INTERNATIONAL STANDARD

ISO 9523

Fifth edition
2023-12

Touring ski-boots for adults — Interface with touring ski-bindings — Requirements and test methods

Chaussures de ski de randonnée pour adultes — Zone de contact avec les fixations de skis de randonnée — Exigences et méthodes d'essai

Reference number
ISO 9523:2023(E)

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Published in Switzerland

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Foreword

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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 document 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).

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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*, Subcommittee SC 4, *Snowsports Equipment*.

This fifth edition cancels and replaces the fourth edition (ISO 9523:2019), which has been technically revised.

The main changes are as follows:

— the procedure of testing the coefficient of dynamic friction was modified (4.3.6.1.3);

— the requirements on front interface and rear interface were modified;

— the requirements on contact zone for adjustment device of touring sole were modified.

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.

Touring ski-boots for adults — Interface with touring ski-bindings — Requirements and test methods

1 Scope

This document specifies the dimensions and characteristics of the interface, requirements, test methods and marking of ski-boots with a rigid ski boot sole that are used with current systems of touring 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.

This document is not necessarily applicable to touring ski boots that function independent of the sole shape with certain ski-binding systems.

This document is applicable to ski-boots of sizes 15,0 and larger in the Mondopoint system (see Annex A).

It is applicable to rigid touring boots. Boots with softer shells such as Telemark boots are excluded as they do not have the necessary shell stability to act as part of the release systems.

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 527-1, *Plastics — Determination of tensile properties — Part 1: General principles*

ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

ISO 1183 (all parts), *Plastics — Methods for determining the density of non-cellular plastics*

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

ISO 5355, *Alpine ski-boots — Requirements and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 5355 and the following apply.

ISO and IEC maintain terminology 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
interface area
part of the ski-boot intended to contact with the ski-binding

3.2
front interface
part of the ski-boot intended to contact with the front binding

3.3
rear interface
part of the ski-boot intended to contact with the rear binding

3.4
free space
space intended to avoid contact between ski-boots and binding, especially during step in/step out or release

3.5
rigid ski boot sole
ski boot sole that does not flex when walking

Note 1 to entry: See 4.3.5.1.

3.6
median plane
middle plane of the sole, longitudinal and perpendicular to the bearing surface

3.7
bearing surface
toe or heel surface of the boot sole that is in contact with a plane on which the boot is standing

3.8
ski-brake
device to stop the ski after release of the binding

4 Requirements and test methods

4.1 General

If no specific test methods are indicated, check the characteristics as appropriate (e.g. by measurement).

If not otherwise indicated, execute the testing under standard atmosphere 23/50, in accordance with ISO 554, with ordinary tolerances.

4.2 Dimensions

The dimensions of the boot toe and heel shall correspond to Figure 1.

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

Looking at several dimensions (see Annex B), deviations may be accepted, provided that the following specifications are respected:

a) deviations remain exceptional;

