Designation: D 4968 – 0~~0~~2

Standard Guide for Annual Review of Test Methods and Specifications for Plastics[1]

This standard is issued under the fixed designation D 4968; 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 guide is intended to assist the subcommittees and sections of Committee D20 on Plastics with the process of standards evaluation during the five-year review mandated by ASTM or when changes to test methods and specifications are required.

NOTE 1—There is no known ISO equivalent to this guide.

2. Referenced Documents

2.1 *ASTM Standards:*

D 883 Terminology Relating to Plastics[2]

[1] This guide is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.13 on Statistical Methods.

Current edition approved ~~March~~ August 10, 200~~0~~2. Published ~~June 2000.~~ October 2002. Originally published as D 4968 – 89. Last previous edition D 4968 – 9~~8~~00.

***A Summary of Changes section appears at the end of this standard.**

D 5033 Guide for ~~the~~ Development of ASTM Standards Relating to ~~the Proper~~ Recycling and Use of Recycled Plastics[3]
E 456 Terminology Relating to Quality and Statistics[4]
E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[4]

3. Terminology

3.1 *Definitions*— For definitions of terms that appear in this guide, refer to Terminology E 456.
3.2 Guidelines for terminology in standards which are referenced in BOCA National Codes are given in Appendix X3.

4. Significance and Use

4.1 It is the intention of this guide to provide information to persons revising test methods and specifications in Committee D20 to ensure that all required elements are included and that the revised document is presented in the most user-friendly manner possible.
4.2 This guide is intended for use by Committee D20 when test methods and specifications under its jurisdiction are revised due to technical changes or upon five-year review.
4.3 The flowchart in Annex A1 shows the review process in outline form.
4.4 Specific instructions to be followed when revising Committee D20 documents are given in this guide.
4.5 The model precision and bias (P and B) statements included in Appendix X1-Appendix X3 were developed to standardize the presentation of data.

5. Evaluating the Need for Revisions

5.1 Society regulations require that all D20 standards be reviewed in detail every five years. Ballots to revise individual sections of a document (which may change the date of issue) do not absolve the responsible D20 subcommittee from the requirement to conduct the detailed review every five years. Begin the review for revision, reapproval, or withdrawal at least one year prior to the required revision year, that is, four years after the last full review. The date of the last complete document review must be listed in the Summary of Changes section at the end of the document.
5.2 The first step in the review process is to determine if the document under review should to be balloted for:
5.2.1 Reapproval without change,
5.2.2 Reapproval with editorial changes,
5.2.3 Revision with technical changes, or
5.2.4 Withdrawal.
5.3 *Using the Flowchart*:
5.3.1 The flowchart for review of standards is found in Annex A1. The following describes the details for each step of the flowchart.
5.3.2 *Is Any Action Advisable?*—If the review of the standard using the guidelines in this guide and the current version of the *ASTM Form and Style for ASTM Standards* (Blue Book) indicate no needed changes, ballot the standard for reapproval without change.
5.3.3 *Should the Standard Be Withdrawn?* —If the examination of the standard indicates that it is obsolete or basically flawed in light of more recent knowledge, ballot for withdrawal. Ballot for withdrawal should also be done if the document is replaced by a more current document.
5.3.4 *Is a Task Group Required?*—If changes to the document are to be considered, the subcommittee or section chairperson may appoint a task group to recommend revisions.
5.3.5 *Are Changes Editorial?*—If the subcommittee, section, or task group considers the intended changes to be editorial in nature, the appropriate standards editor at ASTM Headquarters should be consulted. If the changes meet the qualifications for editorial revision, the document can be changed without balloting. However the document must still be balloted for reapproval at least every five years regardless of editorial changes.
5.3.6 *Is Technical Revision Necessary?* —If it is decided that the changes needed in the standard modify the technical content in any way, or if the review using this guide finds missing elements, technical changes must be balloted. If major changes are needed, a subcommittee ballot is suggested. Otherwise a concurrent subcommittee, Main Committee, and Society ballot may be circulated for vote.
5.3.7 *Model Precision and Bias (P and B) Statement*:
5.3.7.1 It is a requirement of ASTM that all test methods have a precision and bias section. For test methods that produce a numerical test result, an interlaboratory study should be conducted in accordance with Practice E 691.

NOTE 2—Practice E 691 requires a minimum number of six laboratories generating usable data for a round robin for an acceptable round robin. As a result, Practice E 691 may not be applicable in all cases. Other statistical practices may be used if they yield equivalent information and have been reviewed by Subcommittee D20.13 on Statistics.

[2] *Annual Book of ASTM Standards*, Vol 08.01.
[3] *Annual Book of ASTM Standards*, Vol 08.03.
[4] *Annual Book of ASTM Standards*, Vol 14.02.

