# International Standard 7139

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# Cross-country skis — Determination of elastic properties

*Skis de fond — Détermination des caractéristiques élastiques*

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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.

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.



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# Cross-country skis — Determination of elastic properties

## 1 Scope and field of application

This International Standard specifies laboratory measurement methods to determine the elastic properties of cross-country skis. Its purpose is to calculate the resistance of defined parts of the ski to bending.

This International Standard applies to cross-country skis with a nominal length greater than or equal to 150 cm.

The standard measurement procedures are recommended in order to ensure comparability between laboratory measurement data, determined and published by ski manufacturers, institutions or others.

In this International Standard no attempt is made to relate the measurement data to the quality of the ski.



## 2 References

ISO 5902, *Alpine skis — Determination of the elastic properties.*

ISO 6289, *Skis — Terms and definitions.*[1)]

## 3 Definitions

For the definitions of spring constant, $c$, mounting point, MP, and nominal length, $l_N$, see ISO 6289.

## 4 Apparatus

**4.1** The apparatus for measuring the spring constant of the central section shall consist of

a) two supports, which are placed at a distance that is adjustable between 750 and 1 050 mm, with low-friction rollers of 20 mm diameter and wide enough to ensure that the test ski can be supported on its whole width. One of the supports with low-friction rollers has a device for clamping the end of the ski;

b) a load application device with an accuracy of ± 5 N for application of the test force $F_M$ mid-way between the supports by means of a contact ram with a radius of 10 mm and a width touching the whole width of the test ski;

c) a linear measuring device for measuring the deflection $f$ with an accuracy of ± 0,5 mm.

**4.2** The apparatus for measuring the shovel and rear spring constants shall consist of

a) a clamping device, consisting of a flat jaw and three clamps, ensuring that the whole width of the ski can be clamped (see figure 2 of ISO 5902);

b) a load application device with an accuracy of ± 2 N for application of the test forces $F_S$ and $F_R$ at an adjustable distance from the edge of the flat jaw of the clamping device by means of a low-friction roller of 20 mm diameter and wide enough to touch the whole width of the test ski;

c) a linear measuring device as specified in 4.1 c).

## 5 Sampling and conditioning

In order to ensure comparability it is recommended to use for publication only data of the following ski sizes :

150, 180 or 200 cm

From these three sizes the one which is most representative for the intended application shall be selected for the ski model concerned.

All measurements shall be taken from a finished ski without any ancillary equipment.

Before testing, the test ski shall be conditioned for at least 2 h at a temperature of 23 ± 5 °C.

1) At present at the stage of a draft.

## 6 Procedure

### 6.1 Determination of spring constant of the central section, $c_M$

Place the ski on two supports set at a distance of 0,5 $l_N$ with the binding mounting point MP mid-way between the supports using the apparatus specified in 4.1 and shown in figure 1.

Apply a pre-load of 10 N. Load the ski quasi-statically[1] with a test load of $F_M$ = 250 N. Read the deflection, $f_M$, in millimetres, caused by the test load, $F_M$, within 2 to 5 s after the test load has been applied.

### 6.2 Determination of shovel spring constant, $c_S$

Clamp the ski in the apparatus specified in 4.2 at a projected distance $x_{MP}$ + 0,25 $l_N$ from the tail as shown in figure 2.

Apply a pre-load of 10 N. Load the ski quasi-statically[1] with a test load of $F_S$ = 40 N. Read the deflection, $f_S$, in millimetres, caused by the test load $F_S$, within 2 to 5 s after the test load has been applied.

### 6.3 Determination of rear spring constant, $c_R$

Clamp the ski in the apparatus specified in 4.2 at a projected distance $x_{MP}$ − 0,25 $l_N$ from the tail as shown in figure 3.

Apply a pre-load of 10 N. Load the ski quasi-statically[1] with a test load of $F_R$ = 40 N. Read the deflection, $f_R$, in millimetres, caused by the test load $F_R$ within 2 to 5 s after the test load has been applied.