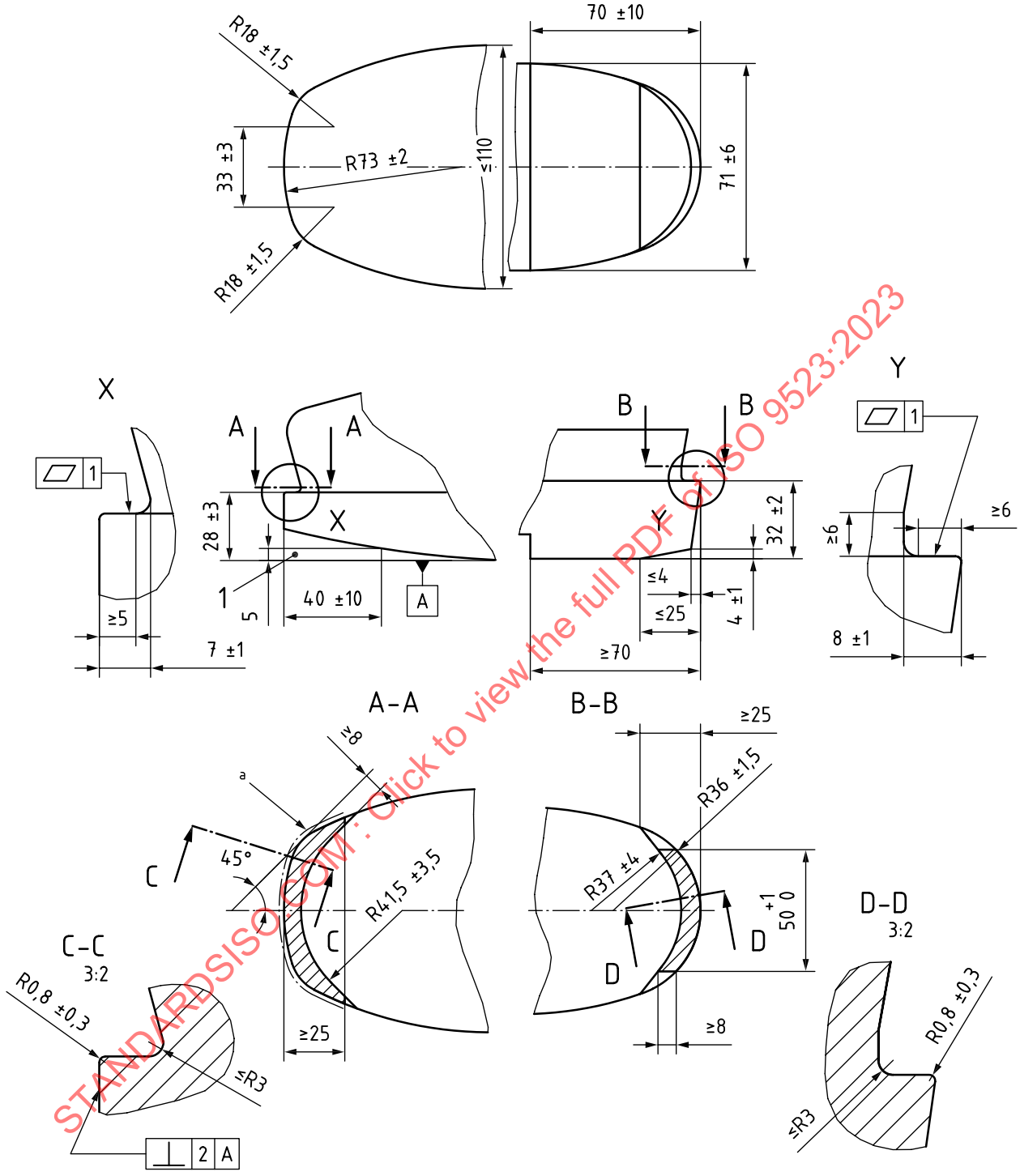
b) deviations are small;

c) no limitations of function arise with all marketable and critical bindings;

d) tolerance is respected at the next possible chance (e.g. reconstruction of a tool).

The gauge (see Figure 1) shall be wider than the boot sole.

Dimensions in millimetres



Key

1 gauge

[a] Area where perpendicularity tolerance is valid.

NOTE Shaded areas are those in which the tolerance of evenness and the dimensions 28 mm ± 3 mm and 32 mm ± 2 mm are valid.

Figure 1 — Dimensions of boot toe and heel

4.3 Design

4.3.1 Sole length

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

4.3.2 Boot sole interface

The sole dimensions in the toe and heel boot binding interface areas shall be symmetrical about the median plane within an admissible 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.

The design of the toe and heel boot binding interface areas shall not negatively influence the function of the binding.

4.3.3 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-outward deviation as shown in Figure 1, section C-C.

Cut outs with an outside diameter of not more than 5,5 mm with a centre in 14 mm ± 1 mm from the tip and 6,5 mm ± 1,5 mm from the top surface are allowed (see Figure 2).

Around the hole, material different from the shell material may be used.

Dimensions in millimetres

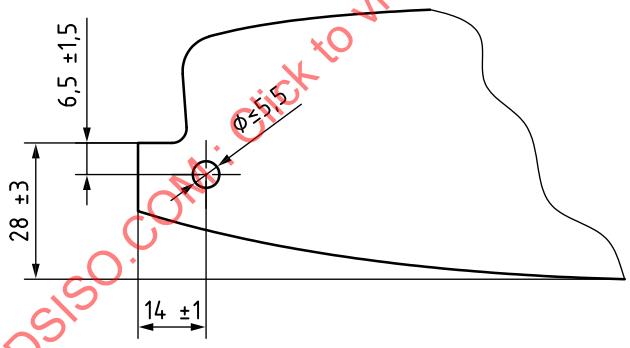


Figure 2 — Boot with the position and dimensions of an example for cut outs allowed in the toe area

4.3.4 Side walls at boot heel

The lateral side walls of the sole at the boot heel up to a distance of at least 70 mm from the heel end shall be perpendicular to the bearing surface or tapered inwards-outwards between 0° and 10° up to a height of 14 mm.

