

AATCC Style Guide for Writing Test Methods

1. Introduction

1.1 AATCC test methods are used in many different ways, and by many different types of users. Hence, it is important that they be written in as precise a manner as possible.

1.2 AATCC policy prohibits endorsement of commodity specifications. The results obtained by the methods should not be construed as commodity specifications.

2. Organization of Test Methods

2.1 Scope

2.1.1 All AATCC test methods are required to contain the sections identified in the list below by an asterisk. Test methods may also contain the additional sections shown in the list. However, in order to promote uniform style, the additional sections may only be used in the sequence shown. And, the titles or headings of the sections may not be replaced with other terms.

2.2 Subdivisions

2.2.1 The following is the prescribed order for the text of AATCC test methods:

- *Title
- *Activity History
- Foreword
- *Purpose and Scope
- *Principle
- Referenced Documents
- *Terminology
- *Safety Precautions
- Uses and Limitations
- Apparatus, Reagents, Materials**
- Verification, Calibration**
- Sampling
- *Specimens
- Conditioning
- Preparation of Apparatus, Specimens, Reagents**
- *Procedure
- *Calculations, Interpretation, Evaluation**
- Report
- *Precision and Bias
- Additional References
- Notes
- Appendices

*Required for all test methods.

**Use appropriate heading.

2.3 Numbering of Sections

2.3.1 Using the modified decimal system, number each series of sections and subdivisions serially and set off these numbers by periods (decimal points) to indicate the particular part of the method from the largest division or section, down to the individual paragraphs. For example: "2." indicates the second principal section of a method; "2.3 and 2.14" designate respectively the third and fourteenth subdivisions of primary division 2.; similarly, "2.14.10" designates the tenth paragraph or subdivision of the fourteenth division of the second section of the method.

2.3.2 Use no longer than three-place numbers. For example: A two-place number means 2.14; a three-place number means a symbol such as 2.14.1 or 2.14.10. This numbering not only shows at a glance the arrangement of the written material, but also permits simple and specific cross referencing. Numbers with more than three places defeat the purpose of simplicity. The need for more than three places can usually be avoided by making more primary and secondary subdivisions of the subject or by using fewer subdivisions.

2.4 Title

2.4.1 Name the property to be measured, not some quality to be inferred. Keep the title explicit and terse. For example: "Loss of Strength in Rayon Cloth by Exposure to Sulfurous Acid"; not "Resistance of Fabric to Acid Damage." "Biological Oxygen Demand in Textile Mill Effluents" not "Stream Sanitation."

2.4.2 In order to simplify finding methods in alphabetical listing, key words that describe the general nature of the test should be used in the beginning of the title followed by more specific descriptive terms. For example, AATCC Method 162, Colorfastness to Water: Chlorinated Pool.

2.5 Activity History

2.5.1 State briefly the history of the test method including the number of the committee which developed it, the first year of publication and the year of all subsequent reaffirmations, editorial revisions and technical revisions. Also list any similar test methods of other organizations such as ISO.

2.6 Foreword

2.6.1 A history of the rationale for the development of the method may be included to help clarify the need for the method.

2.7 Purpose and Scope

2.7.1 Name the properties to be tested, the material to which the tests are applicable and the characteristics to be inferred. If the method contains a series of tests on several attributes, list them.

2.7.2 Keep all methods anonymous; they are pronouncements of AATCC.

2.8 Principle

2.8.1 Briefly sketch the technique, outlining the fundamental physical and chemical concepts involved.

2.9 Referenced Documents

2.9.1 List any AATCC, ASTM, ISO or other test method cited in the test method, by numerical designation, and title.

2.9.2 To cite references, use the format of Chemical Abstracts.

2.10 Terminology

2.10.1 Define all terms not found in the ordinary desk dictionary, and all terms used in some specialized sense. Define terms that are used only in one restricted branch of the textile industry. If a definition is taken from some other publication, quote it in full and give due credit by complete attribution.

2.10.2 Define all key terms in titles to ensure that all persons referring to or using the test method understand its intent.

