.

This area shall be parallel to the median plane and shall lie at the same height on both sides of the sole.

NOTE 1   Bindings for which the release adjustement test can be carried out by applying a lateral force on the surface should be conceived so as not to interfere with the application of this force. This test method is only one among many.

4.2.7 Bevelled areas

A tread pattern is permitted in the front area and the rear bevelled area.

4.2.8 Bearing surface at heel

The bearing surface at the heel shall satisfy the following requirements:

a) It shall be suitable for closing the heel part of the binding.

b) It shall provide a correct fit on the bearing plate of the binding.

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.

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 5355 was prepared by Technical Committee ISO/TC 83, Sports and recreational equipment.

This second edition cancels and replaces the first edition (ISO 5355:1982), as well as ISO 5977:1982, the technical content of which has been incorporated into this edition.

The following changes have been introduced:

— use of the Mondopoint system instead of English, French and American systems;

— use of test bodies for testing the free spaces;

— detailed requirements concerning interfaces and free spaces.

Annexes A, B, C, D and E of this International Standard are for information only.

c) There shall be no hindrance to sideways movement of the sole if the binding releases.

d) There shall be no interference with proper functioning of ski-brakes.

Smaller bearing surfaces are also permissible, for example horseshoe-shaped as in figure 8 and figure 9. The horseshoe may be non-continuous if the requirements of 4.2.8 b) and d) are still met.

4.2.9 Low-friction zone

4.2.9.1 The coefficient of dynamic friction between the low-friction zone of the boot and a low-friction element of polytetrafluoroethylene (PTFE) shall have a maximum value of 0,10 rounded off to two decimal places.

4.2.9.2 No material that would interfere with side-to-side movement of the boot shall protrude below the low-friction zone.

4.2.10 Style of boot shell

In figure 1 and figure 2, sections A-A and B-B, any style of boot shell (exterior surface) is admissible, provided

— it is symmetrical to the median plane;

— in section A-A, the curvature at any point up to a distance of 25 mm min. stays within the limits of 41,5 mm $\pm$ 3,5 mm for type A and 35 mm $\pm$ 3 mm for type C;

— in section B-B, the curvature at any point up to a distance of 26 mm min. for type A and 25 mm min. for type C, stays within the limits of 37 mm $\pm$ 4 mm for type A and 27 mm $\pm$ 3 mm for type C.

4.2.11 Mounting point

The mounting point for positioning the binding on the ski shall be indicated by a line on each side of the lower surface of the boot as close as possible to the ski. This line shall be clearly visible and permanent. It shall not be less than 10 mm in length and shall not be more than 5 mm for type A and 4 mm for type C from the middle of the boot sole length.

5 Testing

If no specific test methods are indicated in 5.1 to 5.3, the characteristics of clause 4 shall be checked as appropriate, e.g. by measurement.

If not otherwise indicated, execute the testing under standard atmosphere 23/50 with ordinary tolerances.

5.1 Free space at boot toe and heel

The free space at the boot toe and heel is tested with the test bodies as shown in annex B.

5.2 Bearing surface at heel

5.2.1 The requirement of 4.2.8 b) shall be tested as follows.

Move a test cylinder of 10 mm diameter and 20 mm length within the peripheral zone of 13 mm for type A and 10 mm for type C (see figure 8 and figure 9). The test shall not reveal a transverse variation in height greater than 1,5 mm in the longitudinal axis of the boot.

5.2.2 The requirement of 4.2.8 d) shall be tested as follows.

Move a test cylinder of 5 mm diameter and of length greater than the breadth of the sole along the longitudinal axis of the boot and a test cylinder of 5 mm diameter and a length of 35 mm in the area between 25 mm and 100 mm for type A and 25 mm and 80 mm for type C from the heel end. The test shall not reveal a variation in height greater than 1,5 mm along this axis.

5.3 Coefficient of friction

The coefficient of dynamic friction is determined by the ratio of the force F_1 necessary to move a low-friction element over the low-friction zone of the boot to the test load F_2 which is applied to the low-friction element.