If lateral grooves of more than 2 mm depth are present at the heel (see Figure 3), supports conforming with Figure 4 shall remain.

Other configurations of grooves may be used if they are within the given dimensions in Figure 3, Figure 4 and Figure 5.

Dimensions in millimetres

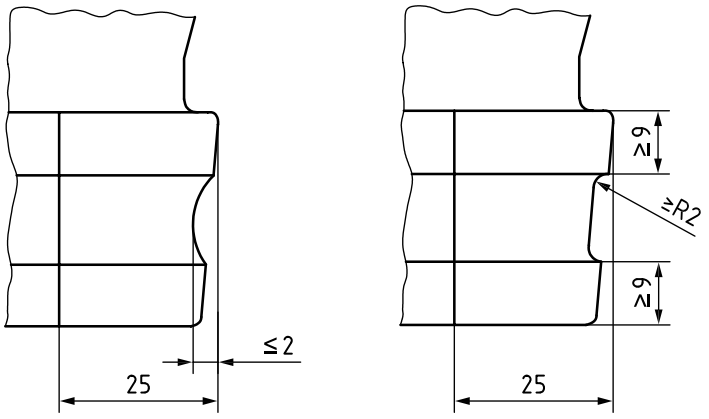


Figure 3 — Lateral grooves at heel

Dimensions in millimetres

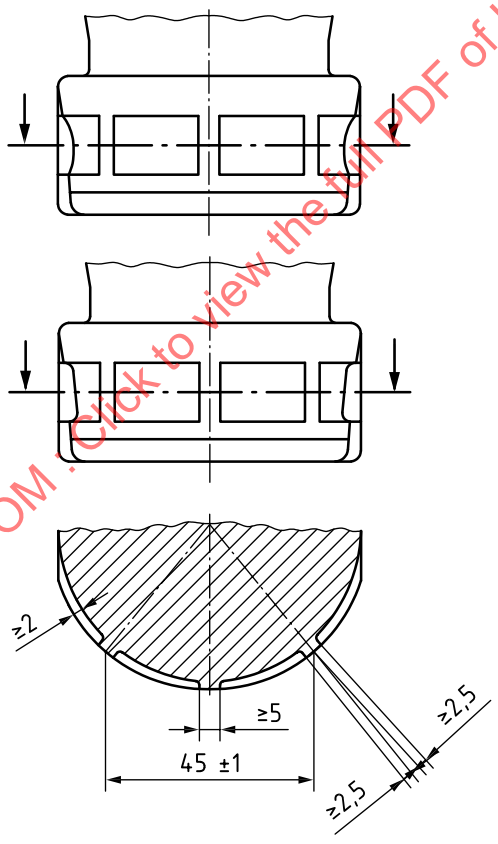
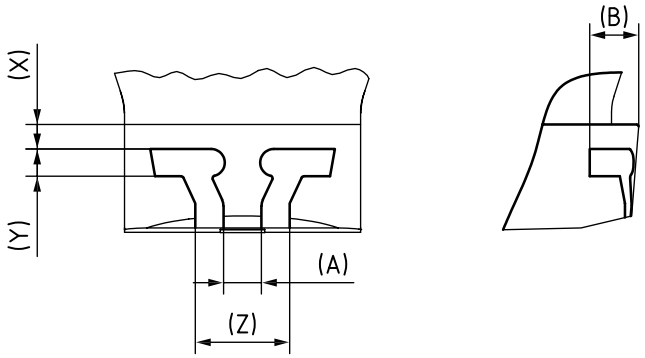


Figure 4 — Lateral supports at heel

Dimensions in millimetres



Key

(A) 12,8 mm 0/−1
(B) 13 mm 0/+2
(X) ≥ 6,5 mm (reinforced by metal)
(Y) (7,5 ± 0,5) mm
(Z) (25,5 +6/−0) mm

Figure 5 — Boot with the position and dimensions of an example for cut outs allowed in the heel area

The design of the cut out at the heel area of the boot shall not negatively influence the function of the binding.

