SLOVENSKI STANDARD
SIST ISO 9465:1995

01-december-1995

Varnostne vezi za alpske smuči - Bočno odpiranje pri udarni obremenitvi - Preskusna metoda

Alpine ski-bindings -- Lateral release under impact loading -- Test method

Fixations de skis alpins -- Déclenchement latéral sous choc -- Méthode d'essai

Ta slovenski standard je istoveten z: **ISO 9465:1991**

ICS:

97.220.20 Oprema za zimske športe Winter sports equipment

SIST ISO 9465:1995 **en**

INTERNATIONAL STANDARD

ISO 9465

First edition
1991-11-15

Alpine ski-bindings — Lateral release under impact loading — Test method

Fixations de skis alpins — Déclenchement latéral sous choc — Méthode d'essai

Reference number
ISO 9465:1991(E)

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 9465 was prepared by Technical Committee ISO/TC 83, *Sports and recreational equipment*, Sub-Committee SC 3, *Ski bindings*.

Annex A of this International Standard is for information only.

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

This International Standard is one of a series dealing with the safety of ski-bindings. The other current International Standards are ISO 8061 and ISO 9462.

National standards, complying with legal regulations, may be more extensive, for instance covering combined loading and ski deflexion. Concerning these aspects International Standards are being prepared. To verify the safety of ski-bindings it is necessary to use all International Standards of the series and additionally the national standards covering those aspects which are not yet standardized internationally.

The release and retention functions of ski-bindings are multifaceted and complex. The functions involve combinations of static and dynamic loading in varied release directions of the boot relative to the ski. This impulsive test method evaluates an important ski-binding function, but it should not be interpreted as conclusively evaluating the binding impulse release behaviour in general. The test evaluates the release and retention function of the binding in a single mode of binding release; other static and dynamic retention and release tests are not excluded by this standard test.

This page intentionally left blank

Alpine ski-bindings — Lateral release under impact loading — Test method

1 Scope

This International Standard defines an impact test for establishing the maximum impulse for retention of a test ski on the test sole in the lateral direction.

The test provides a measure of the release and retention boundary for lateral release of a ski-binding for adults (type A according to ISO 9462) at a particular ski-binding setting.

The test method is designed to simulate the lateral impulsive loading during skiing located at the front part of the ski. The test permits the evaluation of a ski-binding's release and retention properties under expected loading rates. The test permits comparison of the release caused by lateral impulse to the ski for different binding system designs.

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 9462:1988, *Alpine ski-bindings — Safety requirements and test methods.*

ISO 9838:1991, *Alpine ski-bindings — Test soles for ski-binding tests.*

3 Definitions

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

3.1 contact material: Material interface between the pendulum contact tip and the side wall of the test ski. The contact material specification in conjunction with the pendulum release angle determines the duration and the magnitude of the impulse force during the impact test.

3.2 impact force: Force, the duration of application of which is short compared with the time of the ski binding-pendulum system to respond.

3.3 impulse: Product of mass (m) and variation of speed (Δv) of the impact-parts. According to Newton's second law of motion, we have

$$m \cdot \Delta v = F \cdot \Delta t$$

where

F is the force;

Δt is the time variation.

3.4 test ski: Aluminium, U-shaped channel. The tip and the tail of the test ski refer to the extreme points along the length of the channel in front of and behind the ski-binding that is mounted on the channel.

3.5 test sole: Sole in accordance with ISO 9838, backed by a steel plate.

3.6 goniometer: Instrument used to measure the angle of the pendulum shaft relative to the vertical equilibrium axis at the pendulum bearing.

3.7 pendulum shaft: Long, circular cylinder connecting the pendulum block to the pendulum bearing.

3.8 contact tip: Steel hemispherical tip on the pendulum bearing.

3.9 pendulum block: Rigid mass on the free end of the pendulum shaft, upon which the contact tip is rigidly mounted.

3.10 impact location: Point on the test ski side wall where the impact occurs.

3.11 binding release: If, upon carrying out an impact test,

a) the test ski either separates completely from the test boot, or

b) the test ski is offset from the boot toe by 5 mm or more and no visible recentring of the test ski on the test boot is observed for a period of up to 10 s,

the binding is defined as having released the test ski from the test boot.

3.12 pendulum tower: Structure supporting the pendulum bearing, shaft and block.

3.13 pendulum release angle: Angle between the pendulum shaft and the vertical when the pendulum shaft is released from the rest.

3.14 pendulum bearing: Bearing mounted on the pendulum tower and supporting the pendulum shaft.

3.15 sole support: Structure required to hold and position the test sole rigidly.

3.16 pendulum rebound angle: Maximum angle between the pendulum shaft and the vertical, following impact of the contact tip and contact material during a test.

3.17 percentage rebound: The impact resilience of the contact material is determined from the percentage rebound, R:

$$R = \frac{[1 - \cos(\theta_{reb})]}{[1 - \cos(\theta_{rel})]} \times 100$$

where

θ_{reb} is the pendulum rebound angle;

θ_{rel} is the pendulum release angle.

4 Test method

4.1 Principle

The ski-binding is mounted on a standard test ski. The ski release binding is adjusted for a static release according to ISO 9462. The release setting is recorded.

The test ski is mounted on the test sole. The sole is rigidly fixed during testing.

The contact material between the test ski and the pendulum impact is as specified in 4.2.7.

The standard pendulum applies impulsive loading to the test ski at the lowest point of the pendulum arc.

The pendulum pivot friction and the contact material are evaluated according to 4.2.6.2 and 4.2.7.3 prior to and following the test of ski release bindings. Records of the evaluations are maintained.