5.3.1 Low friction zone

5.3.1.1 Test equipment and conditions

The following test equipment and conditions will be required.

a) Six sample boots of at least three different sizes, stored for at least 14 days with the last 12 h of storage before test under standard atmosphere.

b) Low-friction element 100 mm min. wide, 40 mm long, 1 mm min. thickness, and of peeled PTFE with the following characteristics:

   1) density according to ISO 1183, method A, of 2,18 g/cm^3 $\pm$ 3 %;

   2) mean tensile stress, according to ISO/R 527 but with a specimen according to figure 10, equal to or over 28,8 N/mm^2;

3) mean percentage elongation according to ISO/R 527 but with a specimen according to figure 10, equal to or over 300;

4) mean ball-indentation hardness according to ISO 2039-1, method B, equal to or over 22,8 N/mm²;

5) surface profile less than 6 µm.

NOTE 2 The low-friction element may be used for more than 30 measurements until marks of abrasion are visible.

c) Standard atmosphere: 20 °C ± 2 °C, relative humidity 65 % ± 5 %.

d) Test load F_2:

Type A = 500 N ± 5 N

Type C = 300 N ± 5 N

e) Measuring distance: 8 mm.

f) The speed of the relative movement of the boot to the low-friction element shall be 1 mm/s ± 0,2 mm/s.

5.3.1.2 Procedure

Submit the low-friction element to 10 preliminary measurements which are not taken into account for the evaluation.

Clean the low-friction zone of the sample boot using neutral soap and hot water, rubbing with a soft brush. Allow to dry. After cleaning, the low-friction zone shall be free of grease and soap.

Carry out five measurements, the first of which is ignored, on each sample boot. Deformation of the sole greater than 1 mm, which can be avoided by using an appropriate support (see figure 11) is not permitted.

The measurement error for the four significant measurements shall not exceed ± 5 %.

Clean the low-friction element before measuring the next sample boot by rubbing with a clean soft cloth. After cleaning, the low-friction element shall be free of grease.

Determine the coefficient of dynamic friction by taking the mean value of the 24 measurements (6 boots × 4 measurements each).

5.3.2 Front interface area

If the material of the front interface is identical to the material of the low friction zone, no testing is necessary.

If the materials are different, test as follows.

5.3.2.1 Test equipment and conditions

Inject a test specimen in the form of a plate (dimensions greater than or equal to low friction zone) or of a part of the sole with the low friction zone of the diverging material.

