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Alpine ski-bindings — Requirements and test methods

Fixations de skis alpins — Exigences et méthodes d'essai

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 9462 was prepared by Technical Committee ISO/TC 83, *Sports and recreational equipment*, Subcommittee SC 3, *Ski bindings*.

This third edition cancels and replaces the second edition (ISO 9462:1993), Clauses 3 and 7/subclauses 5.1, 6.3.3, 6.3.4 and 6.6.2/Tables 1 and 3/Annexes A and B of which have been technically revised/deleted/added. It also incorporates the Amendment ISO 9462:1993/Amd.1:2002 and the Technical Corrigendum ISO 9462:1993/Cor.1:1993.

Alpine ski-bindings — Requirements and test methods

1 Scope

This International Standard specifies the main 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 referenced documents are indispensable for the application 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 5355:2005, *Alpine ski-boots — Requirements and test methods*

ISO 8061:2004, *Alpine ski-bindings — Selection of release torque values*

ISO 9465:1991, *Alpine ski-bindings — Lateral release under impact loading — Test method*

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
alpine ski-binding
system to ensure firm connection between boot and ski, fixing the heel low for downhill skiing

NOTE   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

NOTE   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 caused at the boot/ski connection by the two movements of torsion and forward bending

See Figure 1.

1

NOTE 1   These values are generally adjustable on current bindings which have a scale and an indicator displaying the setting level.

NOTE 2   In the present state of the art, bindings are designed at least to release in torsion ($\pm M_z$) and in forward bending ($\pm M_y$)

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 6.3.1)

3.5
combined loading
loading of the sole or ski in several directions at the same time, where one of the loads is the torque M_z progressively applied to the sole until the binding releases

See Figure 1 and Table 1.
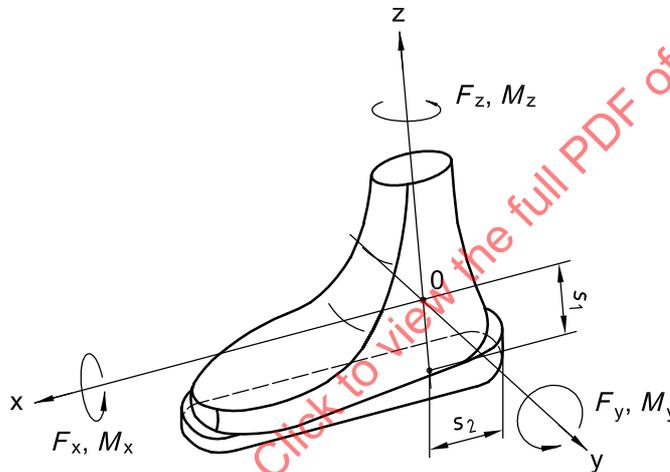
Figure 1 — Definition of the loads and torques

Table 1 — Coordinates of reference point 0

Dimensions in millimetres

	Type of binding		
	C	CA	A
s_1	85	100	100
s_2	70	80	80

NOTE   Each of the load combinations simulates a given situation, chosen within an infinite field of possibilities and simplified for the purpose of the tests. The main simplification being that the loads applied additionally to the release torque M_z are held constant in value and direction during all the release process.

3.6
additional loads
loads applied additionally to the release torque M_z

3.7
deflection of the ski
deflection of the ski perpendicular to its gliding surface

NOTE   In practice, the deflection of the ski depends at the same time on the loading situation and the profile of the snow-surface ("geometrical" situation); in test simplification, only the "geometrical" situation is simulated.

3.8
type C bindings
bindings suitable for boot soles complying with type C of ISO 5355:2005, which can be adjusted to at least the following release values:

a) M_z = 10 N·m

b) M_y = 37 N·m

3.9
type CA bindings
bindings suitable for boot soles complying with types C and A of ISO 5355:2005, which can be adjusted to at least the following release values:

a) M_z = 20 N·m

b) M_y = 75 N·m

3.10
type A bindings
bindings suitable for boot soles complying with type A of ISO 5355:2005

3.11
limit
L_1
lowest possible position of the setting indicator

3.12
limit
L_2
position of the indicator at the lowest mark on the setting scale

3.13
limit
L_3
position of the indicator at the highest mark on the setting scale

3.14
limit
L_4
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:

$$\frac{\mathrm{d}M_z}{\mathrm{d}t} \leqslant 50 \cdot \mathrm{m/s}$$

b) forward bending release:

$$\frac{\mathrm{d}M_y}{\mathrm{d}t} \leqslant 220 \ \mathrm{N \cdot m/s}$$

4.2 Accuracy of measurement

The measurement error of the release value in torsion shall be smaller than $\pm 2\ \%$ for values $\geqslant 50\ \mathrm{N \cdot m}$ and $\pm 1\ \mathrm{N \cdot m}$ for values $< 50\ \mathrm{N \cdot m}$.

The measurement error of the release value in forward bending shall be smaller than $\pm 2\ \%$ for values $\geqslant 200\ \mathrm{N \cdot m}$ and $\pm 4\ \mathrm{N \cdot m}$ for values $< 200\ \mathrm{N \cdot m}$.

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

4.3 Test sole

The test sole shall be in accordance with ISO 9838.

Before testing, 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. If the binding is pre-mounted (already mounted on the ski by the producer) use the ski with which the binding is delivered in its medium size. If not, choose a ski which represents the market.

5 Test methods A and B

5.1 Principle

The binding shall be mounted on a ski in accordance with the manufacturer's instructions. 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 applied 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.

Annexes A and B give examples of how to realise method A or method B.

Passing by either method shall be deemed satisfactory.

5.2 Simple torsion test

5.2.1 Method A

See Figure 2.

Key

1   fixed ski

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

5.2.2 Method B

See Figure 3.

Key

1   fixed base

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

5.3 Forward bending test

5.3.1 Method A

See Figure 4.

