
**Winter-sports equipment — Test devices
for the setting of the functional unit
ski/boot/binding — Requirements and tests**

*Matériel de sports d'hiver — Dispositifs d'essai pour le réglage de l'unité
fonctionnelle ski/chaussure/fixation — Exigences et essais*

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ISO 11110:1997

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Foreword

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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 11110 was prepared by Technical Committee ISO/TC 83, *Sports and recreational equipment*, Subcommittee SC 3, *Ski bindings*.

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Printed in Switzerland

Winter-sports equipment — Test devices for the setting of the functional unit ski/boot/binding — Requirements and tests

1 Scope

This International Standard specifies the tests and requirements for devices used to determine the release moments of ski-bindings in retail sales, rental and other facilities.

It specifies requirements for the design accuracy, operation, maintenance and calibration of the test devices used for determining binding release settings.

For other requirements, see appropriate standards (e.g. standards on electronic measuring devices, safety of electrical apparatus, etc.).

This International Standard is to be used in conjunction with ISO 9462 and ISO 8061.

2 Normative references

The following standards contain provisions which, through references 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 554 : 1976, *Standard atmospheres for conditioning and/or testing – Specifications*

ISO 8061 : 1991, *Alpine ski-bindings – Selection of release torque values*

ISO 9462 : 1993, *Alpine ski-bindings – Safety requirements and test methods*

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

3 Requirements

3.1 General requirements

3.1.1 Design

3.1.1.1 Setting devices shall be capable of determining the actual release moments of common ski-bindings on the market. They are designed for practical use by retail, rental and other facilities.

3.1.1.2 The device shall be capable of completely releasing the boot from the binding.

3.1.1.3 It shall be possible to apply the release load smoothly and without interruption until the maximum release moment has been reached.

The release shall be quasi-static such that the total time required shall not be more than 5 s nor less than 2 s.

The speed at the boot toe or heel shall never exceed 20 mm/s, from the beginning of the release process up to the time when the maximum release value is reached.

3.1.1.4 The device shall be capable of indicating the peak release moment after the test is over.

3.1.1.5 It shall be possible to observe the boot and the binding at all times during the release process.

3.1.1.6 The ski, ski-boot and ski-binding shall not be damaged by normal use of the test device.

3.1.2 Release moments and operating range

3.1.2.1 The test device shall indicate release moments in at least forward bending (+ M_y) and in twist (+ M_z and - M_z). Test results are in newton metres (N·m).

Release moments shall be as described in clause 5 of ISO 9462:1993.

3.1.2.2 The manufacturer of the test device shall specify the Recommended Operating Ranges (ROR) of the test device.

3.1.2.3 The magnitude of the smallest increment which can normally be estimated shall not exceed 1 N·m for M_z and 5 N·m for M_y or 5 % of the smallest value in the ROR, whichever is the greater.

3.2 Quantitative requirements

3.2.1 Accuracy

The test device shall be of a design such that when tested by the methods of clause 4 the difference in the results between the test device and the reference device will be as follows.

a) The average difference for all test series shall not exceed

- for M_z : 10 % or 4 N·m, whichever is the least restrictive;
- for M_y : 5 % or 10 N·m, whichever is the least restrictive.

b) The difference for any individual test series shall not exceed

- for M_z : 10 % or 4 N·m, whichever is the least restrictive;
- for M_y : 10 % or 15 N·m, whichever is the least restrictive.

If these requirements are not fulfilled for a test series involving one or several particular bindings, the instructions for use of the test device should describe the appropriate actions:

- by excluding these bindings from the application field of the device;
- by giving the amount of correction needed to obtain an accurate measurement, if this is possible by simple means.

3.2.2 Reproducibility

The device shall be of a design such that the reproducibility limit r , when averaged for all series, is not more than 3 %.

4 Testing

4.1 Test conditions

Carry out the tests at standard atmosphere 23/50 according to ISO 554 with ordinary tolerances.

If the design of the test device is such as to be used in the open air (e.g. at ski-lift stations), carry out the tests also at lower temperatures (e.g. at the lowest temperature specified by the manufacturer in the instructions for use).

4.2 Test bindings

Take commercial ski-bindings and boots for the tests.

If no obvious influence on the release values can be expected from the boots, a variable length sole according to ISO 9838 can be used.