5.3.2.2 Procedure

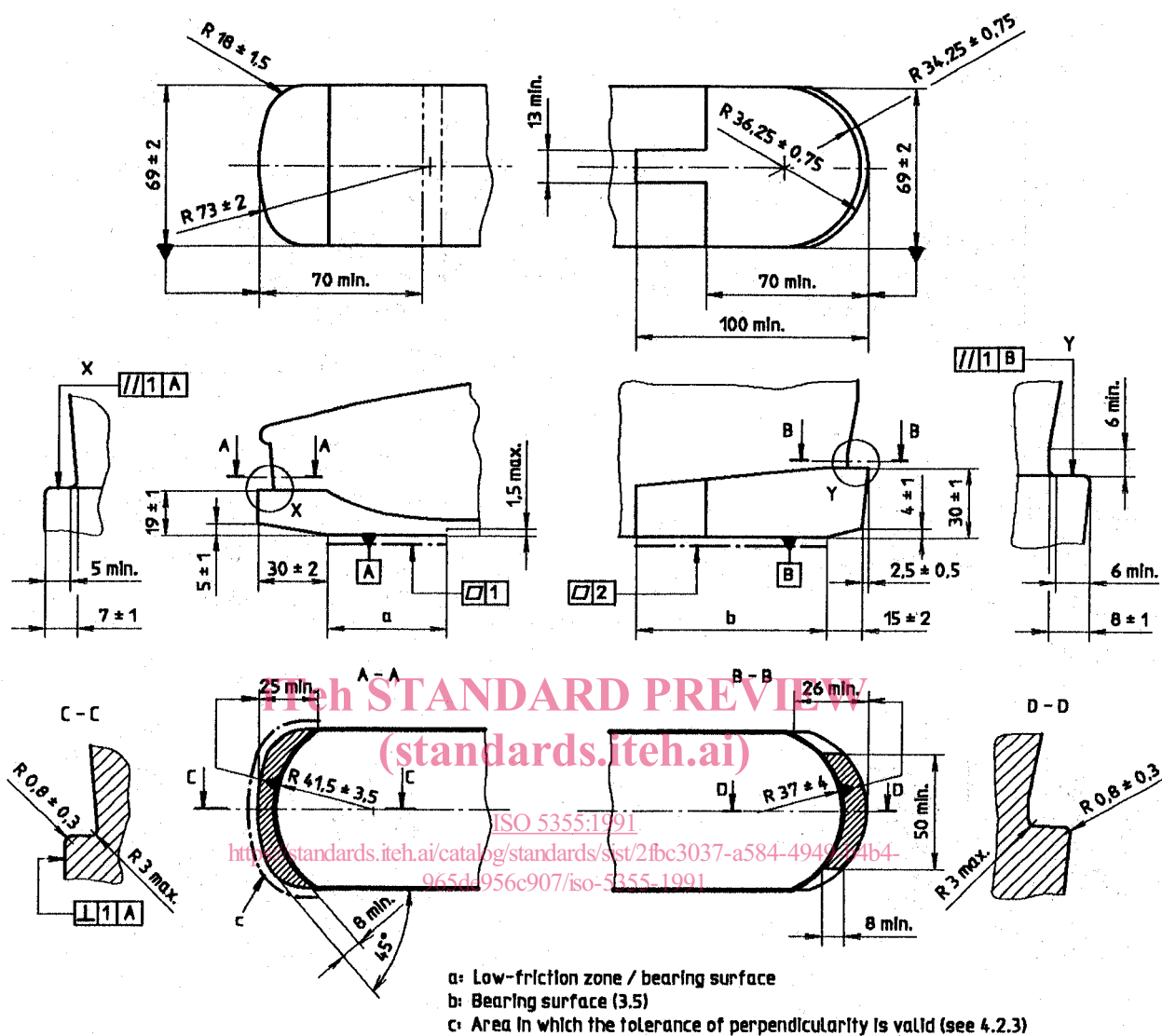Test the coefficient of friction according to 5.3.1.2.

6 Marking

Ski-boots which meet the requirements of this International Standard shall be marked as follows:

a) reference to this International Standard;

b) name or trade-mark of the manufacturer or importer;

c) letter symbol A or C for type of boot beside the mounting point, at least 5 mm high. The letter shall be permanent and easily recognizable.