5.3.7.2 If a round robin cannot be accomplished prior to initial balloting of a test method, single-laboratory data must be used in the P and B statement. Use the model statement in Appendix X1 as a guide. No test method may be published without at least a single-laboratory P and B statement.

5.3.7.3 The American Society for Testing and Materials requires that a round robin be performed, if possible, within five years of the test method's initial publication. If insufficient laboratories are available to complete a round robin by the five-year review, the statement in Appendix X1 may still be used, but the statement in Appendix X2 must be added.

5.3.7.4 When acceptable round-robin data is developed, it shall be written using Appendix X3 as a guide and balloted for approval as a technical change. Documentation for the round robin shall be assembled in a technical report and submitted to the staff manager. A footnote documenting the report number should be included in the standard.

6. Revising the Standard

6.1 Keep the audience in mind.

6.1.1 There are many different users of ASTM standards. When revising documents, write the standard to be of use to the proper audience. This may seem difficult since a standard can be used by such diverse users as design engineers, product specifiers, quality control persons, testing laboratory managers, and technicians who will perform tests.

6.1.2 Keep in mind, however, that certain sections of the documents are directed at different audiences. For example, the procedures section of a test method will primarily be used by the technician who does the test. Write this section in an imperative mood giving direct instructions on how to do the test, just as you would if you were speaking to the person. Do not add extra explanations, and so forth. Be direct and to the point. Think about where the explanations might better be included as, for example, in an appendix.

6.1.3 Sections such as the scope are to give direction to the user on how and for what the standard is to be used. Setup and calibration will be used by a test laboratory manager, and so forth. For each section, think about who the user will probably be and write that section to give the most direct and usable information to the potential user in the most concise and understandable manner possible.

6.2 Upon request, your staff manager can provide a copy of the standard to be revised on disk for use in revisions. It is best to strikeout deleted portions of the existing text and to **use bold type for insertion of new text**. Another good method is to cut and paste by placing the original text in the left column of a page and placing the revision notes in the right column of the page. See Examples 1 and 2 in the appendix of this guide.

6.3 Whenever a document is revised and circulated for ballot, it must be accompanied by a cover letter that explains the purpose of the ballot.

6.4 When circulating a standard for ballot, the standard shall have the following working caveat in bold print on the front page of the revision draft:

~~***This document is not an ASTM Standard. It is under consideration within an ASTM Technical Committee, but has not received all approvals required to become an ASTM standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of ASTM Committee activities except without the approval of the Chairman of the Committee having jurisdiction and the President of the Society. Copyright ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.***~~

This document is not an ASTM Standard. It is under consideration within an ASTM Technical Committee, but has not received all approvals required to become an ASTM standard. It shall not be reproduced or circulated or quoted, in whole or in part, outside of ASTM Committee activities except without the approval of the Chairman of the Committee having jurisdiction and the President of the Society. Copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

6.5 Reference *Form and Style for ASTM Standards* for further guidance in the preparation of standards not referenced by this guide.

7. Reviewing Test Methods

7.1 Use the following assessment sections as an aid in test method review. Committee D20 test methods can become more complex than necessary. One of the advantages to be gained in the five-year review is to make them very user friendly. Read each section. If it is not clear and does not contain the points mentioned in this section, rewrite it!

7.2 *Assessing the Title*—Determine if the title accurately defines the test method described. Change it if it does not.

7.3 *Assessing the Scope*—The scope should contain the following essential items:

7.3.1 Clearly state the purpose of the test method in one or two sentences.

7.3.2 If there are any cautions or concerns regarding the use of the results of the test method or how it is performed, insert the following sentence in the Scope: See the Significance and Use section for cautions in using this test method.

7.3.3 Committee D20 considers SI units to be primary. The scope must include the sentence shown in 7.3.3.1 in accordance with Blue Book instruction; or if the subcommittee chairperson gives permission, the sentence shown in 7.3.3.2 can be used instead. Make these numbered paragraphs in either case.

7.3.3.1 "The values stated in SI units are to be regarded as standard."

7.3.3.2 "The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard."

7.3.4 Ensure that the test method has the following mandatory caveat included as a numbered paragraph in the scope.

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.