4.3.5 Rigidity

4.3.5.1 Requirements

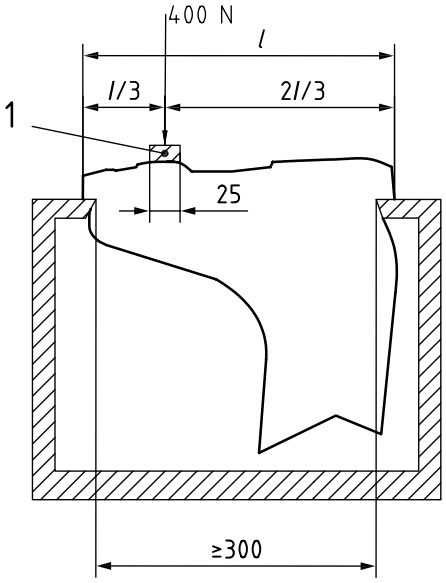
When measured in accordance with 4.3.5.2, the sole shall not deflex more than 5 mm.

NOTE This is to avoid any contact point outside the frontal zone and the boot sole interface area (see Figure 7) in order to ensure proper lateral release function.

4.3.5.2 Test method

The rigid metal test bar (width 25 mm) shall cover the whole width of the sole (see Figure 6).

Dimensions in millimetres



Key

1 rigid metal test bar

l length of sole

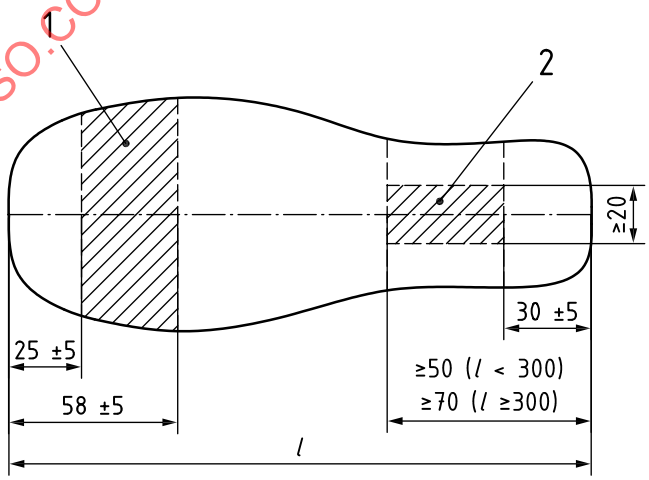
Figure 6 — Testing of rigidity

4.3.6 Boot sole interface areas with the binding

The boot sole interface areas shall conform to Figure 7.

There shall be no gaps >10 mm between two studs in any direction in the toe interface area and heel interface area (see Figure 7).

Dimensions in millimetres



Key

1 front interface

2 rear interface

l length of sole

Figure 7 — Interface areas

Table 1 — Boot sole interface area with the binding

Interface area	Area in contact with the bearing surface of the binding %
toe	> 25
heel	> 40

The rubber material for the interface areas shall have Shore A hardness of at least 65 and coefficient of dynamic friction of < 0,2.

Testing of Shore A hardness shall be in accordance with ISO 868.

Testing of the coefficient of dynamic friction shall be in accordance with 4.3.6.1.

4.3.6.1 Test method

4.3.6.1.1 Principle

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

4.3.6.1.2 Test equipment and conditions

The following test equipment and conditions shall be required.

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

b) Low-friction element, minimum of 100 mm wide, 40 mm long, minimum of 1 mm thick of peeled polytetrafluoroethylene (PTFE) with the following characteristics:

   1) density, in accordance with the ISO 1183 series: 2,16 g/cm^3 ± 0,02 g/cm^3;

   2) strength, in accordance with ISO 527-1 and ISO 527-2: ≥24 MPa;

   3) strain at break, in accordance with ISO 527-1 and ISO 527-2: ≥250 %;

   4) mean ball-indentation hardness, in accordance with ISO 2039-1: 26 N/mm^2 ± 4 N/mm^2.