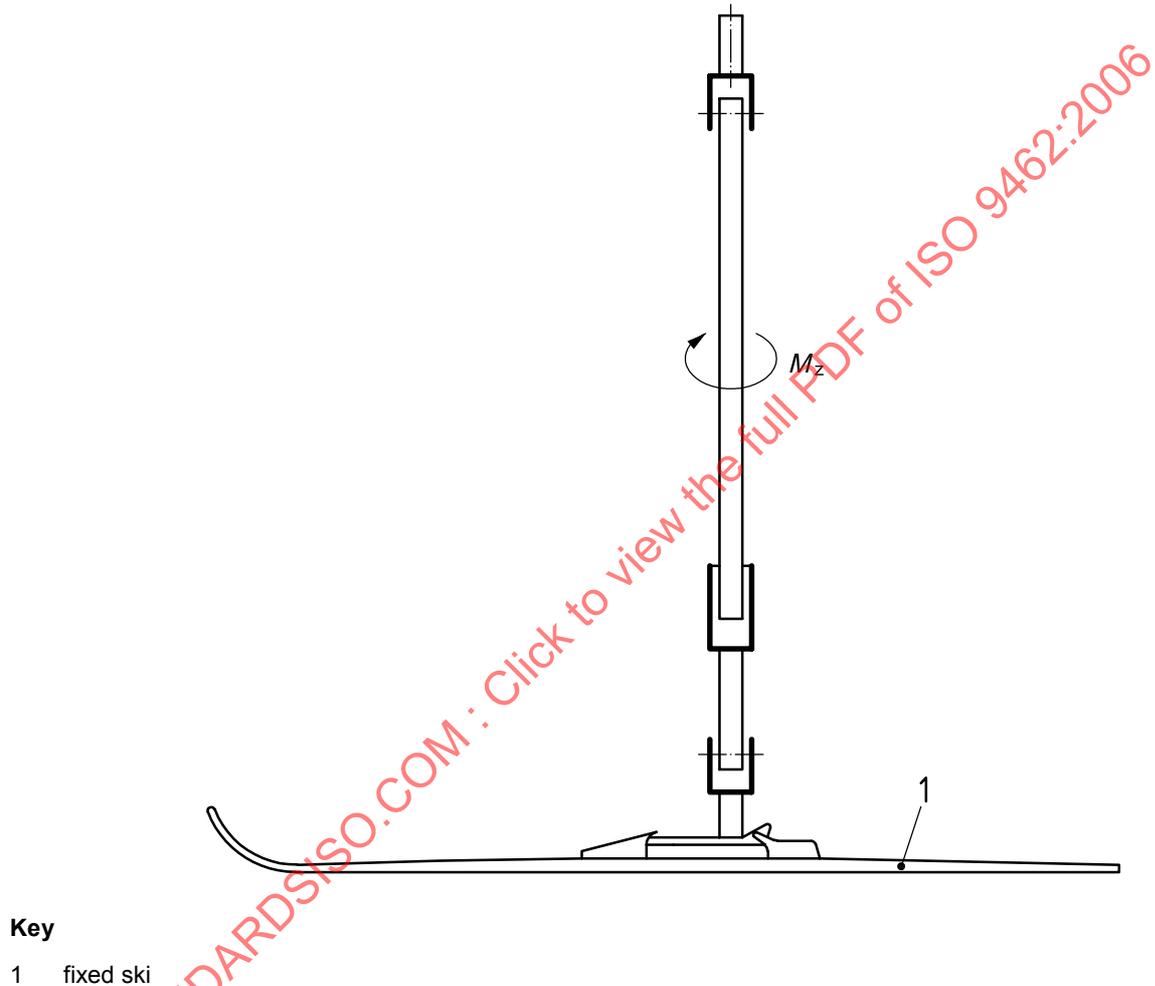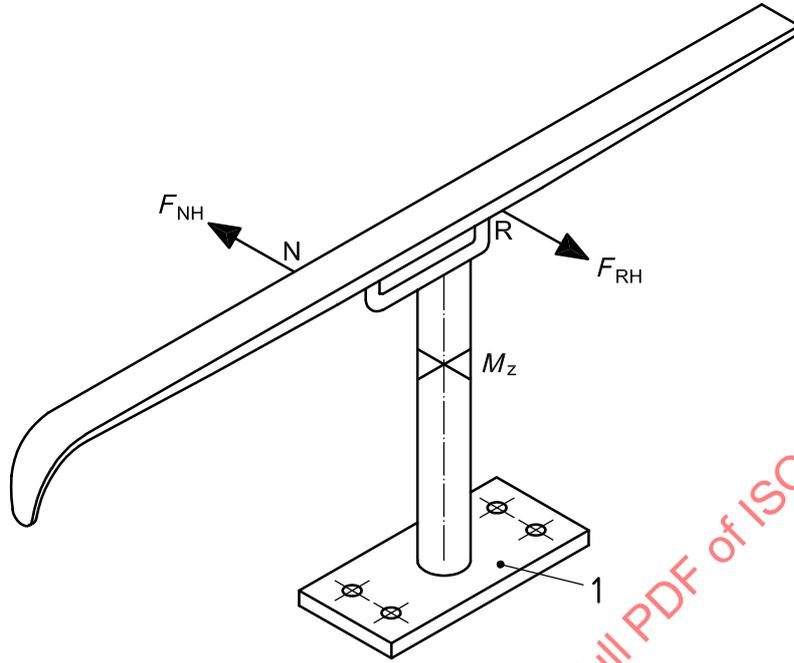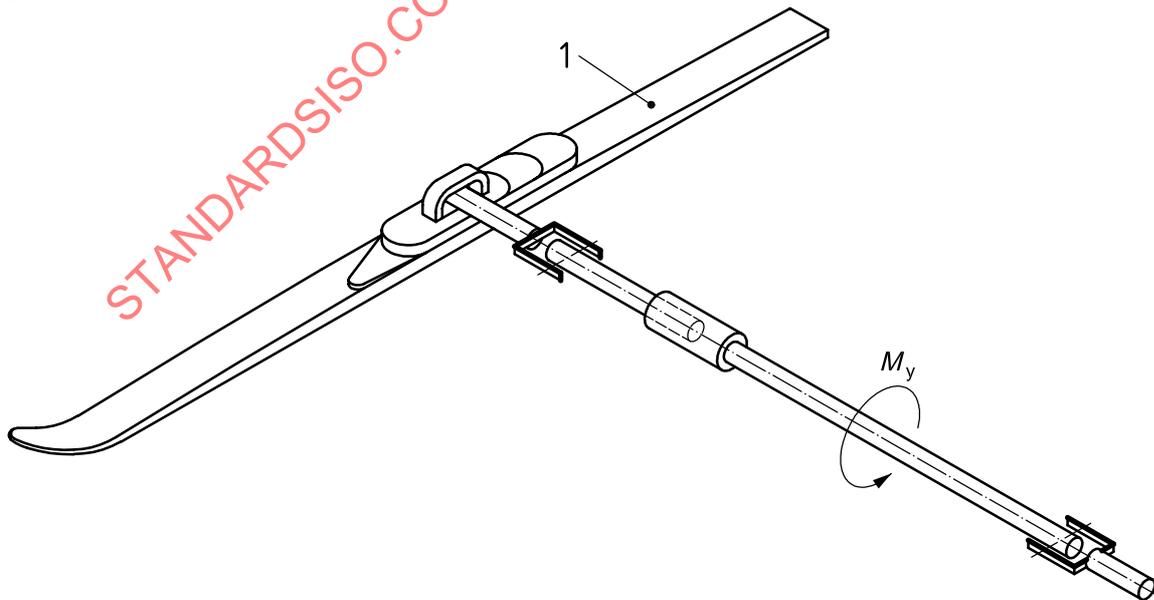**Key**

1   fixed ski

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

5.3.2 Method B

See Figure 5.

Key
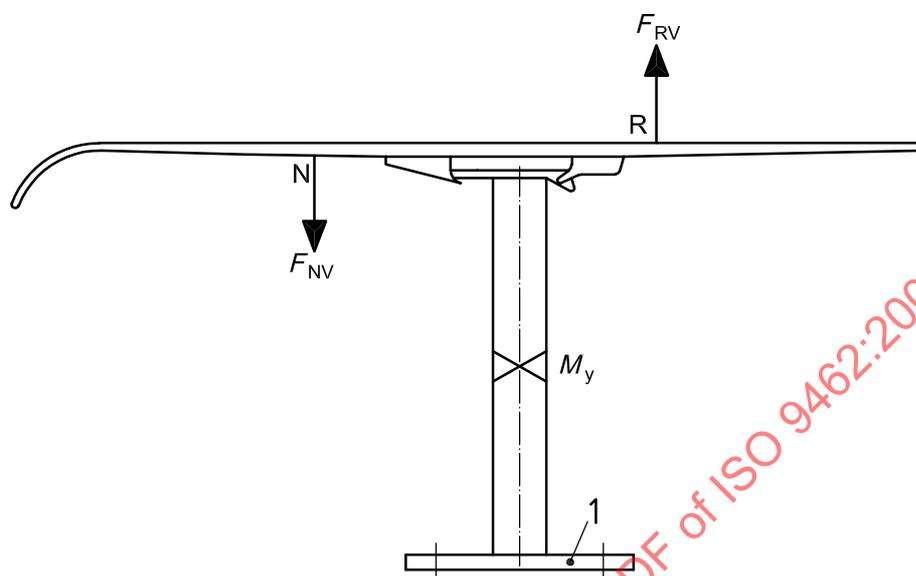
1   fixed base

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

6   Requirements and testing

6.1   General requirements

NOTE   This subclause deals with general requirements covering topics where the evaluation is carried out visually.