2.11 Safety Precautions

2.11.1 A generic caveat on precautions shall appear in all test methods.

2.11.2 This generic caveat shall appear in the Safety Precautions section of the appropriate test methods.

2.11.3 The generic caveat shall be: NOTE: These safety precautions are for information purposes only. The precautions are ancillary to the testing procedures and are not intended to be all inclusive. It is the user's responsibility to use safe and proper techniques in handling materials in this test method. Manufacturers MUST be consulted for specific

details such as material safety data sheets and other manufacturer's recommendations. All OSHA standards and rules must also be consulted and followed.

2.11.4 Where the test method does not involve the use of hazardous materials, operations and equipment, an exception to the inclusion of the generic caveat may be presented to AATCC Committee RA100 on Safety, Health and Environmental Technology.

2.11.5 Specific precautionary statement(s), where appropriate, shall be included in the body of the test method. These statements shall not prescribe specific remedial measures and actions. However, reference may be made to authoritative sources where reliable information concerning remedial measures can be obtained.

2.11.6 When a specific precautionary statement(s) exists in a test method, reference to the appropriate section(s) shall be made following the generic caveat.

2.12 Uses and Limitations

2.12.1 Show how the test results may best be used, and discuss inferences that may legitimately be drawn from the data. Point out where the results are not useful and particularly where they might be misleading.

2.12.2 State categories wherein the method should not be attempted. Particularly where they might be misleading.

2.13 Apparatus, Reagents, Materials

2.13.1 Separate the subject into two or three separate sections if there will be more than 10 items per section. In a text note, show where any unusual item may be procured. Check the source for availability.

2.13.2 Do not include preparation of reagents or calibration of apparatus in this section.

2.13.3 Include as apparatus only special equipment which is not in the catalogs of laboratory supply houses, or apparatus which is rarely used. Include spectrophotometers, projection microscopes and Launder-Ometers. Do not include such ordinary items as scissors. Common glassware, such as beakers, burettes, and flasks, need not be listed, but may be listed, if it is felt test method efficacy is enhanced.

2.13.4 List all reagents—acids, bases, salts, etc.—using chemical names not trade names; for example, sodium hydroxide, not caustic soda. Include chemical formulae for all reagents. If a complex organic compound is used the formula may be omitted but the proper name as accepted by the Geneva Convention should be used.

2.13.5 Unless otherwise stipulated, assume all chemical reagents are of ACS Reagent quality; and construe "water" as distilled or deionized to not over 15 ppm total solids and not less than 50,000 ohms resistance.

2.13.6 Among materials, include unusual things like multifiber test fabric, standard color swatches, standard photographs of defects and reference spectra.

2.14 Verification, Calibration

2.14.1 Instruments and equipment must be periodically verified to protect against any drift due to time, wear or accident. Such checks may be made by the operator every time a test is performed, or perhaps daily, like checking the zero point of analytical balances. The check may be rarely performed, as when installing new apparatus or setting up after a major relocation; or the check may be part of good laboratory management that is performed as weekly or monthly routine. Include day-to-day verification in PROCEDURE. Infrequent checks belong in a separate appendix. Include verifications that are part of laboratory routine and which should be put on a regular schedule.

2.14.2 Besides mechanical adjustments, include calibration curves, standard curves and verification of normality (or molarity) of standard solutions.

2.14.3 Describe the preparation of standard reagents; also standard curves or tables relating the quantity of an unknown with reference to color transmission, conductance, pH or other property of a standard solution.

2.15 Sampling

2.15.1 Test results are valid only when the samples are statistically representative.

2.15.2 Sampling must be random. Every unit of product must have a mathematically equal chance of becoming a sample; and every portion of each sample must be equally likely to become a test specimen.

2.15.3 All specimens must be alike within the variations due to pure chance. There must be no differences within samples assignable to known causes. If test results are not in a normal or other recognizable distribution, the test method is not in control.