The low-friction element can be used until marks of abrasion are visible.

c) Standard atmosphere: 23 °C/50 % relative humidity or 20 °C/65 % relative humidity.

d) Test load F_2: 500 N ± 5 N.

e) Measuring distance: 8 mm.

f) Relative speed of the boot to the low-friction element 1 mm/s ± 0,2 mm/s.

4.3.6.1.3 Procedure

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

Clean the interface area of the sample boot using neutral soap and hot water, rubbing with a soft brush.

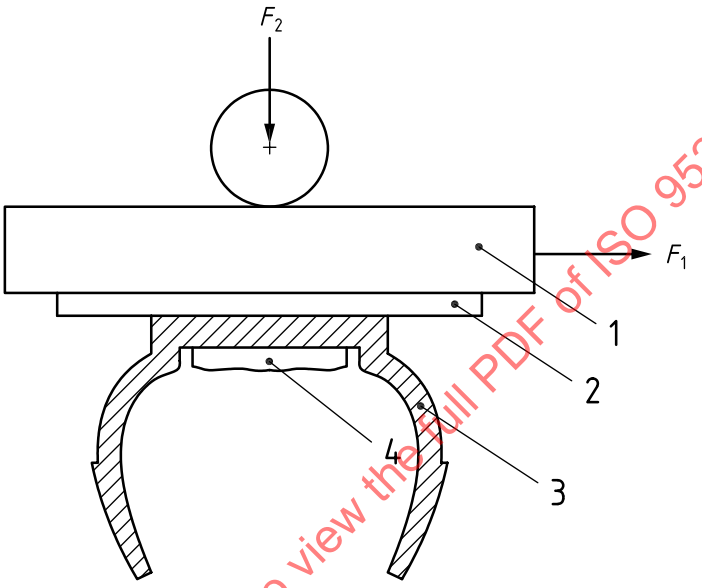
Allow to dry. After cleaning, the interface area shall be free from grease and soap.

Carry out 10 measurements on one of the sample boots for each size. Out of the 10 measurements, the first five shall be ignored. Deformation of the sole greater than 1 mm, which can be avoided by using an appropriate support (see Figure 8) 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 from grease.

Determine the coefficient of dynamic friction by taking the mean value of 15 measurements (3 boots x 5 measurements each).



Key

1 low-friction element support
2 low-friction element
3 sample boot
4 support to prevent boot deformation
F_1 measuring force
F_2 test load

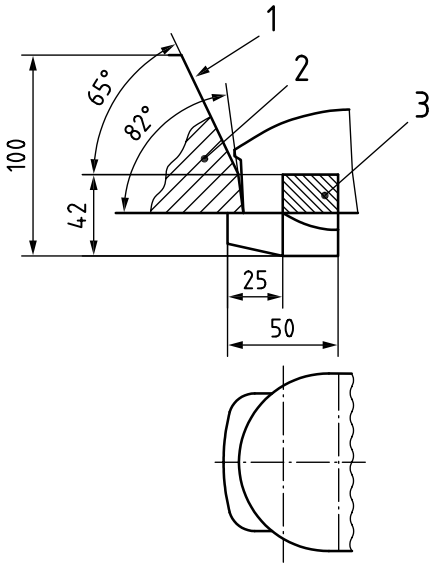
Figure 8 — Coefficient of dynamic friction test

4.3.7 Free spaces

4.3.7.1 Requirements

4.3.7.1.1 The boot shell in the toe of the boot along the arcs with radius of 41,5 mm ± 3,5 mm (see Figure 1, section A-A) shall lie outside the free space 1 (see Figure 9).