6.1.1   Function and form

6.1.1.1   The binding shall release at least in two cases:

⎯   when applying a torque M_z about an axis perpendicular to the ski gliding surface;

⎯   when applying a torque M_y about an axis parallel to the ski surface and perpendicular to the longitudinal axis of the ski.

The binding is said to release when the above mentioned torque reaches a maximum value (release value) and then drops to a value that is harmless for the skier. After release, all the loads applied by the ski and the boot on the leg shall remain below the dangerous level for all possible movements, and until all the risks associated with the coupling boot-ski are no longer apparent.

6.1.1.2   The release level shall be clearly indicated by a scale covering all of the setting range anticipated by the manufacturer. The release shall still be possible at the upper limit (maximum setting). Settings above $Z = 10$ shall be clearly differentiated from settings below $Z = 10$ on the indicator scale.

6.1.1.3   Each procedure of adjustment to the boot having an influence on the binding functioning shall be verifiable by the use of a clear indicator, or by any other means considered suitable by the operator for showing the correct adjustment.

6.1.1.4   The binding shall be equipped with a ski-brake or allow for an easy and secure attachment of a leash.

6.1.1.5   The design of the ski-brake or the leash shall be such that, after release, no unnecessary danger will occur to the skier.

6.1.1.6   The binding shall have an external design which does not have a negative influence on skiing or cause unnecessary risk of injuries when used normally.

6.1.2   Handling

6.1.2.1   Mounting instructions

The manufacturer or the importer shall deliver mounting instructions that are easily understood, to the sports shop. These instructions shall include at least:

a)   the mechanical procedure for adjusting the release values of the binding;

b)   recommendations for determining the appropriate release values for the skier;

c)   the sole characteristics required for good functioning of the binding;

d)   the boot-sole requirements and preparation for mounting of additional elements if necessary;

e)   preparation and mounting of the binding e.g. use of jig, compatibility with ski, etc.;

f)   the adjustment instructions necessary for accommodating different boot-sole lengths and heights, the centring of the sole and ways of controlling the length adjustment;

g)   ways of performing the basic functional tests after mounting;

h)   recommendation for setting the binding with a setting device;

i)   troubleshooting procedures for non-symmetric release and readjustment.

6.1.2.2   Instructions for use

An easily understood set of instructions for the skier shall be included with all bindings. These instructions shall contain at least:

a)   warnings against important modifications of the recommended setting;

b)   instructions on how to step in and out of the binding, how to restore the binding to its initial position after release and how to open the binding after a fall in an awkward position;

c)   recommendations for avoiding problems, for example increase of the release level with time;

d)   instructions for maintenance, storage and control of the binding;

e)   recommendations for setting the binding by a specialist with a setting device and for controlling this setting each year;

f)   a warning that, when skiing in deep snow, the brake alone is not sufficient to avoid losing the ski;

g)   information on the appropriate ski-boots with which the binding is designed to function.

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

6.2.1 Requirements

6.2.1.1 Scattering of values

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

6.2.1.2 Symmetry in torsion

The difference between the mean of the five values of M_z in one direction and the mean of the ten values of $|M_z|$ shall not exceed $\pm$ 10 % of the latter.

6.2.1.3 Accuracy of setting scale

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

For M_z, the tolerance is $\pm$ 5 N·m for Z = 1 and then increases linearly to $\pm$ 10 N·m for Z = 10.

For M_y, the tolerance is calculated by taking into account the relationship between M_y and M_z given in Table 2.

NOTE   To determine the tolerances on M_z and M_y, use Figures D.1 and D.2.

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 L_2, 1/3, 2/3 and L_3.

For the highest setting (limit L_4, i.e. off the scale), these mean values shall not exceed the mean values corresponding to limit L_3 by more than 20 %.

6.2.2 Testing

6.2.2.1 Sampling

Carry out the test on four bindings randomly chosen from a set of six bindings. If the preceding requirements in 6.2.1 are not fulfilled, two of the four bindings can be replaced by the remaining two bindings in this set.

6.2.2.2 Choice of settings

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

— limit L_2;

— at approximately 1/3 of the scale;

— at approximately 2/3 of the scale;

— limit L_3;

— limit L_4.

Carry out the tests using the sole length corresponding to the setting mark, according to Table 2.

Table 2 — Setting scale

Setting mark	Release torques		Sole length
Z	M_z	M_y	l
	N·m	N·m	mm
0,5	5	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, release each of the four bindings 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).

6.2.2.3   Calculation of mean values

Calculate for each setting and each binding the following values:

— 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.

6.3   Evaluation of reproducibility of release under different influences

6.3.1   Order of tests

Carry out the tests described in this subclause in the following order on the four bindings already used for the tests in 6.2.2.

6.3.2   Reference values

Set the bindings in order to release for one pair of the values M_z/M_y indicated below:

l = 250 mm for

M_z = 20 N·m $\pm$ 2 N·m

M_y = 75 N·m $\pm$ 5 N·m

l = 305 mm for

M_z = 40 N·m $\pm$ 3 N·m

M_y = 154 N·m $\pm$ 10 N·m

l = 320 mm for

M_z = 60 N·m $\pm$ 3 N·m

M_y = 240 N·m $\pm$ 10 N·m

l = 340 mm for

M_z = 80 N·m $\pm$ 4 N·m

M_y = 330 N·m $\pm$ 15 N·m

Use the pair which lies nearest to the release value corresponding to the middle of the L_2/L_3 range of the binding.

Indicate also the boot-sole length, l. Carry out the tests at ambient temperature $(23 \pm 5)\,°C$ with sole and bindings dry.

Release each binding five times in torsion to the right or to the left (for all subsequent tests maintain the direction) and five times in forward bending.

The mean value of each group of five release values is considered as the reference value.

This setting remains the same for all of the following tests (6.3.3 to 6.7.2).

6.3.3   Release with ski deflection

6.3.3.1   Requirements

The mean value of the deviations between each of the release values and the corresponding reference value shall not exceed 20 % for the torsion release (deflection of the ski M_z) and 15 % for the forward bending release, M_y.

None of the five values for the torsion release shall exceed ± 10 % of their mean value.

None of the five release values for the forward bending release shall exceed ± 7,5 % of their mean value.

6.3.3.2 Testing

Subject one binding to the test. Release the binding five times in torsion to the right and five times in forward bending. Carry out the tests at ambient temperature (23 ± 5) °C with wet sole and binding.

Position and deflect the test ski with the sole inserted in the binding in accordance with Figure 6 and Table 3 and force the ski to deflect to given values by a strap or clamp that does not interfere with the binding.

If the distance of the supports is different, use Table 3.

