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МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Alpine ski-bindings — Safety requirements and test methods

Fixations de skis alpins — Exigences de sécurité et méthodes d'essai

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Contents

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 9462 was prepared by Technical Committee ISO/TC 83, *Sports and recreational equipment.*

Annex A forms an integral part of this International Standard.

Introduction

This International Standard is one of a series of International Standards dealing with the safety of ski-bindings, the other International Standards of the series being ISO 8061 and ISO 9465.

National standards, complying with legal regulations, may be more extensive, e. g. regarding

— combined loading[1)]

— deflexion of the ski[1)]

— practical tests[2)]

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.

This International Standard is limited to the so-called first category tests, for which the use of method A [developed in Germany, F.R. (DIN) and Switzerland (BfU[3)])] and method B [developed in USA (ASTM)] leads, in principle, to equivalent results. This concerns release tests in simple torsion (movement around an axis perpendicular to the ski gliding surface) and in simple forward bending (movement around an axis parallel to the gliding surface and perpendicular to its longitudinal axis). As shown in clause 5, both methods are equivalent for tests in simple torsion and simple forward bending, because of the principle of action/reaction, under the following conditions:

a) the torque applied in method A is a pure torque.

b) the forces applied in method B are parallel, equal and opposite.

NOTE — Information concerning test conditions and results may be obtained from the Secretariat of ISO/TC 83/SC 3 (DIN, Germany, F. R.)

1) Tests to be carried out between those of 6.2.1 and 6.2.2.

2) Tests to be carried out between those of 6.2.4 and 6.2.5. After practical tests the reference values should be measured according to clause 6.2.1. These references should be used for the following tests (6.2.5 to 6.2.7).

3) Schweizerische Beratungsstelle für Unfallverhütung (Swiss accident-prevention office).

Alpine ski-bindings — Safety requirements and test methods

1 Scope

This International Standard specifies the main safety characteristics of ski-bindings and describes, as an example, the test methods A and B.

This International Standard applies to ski-bindings for alpine skiing for children, juniors and adults.

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 listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5355 : — [1], *Ski-boots for downhill skiing — Safety characteristics and test method.*

ISO 8061 : — [1], *Alpine ski-bindings — Selection of release torque values.*

ISO 9465 : — [1], *Alpine ski-bindings — Lateral toe release under impact loading — Safety requirement and test method.*

ISO 9838 : — [1], *Alpine ski-bindings — Test soles for ski-bindings tests.*

3 Definitions

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

3.1 alpine ski-binding: System to ensure firm connection between boot and ski, fixing the heel low for downhill skiing. The system releases the boot from the ski when certain loads reach preset values.

3.2 release: Detachment of the boot from the ski by release of the mechanism that ensures the connection between boot and ski.

This release is only considered effective when all the loads due to the boot/ski connection have dropped to values which present no danger to the skier.

3.3 release values: Maximum values of torques M_z and M_y (see figure 1), caused at the boot/ski connection by the two movements of torsion and forward bending.

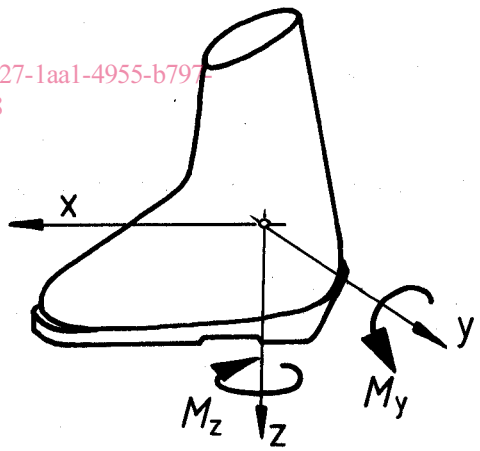

Figure 1 — Definition of the torques M_z and M_y

These values are generally adjustable on current bindings, which have a scale and an indicator displaying the setting level.

NOTE — In the present state of the art, bindings are designed at least to release in torsion and in forward bending.

3.4 reference value: Value, adjusted after a series of tests, used as a basis of comparison to evaluate the behaviour of the binding during the tests (see 6.2.1).

1) To be published.