Dimensions in millimetres



Key

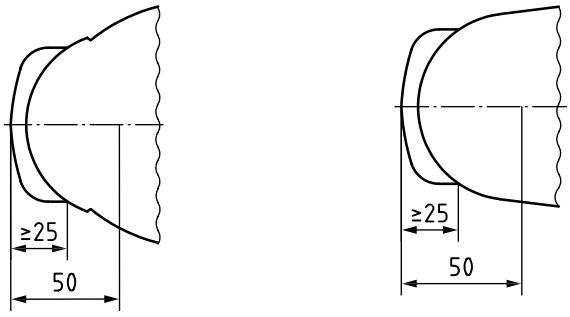
1 cone
2 free space 1
3 free space 2

Figure 9 — Free space at boot toe

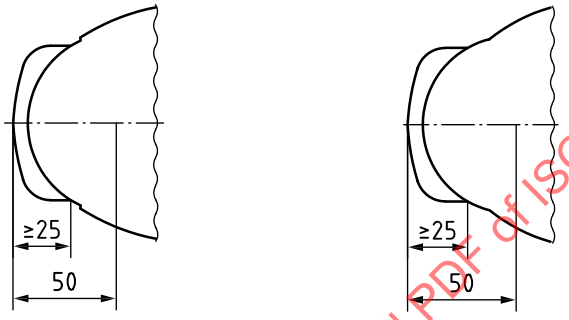
4.3.7.1.2 Within free space 2 (see Figure 10), the arcs with radius of 41,5 mm ± 3,5 mm (see Figure 1, section A-A) shall be continued as an arc without discontinuity, providing a smooth transition to the sides of the shaft, between 25 mm and 50 mm. This condition is fulfilled when the curvature of the shell within free space 2 remains convex (according to Figure 10) in both longitudinal and vertical planes.

Symmetry is not required.

Dimensions in millimetres



a) Acceptable

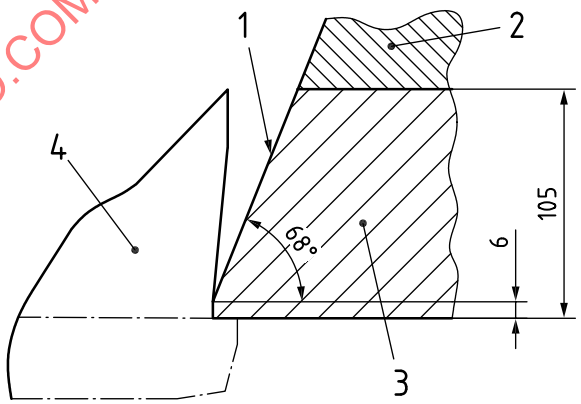


b) Not acceptable

Figure 10 — Examples of curvature of the shaft in free space 2

4.3.7.1.3 The boot shell at the heel of the boot along the arcs with radius of 37 mm ± 4 mm (see Figure 1, section B-B) shall lie outside free space 3 and free space 4 (see Figure 11), available for the ski-binding and for handling the boot and binding.

Dimensions in millimetres



Key

1 cone
2 free space 3 (free space for handling boot and binding)
3 free space 4 (free space for ski-binding)
4 sample boot

NOTE The width of the free space 3 and free space 4 is 50 mm (see Figure 13).

Figure 11 — Free space and heel interface for ski-binding at boot heel

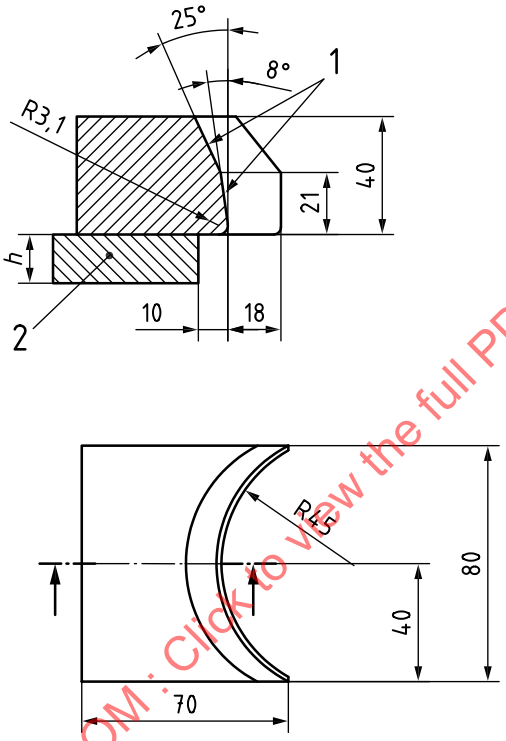
4.3.7.2 Test methods

4.3.7.2.1 Measuring free space at boot toe

Place the boot with its front part on a measuring plane. Use a supporting block to adapt exactly to the toe sole height (28 mm ± 3 mm) of the boot. Then, set the test body (see Figure 12) on a supporting block.

Check whether the sole height exceeds the maximum value of 28 mm ± 3 mm and whether the requirements for free space for the binding are met.