Dimensions in millimetres
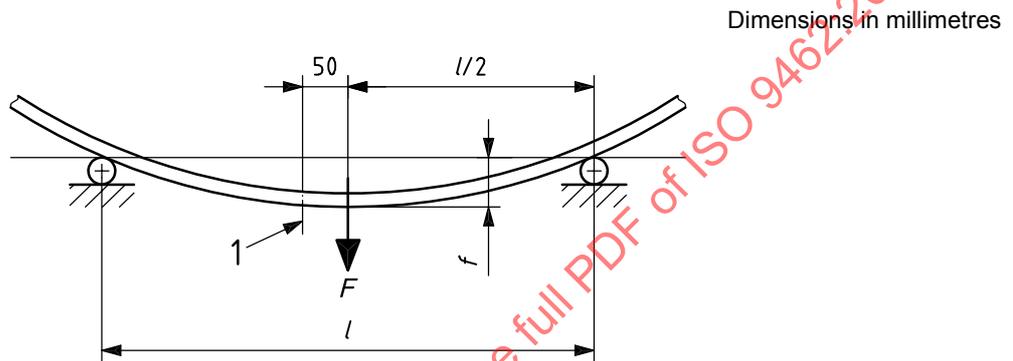
Key

1   boot toe

Figure 6 — Deflection of the ski

Table 3 — Deflection of the ski

Dimensions in millimetres

Radius R	l	f
	500	6,6
	600	9,5
	700	13,0
	800	17,0
	900	21,5
	1 000	26,6
4 717,5	1 100	32,2
	1 200	38,3
	1 300	45,0
	1 400	52,2
	1 500	60,0
	1 600	68,3
	1 700	77,2

6.3.4   Release under combined loading

6.3.4.1   General requirement about scattering

For a given test, each of the five release values shall remain within ± 10 % of their mean values.

6.3.4.2   General test conditions

Subject one binding to the following tests. Carry out these tests at ambient temperature (23 ± 5) °C, with wet sole and binding.

For each of the following configurations of combined loading, release the binding five times in torsion to the right.

The values of the additional load are proportional to the reference value, M_z, measured according to 6.3.2.

Apply the combined load to the ski boot (method A) on the reference point or to the ski (method B) in an equivalent manner during all its movements, which shall remain constant in amplitude and direction relative to the ski boot (method A) or relative to the ski (method B).

6.3.4.3   Influence of forward lean of the body

6.3.4.3.1   Requirement

The mean value of the deviations between each of the release and the reference value shall not exceed 35 %.

6.3.4.3.2   Testing

Apply the following additional loads:

$$+ M_y = 2\,M_z$$

$$- F_z = \frac{40\,\text{N}}{6\,\text{N·m}}\,M_z$$

where M_z = reference value

Calculate the mean value from five measurements.

6.3.4.4   Influence of "roll loading"

6.3.4.4.1   Requirement

The mean value of the deviations between each of the release values and the reference value shall not exceed 20 %.

6.3.4.4.2   Testing

Apply the following additional loads:

M_x = 0,2 M_z (first test configuration)

M_x = − 0,2 M_z (second test configuration)

Calculate the mean value from five measurements.

6.3.4.5   Influence of backward lean of the body

6.3.4.5.1   Requirement

The mean value of the deviations between each of the release values and the reference value shall not exceed 25 %.

6.3.4.5.2   Testing

Apply the following additional loads:

— $M_y = 1{,}25\, M_z$

— $F_z = \dfrac{40\,\text{N}}{6\,\text{N·m}}\, M_z$

Calculate the mean value from five measurements.

6.3.4.6   Influence of axial force

6.3.4.6.1   Requirement

The mean value of the deviations between each of the release values and the reference value shall not exceed 15 %.

6.3.4.6.2   Testing

Apply the following additional load:

$F_x = \dfrac{20\,\text{N}}{6\,\text{N·m}}\, M_z$

Calculate the mean value from five measurements.

6.3.5   Low temperature exposure

6.3.5.1   Requirements

The difference between each of the release values and the corresponding reference value shall not exceed 35 % for bindings of type C and CA and 30 % for bindings of type A.

6.3.5.2   Testing

Subject only one binding to the test.

Subject boot sole and binding in a dry state separately to − 20 °C. Release the binding twice in torsion to the right and twice in forward bending.

6.3.6   Icing

6.3.6.1   Requirements

The mean value of the deviations between each of the release values and the corresponding reference value shall not exceed 40 % for bindings of type C and CA and 35 % for bindings of type A.

6.3.6.2   Testing

Subject four bindings to the following cycles

a)   The ski shall be placed in a horizontal position at a temperature of -20 °C for at least 30 min after the following preconditions:

   1)   hold ski upright, with tip uppermost at (23 ± 5) °C;

   2)   binding open at heel;

   3)   shower with water at (40 ± 3) °C for 2 min;

   4)   leave in this position for approximately 1 min.

Then insert a boot sole (dry and at -20 °C) into binding. Flex the ski five times (curve of deflection approximately 30 mm while ski is supported between supports 1 000 mm apart). The specimen is now ready for specified release tests in accordance with the following instructions.

b)   Take the horizontal ski, with an inserted test sole [both at (23 ± 5) °C], and shower it for 2 min with water at (40 ± 5) °C, from a distance of 200 mm. Place the ski in an upright position (tip uppermost) for 10 s. Place the ski in a horizontal position and hold it at -20 °C for at least 30 min.

For cycles a) and b), after five flections of the ski [see a)] carry out the release tests at first for M_y, then after stepping into the binding again, immediately for M_z.

c)   Carry out cycles a) and b) alternatively. Immediately after the release test, store the binding at ambient temperature (23 ± 5) °C for 10 min before beginning the subsequent cycle. The total number of cycles is six, each of them being carried out three times. The number of cycles may be reduced to two, if the mean value of the deviations between the measurements for the first two cycles and the corresponding references is smaller than 25 %.

6.3.7   Snow pack

6.3.7.1   Requirements

The mean value of the deviations between each of the release values and the corresponding reference value shall not exceed 40 % for bindings of type C and CA, and 35 % for bindings of type A.

Additionally, this mean value shall not be situated in a range of 25 % to 75 % of the reference value for the forward fall release, in order to avoid the risk of inadvertent release due to the binding having been fixed incorrectly.

6.3.7.2   Testing

Simulate the effect of snow pack by means of a peeled PTFE plate, with the same dimensions as the sole, being placed under the sole when it is inserted in the binding. The thickness of this plate shall be 2 mm along its frontal half and 3 mm along the rear half.

Submit only one binding to the test. Release it twice in torsion and twice in forward fall. Carry out these tests at ambient temperature (23 ± 5) °C with binding and sole wet.

6.3.8 Exposure to vibration and shock

6.3.8.1 Requirements

The mean value of the deviations between each of the release values and the corresponding reference value shall not exceed 15 % for bindings of type C and CA, and 10 % for bindings or type A.

6.3.8.2 Testing

Place four bindings (mounted on their ski sections) loosely together in a steel cylinder 400 mm in diameter. Then rotate this cylinder [20 revolutions at a speed of 1 s^{-1} (60 r/min)] then perform a shock test as follows.

Drop one of the skis, vertical with the tip pointing upwards from a height of 500 mm on to a hard surface. Repeat the test five times.

Then release the binding twice in torsion and twice in forward bending. Carry out the tests at ambient temperature (23 ± 5) °C, with bindings and sole dry.

6.4 Energy absorption (recentring)

6.4.1 Requirements

During the test, the binding, after absorbing the required energy, shall return the test sole quickly to within ± 2 mm of its original position (i.e. no point of the sole shall be distant by more than 2 mm from its original position).

The energy, W, absorbed shall be at least $M_z/45$ N·m for the binding set, in order to release at the following values:

for type C: 5 N·m above the value corresponding to limit L_2;

for types CA and A: 10 N·m above the value corresponding to limit L_2.

6.4.2 Testing

The quasi-static test method does not allow a prediction of the dynamic behaviour of the binding in all circumstances but it does represent an appropriate means of evaluation of this behaviour.

