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## Alpine ski-bindings — Requirements and test methods

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

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# Contents

	Page
Foreword.....	iv
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Test conditions.....</b>	<b>3</b>
4.1 Loading rate.....	3
4.2 Accuracy of measurement.....	4
4.3 Test sole.....	4
4.4 Test ski.....	4
<b>5 Test methods A and B.....</b>	<b>4</b>
5.1 Principle.....	4
5.2 Simple torsion test.....	4
5.3 Forward bending test.....	6
<b>6 Requirements and testing.....</b>	<b>7</b>
6.1 General requirements.....	7
6.2 Release tests — Setting, reproducibility, and symmetry of release values.....	9
6.3 Evaluation of reproducibility of release under different influences.....	10
6.4 Energy absorption (recentering).....	16
6.5 Lateral release under impact loading.....	16
6.6 Field tests.....	16
6.7 Exposure to corrosion and dirt.....	18
<b>7 Marking.....</b>	<b>18</b>
<b>Annex A (informative) Additional information to conduct tests according to test method A.....</b>	<b>20</b>
<b>Annex B (informative) Fixtures and load configurations necessary for conducting tests using test method B.....</b>	<b>25</b>
<b>Annex C (normative) Grain size distribution of dirt.....</b>	<b>32</b>
<b>Annex D (informative) Determination of tolerances on <math>M_z</math> and <math>M_y</math>.....</b>	<b>33</b>

## 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.

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 documents 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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 83, *Sports and recreational equipment*, Subcommittee SC 4, *Snowsports equipment*.

This fourth edition ~~is a technical revision of the third edition (ISO 9462:2006 and ISO 9462:2006/Amd.1:2009), which has been technically revised with the following changes:~~ ~~and replaces the third edition (ISO 9462:2006 and ISO 9462:2006/Amd.1:2009), which has been technically revised with the following changes:~~

- [Clause 3](#) new definitions [3.5](#), [3.6](#) and [3.7](#);
- deletion of Table 1 “Test ski characteristics”;
- modification of [5.1](#);
- addition of new [6.3.3](#) “Release with ski deflection”;
- new [Table 3](#) “Deflection of ski”;
- addition of new [6.3.4](#) “Release under combined loading”;
- in [6.6.2](#) deletion of ski lengths;
- addition of new [Clause 7](#) “Marking”;
- addition of new informative [Annex A](#) “Additional information to conduct tests according to test method A”;
- addition of new informative [Annex B](#) “Fixtures and load configurations necessary for conducting tests using test method B”.

# 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 documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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

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

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

ISO 9838, *Alpine and touring ski-bindings — Test soles for ski-binding tests*

ISO 11087, *Alpine ski-bindings — Retention devices — Requirements and test methods*

## 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 1 to entry: 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 1 to entry: 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

Note 1 to entry: For the torques  $M_z$  and  $M_y$ , see Figure 1.

Note 2 to entry: These values are generally adjustable on current bindings which have a scale and an indicator displaying the setting level.

Note 3 to entry: 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

Note 1 to entry: 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

Note 1 to entry: 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.

Note 2 to entry: For the loading, see Figure 1 and Table 1.