Dimensions in millimetres



Key

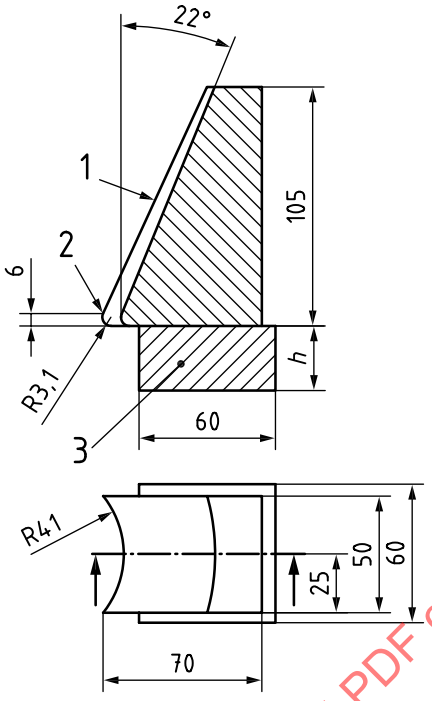
1 concentric cones
2 supporting blocks
h 25 mm < *h* < 31 mm

Figure 12 — Test body for the free space at boot toe

4.3.7.2.2 Measuring free space at heel of boot

Place the boot with its rear part on the measuring plane. Use a supporting block to adapt exactly to the heel sole height (32 mm ± 2 mm) of the boot. Then, set the test body (see Figure 13) on a supporting block. Check whether the sole height exceeds the maximum value of 32 mm ± 2 mm and whether the requirements for free space for the binding are met.

Dimensions in millimetres



Key

1 cones (concentric with the cylinder)
2 cylinder
3 supporting blocks
h 30 mm < *h* < 34 mm

Figure 13 — Test body for the free space at heel of boot

4.3.8 Toe and heel boot/binding interface areas

4.3.8.1 Material

4.3.8.1.1 Hardness

The hardness of the material at the toe and heel boot/binding interfaces (see shaded areas in Figure 14 and Figure 15) shall be not less than Shore D hardness 50, measured at a temperature of (23 ± 2) °C.

This is not applicable for the bearing surfaces.

Testing shall be in accordance with ISO 868.

4.3.8.1.2 Antifriction – requirements and test method

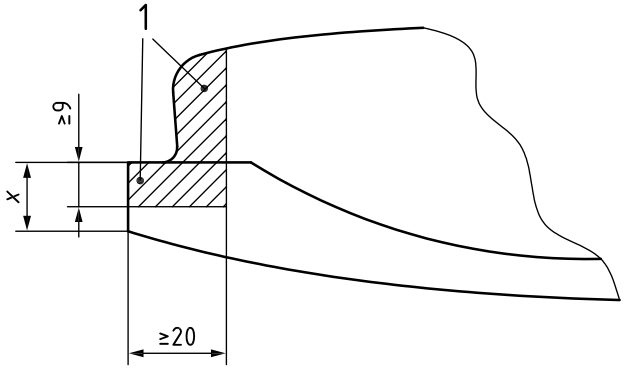
a) Requirements

The coefficient of dynamic friction at the toe (see shaded area in Figure 14) and heel binding interfaces (see shaded area in Figure 15) between the boot material and a low friction element of PTFE shall be ≤ 0,1. Test in accordance with 4.3.8.1.2 b).

b) Test method

Inject a test specimen in the form of a plate (dimensions greater than or equal to those of the interface area) with the boot material of the toe and the heel interface. Test the coefficient of friction in accordance with 4.3.6.1 and Figure 8.

Dimensions in millimetres



Key

1 boot/binding toe interface

x boot sole interface including rubber

Figure 14 — Front interface

4.3.8.2 Front interface

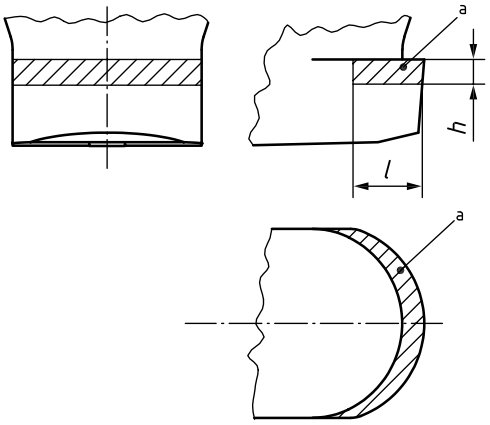
At the front interface (see Figure 14):

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

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

4.3.8.3 Rear interface

The rear interface is given in Figure 15.



