



Standard Practice for Units of Measurement and Conversion Factors for Pulp, Paper, and Paperboard¹

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1. Scope

1.1 This practice covers the application of the International System of Units (abbreviated SI) within the field of pulp, paper, and paperboard. The SI units have been adopted by ISO, ASTM, and TAPPI as the preferred units for use in their standards and test methods.

1.2 Details of SI are given in various parts of ISO Standards 31 and 1000, and in ASTM Standard E 380. Application of this information is not always easy, as some properties cannot at this time be expressed in SI, some can be expressed in various units all within SI, and various multiples can be used. Such variation can lead to confusion in reporting test results and in quoting values for properties.

1.3 In order to overcome such problems within the pulp, paper, and paperboard field, ISO/TC6 has recommended appropriate units in ISO Standard 5651. These recommendations are reproduced in this practice, together with other information and recommendations.

2. Referenced Documents²

2.1 ASTM Standards:

E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)³

2.2 ISO Standards:

ISO 31 Quantities, Units and Symbols, Parts 0–13⁴

ISO 1000 SI Units and Recommendations for the Use of Their Multiples and of Certain Other Units⁴

3. Summary of Practice

3.1 This practice covers the units recommended for use in expressing the properties of pulp, paper, and paperboard and other quantities found in the pulp, paper, and paperboard documents. It also provides the conversion factors for converting customary units to metric units or other recommended

units, and marks with an asterisk (*) when the conversion factor is exact.

3.2 Units recommended in ISO 5651 are marked (+) or (#), with the latter indicating that the recommended unit for pulp, paper, and paperboard is not a preferred SI unit.

3.3 The international symbol for each unit is given in square brackets [] following the name of the unit.

4. Significance and Use

4.1 Uniformity in expressing the results of testing and in quoting property values is needed for improved communication in commerce and research.

4.2 The table of recommended units and symbols and the rules for using them provided in this practice will aid in achieving uniformity.

5. Procedure

5.1 In converting from the customary units to the recommended form, multiply the test value expressed in customary units by the conversion factor to obtain the test value in the recommended form. As an example, suppose that the property of interest is the thickness of a sheet of paper, and that this has been determined to be 5.3 mils. Examination of the table shows that in Section 1.2, Thickness, the conversion factor from mils to micrometres, is exactly 25.4. Multiplying 5.3 by 25.4, the test value in the recommended units is 134.62 μm. Generally, the converted value should be rounded to the same number of significant figures or one more than in the value in customary units, depending, respectively, on whether the first digit of the new value is more or less than that of the original value. Thus, in this case, the converted value would be 135 μm.

NOTE 1—The rounding rule given here is easy to remember and does not result in the loss of significant information. For more detailed information on rounding, see ASTM Practice E 380.

5.2 If the property of interest had been the thickness of corrugated board of, for example, 180 mils, the value would be converted to millimetres, not micrometres. The conversion factor is 0.0254 and the value in the recommended form is 4.57 or 4.6 mm, depending on whether the zero in the last digit of 180 is significant or simply holding the decimal place.

5.3 Generally, if the table allows a choice in the recommended form, choose that form that would have no more than three significant figures in front of the decimal point for most

¹ This practice is under the jurisdiction of ASTM Committee D-6 on Paper and Paper Products and is the direct responsibility of Subcommittee D06.92 on Test Methods.

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² For the full titles of the standards and other documents listed in the table, see the ISO, ASTM, and TAPPI indexes.

³ *Annual Book of ASTM Standards*, Vol 14.02. (Excerpts in Related Material section of all other volumes.)

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.