Conduct the tests on a group of at least six binding/boot systems from at least three binding manufacturers.

Carry out the selection of the bindings and the boots by the tests specified by the manufacturer of the test device.

Match appropriate bindings to each boot sole and mount according to skis (or simulated skis) in accordance with the binding manufacturer's instructions.

4.3 Setting of test bindings

The release indicator values (Z) and sole lengths (L) shall be as given in table 1.

Table 1
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Sole	L mm	Z
Type C	260	1
	260	1,5
Type A	300	3
	300	10
	340	4
	340	8

These settings and sole lengths shall remain unchanged throughout the test series.

4.4 Procedure

Carry out the measurement of the release values for each binding and setting as follows.

a) On the reference device

Torsion release: 7 measurements for right-hand release and 7 measurements for left-hand release.
Forward release: 7 measurements.

b) On the test device

After this, measure the release level of the binding with the device to be tested (7 measurements for each direction of release).

c) On the reference device

Finally, repeat the initial measurements on the reference device (7 measurements for each direction of release).

Test results should not be visible to the operator during a test series. If a recording device is not used another person should observe and record each test result.

All releases shall be complete so that the binding has to be recocked and closed before each test.

Test results may be rejected if a procedural error is detected during a test.

For evaluation, delete the highest and lowest test in each series.

Calculate the mean (\bar{X}) and standard deviation (s) of each series of 5 test device results and 10 reference device results by the method below. Determine the difference d (as a percentage) and D (in N·m) and reproducibility limit (r) for each test device with respect to the reference device and compare with the limits specified in 3.2.1 and 3.2.2.

Standard deviation:

$$s = \frac{0,43 R}{\bar{X}} \cdot 100 \%$$

where

\bar{X} is the mean;

R is the range of the measurements.

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Difference:

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$$d = \frac{\bar{X}_{td} - \bar{X}_{rd}}{\bar{X}_{rd}} \cdot 100 \%$$

$$D = \bar{X}_{td} - \bar{X}_{rd}$$

where

\bar{X}_{td} is the mean for test device;

\bar{X}_{rd} is the mean for reference device.

Reproducibility limit:

$$r = \sqrt{s_{td}^2 - s_{rd}^2}$$

If $s_{rd} > s_{td}$ then $r = 0$

where

s_{td} is the standard deviation for test device;

s_{rd} is the standard deviation for reference device.

4.5 Reference device

The accuracy of the reference device shall be better than 2 %.

The reference measurements shall also be made with torques for the evaluation of devices applying release forces.

5 Instructions for use and maintenance

Detailed, easily understandable instructions for use shall be provided with the test device.

The instructions for use and the relevant supplementary sheets shall indicate those bindings which cannot be adjusted without correction of the values directly read from the measuring instruments (see 4.2). The procedure (e.g. the application of correction tables) shall be explained in these cases.

The manufacturer shall indicate which binding systems cannot be adjusted by means of the test device.

The instructions for use shall contain simple methods and intervals which make it possible for the service staff to carry out preseason and random tests for correct functioning and accuracy of measurement (e.g. by means of a calibration binding and a test sole).

Furthermore, the periods shall be given within which the test device is to be calibrated, and the procedure required by the manufacturer or a firm or institution commissioned by the manufacturer. The maximum interval is 2 years.

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6 Test report

A test report for the description and documentary proof of all calibration processes shall be provided together with the test device. This test report shall include the following information:

- a) equipment number;
- b) date of construction;
- c) basic method (tibia and/or weight) and software version;
- d) acceptance date and values of first calibration;
- e) date of delivery;
- f) location of the device (address);
- g) calibration values obtained at the specific service interval;
- h) field for indication of
 - date
 - kind of test
 - result
 - symbol (signature)

In addition, the instructions for use shall deal with the maintenance of the equipment (temperature, humidity, calibration, inspection).

Attention shall be drawn to the necessity that release shall take place for both + M_z and – M_z .

7 Marking

Setting test devices according to International Standard shall be marked with the name or trademark of the manufacturer or importer.

The manufacturer may indicate on his own responsibility that the test devices comply with this International Standard by adding "ISO 11110".

Test devices which can be used outdoors shall be so marked, with an indication of the temperature range.

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