Carry out the tests with a wet test sole on one of the new bindings remaining from the set of six bindings (see 6.2.2), at two values of the longitudinal compression of the sole: normal and increased. The "increased" value is obtained by reducing the length between the clamping elements by 1 mm.

A quasi-static torsion moment diagram is recorded for each repetition of the test.

6.5 Lateral release under impact loading

6.5.1 Requirement

When tested according to ISO 9465, the angle of release of the pendulum shall fall between the two limits, U, (upper limit, in degrees) and L (lower limit, in degrees), for all quasi-static release values, M_z, of the binding greater than 20 N·m.

$$U = \frac{8}{7} \times \frac{M_z}{\text{N·m}}$$

$$L = 12 + 0{,}2 \, \frac{M_z}{\text{N·m}}$$

6.5.2 Testing

Carry out the test according to the method defined in ISO 9465 on the binding already used for the tests of 6.4.

6.6 Field tests

6.6.1 Object of the tests

Field tests are an important complement to laboratory tests. Since evaluation of the following procedure is, to a degree, subjective, results should not form the basis for acceptance or rejection of a given binding. However, comments from this test procedure should be attached to laboratory test results, and should be considered by the manufacturer.

6.6.2 Performance of the test and grading

Tests are carried out on bindings already used for the laboratory tests.

All adjustment screws that are essential to proper functioning shall be sealed with lacquer.

Carry out the tests with skis specified by the binding manufacturers.

The ski boots shall be fitted with a sole that conforms to ISO 5355.

Snow conditions:

— hard to icy snow, piste on which moderately to highly unfavourable conditions prevail;

— soft course or deep snow with moderate to high clearing resistance.

Each of these two conditions shall be present over at least one-third of the total piste.

Mode of skiing: free style, i.e. no prescriptions concerning the mode of skiing.

The bindings are tested by four skiers, usually only in winter conditions, on several difficult runs with a total vertical drop of at least 5 000 m. Each of the five points described in 6.6.3 (four points if the design in question does not allow touring) are graded on the basis of the following scale.

Very good: + 2

Good: + 1

Satisfactory: 0

Mediocre: − 1

Bad: − 2

Unacceptable: rejected

The sum of the 20 (16) results thus obtained shall be positive or zero. Otherwise, the release settings are checked after the practical tests. For each measurement, the deviation from the initial setting should be $\leqslant$ 35 % (initial setting $M_z \leqslant$ 40 N·m) or 30 % (initial setting $M_z >$ 40 N·m).

During the tests, each binding is released at least once in torsion. The deviation of the measured value from the initial setting should be smaller than or equal to:

⎯ 45 % for initial setting values of 20 N·m to 40 N·m;

⎯ 35 % for values of 40 N·m to 50 N·m;

⎯ 30 % for values greater than 50 N·m.

After the test, it shall be verified that no alteration of the setting of any of the adjustment screws that are essential to proper functioning (e.g. release setting, sole lug, contact pressure) has occurred.

NOTE   There will be no measurement for initial setting values lower than 20 N·m.

6.6.3   Items to be considered

6.6.3.1   Unwanted release

For all practical tests, the bindings are adjusted according to ISO 8061, on values located in the mid-range between the lower and upper limit, individually for each skier. If the binding has a coupled setting (only one setting screw or feature for adjusting torsion and forward lean), one or both release values will be set according to ISO 8061, mid-range. The other release value should be equal to or lower than the value indicated by ISO 8061.

The setting in the other release directions (if foreseen) will be carried out according to the manufacturer's instructions, with the condition that the release values in torsion and forward lean remain equal to or lower than the values indicated by ISO 8061, mid-range (case of the coupled setting).

With these settings, the binding should allow skiing with a very restricted number of inadvertent releases.

6.6.3.2   Boot-ski connection

The fixing of the boot to the ski shall be sufficiently rigid to offer adequate steering control.

6.6.3.3   Stepping into the binding

Stepping into the binding and centring of the boot shall be simple. The closing shall be positive and easily understood by the skier. Stepping in after release shall be possible without difficulty, even on steep slopes or in deep snow.

6.6.3.4   Manual release

Manual release shall be as simple as possible so that the skier can easily take off the skis, for example, after a fall or under difficult conditions (e.g. deep snow).

6.7   Exposure to corrosion and dirt

6.7.1   Requirements

The mean value of the differences between each of the release values and the corresponding reference value shall not exceed 35 % for bindings of type C and CA, and 30 % for bindings of type A.

6.7.2 Testing

Subject the four bindings, closed and adjusted to the reference values according to 6.3.2, first to a salt mist for 48 h:

— salt content of the mist: $(5 \pm 0,5)$ % (percentage by mass of sodium chloride in water);

— temperature: (35 ± 2) °C.

Immediately afterwards, immerse the bindings eight times per minute for 15 min in a mixture with the following composition and temperature:

— salt content: 6 g NaCl/l water;

— dirt content: 12 g of street dirt per litre (the grain size distribution of the dirt is indicated in Annex A);

— temperature: (23 ± 5) °C.

Stir the mixture constantly to ensure good homogeneity.

After drying for 24 h, subject each of the bindings to one release test in torsion and one release test in forward bending. Carry out the tests at ambient temperature, (23 ± 5) °C, with dry bindings and dry boot sole.

7 Marking

7.1   Ski-bindings in accordance with this International Standard shall be marked with the name or trade-mark of the manufacturer or importer.

7.2   The correspondence of ski-bindings with this International Standard can be expressed by the manufacturer in his own responsibility by the additional reference to ISO 9462.

Annex A
(informative)

Additional information to conduct tests according to test method A

A.1 Influence of forward lean (see 6.3.4.3)

Apply loads, see Figure A.1:

m (additional mass) = $(F_z/9{,}81) - m_x$

$m_x = m_{lever} + m_{balance}$ [mass (kg)]

$M_y = 2 \times M_z$

$F_z = (40\ \text{N}/6\ \text{N·m}) \times M_z$

$$\Delta L\ (\text{m}) = \frac{2 \times M_z - M_{lever}}{(40\ \text{N}/6\ \text{N·m}) \times M_z - F_{lever}}$$
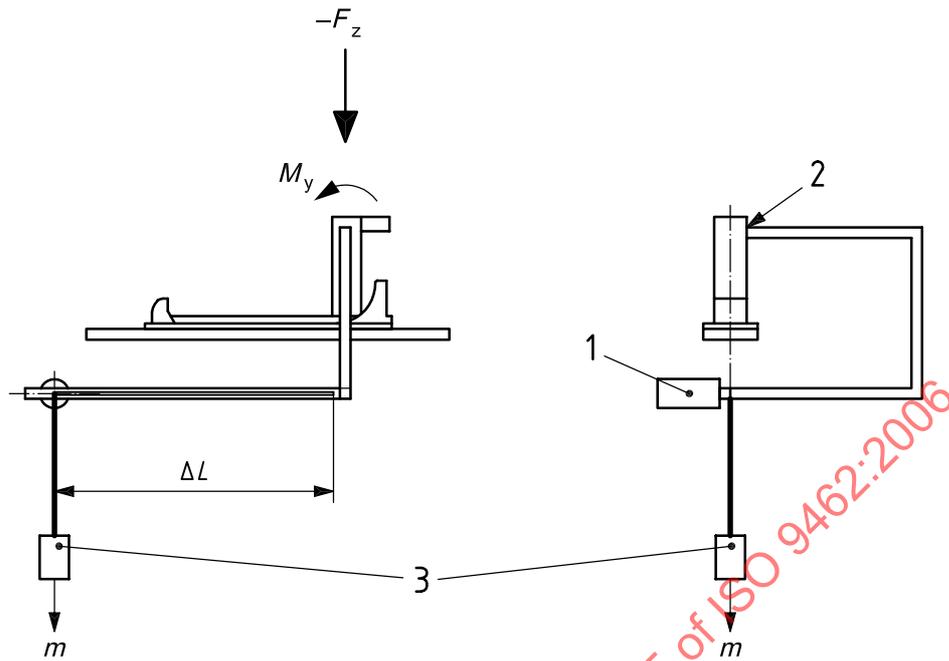
where

F_{lever} is the resulting force from the test fixture (without balance mass);

M_{lever} is the moment about y-axis produced by the test fixture;

ΔL is the adjustable length for additional mass, in metres;

m is the additional mass.