Dimensions in millimetres

a: Low-friction zone / bearing surface
b: Bearing surface (3.5)
c: Area in which the tolerance of perpendicularity is valid (see 4.2.3)
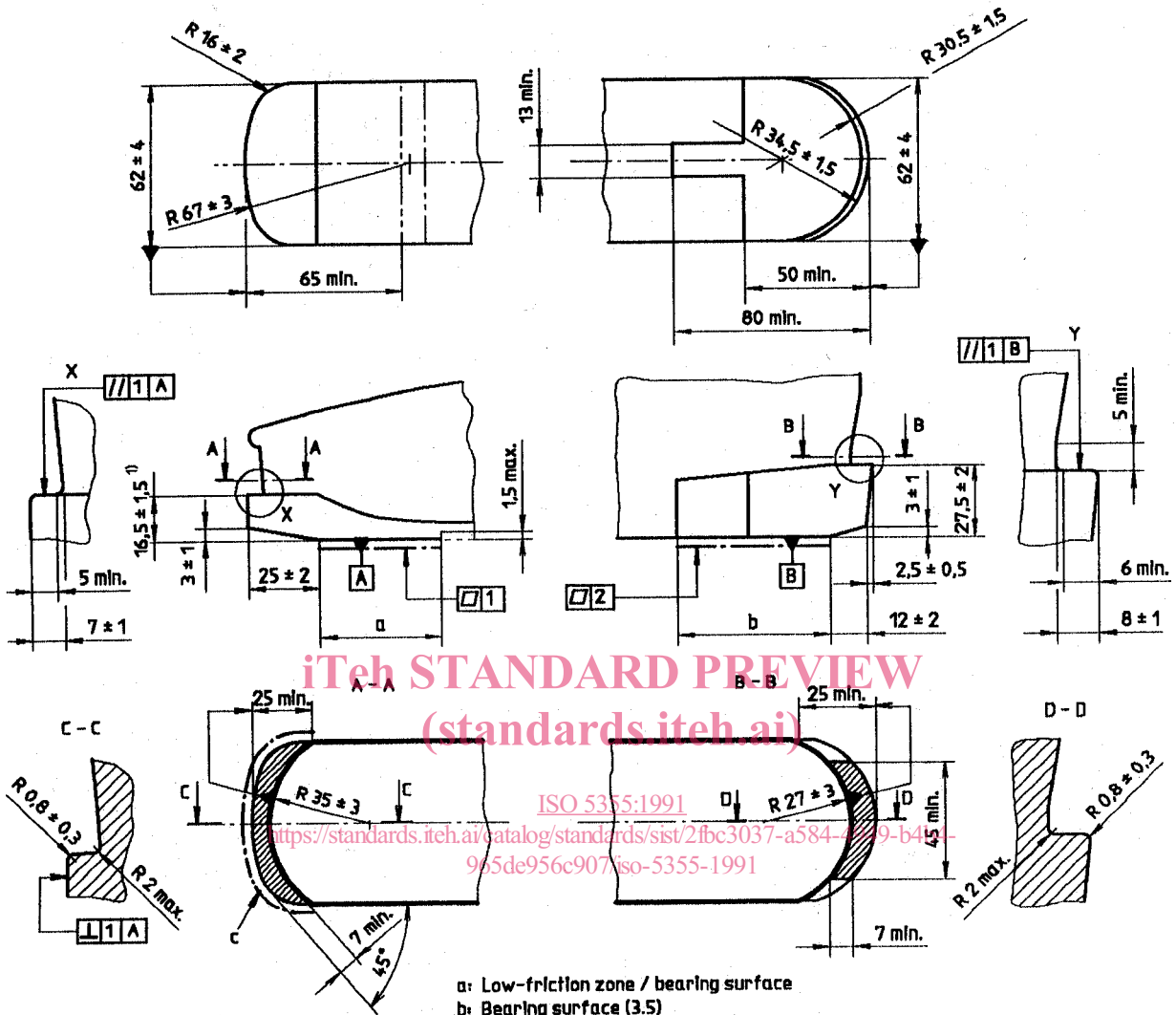
NOTE – Shaded areas are those in which the tolerances of evenness and the dimensions 19 ± 1 and 30 ± 1 are valid.

Figure 1 — Dimensions of boot toe and heel, type A

Dimensions in millimetres

a: Low-friction zone / bearing surface
b: Bearing surface (3.5)
c: Area in which the tolerance of perpendicularity is valid (see 4.2.3)

1) This dimension is valid for a transition period of 5 years.

NOTE — Shaded areas are those in which the tolerances of evenness and the dimensions 16,5 ± 1,5 and 27,5 ± 2 are valid.

Figure 2 — Dimensions of boot toe and heel, type C

Dimensions in millimetres
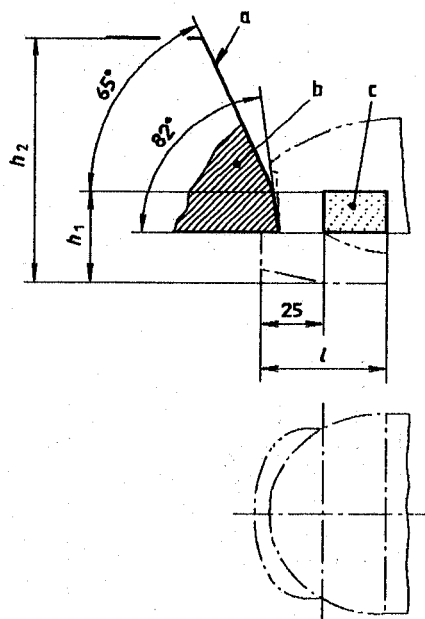
Dimension	Type	
	A min.	C min.
h_1	33	29
h_2	100	80
l	50	44

a: Cone
b: Free space 1 (see 4.2.5.1)
c: Free space 2 (see 4.2.5.2)

Figure 3 — Free spaces at boot toe