7.3.5 If specific hazards are known, put them in a Hazards section and cite any appropriate additional warnings.

7.3.6 A note must be added to the scope (or revised to comply) with one of the following four formats for an ISO equivalency statement. A further explanation of the choices can be found in Appendix X2 to this guide. Use one of the following:

7.3.6.1 There is no known ISO equivalent to this standard.

7.3.6.2 This test method is identical to ISO ____.

7.3.6.3 This test method is equivalent to ISO ____.

7.3.6.4 This test method is not equivalent to ISO ____, and results cannot be directly compared between the two methods.

7.3.6.5 When sections of the test method are equivalent, but other sections or portions are not, a combination of 7.5.6.3 and 7.5.6.4 may be used to inform the user which portions of the ASTM test method are equivalent and which are not.

NOTE 3—For example, this test method is equivalent to ISO ~~xxxx~~ XXXX in the measurement of abc in Section x.x.x. It is not equivalent to ISO ~~xxxx~~ XXXX in any other measurement or section.

7.4 *Referenced Documents*:

7.4.1 Ensure that all ASTM standards (including the document designation and title) that are cited in the text of the standard are referenced in this section.

7.4.2 Also list other organizations' standards if they are referenced in the text.

7.5 *Terminology*:

7.5.1 A terminology section is now mandatory. If the document does not have this section, it must be added.

7.5.2 Determine from the text a list of terms used which the user may not understand.

7.5.3 Check Terminology D 883 for the terms. If any terms appear in the document which appear in Terminology D 883, include a reference to Terminology D 883 in the Terminology section.

7.5.4 Check the subcommittee chairperson for specific terminology documents which may apply to the standard. Reference these if a term is included.

7.5.5 If a term is listed in the document which is not found in the terminology documents, develop a definition and include the term in the Terminology section of the update to be balloted. In addition, submit the definition to the chairperson of Subcommittee D20.92 for review and possible inclusion in Terminology D 883.

7.6 *Summary of Test Method (Optional)* —Include a brief outline of the test method. Describe essentially how the test method is performed without any details of the procedure or sequence.

7.7 *Significance and Use*—Examine the Significance and Use section. Ensure that it includes the following and write it in the imperative mood.

NOTE 4—The imperative mood is one in which direct instructions are given as if you were speaking to a person. An example would be: "Results from this test are intended for use in quality control. Do not use them as criteria for design."

7.7.1 State when, where, and why the test method should be used.

7.7.2 State how the test method is to be used by industry.

7.7.3 State how suitable the test method is for use in specifications.

7.7.4 For test methods where appropriate, add the following statement:

~~Before proceeding with this test method, reference should be made to the specification of the material being tested. Any test specimen preparation, conditioning, dimensions, or testing parameters, or combination thereof, covered in the materials specification shall take precedence over those mentioned in this test method. If there are no material specifications, then the default conditions apply."~~

Before proceeding with this test method, reference should be made to the specification of the material being tested. Any test specimen preparation, conditioning, dimensions, or testing parameters, or combination thereof, covered in the relevant ASTM materials specification shall take precedence over those mentioned in this test method. If there are no relevant ASTM material specifications, then the default conditions apply."

7.7.5 State what are the significant features of the test ~~method are.~~ method.

7.7.6 State any appropriate warnings which restrict the use of the results of the test method.

7.8 *Interferences*— If the successful execution of the test method requires explanatory statements on interference effects, briefly

list the constituents or properties that are most likely to cause interference, and the amounts that they are known to interfere.

7.9 *Apparatus*:

7.9.1 If the required equipment for performing the test method is no longer available, ballot the test method for withdrawal.

7.9.2 If the equipment is available from only one manufacturer, the source for obtaining the equipment must be listed.

7.9.3 If there are two or more sources of the equipment for performing the test method, no mention of the equipment manufacturer or where the equipment can be obtained may be mentioned.

7.9.4 In some cases the following statement may be used:

It is believed that the instrument specified in this test method is no longer commercially available.

7.10 *Hazards*:

7.10.1 Point out safety precautions in this section or in the notes where appropriate in the text if specific hazards are known.

7.10.2 Cite any precautions or warnings at the end of the generic safety hazards caveat.

7.11 *Sampling, Test Specimens, and Test Units*—Give instructions for any sampling techniques in the imperative mood.

7.12 *Preparation of Apparatus*—Give instructions in the imperative mood.

7.13 *Calibration and Standardization* —Give instructions in the imperative mood.

7.14 *Conditioning*:

7.14.1 Specify, in the imperative mood, the conditioning atmosphere required during the test and the time of exposure to the atmosphere.

7.14.2 If the wording of the conditioning section contains the term "...for those tests where conditioning is required...," replace this wording with "...unless otherwise specified by ~~the~~ contract or relevant ASTM material specification..."

7.15 *Procedure*—Give instructions in the imperative mood. It is important that this be a step-by-step instruction which could be used to perform the test method.

7.16 *Calculation*— State the directions for calculating the results in the imperative mood.