3.5 type C bindings: Bindings suitable for boot-soles complying with type C of ISO 5355 which can be adjusted to at least to the following release values:

a) M_z = 10 N·m

b) M_y = 37 N·m

3.6 type CA bindings: Bindings suitable for boot-soles complying with types C and A of ISO 5355 which can be adjusted to at least the following release values:

a) M_z = 20 N·m

b) M_y = 75 N·m

3.7 type A bindings: Bindings suitable for boot-soles complying with type A of ISO 5355.

3.8 limit A: Lowest possible position of the setting indicator.

3.9 limit B: Position of the indicator at the lowest mark on the setting scale.

3.10 limit C: Position of the indicator at the highest mark on the setting scale.

3.11 limit D: Highest possible position of the setting indicator.

4 Test conditions

4.1 Loading rate

The tests shall be performed quasi-statically, ensuring that the following indicative values of the torque gradient are respected:

a) torsion release: $\frac{dM_z}{dt}$ = 50 N·m/s;

b) forward bending release: $\frac{dM_y}{dt}$ = 200 N·m/s.

4.2 Accuracy of measurement

The measurement error of the release value in torsion shall be smaller than ± 2 % for values above 50 N·m inclusive and ± 1 N·m for values below 50 N·m.

The measurement error of the release value in forward bending shall be smaller than ± 2 % for values above 200 N·m inclusive and ± 4 N·m for values below 200 N·m.

The test equipment shall be designed to allow application of pure torques without any extraneous forces during the entire release process.

4.3 Test sole

The test sole shall be in accordance with ISO 9838.

Before the tests the sole shall be degreased, washed and dried.

4.4 Test ski

For the release tests in the laboratory, the bindings shall be mounted either on whole skis or on appropriate sections of skis. The skis used for this purpose shall have the characteristics given in table 1.

5 Test methods

The binding shall be mounted on a ski. A test sole shall then be inserted in the binding.

In method A, the ski is rigidly connected to the test frame and the torque M_z or M_y is progressively appplied to the sole until the binding releases. The peak value of M_z or M_y is recorded.

In method B, the sole is rigidly connected to the test frame through a sensor which measures the torques M_z and M_y. Forces are progressively applied to the ski until the binding releases. The peak value of M_z or M_y is recorded.

For a detailed description of both methods, see the appropriate test programmes.

Table 1

Type of binding	Length mm	Spring constant c_M N/mm	Test force for c_M N	Distance between supports
C	1 200 to 1 400	8 ± 0,5	200	0,85 l_p[1)]
CA	1 600 to 1 800	6 ± 0,5	300	
A	1 900 to 2 050	5 ± 0,5	350	

1) l_p is the projected length.