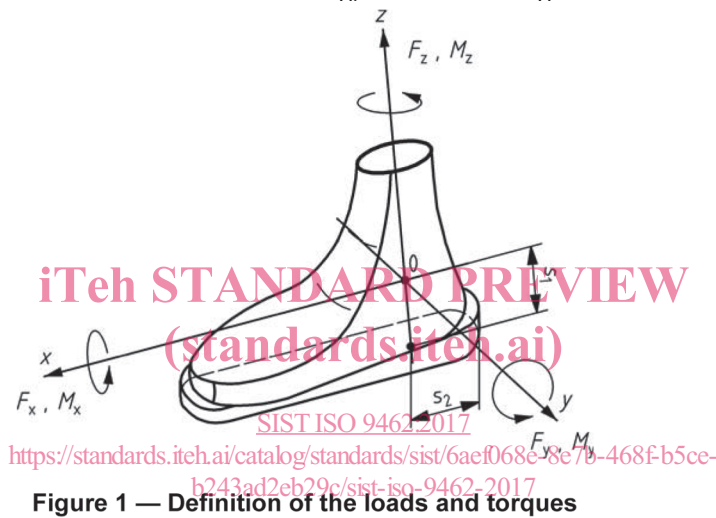


Figure 1 — Definition of the loads and torques

Table 1 — Coordinates of reference point 0

Dimensions in millimetres

	Type of binding		
	C (see 3.8)	CA (see 3.9)	A (see 3.10)
$s_1$	85	100	100
$s_2$	70	80	80

**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 1 to entry: 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, which can be adjusted to at least the following release values:

a)  $M_z = 10 \text{ Nm}$ ;

b)  $M_y = 37 \text{ m}$ .

### 3.9

#### 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)  $M_z = 20 \text{ Nm}$

b)  $M_y = 75 \text{ Nm}$

### 3.10

#### type A bindings

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

### 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 comply with:

a) torsion release:

The angular velocity of the test shall be for:

$M_z$  (moment in z-axis)

$3,8^\circ/\text{sec} \pm 0,1^\circ/\text{sec}$

FAV (moment in y-axis measured with force)

$5 \text{ mm/s} \pm 2 \text{ mm/s}$

b) forward bending release:

The angular velocity of the test shall be for:

$M_y$  (moment in y-axis)

3,8°/sec ± 0,1°/sec

FSH [Energy absorption (recentering)]

5 mm/s ± 2mm/s

## 4.2 Accuracy of measurement

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

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

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.

If a boot-binding system requires a specific boot-sole design, a test sole should be cut from a boot provided by the manufacturer and adapted for test needs.

The test sole shall be degreased, washed, and dried before testing.

## 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.

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# 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.

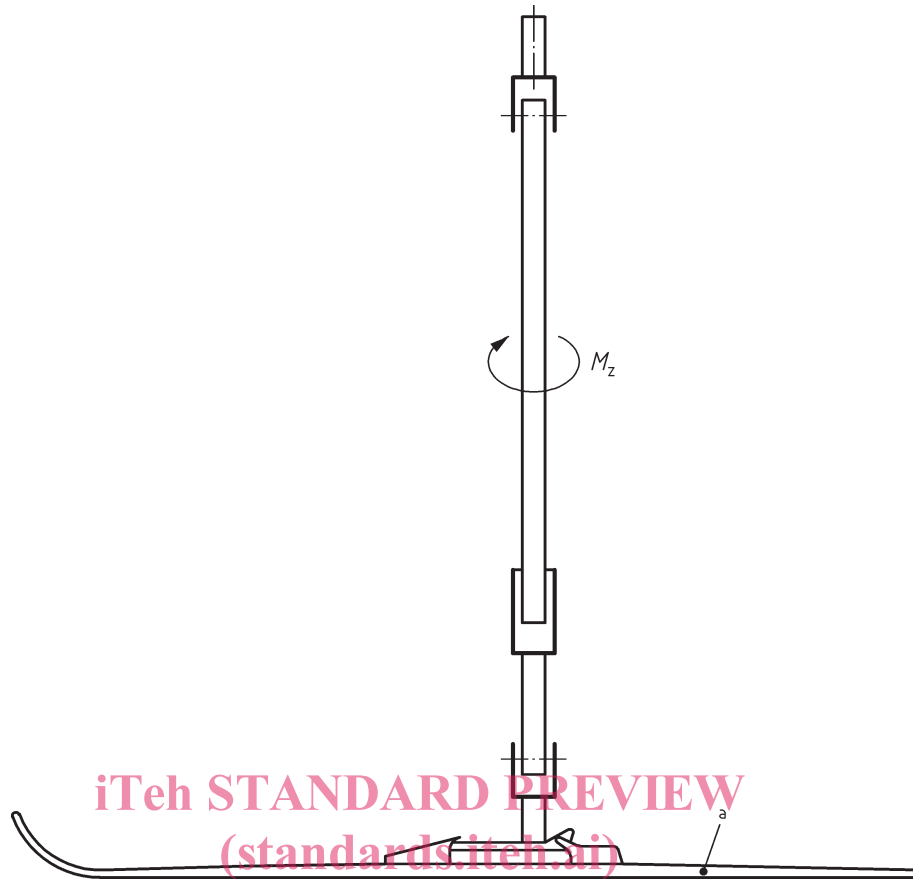
[Annexes A](#) and [B](#) give examples of how to realize method A or method B.