7.17 *Report*—State detailed information required in reporting the results of the tests.

7.18 *Precision and Bias*:

7.18.1 All test methods must have a precision (P) and bias (B) section.

7.18.2 The precision data presented in this test method are representative of the conditions defined in the standard. However, material preparation and specific test conditions in the ASTM material specification may result in a deviation from the P & B, requiring separate study.

7.18.3 If the test result is a nonnumerical report of success or failure or other categorization or classification based on criteria specified in the procedure, use the following statement of P and B: No information is presented about either the precision or bias of Test Method XXXX for measuring (insert here the name of the property) since the test result is nonquant~~at~~itative.

7.18.4 If a round robin has been conducted, refer to the instructions for including the P and B in Appendix X3 of this guide, including appropriate wording.

7.19 *Keywords*—List in alphabetical order appropriate terms for indexing, selected from both the title and body of the document and including general, vernacular, and trade items.

7.20 *Summary of Changes*:

7.20.1 List all changes from the last revision so that persons reading the standard will know what items are different from previous additions.

7.20.2 List the year of the last complete review/revision of the standard.

8. Reviewing Specifications

8.1 *Assessing the Scope*—Clearly state the purpose of the specification in one or two sentences.

8.1.1 State whether SI units or other units are preferred.

8.1.2 If the specification contains test methods within the body of the document include the following caveat in the scope:

> The following safety hazards caveat pertains only to the test method described in this specification: *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.*

8.1.3 *Assessing the Referenced Documents Section*—Ensure all ASTM standards cited in the text are referenced in this section. Include the ASTM designation and title. Also list other organizations' standards if they are referenced in the text and are available to the public.

8.1.4 All specifications must have an ISO equivalency statement in the scope. See Annex A2 for instructions.

8.1.5 If the specification includes recycled plastics, insert a sentence in the scope which mentions the extent to which the document deals with these materials. It may also be appropriate to include reference to recycled plastics in the title, the Referenced Documents section, and in the Keywords section.

NOTE 5—Recycled plastics is defined by terms and sub terms in Guide D 5033.

8.2 *Terminology*:

8.2.1 If terms used in the specification are defined in Terminology D 883 or other definition standards, list the standards here.

8.2.2 List definitions of terms that are specific only to the standard in which they are used and have no application outside of that context.

8.3 *Classification*:

8.3.1 *Types*—When more than one material, product, or system is specified, they may be separated first by types, which are distinguished by roman numerals (I, II, III, and so forth).

8.3.1.1 The first subdivision shall be based upon some major property, composition, or application of the item.

8.3.1.2 *Grades*—Designate further subdivision by grades ~~according to~~ in accordance with some pertinent property or properties and identify by Arabic numbers.

8.3.1.3 *Classes*—If necessary, make additional division into classes, identified by capital letters (A, B, C, and so forth).

NOTE 6—The precedence of type, grade, and class, as well as the method of designation, is the ASTM preferred style, and it should be used in the absence of any established preference.

8.3.1.4 When a type, grade, or class has been deleted, do not use this designation again, to avoid confusion with earlier specifications.

8.4 *Ordering Information (Optional)* :

8.4.1 When the specification covers options for purchase, such as various types, grades, classes, alloys, sizes, mass, and so forth, the purchase order or inquiry should state which particular types, alloys, sizes, and so forth, are desired.

8.4.2 A listing of each such optional feature, together with a reference to the applicable section of the specification, will be of assistance in the wording of orders.

8.4.3 After the attention of the purchaser is directed to all of the options in the specification, attention might be directed to what would be furnished by the supplier, if the purchaser fails to specify one or more of the options.

8.4.4 It is recommended that this section be included in all specifications as a checklist of items to be included in a purchase order or contract.

8.4.5 If the list includes the ASTM designation, it is desirable to include "year of issue" to avoid misunderstandings between contractual parties.

8.5 *Materials and Manufacture*—In this section, include any general requirements about the materials and manufacturing process to be used, especially when reference is made to a specific manufacturing process, such as injection molding, and so forth.

8.6 *Chemical Composition (Optional)* :

8.6.1 Give detailed requirements for chemical composition to which the specified material, product, or system must conform.

8.6.1.1 This information is usually presented in a table.

8.6.1.2 When presenting these requirements, clearly indicate the following:

~~8.6.1.2.1 Name~~

(a) Name of each specified constituent, given sequentially,

~~8.6.1.2.2 Whether~~

(b) Whether a requirement is the maximum, minimum, or a range,

~~8.6.1.2.3 Whether~~

(c) Whether an allowance for measurement error is included,

~~8.6.1.2.4 Applicable~~

(d) Applicable units,

~~8.6.1.2.5 Notes~~

(e) Notes and footnotes appropriate for clarification, and

~~8.6.1.2.6 Appropriate~~

(f) Appropriate analytical methodology.