The pendulum release angle is decreased from a value sufficient to guarantee release of the binding following a single impact of the test ski until the maximum angle for which retention of the binding is obtained. The release angle causing the ski-binding to release at the release-retention boundary is recorded.

4.2 Apparatus

4.2.1 Test ski

The test ski is a U-shaped channel section of aluminium with the following dimensions:

length 500 mm ± 2 mm,

width 62 mm ± 2 mm,

height 35 mm ± 5 mm,

wall thickness 3,6 mm ± 0,6 mm.

The toe of the boot sole shall be located 75 mm ± 1 mm from the tip of the test ski. The mass of the test ski shall be 610 g ± 150 g.

4.2.2 Test sole

The test sole shall conform to ISO 9838 except when the binding manufacturer specifies modifications for the sole design. The test sole is backed by a steel plate 216 mm ± 4 mm × 57 mm ± 3 mm × 10 mm ± 1 mm. The test sole is bolted to the plate which is used for rigidly holding the test sole to the boot support.

4.2.3 Pendulum tower

4.2.3.1 The pendulum tower shall be sufficiently rigid that it does not influence the impact response of the test ski. The smallest characteristic frequency of the tower in transverse bending should be greater than or equal to 100 Hz.

4.2.3.2 One configuration for the tower consists of a structure of four steel plates welded into the form of a hollow, square cylinder with external square cross-section dimensions 254 mm ± 2 mm × 254 mm ± 2 mm and length 1 220 mm ± 2 mm. The plate thickness is 9,5 mm ± 0,5 mm. An additional steel plate of dimensions 330 mm ± 2 mm × 330 mm ± 2 mm × 25 mm ± 1 mm is welded to the bottom of

the cylinder, and a plate of dimensions 305 mm ± 2 mm × 381 mm ± 2 mm × 13 mm ± 0,5 mm is welded to the top. The latter two plate surfaces are approximately parallel and perpendicular to the long axis of the cylinder. The base plate is drilled to allow bolting the tower rigidly to a concrete foundation at four or more places. The top plate forms a nearly rigid foundation for the pendulum bearing system.

4.2.3.3 The pendulum bearing base shall allow adjustment of the pendulum height and position by movement of the pendulum bearing in the plane of the pendulum motion. Adjustment of height is required to guarantee proper impact of the contact tip with the impact location for bindings of different height. Adjustment of the horizontal position is required to guarantee that impact occurs at the bottom of the pendulum arc.

4.2.4 Pendulum shaft

4.2.4.1 The pendulum shaft is a circular steel cylinder of mass 2,3 kg ± 0,1 kg. The shaft is 1 000 mm ± 2 mm long with outer diameter 40 mm ± 0,1 mm and inner diameter 35 mm ± 0,1 mm. The shaft is mounted in the pendulum bearing so that it swings in a single vertical plane normal to the test ski.

4.2.4.2 The fundamental natural frequency of the pendulum shaft, block and bearing system in bending is approximately 10 Hz.

4.2.4.3 The pendulum shaft is rigidly secured to the pendulum block on the end of the shaft furthest from the pendulum bearing. The pendulum block mass is 3 kg ± 0,1 kg. The contact tip has a hardness of 45 HRC and diameter of 10 mm ± 0,5 mm and is rigidly fixed to the pendulum block.

4.2.4.4 The length from the centre of the pendulum bearing to the point of impact on the contact tip is 1 025 mm ± 5 mm.

4.2.5 Test sole support

4.2.5.1 The test sole support holds the test sole rigidly.

4.2.5.2 The support structure is constructed of heavy, steel plate and it is mounted in a concrete foundation to maintain rigidity during impact.

4.2.5.3 The support adjustment allows movement of the test sole longitudinally for positioning the impact location relative to the contact tip.

4.2.6 Pendulum bearing

4.2.6.1 A roller bearing of inner race diameter at least 12 mm ± 0,5 mm diameter supports the pendulum shaft on the pendulum tower.

4.2.6.2 The pendulum bearing function is evaluated by a free oscillation test of the complete pendulum tower, shaft and block systems. No test ski or boot is involved. The pendulum is released from rest at a pendulum release angle of 12° ± 0,5°. The pendulum shall move through at least 60 complete oscillations before coming to rest at the vertical equilibrium. The number of oscillations is recorded.

4.2.7 Contact material specification

4.2.7.1 The contact material is chosen to produce a loading separation time from 20 ms to 100 ms at the toe of the test sole which is similar to those measured during skiing.

4.2.7.2 The contact material shall be neoprene with Type A durometer hardness from 60 to 65 and dimensions 20 mm ± 0,2 mm × 20 mm ± 0,2 mm × 7 mm ± 1 mm at 23 °C. Contact materials constructed of metal, wood, acrylic plastic and other hard materials are specifically excluded as well as contact materials from very soft materials giving long loading durations or large dissipation of energy.

4.2.7.3 The contact material shall be qualified for application through a resiliency test using the percentage rebound R defined in 3.17. The qualification test requires that the average percentage rebound shall lie between 34 % and 39 % (6,6° ± 0,2°) for a pendulum release angle of 11° ± 0,2° during impact of the contact material mounted on the material test fixture. The average percentage rebound is the average of three R values measured in consecutive tests. Variations in R of 5 % or more from the mean value in a single test indicate a defective test procedure or contact material. Such a test cannot be used to qualify the contact material. The pendulum shaft, block and bearing system used during the impact test is also used for qualification of the contact material.

4.2.7.4 The contact material shall qualify before and after each test series. All qualification tests shall be recorded. Where the contact material fails to qualify following a test series, all tests of the series shall be discarded.

4.2.7.5 The centre of the contact material square surface is positioned at the impact location, which is 10 mm ± 1 mm from the ski tip.