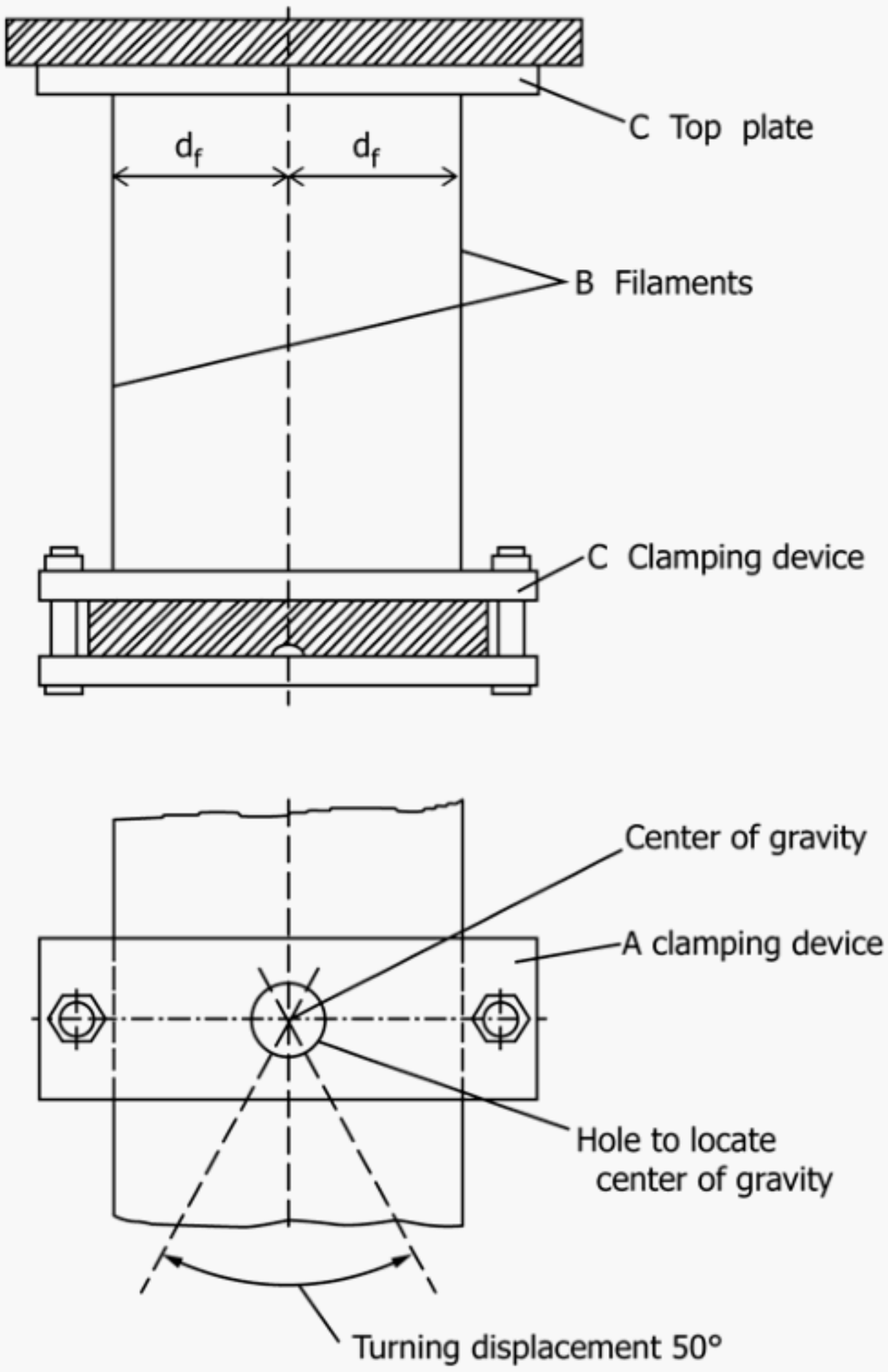

FIG. 1 Measuring Device

length), should be within 3 cm of the value chosen. From these three sizes, choose the one that is most representative of the tested model.