8.6.1.3 Begin this section with the preferred statement:

> The material shall conform to the requirements prescribed in Table 1

8.6.1.4 Add the following statement to the tables of chemical requirements when applicable for nonspecified elements:

> By agreement between the purchaser and the supplier, analysis may be required and limits established for elements or compounds not specified in the table of chemical composition.

NOTE 7—This instruction and others like it in this instruction which refer to agreements between the purchaser and the supplier are intended for clarification but must be addressed with care. It is not the intention of these statements to negate the requirements which are included as part of the specification.

8.7 *Physical Properties*—Present requirements for electrical, thermal, optical, and similar properties, usually in a table.

8.8 *Mechanical Properties*—Present requirements for tensile strength, yield strength, elongation, and similar properties.

8.9 *Performance Requirements*—Present functional, environmental, and similar requirements.

8.10 *Other Requirements*:

8.10.1 Give detailed requirements as to characteristics to which the material, product, or system shall conform.

8.10.2 Include the following in the requirements:

8.10.2.1 Name of each property or requirement,

8.10.2.2 Whether a requirement is the maximum, minimum, or a range,

8.10.2.3 Whether limits allow for measurement error,

8.10.2.4 Applicable units,

8.10.2.5 Notes and footnotes for clarification, and

8.10.2.6 Appropriate test methodology.

8.11 *Dimensions, Mass, and Permissible Variations*:

8.11.1 Include details as to standard shapes, mass, and size ranges.

8.11.2 Present in tabular form with brief reference in the text.

8.11.3 Indicate in the tables where the various size ranges are divided (for example, ranges from 0 to 250 mm, 250 to 500 mm, and 500 to 750 mm shall be more properly stated as 250 mm and under, over 250 to 500 mm, inclusive, over 500 to 750 mm, inclusive, and so forth).

8.11.4 Include permissible variations in dimensions, mass, and so forth, in the same tables with the nominal sizes. State whether the tolerances specified are both plus and minus or apply in only one direction.

8.12 *Workmanship, Finish, and Appearance* :

8.12.1 Include general requirements, such as type of finish and general appearance of color, uniform quality and temper (for metals), and whether the item is clean, sound, and free of scale and injurious defects. To avoid misunderstanding, these requirements should be spelled out clearly.

8.12.2 State provisions for removal or repair of minor surface imperfections that are not considered cause for rejection.

8.12.3 For some products, it is customary to specify absence of defects such as fractures, large or deep cracks, checks, blisters, laminations, and surface roughness. The finish and shape of the ends should also be specified.

8.13 *Sampling (Optional)*:

8.13.1 If a specification applies to a unit of product or material from which specimens are to be taken for testing, the procedure for obtaining these specimens shall be described.

8.13.2 If a specification pertains to individual units of a lot and sampling inspection is likely to be the normal procedure, it is desirable for the specification to reference or include in a supplementary section a sampling procedure for determining acceptability of the lot.

8.13.3 If a specification pertains to the mean value of a lot, in particular to the mean of a lot of bulk material, the procedure for sampling the lot or the formation of sample test units, or both, shall be described or referenced. The criterion for determining conformance of the lot shall be specifically stated.

8.13.4 If a specification applies to a lot of bulk material, state the number of increments required to create a sample test unit and the number of test units to be taken to determine conformance of the lot.

8.13.5 Indicate the minimum amount of material required to conveniently carry out ~~conveniently~~ all the tests in the specification for the convenience of the user of the specification.

8.14 *Number of Tests and Retests* :

8.14.1 State the number of test units and the number of test specimens that are required to determine conformance of the material or product to the specifications. In the sampling of a lot of bulk material, state the size of the sample in terms of the number of primary (first stage) sampling units that is required to determine conformance to the specifications.

8.14.2 When a specification pertains to several different properties of a material to be determined by a variety of test methods, a test unit is defined as a unit or portion of the material that is sufficient to obtain a single, adequate set of test results for all properties to be measured.

8.14.3 If a specification allows retesting in cases where the material or product fails to pass the specification, state the rules for the retesting and the conditions under which the retesting would be permitted.

8.15 *Specimen Preparation*:

8.15.1 Include this section when special preparation is required (for example, in specifications for molding materials).

8.15.1.1 Refer to a standard test method if possible.

8.15.1.2 If no standard test method exists, include sufficient detail in the specification to ensure acceptable reproducibility of test results.

8.15.2 State that specimens are to be prepared in accordance with the recommendations of the manufacturer only if neither 8.15.1.1 nor 8.15.1.2 is feasible.