5.1 Simple torsion test

Method A

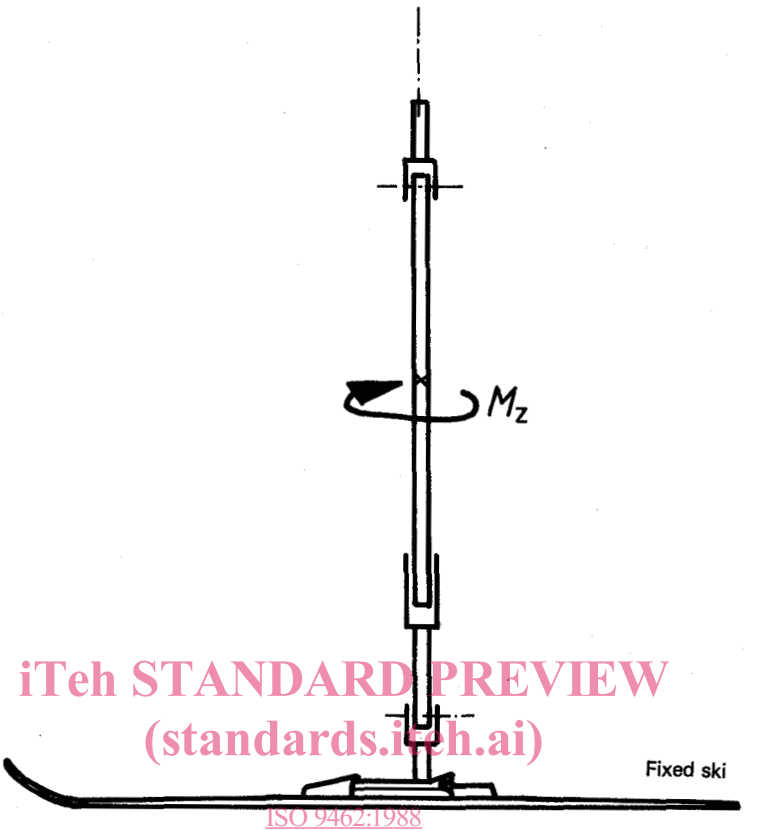

Figure 2 — Application of M_z torque and measurement of $M_{z,\,max}$

Method B

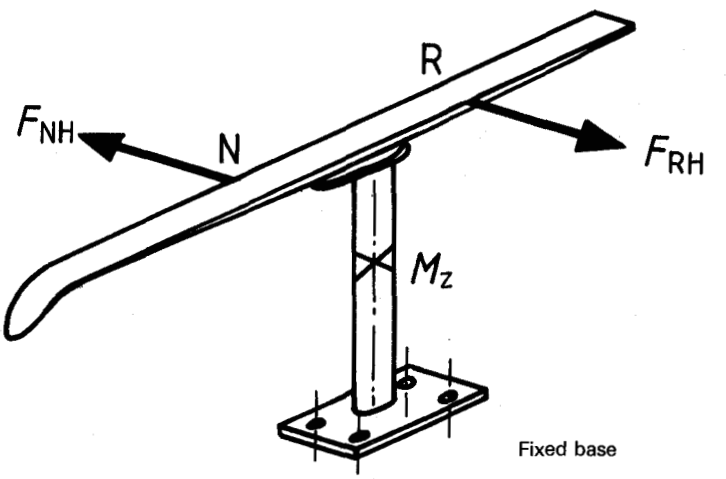

Figure 3 — Application of two equal forces F_{NH} and F_{RH} and measurement of $M_{z,\,max}$ torque

