Designation: F780 – 93a (Reapproved 2012)

# Standard Test Method for Linear Deformation and Breaking Strength of Alpine Skis[1]

This standard is issued under the fixed designation F780; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This test method covers the determination of linear deformation load and breaking load for Alpine skis.[2]

1.2 This test method is applicable to all Alpine skis.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

2.1 *ASTM Standards:*[3]

D2240 Test Method for Rubber Property—Durometer Hardness

F472 Terminology for Geometry of Alpine Skis

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *breaking load ($F_B$)*—the maximum load applied in accordance with Sections 6 and 7 (that is, the maximum load which the ski can sustain).

3.1.2 *deformation load ($F_D$)*—the load applied in accordance with Section 6 that causes a permanent deformation of 1 mm at the load application point of the ski.

## 4. Significance and Use

4.1 This test method provides information concerning the resistance of a ski to permanent bending and an indication of its basic strength. It is not intended to evaluate the data with regard to the quality of the ski.

## 5. Apparatus

5.1 This test method shall be conducted on a device (see Fig. 1) equipped with adjustable supports, a load (*F*) application system (*1*) with a range of at least 20 000 N and reading accuracy of ±50 N, and with an instrument (*2*) for reading bending deformation (*d*) with an accuracy of 0.01 mm. The system must have a controlled deflection rate. A standard universal tension/compression testing machine with X – Y recorder (*3*) is typical of such a system.

5.2 The test method is made with the ski in its normal horizontal position, and the overhanging portions of the ski are left free to deflect.

5.3 The test system shall be set up in accordance with Fig. 1 (Section A) with a 250-mm distance between supports and one support made with a 25-mm diameter, low-friction roller at point of contact with the ski. The end support shall be so designed as to have a hinged clamp which prohibits linear displacement, yet permits rotation about the support. The load is applied through a plate as shown in Fig. 1 (Section B), 25 mm wide and of length equal to or slightly greater than the width of the ski, made up of a steel plate (*5*) and a hard rubber (95 ± 5 Shore A durometer; see Test Method D2240) layer (*4*). The plate must be free to rotate under loading ram.

## 6. Determination of Load Application Point

6.1 In order to obtain comparable values, the test shall be conducted at the load application point with a separation between the supports of 250 ± 0.5 mm. Determine the load application point by moving the ski in a longitudinal direction on the supports until a deflection is obtained under a load of 600 ± 5 N in accordance with the table shown below:

| Ski Length, $L_N$, mm (see Terminology F472) | Deflection, mm | Tolerance, mm |
|---|---|---|
| $1700 \leq L_N$ | 2 | 0.03 |
| $1400 \leq L_N < 1700$ | 4 | 0.03 |
| $1000 \leq L_N < 1400$ | 6 | 0.03 |
| $0750 \leq L_N < 1000$ | 8 | 0.03 |

## 7. Procedure

7.1 Condition the ski for 24 h minimum at a temperature of 23 ± 5°C. Place the ski as shown in Fig. 1, and set up the system to apply the load midway between the supports. The stiffness of the ski at point of loading must be within the 3 %

[1] This test method is under the jurisdiction of ASTM Committee F27 on Snow Skiing and is the direct responsibility of F27.30 on Skis and Boots.

Current edition approved March 1, 2012. Published April 2012. Originally approved in 1982. Last previous edition approved in 2006 as F780 – 93a (2006). DOI: 10.1520/F0780-93AR12.

[2] This test method is meant to conform in all meaningful ways to the ISO standard ISO/DIS 6265, available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[3] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