8.16 *Test Methods or Analytical Methods*:

8.16.1 List standard test methods for measurement of all requirements of a specification. Refer to the ASTM test methods used in testing the material to determine conformance with the specification. This includes sampling; chemical analysis; and mechanical, electrical, thermal, optical, and other testing procedures. When alternative procedures are given in the test methods, it is important to state which particular procedure shall be used as the basis for the specification requirement.

8.16.2 When there is no ASTM test method specified for a particular quality or property of a specified material, describe the test procedure to be followed in detail in the specification, following the Form of ASTM Test Methods, Part A, in the "Blue Book." Include all mandatory sections listed in the "Blue Book" for test methods.

8.16.3 Where a method of some other organization is being used and the committee has not approved the test as an ASTM test method, a footnote reference to the original source shall be included.

8.16.4 State all procedures in the imperative mood, present tense (for example, "Heat the test specimen" rather than "The test specimen shall be heated").

8.17 *Inspection*:

8.17.1 Use the following statement when there is a substantial disagreement between producers and users within a particular committee which blocks progress toward acceptance of new specifications or revisions to specifications:

> Inspection of the material shall be agreed upon between the purchaser and the supplier as part of the purchase contract.

8.17.2 Any technical requirements on inspection such as sampling plan or physical or mechanical properties shall be placed in other appropriate parts of the specification.

8.18 *Rejection and Rehearing*—Use the following wording as a guide when there is a need for a section on rejection and rehearing:

> Material that fails to conform to the requirements of this specification may be rejected. Rejection should be reported to the producer or supplier promptly and in writing. In case of dissatisfaction with the results of the test, the producer or supplier may make claim for a rehearing.

8.19 *Certification*:

8.19.1 If a certification section is included, the section shall read:

> When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

NOTE 8—Specifications dealing with recycled plastics may need additional statements. Guide D 5033 provides additional information on this subject.

8.19.2 Upon the request of the purchaser in the contract or order, the certification of an independent third party indicating conformance to the requirements of this specification may be considered.

8.20 *Product Marking*— Specify the information to be marked on the material or included in the package, or on attached label or tag. This information may include the name, brand, or trademark of the manufacturer; quantity; size; weight; ASTM designation; or any other information that may be required for a specific material.

8.21 *Packaging and Package Marking* —When it is customary and desirable to package, box, crate, wrap, or otherwise protect the item during shipment and storage in accordance with a standard practice, it is customary to state the requirements.

8.22 *Supplementary Requirements* :

8.22.1 Supplementary requirements may be specified in some standards. When they are, these requirements shall appear separately in a Supplementary Requirements section. These requirements usually only apply when specified by the purchaser in the inquiry, contract, or order. A statement to that effect, such as the following, shall appear in the first paragraph of the Supplementary Requirements section:

> The following supplementary requirements shall apply only when specified by the purchaser in the contract or order.

8.22.2 Two examples of supplementary requirements are quality assurance and qualification.

8.22.2.1 *Quality Assurance* shall be qualified by the statement: "When specified in the contract or purchase order." Reference to a suitable document such as ASTM, ANSI, MIL, and so forth, may be made by agreement between the supplier and the purchaser.

8.22.2.2 *Qualification*— When qualification is determined to be feasible and necessary, it shall be included in the Supplementary Requirements section with wording similar to:

> Items furnished under this specification shall be products that are qualified for listing on the applicable qualified products list at the time set for opening of bids.

8.23 *Quality Assurance*:

8.23.1 If included, this requirement shall be qualified by the following clause:

> When specified in the contract or purchase order.

8.23.2 Reference to a suitable document (such as ASTM, ANSI, or MIL standard) may be made by agreement between the supplier and the purchaser.

8.24 *Keywords*—List in alphabetical order appropriate terms for indexing, selected from both the title and body of the document and including general, vernacular, and trade items.

8.25 *Summary of Changes*:

8.25.1 List all changes from the last revision so that persons reading the standard will know what items are different from previous editions.

8.25.2 List the year of the last complete review/revision of the standard.

8.26 *Tables*—Tables shall be referenced in the text. Number tables in the order in which they are cited in the text. Make sure that the tables are titled.

8.27 *Figures*—Figures shall be referenced in the text. Number figures in the order in which they are cited in the text. Make sure that the figures are titled. The subcommittee is responsible for providing camera-ready artwork that does not require retouching or corrections.

8.28 *Annexes (for Mandatory Information)* —Include detailed information on apparatus, materials, and so forth, that is too lengthy to include in the text but is essential to the specification.