2.15.4 Include in each method a brief sampling plan. State either the number of specimens to test per sample and the number of samples per product, or else state the required coefficient of variation of the mean, and permit the operator to determine the number of specimens.

2.15.5 If the number of tests is stipu-

lated in a method, state the expected precision of the mean and the probability. If the operator is to compute the number of tests, to meet a stipulated precision of a mean, provide an expected coefficient of variation (CV) from background experience. If (CV) is unknown, provide for its estimation by methods in any standard test on statistics, or consult ASTM Standard D 2905, Statements on Number of Specimens Required to Determine the Average Quality of Textiles.

2.16 Specimens

2.16.1 Describe the size, shape and weight of specimens. Include any limitations on the location or choice of test material; but put details of trimming, mounting and conditioning in other sections.

2.17 Conditioning

2.17.1 Specify the atmospheres in which the specimens must be pre-conditioned and conditioned for testing.

2.17.2 If the samples or specimens must reach moisture equilibrium, state it something like: "Let specimens reach moisture equilibrium with atmosphere at [(a) ± (b)] °C, [(x) ± (y)] °F, and [(m) ± (n)]% Relative Humidity. Approach equilibrium from the dry side (but not oven-dry)." If the final moisture regain is critical, stipulate also the preconditioning time, temperature and relative humidity.

2.17.3 Define moisture equilibrium as having been attained when the progressive gain in weight does not exceed (k)% of conditioned weight per hour of exposure.

2.18 Preparation of Apparatus, Specimens and Reagents

2.18.1 Include here all preparatory or preliminary steps. Include trimming edges of specimens, pulling threads to trace weave patterns, leveling and adjusting equipment, etc.

2.19 Procedure

2.19.1 Procedures are operating instructions for technicians and must permit trained technicians, working in separate laboratories, to obtain results that are comparable within agreed limits, with little or no other guidance.

2.19.2 State all operating instructions clearly, simply and unequivocally. Leave no room for differing techniques. Recite every needed detail in proper sequence.

2.19.3 If the container is a critical item, name it, such as "a 250-mL wide-mouthed Erlenmeyer flask." If time is important, state narrow limits. Specify the temperature of the water as "water at

140-160°F,” not “hot water”; “water at room temperature” not “rinse in cold water.” State the measure as “add 10.00 ± 0.02 mL” not “add exactly 10 mL.”

2.19.4 Indicate the number of significant figures to record in observations. Be sure the accuracy is mathematically justified.

2.19.5 When two equally acceptable procedures give statistically interchangeable results, spell out each procedure and state that either may be used.

2.19.6 Write procedures in the second person imperative format.

2.20 Calculation, Interpretation, Evaluation

2.20.1 Calculation involves straightforward computation without exercise of opinion. Include as calculation all requisite algebra and arithmetic. State exactly what is to be computed and how. State the number of significant figures required in all calculations.

2.20.2 For subsequent reference in texts, number each equation in a sequence by a numeral in parentheses at the right margin of the line.

2.20.3 Indicate multiplication by parentheses () () and division by the solidus (/). Write:

$$x = 100 (A - B)/C$$

$$y = 100 (0.00587) (A - B)/C$$

2.20.4 Keep formulas on one line of typescript if possible. Write:

$$x = (A - B)/C$$

2.20.5 Use symbols in current use. For x is less than or equal to y , write:

$$x \leq y$$

2.20.6 Restrict equations to symbols and numerals. Write:

$$x = 100 (A - B)/C$$

where:

x = iron as Fe, percent of oven dry specimen weight.

2.20.7 Keep all numerals at the left side of expressions that contain both numerals and letters. Write:

$$x = 100 (0.00587) (A - B)/C$$

2.20.8 Do not condense chemical or physical equations. It makes checking of computations difficult. Write:

$$x = 100 (0.00587) (A - B)/C$$

2.20.9 Confirm the position of the decimal point in all decimal fractions by putting a zero in the units column. Write:

$$a = 0.3010B$$

2.20.10 When a mathematical development requires two or more lines, place the statements in column, repeating only the equality sign. Write:

$$\begin{aligned} n &= (t^2)(v^2)/(e^2) \\ &= (1.96^2)(7.5^2)/(5^2) \\ &= 8.6 \\ &= 10 \text{ (to the nearest higher multiple of 5)} \end{aligned}$$

2.20.11 Show the basis of percentage statements. Write:

“Moisture content, % of conditioned

weight”

2.20.12 Include a sample computation whenever an equation is long, involved or in the least degree difficult to reduce to English.