5.2 Forward bending test

Method A

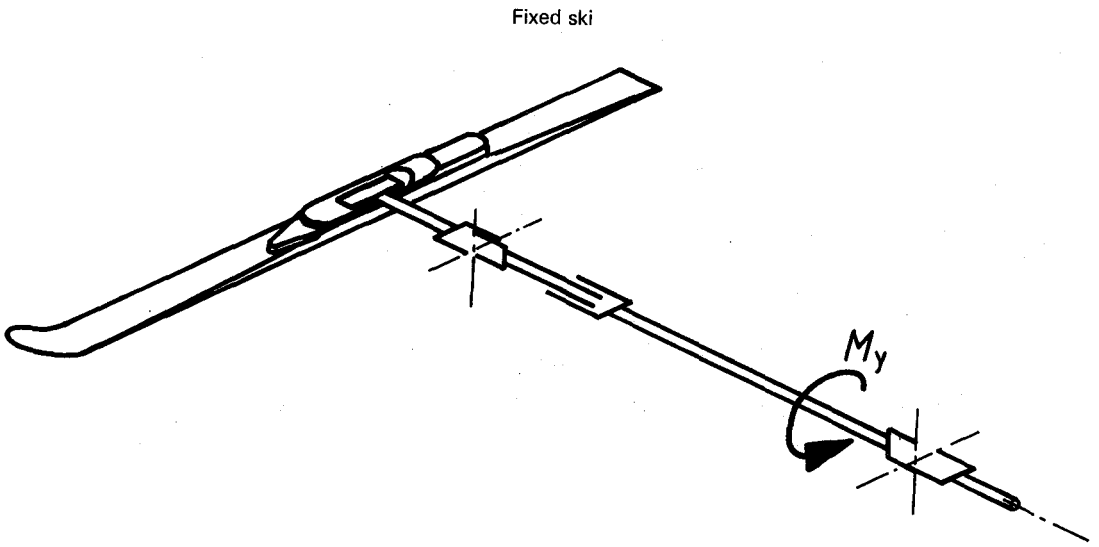

Figure 4 — Application of M_y torque and measurement of $M_{y,\,max}$

Method B

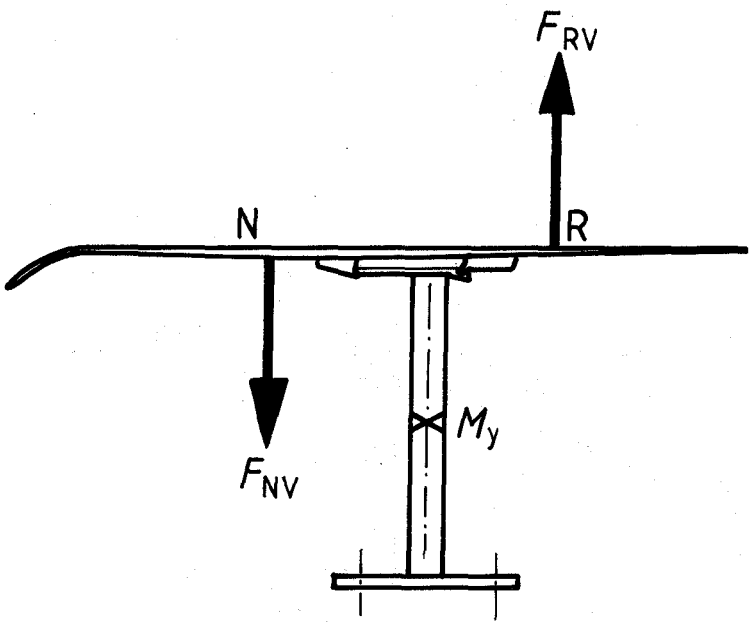

Figure 5 — Application of two equal forces F_{NV} and F_{RV} and measurement of $M_{y,\,max}$

6 Safety requirements and testing

6.1 Release tests — Setting, reproducibility and symmetry of release values

6.1.1 Requirements

6.1.1.1 Scattering of values

The difference between each of the five values and their mean value shall not exceed ± 10 % of that mean value.

6.1.1.2 Symmetry in torsion

The difference between the mean of the five values of M_z and the mean of the ten values of $|M_z|$ shall not exceed ± 10 % of the latter.

6.1.1.3 Accuracy of setting scale

The release value that corresponds to the indicator position of the setting scale is given in table 2.

The tolerance is ± 5 N·m for Z = 1 and then increases linearly to ± 10 N·m for Z = 10.

NOTE — To determine the tolerances between 5 N·m and 10 N·m the use of a diagram is recommended.

This requirement applies to each of the mean values of the ten values of $|M_z|$ and each of the mean values of the five values of M_y corresponding to the settings B, 1/3, 2/3 and C.

For the highest setting (limit D, i.e. off the scale), these mean values shall not exceed the mean values corresponding to limit C by more than 20 %.

6.1.2 Testing

The test shall be carried out on four bindings randomly chosen from a set of six bindings. If the requirements of this clause are not fulfilled, two of the four bindings can be replaced by the remaining two bindings in this set.

6.1.2.1 Choice of settings

The tests shall be carried out at ambient temperature (23 °C ± 5 °C), with the sole and bindings dry, for the following settings:

- limit B;
- at approximately one-third of the scale;
- at approximately two-thirds of the scale;
- limit C;
- limit D.

The tests shall be carried out using the sole length corresponding to the scale mark, according to table 2.

Table 2

Setting mark	Release torques		Sole length
Z	M_z N·m	M_y N·m	l mm
0,5	5,0	18	200
1	10	37	225
1,5	15	55	243
2	20	75	258
2,5	25	94	270
3	30	114	280
3,5	35	134	290
4	40	154	298
4,5	45	175	306
5	50	196	314
5,5	55	218	320
6	60	239	327
6,5	65	261	333
7	70	284	339
7,5	75	307	344
8	80	330	350
8,5	85	353	355
9	90	377	360
9,5	95	401	364
10	100	425	369

For each setting, each of the four bindings is released five times in torsion to the right (+ M_z), five times in torsion to the left (− M_z) and five times in forward bending (M_y).

6.1.2.2 Calculation of mean values

For each setting and each binding, the following values are calculated:

- mean value of the five values of + M_z;
- mean value of the five values of − M_z;
- mean value of the ten values of $|M_z|$;
- mean value of the five values of M_y.

6.2 Evaluation of reproducibility of release under different influences

The tests described in this clause shall be carried out in the following order on the four bindings already used for the tests in the preceding clause.