NOTE 9—Examples of such information are as follows: glossary of terms used in the specification, list of symbols, and instructions for calibrating and standardizing apparatus.

8.29 *Appendix* (for nonmandatory information)—An appendix is informative only and is not a mandatory part of the specification.

NOTE 10—Examples of such information are as follows: example calculations, report forms, and rationale used in the development of the specification.

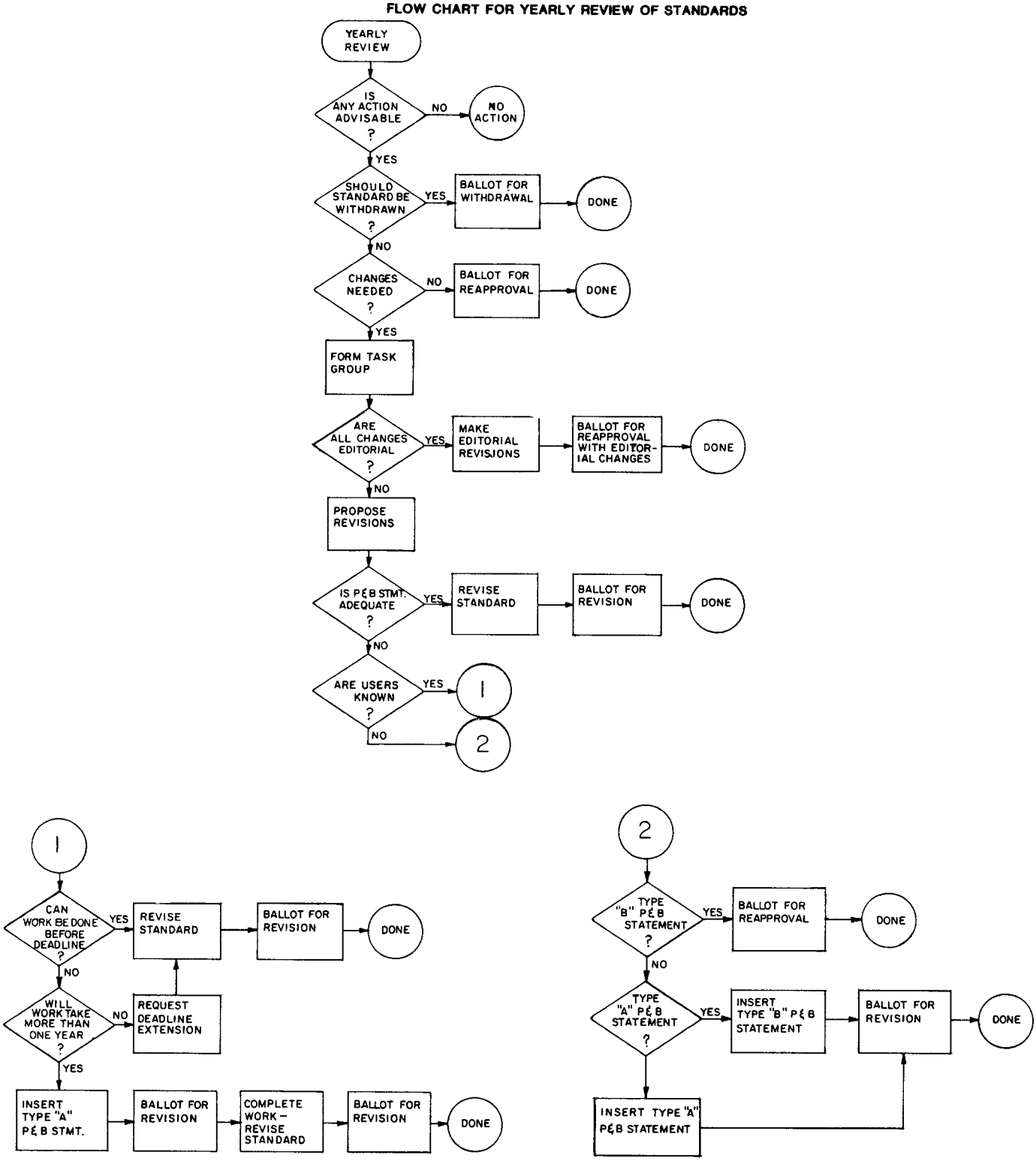
9. Keywords

9.1 plastics; precision and bias; revisions; specification; test method

ANNEXES

(Mandatory Information)

A1. FLOW CHART FOR YEARLY REVIEW OF STANDARDS



A2. INFORMATION ON ISO EQUIVALENCY

All Committee D20 standards shall contain an ISO equivalency statement. The following definitions and discussion will assist in the development of the statement. All ISO equivalency statements must be balloted through the full ballot process. The ISO equivalency statement is formatted as a note at the end of the Scope section of the standard.

