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Standard Test Method for Torsion Characteristic of Alpine Skis[1]

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1. Scope

1.1 This test method covers the measurement of ski forebody torsion and ski afterbody torsion of adult Alpine skis.

1.2 No limitation to ski size is proposed. 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. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *afterbody torsion angle,* θ_A—that angle, in degrees, to which the running surface is rotated at Point *A* when a moment, M_t, is applied at Point *A* as shown in Fig. 1.

2.1.2 *afterbody torsional spring constant,* C_A—the moment per degree of rotation of the ski afterbody when the ski is clamped in accordance with Fig. 1 and the moment applied in accordance with Fig. 2.

$$C_A(\mathrm{N \cdot m/deg}) = \frac{M_t}{\theta_A}$$

2.1.3 *forebody torsion angle,* θ_F—that angle, in degrees, to which the running surface is rotated at Point *F* when a moment, M_t, is applied at Point *F* as shown in Fig. 1.

2.1.4 *forebody torsional spring constant,* C_{TS}—the moment per degree of rotation of the ski forebody when the ski is clamped in accordance with Fig. 1 and the moment applied in accordance with Fig. 2.

$$C_F(\mathrm{N \cdot m/deg}) = \frac{M_t}{\theta_F}$$

2.1.5 *moment of torsion,* M_t—the moment in newton-metres applied to rotate the ski about its longitudinal axis when the ski is clamped according to Fig. 1 and the moment is applied according to Fig. 2.

3. Significance and Use

3.1 This test method provides a means for determining the torsional stiffness of Alpine skis. It is not intended to evaluate the data with regard to the quality of the ski.

4. Apparatus

4.1 *Clamping Fixture*, to grip the ski as a vise with a flat, rigid jaw and three clamps with at least 150 +50, –0 mm spacing between them. One clamp is located at each end of the fixture and one in the center as illustrated in Fig. 1. The clamps should be at least 30 mm wide and cover the full width of the ski.

4.2 *Torsion Head*, shown in Fig. 2, with low-friction moment (≤0.2 N·m) and quasistatic loading system having a clamping fixture described in 4.1. Common devices for this loading system are a weight on a cable wrapped around the head, or a weight on a lever arm rigidly attached to the head. The torsion head clamping fixture should have a width of 10 ± 1 mm and a length equal to or greater than the width of the ski. The base surface of the torsion head fixture to the ski base should be in the same plane as the clamping fixture (that is, camber forced out of ski in clamped position).

4.3 *Scale*, to measure the torsion angle with an accuracy of 0.5°.

5. Procedure

5.1 Test skis at room temperature (23 ± 5°C) without specific preconditioning. Torsion head and clamping fixture are adjusted such that the distance between them is *C*/2 ± 2 mm shown in Fig. 1. Mount the ski to the clamping fixture so that the ski forebody or ski afterbody can rotate freely about Point *M*. The torsion head is attached to the ski at Point *A* or *F* ± 2 mm such that the longitudinal axis of the ski is in the center of the torsion head. Apply a moment, M_t, of 20 ± 0.2 N·m. (The moment should be applied quasistatically.) The torsion angle must be read within 2 to 5 s after the torsion moment, M_t, is initially applied.

6. Calculation

6.1 Calculate the afterbody torsional spring constant, C_A, in newton-metres per degree, in accordance with the following equation:

[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.

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