2.20.13 Use the heading “Interpretation” in place of or in addition to “Calculation” when the results are expressed in descriptive form, relative terms or as abstract values. Such results may be expressed in terms of a 5 to 1 rating scale with 5 being best and 1 being worst.

2.20.14 Evaluation of test results implies consideration of several factors, pro and con, and arrival at a considered decision in view of the whole situation. For example color transfer is evaluated against the International Gray Scale, in which hue, brightness and saturation of color in a stained specimen is translated against a scale of graduated neutral gray chips that have neither hue nor brightness but solely the property of saturation.

2.21 Report

2.21.1 Specify the detailed information to be reported.

2.21.2 Require that the test method be cited, and the procedure if there is a choice.

2.21.3 Report in tabular form series of test results involving several samples, several products or numerous replicates. Include a sample work sheet or report form and include typical computations.

2.21.4 Each report must contain, as a minimum:

(a) Arithmetic mean or average ($\bar{X}$)

(b) The number of tests (n)

(c) Standard deviation (s) or coefficient of variation ($\%CV$)

Statement of a mean without the number of tests and precision is essentially useless.

2.21.5 AATCC policy prohibits endorsement of commodity specifications. The ratings suggested in some of the methods serve as a guide; but they are not intended for and must not be construed as commodity standards.

2.22 Precision

2.22.1 *Precision*. A statement on precision allows potential users of the test method to assess in general terms its usefulness in proposed applications. (For an extended discussion, see ASTM D 2906, Statements on Precision and Bias for Textiles.) A statement on precision is not intended to contain values that can be exactly duplicated in every user's laboratory. Instead the statement provides guidelines as to the kind of variability that can be expected between test results when the method is used in one or more reasonably competent laboratories, and

when the test method's use is in statistical control. No valid statement can be made about precision unless the use is in statistical control.

2.22.2 Variation in test results is a consequence of variation of the material tested, variation in application of the test method and the character of the test method or a combination of any of these variables. With respect to a test method, the statement about precision shall refer to the variation that results from application of the test method to material in which the variation is as small as can reasonably be attained.

2.22.3 The measures of precision discussed below and the presence or absence of statistical control shall be estimated with an interlaboratory test program. When the test results appear to come from certain discrete distributions, precision could be calculated without an interlaboratory test but statistical control could not be established.

2.22.4 Where testing is required to determine precision, every test method shall strive to contain a statement (1) about the precision of test results obtained in the same laboratory under specifically defined conditions of *within-laboratory* variability, and (2) about the precision of test results obtained in different laboratories. The specifically defined *within-laboratory conditions* may concern test results obtained on the same material by the same operator using the same equipment within a short period of time, or *within-laboratory* precision may be reported for other specific conditions; for example, between days or between operators. Describe the particular within-laboratory variability for which precision is reported in detail. The statement regarding *between-laboratory* variability must pertain to test results obtained in different laboratories on the same material.

2.22.5 If the test result data are continuous variates, give the standard deviation or coefficient of variation, whichever is appropriate, and the applicable components of variance for each type of precision that is reported. In any case, the precision statement shall give the 95% critical difference for *within-laboratory* and for *between-laboratory* test data. If the precision is not the same for all materials, then give the precision for each material used in the interlaboratory test that was used to obtain the precision measurements.

2.22.6 File the data obtained in the interlaboratory study and the detailed analysis of the data at the AATCC Technical Center.

2.22.7 The required statement of precision shall contain the information specified above or an explanation as to why a statement is not practicable. The absence of a statement on precision is not war-