The applied torque moment is the result of the adjustable length of the lever and the additional calculated force.

Key

1   balance mass to compensate M_x produced by test fixture

2   moment and force

3   additional mass

Figure A.1 — Influence of forward lean

A.2 Influence of roll loading (see 6.3.4.4)

Apply loads, see Figure A.2:

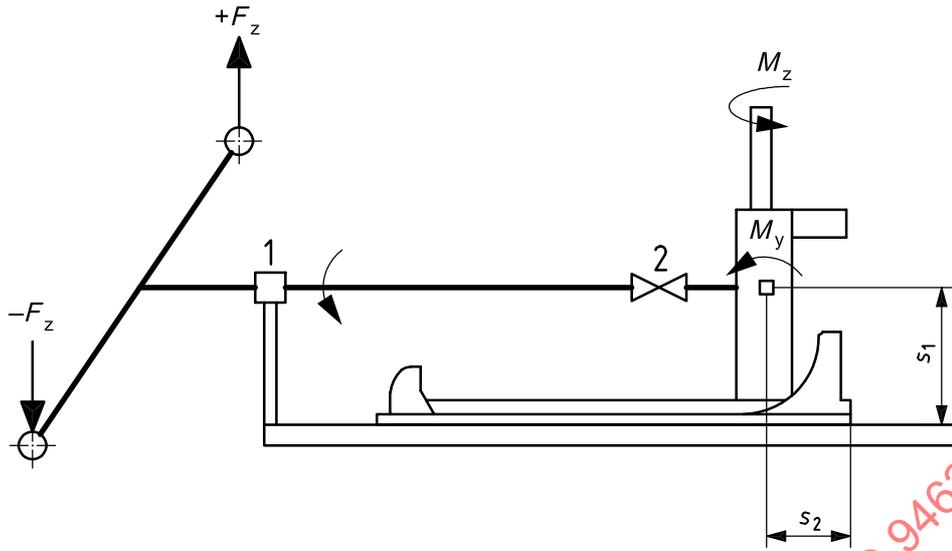$$M_x = 0,2 \times M_z \text{ (N·m)}$$

where

   M_z is the torque about z-axis;

   M_x is the torque about x-axis;

   M_y is the torque about y-axis (F_{AV});

   F_z is the force of M_x.

Key

1 axial ball bearing

2 cardanic joint

Figure A.2 — Influence of roll loading

A.3 Influence of backward lean (see 6.3.4.5)

Apply loads, see Figure A.3:

m (additional mass) = $(F_z/9{,}81) - m_x$

$m_x = m_{lever} + m_{balance}$ [mass (kg)]

$M_y = 1{,}25 \times M_z$

$F_z = (40\ \text{N}/6\ \text{N·m}) \times M_z$

$$\Delta L = (\text{m}) = \frac{1{,}25 \times M_z - M_{lever}}{(40\ \text{N}/6\ \text{N·m}) \times M_z - F_{lever}}$$
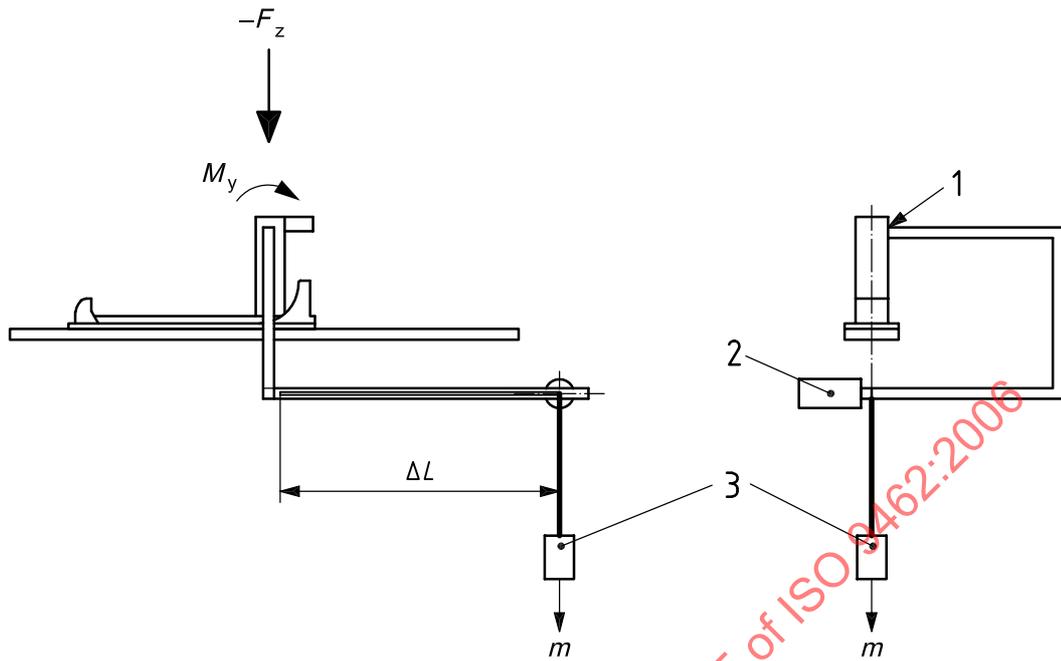
where

F_{lever} is the resulting force from the test device (without balance mass) in newtons;

M_{lever} is the torque moment of the mass from lever construction in newton metres;

ΔL is the adjustable length for additional mass in metres;

m is the additional mass.

The applied torque moment is the result of the adjustable length of the lever and the additional calculated force.

Key

1   moment and force
2   balance mass
3   additional mass

Figure A.3 — Influence of backward lean

A.4 Influence of axial force (see 6.3.4.6)

Apply loads, see Figure A.4:

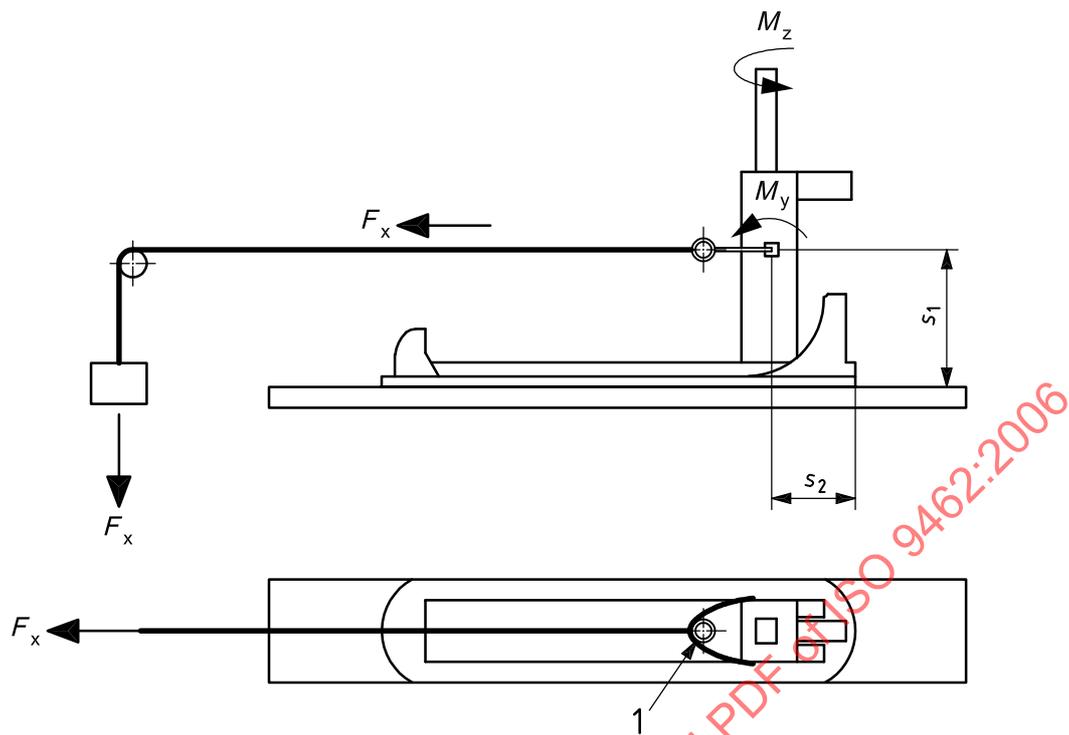$$F_x = (20/6) \times M_z \text{ (N)}$$

where

M_z is the torque about z-axis;

M_x is the torque about x-axis;

M_y is the torque about y-axis;

F_x is the force.

Key

1   roll

Figure A.4 — Influence of axial force

Annex B
(informative)

Fixtures and load configurations necessary for conducting tests using test method B

NOTE   The device described in ASTM F504 may be used to meet the requirements of test method B

B.1 Fixtures and test configurations

B.1.1   An individual release measurement shall consist of attaching a ski-binding system to the boots-test frame system and applying a load configuration sufficient to cause the binding mechanism to release while simultaneously recording information sufficient to determine the two peak M_z and M_y moments, see Figure B.1.
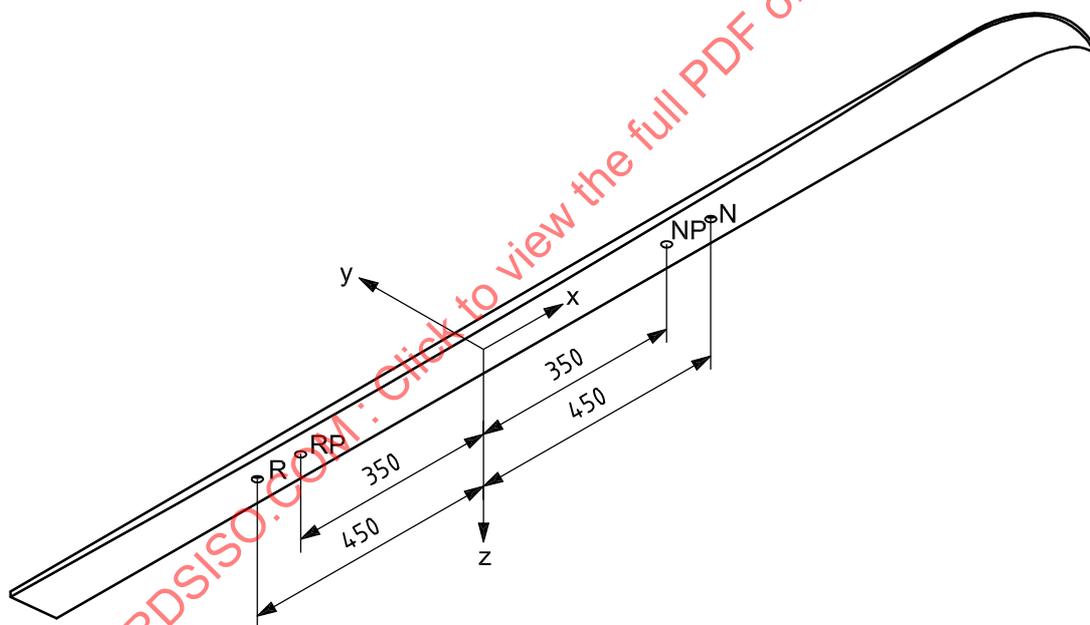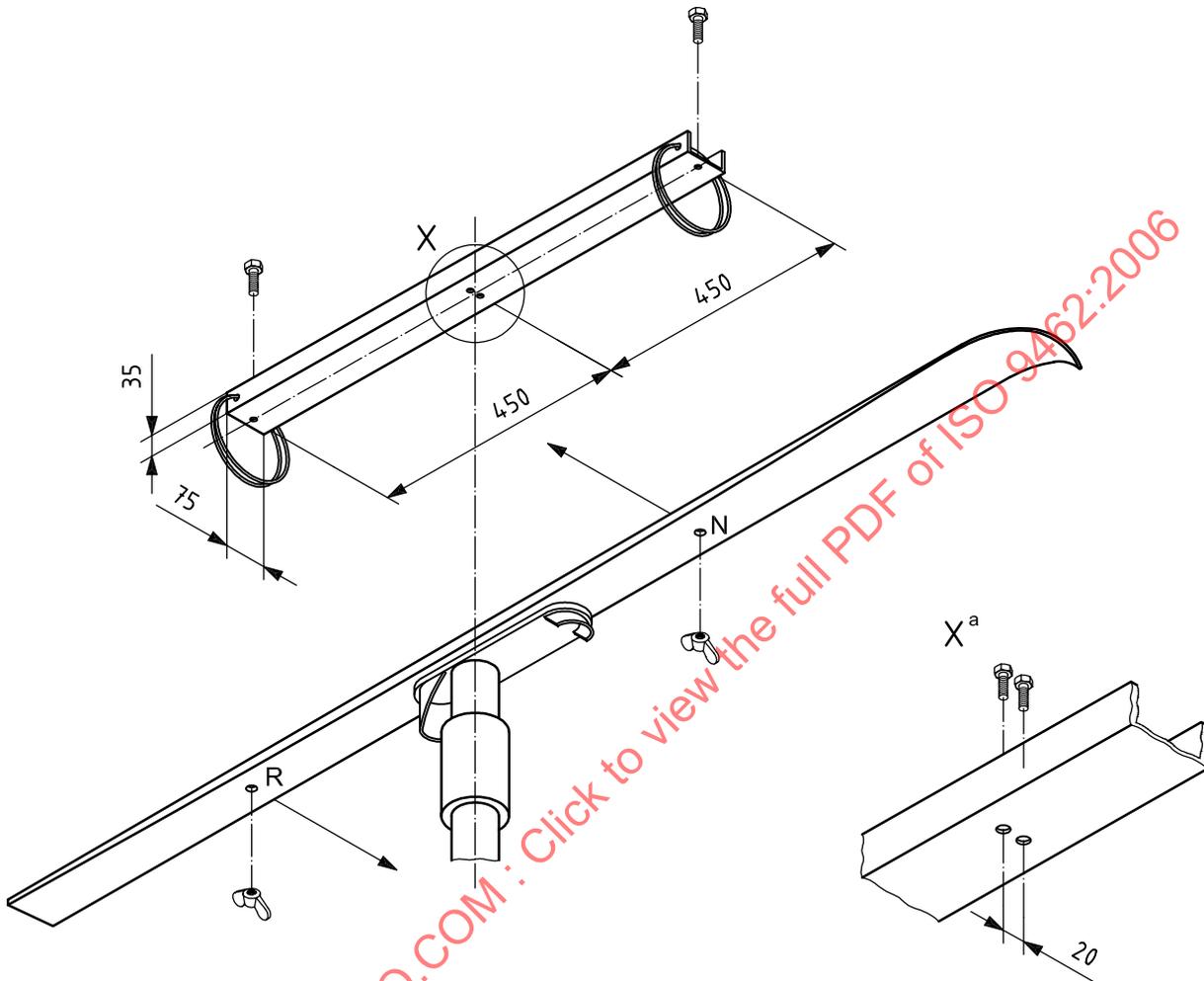
Dimensions in millimetres

Figure B.1 — Load application

Use the ski stiffening fixture described in Figure B.1 as defined in Figure 3 and Figure 5 unless otherwise specified. The release moments shall be prefaced by two equal and contrary tractive forces as shown in Figure B.2.