Passing by either method shall be deemed satisfactory.

## 5.2 Simple torsion test

For method A, see [Figure 2](#).



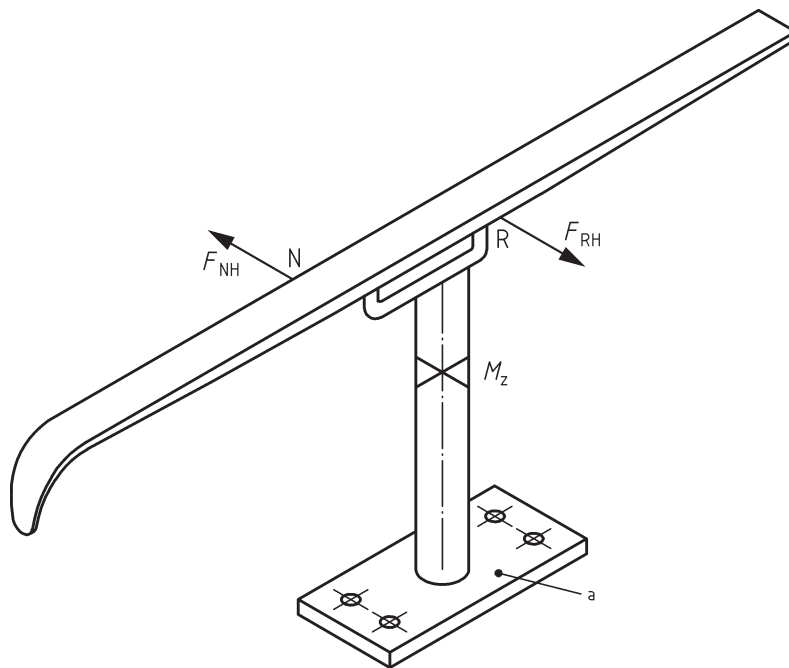
**Key**

a Fixed ski.

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**Figure 2 — Application of  $M_z$  torque and measurement of  $M_{z, \max}$** For method B, see [Figure 3](#).



**Key**

a Fixed base.

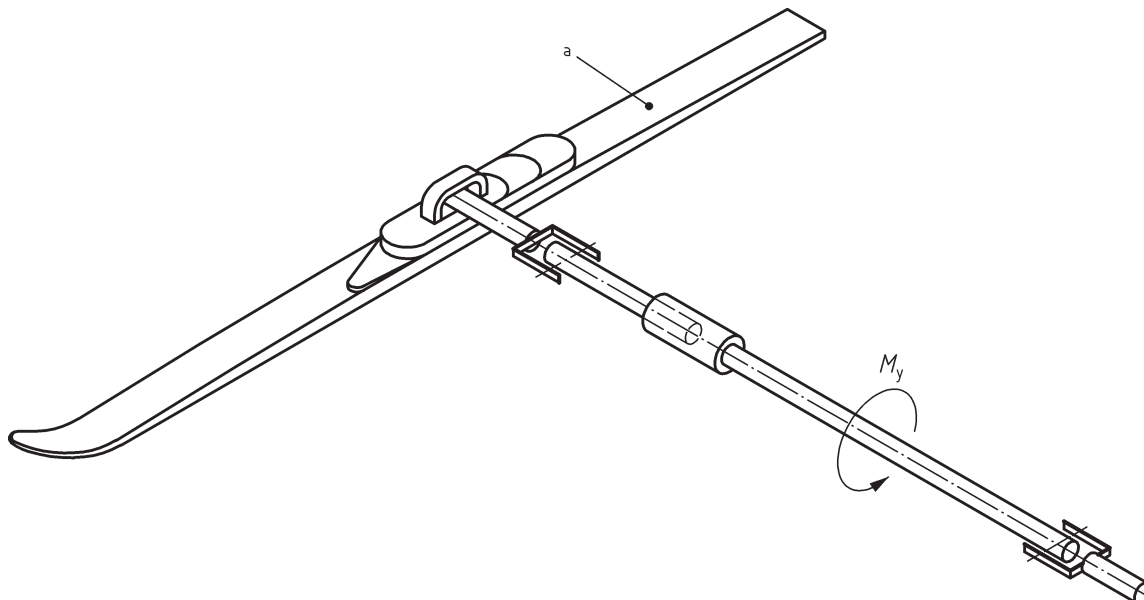
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**Figure 3 — Application of two equal forces  $F_{NH}$  and  $F_{RH}$  and measurement of  $M_{z, \max}$  torque**