Key

[a] Rear interface.

Dimension	without metal reinforcement	with metal reinforcement, according to Figure 5
h	≥ 9 mm	≥ 6,5 mm
l	≥ 26 mm	≥ 26 mm

Figure 15 — Rear interface

4.3.8.4 Contact zone for the adjustment device of touring sole

4.3.8.4.1 Front interface

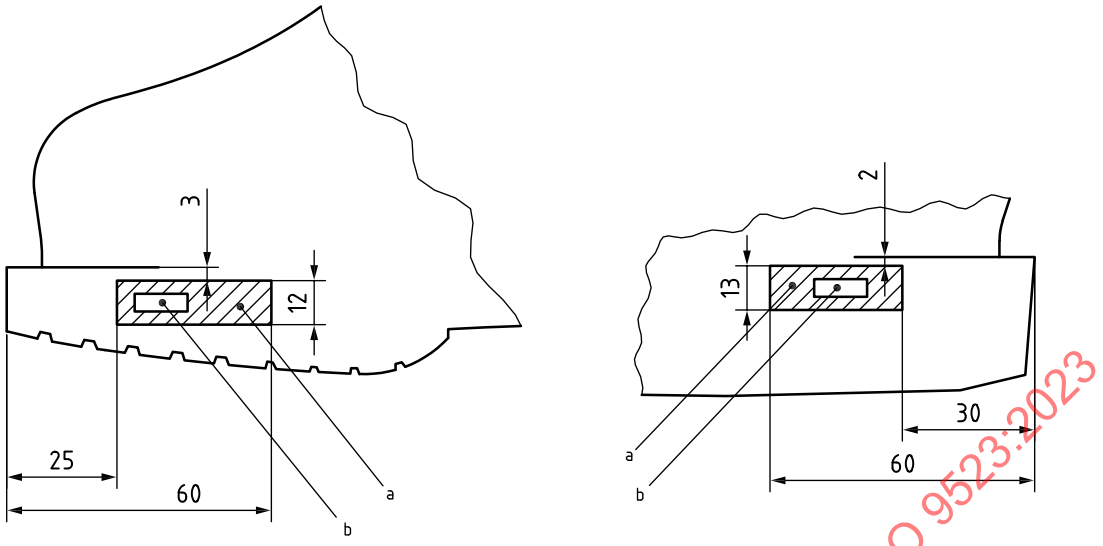
On both sides of the boot soles, a contact area of 12 mm x 4 mm for the adjustment device pushing rod shall be available inside the boundaries specified in Figure 16. The contact area shall lie at the same height on both sides of the front part of the sole.

4.3.8.4.2 Rear interface

On both sides of the boot soles, a contact area of 12 mm x 4 mm for the adjustment device pushing rod shall be available inside the boundaries defined in Figure 16. The contact area shall lie at the same height on both sides of the rear part of the sole.

The shaded areas in Figure 16 shall correspond with the outer shell of the ski boot but shall not contain any edges nor contain any protruding areas.

Dimensions in millimetres



a Contact zone.

b Pushing rod.

Figure 16 — Contact zone for the adjustment device pushing rod

4.3.9 Bevelled areas

A tread pattern is permitted in the heel bevelled area (see Figure 1).

4.3.10 Bearing surface at heel

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

a) there shall be at least a bearing surface of 40 % in the shaded area specified as heel in Table 1;

b) it shall be suitable for closing the heel part and shall allow longitudinal travel of the binding;

c) it shall provide a correct fit on the bearing plate of the binding;

d) there shall be no hindrance to sideways movement of the sole if the binding releases;

e) there shall be no interference with proper functioning of ski-brakes.

4.3.11 Bearing surface at toe

In the shaded area specified as toe in Table 1, there shall be at least a bearing surface of 25 %.

4.3.12 Style of boot shell

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

a) it is symmetrical to the median plane,

b) in section A-A, the curvature at any point up to a distance of 25 mm minimum stays within the limits of 41,5 mm ± 3,5 mm, and

c) in section B-B, the curvature at any point up to a distance of 25 mm minimum stays within the limits of 37 mm ± 4 mm.