Dimensions in millimetres

[a] Enlarged view.

Figure B.2 — Ski stiffening fixture

B.1.2 The application of two equal forces for combined loads:

— for F_{NH} and F_{RH} should be as described in Figure 3;

— for F_{NV} and F_{RV} should be as described in Figure 5.

B.1.3   Use the fixture shown in Figure B.3 to perform the release with ski deflection test.

The parameters "l" and "f" are defined in Table 3.

Dimensions in millimetres
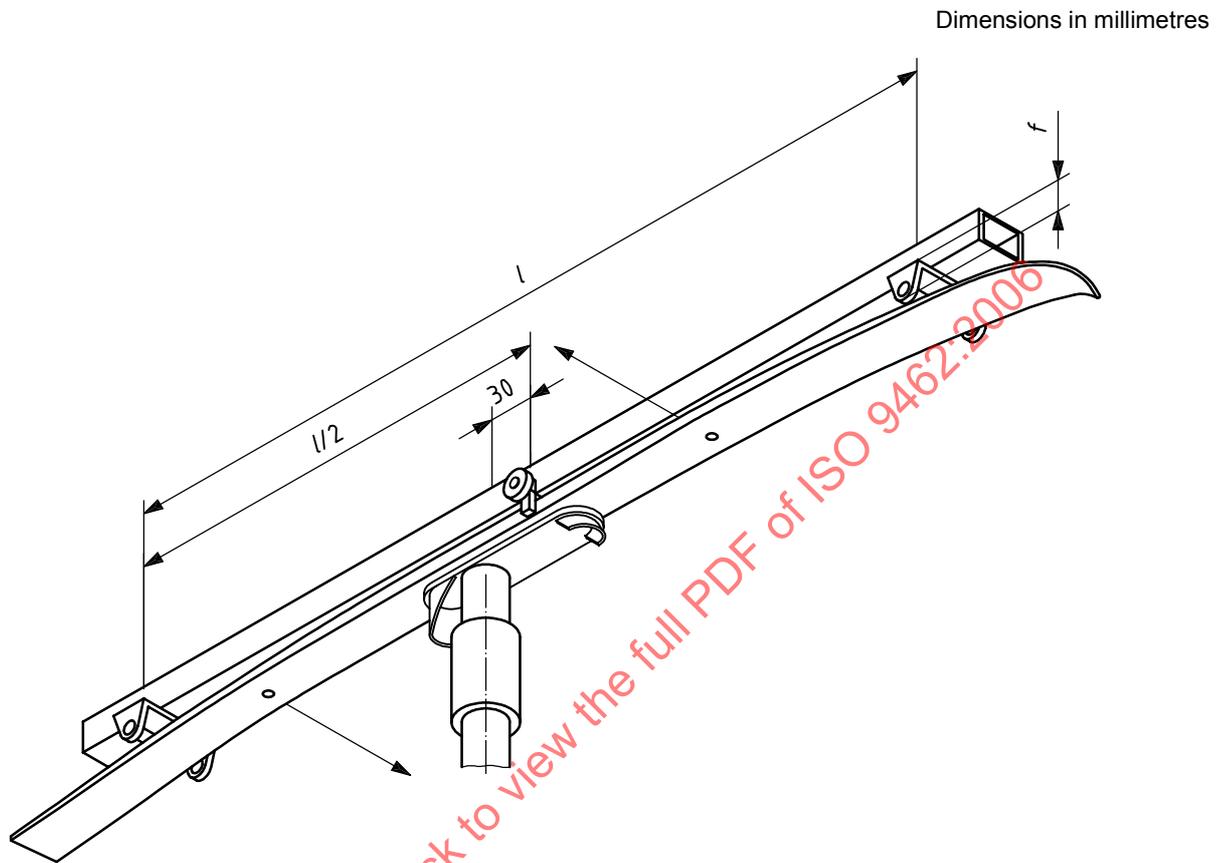
Figure B.3 — Release with ski deflection test

B.1.4 Use the load configuration shown in Figure B.4 to perform the release with combined loading test for influence of forward lean of the body. The term NP in Figure B.4 refers to the Near Preload Point located 350 mm forward of the z axis. PL refers to the force vector necessary to produce the required M_y preload.
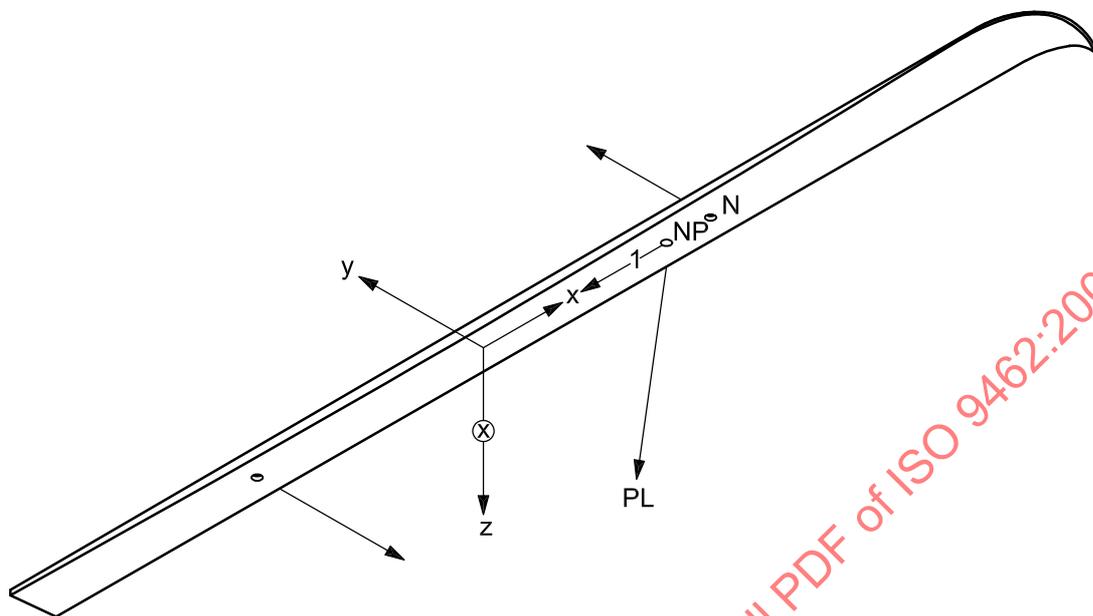
Key

N   near point loading

NP   Near Preload Point

PL   force vector necessary to produce the required M_y preload

Figure B.4 — Release with combined loading test for influence of forward lean of the body