**5.3 Forward bending test**

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For method A, see [Figure 4](https://standards.iteh.ai/catalog/standards/sist/6aef068e-8e7b-468f-b5ce-b243ad2eb29c/sist-iso-9462-2017).

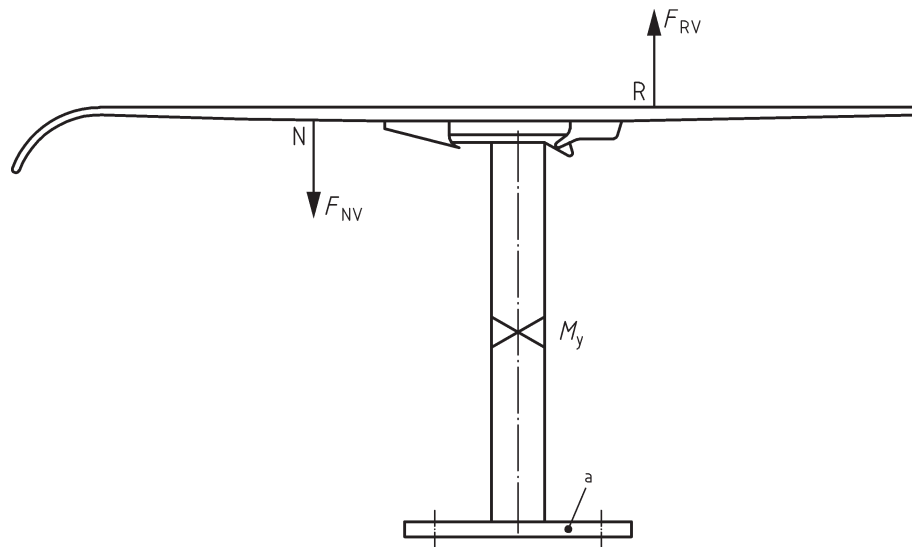


**Key**

a Fixed ski.

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

For method B, see [Figure 5](#).

**Key**

a 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, and
- 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 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 under the dangerous level for all possible movements, and until all the risks associated with the coupling boot-ski have disappeared.

**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. The ski-brake and the attachment for the leash shall be according to ISO 11087.

**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) the 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 centering of the sole and ways of controlling the length adjustment,
- g) the ways of performing the basic functional tests after mounting,
- h) recommendation for setting the binding with a setting device, and
- i) troubleshooting procedures for non-symmetric release and readjustment.

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### **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) the warnings against important modifications of the recommended setting,
- b) the 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) the recommendations for avoiding problems, for example increase of the release level with time,
- d) the instructions for maintenance, storage, and control of the binding,
- e) the 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, and
- g) the information on the appropriate ski-boots the binding is designed to function with.

## 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 10 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  $\pm 5$  Nm for  $Z = 1$  and then increases linearly to  $\pm 10$  Nm 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 10 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  $20\%$ .

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### 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

The tests shall be carried out at ambient temperature ( $23 \pm 5$ ) °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  $L_4$ .

The tests shall be carried out using the sole length corresponding to the setting mark, according to [Table 2](#).