6.2 All measurements shall be taken from a finished, manufactured ski without any mounted parts.

6.3 All measurements shall be taken from a ski that has been conditioned in a standard atmosphere 20/65 (ISO 554) (that is, the ski shall be placed in this atmosphere for at least 24 h prior to measurements being taken).

7. Calibration of Measuring Device

7.1 Differences in construction between the different measuring devices can lead to different measurement results, which deviate from the theoretical value of the polar moment of inertia. In order to reduce such deviations, it is recommended that a test equipment validation factor, c, be determined for each measuring device.

7.2 The test equipment validation factor is determined from the ratio of the calculated moment of inertia to the measured moment of inertia of a bar of steel with dimensions 1 to 8 by 20 to 30 by 1200 to 1700 mm. To ensure accurate measurements, it is important that the steel bar be level when placed in the test device. Any vertical displacement of the steel bar may alter calculation of the test device evaluation factor.

7.3 The theoretical moment of inertia, I_{th}, is calculated from the following formula:

$$I_{th} = \frac{m(a^2+b^2)}{12} \tag{1}$$

where:

a = length of the bar, m,
b = width of the bar, m, and
m = mass of the bar, kg.

7.4 Using this theoretical value and the measured value, the test equipment validation factor, c, can be determined from the following formula:

$$c = \frac{I_{th}}{I} \tag{2}$$

where:

I_{th} = theoretical polar moment of inertia, and
I = measured polar moment of inertia.

7.5 The test equipment validation factor, c, should fall within a range from 0.9 to 1.1. If c lies outside this range, the test equipment shall be checked and brought into conformity with this test method.

8. Procedure

8.1 Measure the mass of the ski with the weighing device (5.1).

8.2 Place the ski on the fulcrum (5.2) until it balances, to determine the center of gravity. Mark the center of gravity on the ski surface.

8.3 Mount the ski in the clamping device, A, (5.4.1) in such a way that the center of gravity mark is in the center of the hole in the top clamping fixture midway between the two filaments. The longitudinal center axis shall be perpendicular to a line drawn between the two filaments, B (see Fig. 1).

8.4 Let the ski come to rest suspended in the device. Eliminate any swinging motion. It is important that the test area be free of air movement, as this affects test accuracy.

8.5 With the hand, rotate the ski horizontally about its axis of gravity. Lateral displacement of the center of gravity exceeding 10 mm shall be avoided. The twist angle should be approximately 25°.

8.6 After displacing the ski, release it to swing freely around the perpendicular axis through the center of gravity. The time required for the ski to complete at least five cycles is recorded with the stopwatch (5.3). The time for one oscillation, T, is determined by the following formula:

$$T = \frac{\text{recorded time}}{n} \tag{3}$$

where:

n = number of cycles recorded.

9. Expression of Results

9.1 *Mass of the Ski*—Express the mass of the ski, m, in kilograms.

9.2 *Moment of Inertia of the Ski*—Express the moment of inertia of the ski, I, in kilogram-metres squared, using the following formula:

$$I = \left(\frac{T}{2\Pi} \right)^2 \text{mg} \frac{d_f^2}{l} \quad (4)$$

where:

T = period of oscillation, s,
m = mass of the finished manufactured ski without any ancillary parts, kg,
g = acceleration due to gravity, m/s^2,
d_f = half-distance between the filaments measured on the top plate, m, and
l = length of the filaments, m.

10. Tolerances

10.1 *Measurement Tolerances:*

Mass	±0.02 kg
Moment of inertia	±0.02 kg-m^2

10.2 *Tolerances on Published Data*—If data are published by the manufacturer with reference to this test method, the following tolerances shall be observed:

Mass	10 %
Moment of inertia	10 %

11. Report

11.1 Report the following information:
11.1.1 Reference to this test method,
11.1.2 Name of ski manufacturer,
11.1.3 Model designation of ski,
11.1.4 Nominal length of ski,
11.1.5 Registration number of ski, and
11.1.6 Any deviation from this test method, with an explanation of the reason for the deviation.

12. Precision and Bias

12.1 *Precision*—The precision of this test method is currently being determined.

12.2 *Bias*—There should be no bias in measurement of mass if the specification in 5.1 is followed. Bias in measurement of the moment of inertia is controlled by the test equipment evaluation factor described in Section 7.

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