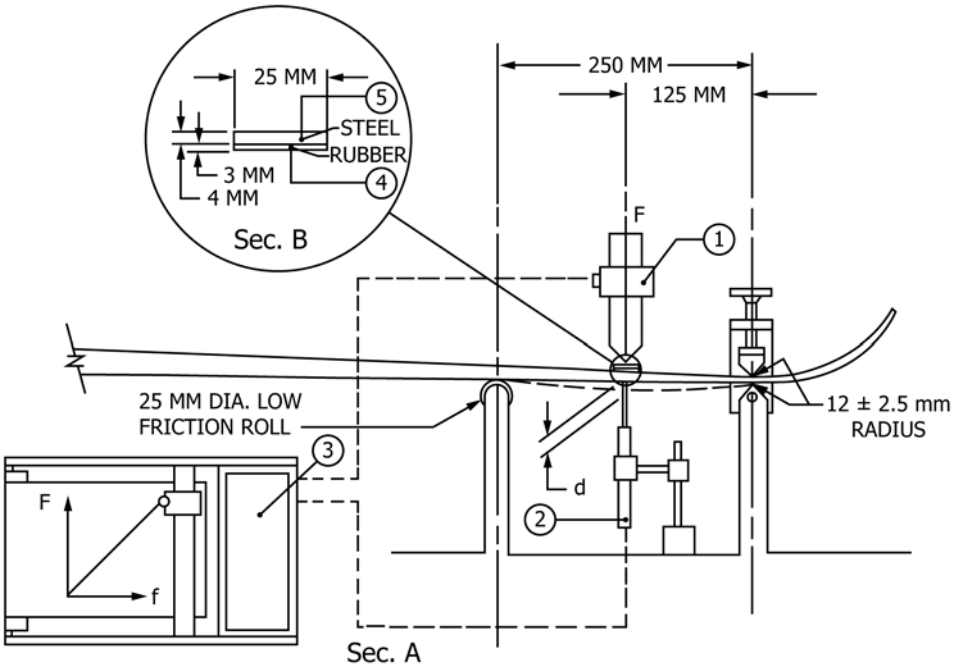


**FIG. 1 Test System for Linear Deformation and Breaking Strength of Alpine Skis**

tolerance under a load of 600 ± 5 N; noncomparable information will result otherwise. Load the ski at a rate sufficient to increase the deflection by 25 ± 5 mm/min, until the load deflection curve changes to a negative slope indicating failure of the ski.

## 8. Interpretation of Results

8.1 The test data obtained from a load-deflection diagram is shown in Fig. 2. The deformation load, $F_D$, is determined by drawing a straight line parallel to the linear portion of the load-deflection diagram through that point on the abscissa which equals a deflection of 1.0 mm. The intersection of that line with the load-deflection curve determines the deformation load $F_D$. The maximum load on the diagram is defined as the breaking load $F_B$.

## 9. Report

9.1 Report the following information:

9.1.1 This designation, ASTM F780,

9.1.2 Brand, model, manufacturer's serial number, and size of ski, and

9.1.3 Any deviation from the procedure and reasons therefore.

## 10. Precision and Bias

10.1 *Precision*—It is not practical to specify the precision of the procedure in this test method because the test is destructive.

10.2 *Bias*—The procedure in this test method has no bias because the values for torsion characteristics of alpine skis are defined only in terms of the test method.

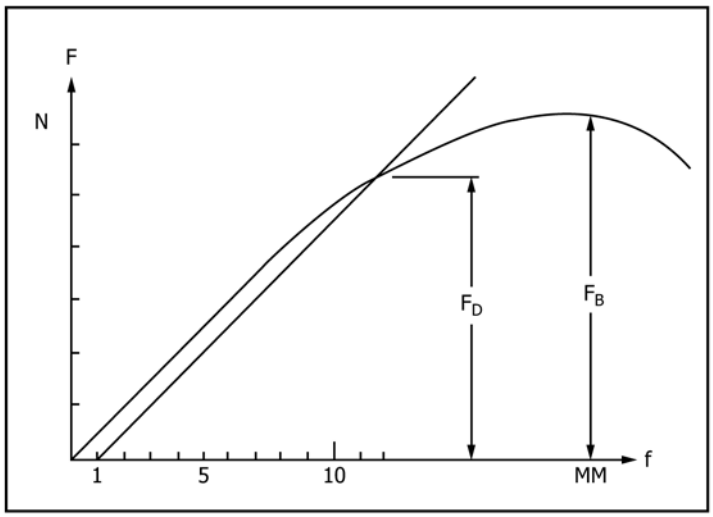


**FIG. 2 Load - Deflection Diagram**

## 11. Keywords

11.1 Alpine skis; breaking strength; Alpine skis; linear deformation; Alpine skis; test methods