Dimensions in millimetres

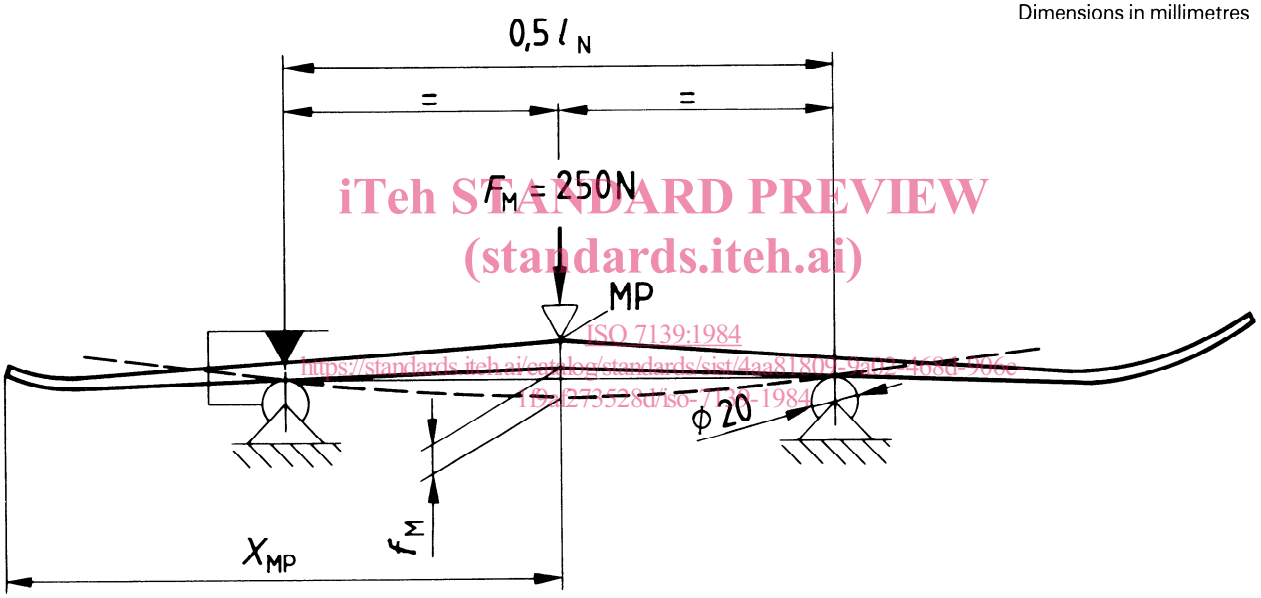




Figure 1 — Determination of spring constant of the central section, $c_M$

Dimensions in millimetres

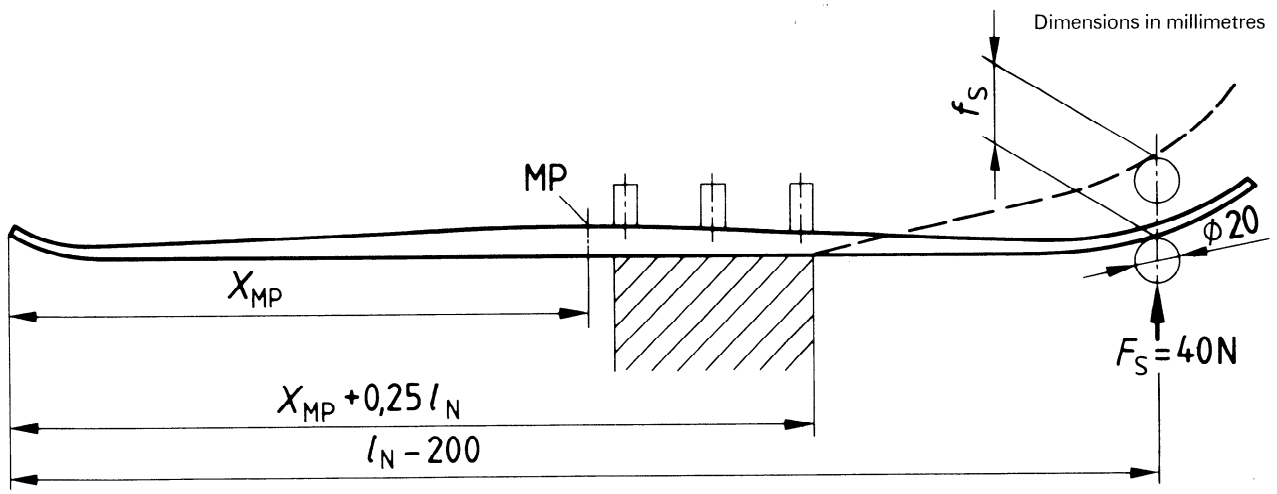


Figure 2 — Determination of shovel spring constant, $c_S$

1) This means that the rate of deflection is less than 20 mm/min.

Dimensions in millimetres

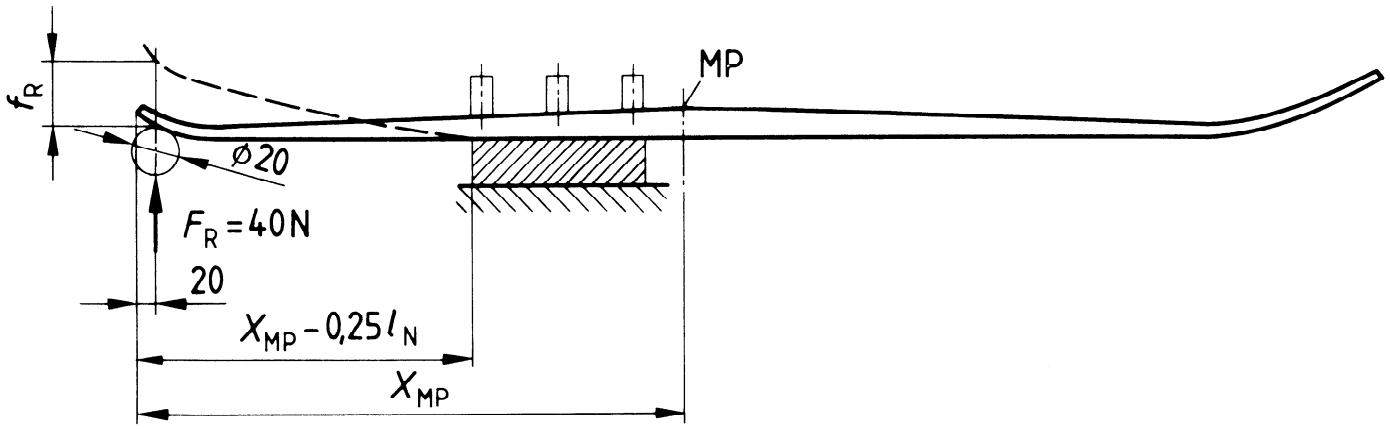


**Figure 3 — Determination of rear spring constant, $c_R$**

## 7 Expression of results

For each property, calculate the single results of three tests, recording their mean.

The recommended unit for the spring constant, $c$, is newtons per millimetre (N/mm).

## 8 Tolerances

If data are published by the manufacturer with reference to this International Standard, the following tolerance range shall be observed :

all spring constants ± 20 %

## 9 Test report

The test report shall include the following particulars :

a) reference to this International Standard;

b) name of distributor or manufacturer;

c) trade mark and model designation;

d) nominal length;

e) imprinted serial number;

f) test results (see clause 7);

g) any deviation from this International Standard with an explanation of the reason for the deviation.

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