Identical—The technical content is equivalent and fully corresponding in presentation. Anything acceptable in the International standard will be acceptable in the ASTM standard. The" vice versa" principle must apply. This means that actions taken in the ISO standard will give "identical" results to those actions performed as a result of following the ASTM standard and "visa versa." In other words, the two documents may have some minor form differences, but otherwise are fully the same.

Equivalent—The technical content is equivalent, but not fully corresponding in presentation. This means that some additions or subtractions occur from one document to the other which have absolutely no effect on the technical content. The visa versa principle must apply.

Not equivalent—The technical content of the documents are different, even if the differences are minor.

It is possible to have sections of an ASTM standard which are identical or equivalent to a corresponding ISO standard. For example, a test method may have a Test Method A which is equivalent to an ISO test method, but also contain a Test Method B which is not. In such cases, the equivalent or identical sections of the ISO and ASTM standards must be clearly identified in the ISO equivalency statement.

If a standard is deemed "not equivalent" actions should be taken by the responsible subcommittee to determine if there is a need to harmonize the documents into one that is "equivalent." Three actions are then possible. They are as follows:

(*1*) Modify the ASTM standard to be of the same technical content as the ISO standard.

(*2*) Institute a new work item through ASTM Subcommittee D20.61 to make changes in the ISO document.

(*3*) Make a conscious decision not to harmonize the documents.

The action to take is to be decided by the subcommittee working on the documents and should be based on actions which produce the best technical standard which serves the industry.

Each Committee D20 subcommittee chairperson should maintain a listing of the document actions in progress to harmonize ISO and Committee D20 ASTM standards.

APPENDIXES

(Nonmandatory Information)

X1. "TYPE A" P AND B STATEMENT

X1.1 When test methods are first published, round-robin data may not yet be available. However, the ASTM Blue Book requires at least single-laboratory repeatability be included at first publication. To comply with this requirement, use X1.3 as a guide.

X1.2 As soon as possible, a round robin using Practice E 691 or other suitable method for developing P and B should be initiated. The P and B in X1.3 cannot be used in the standard past the first five-year review without addition of the wording in X2.1.

X1.3 A sample "Type A" P and B statement is as follows:

Precision [5]—The repeatability standard deviation has been determined to be (insert the test values and corresponding repeatability values). The reproducibility of this test method is not yet available."

[5] Supporting data has been filed at ASTM Headquarters and may be obtained by requesting Research Report ~~RRxxx.xxxx.~~ RR: D20-XXXX.

X2. "TYPE B" P AND B STATEMENT

X2.1 If no round-robin data is available which meets the requirements of Practice E 691 or other suitable alternative statistical procedure as determined by Subcommittee D20.13, the following sample "Type B" P and B should be used:

Precision[5]—The repeatability standard deviation has been determined to be (insert the test values and corresponding repeatability values). Attempts to develop a full precision and bias statement for this test method have not been successful. For this reason, data on precision and bias cannot be given. Because this test method does not contain a round-robin-based numerical precision and bias statement, it shall not be used as a referee test method in case of dispute. Anyone wishing to participate in the development of

precision and bias data should contact the Chairman, Subcommittee D20.00 (Section 20.00.00), ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

X3. "TYPE C" P AND B STATEMENT

Instructions:

A Caution! - Paragraph ##.1 Must carefully be reworded to describe HOW the ACTUAL round robin was carried out. Also, the SPECIFIC CONDITIONS of ##2.1 and ##2.2 must AGREE with those stated in ##.1.

B. If the data is from less than 6 laboratories, no statement may be made about between-labs reproducibility. Data for within-lab repeatability may be presented, however.

C. In ##.2, INSERT the number of specimens that the TEST METHOD requires for obtaining one test result.

##.1 Table((s)) _____ is/((are)) based on a round robin[x] conducted in _(insert year)__ in accordance with Practice E 691, involving _(insert number of materials)__materials tested by __(insert number of laboratories)__laboratories. For each material, all the samples were prepared at one source, but the individual specimens were prepared at the laboratories which tested them. Each test result was the average [[or median or other function]] of __C__ individual determinations. Each laboratory obtained __(insert number)__test results for each material.

~~Note __#__ - -Caution—The explanation of "r" and "R" (##.2 thru ##.2.3) are only intended to present a meaningful way of considering the approximate precision of this test method. The data in Table((s)) _____ should not be applied to acceptance or rejection of materials, as these data apply only to the materials tested in the round robin and are unlikely to be rigorously representative of other lots, formulations, conditions, materials, or laboratories. Users of this test method should apply the principles outlined in Practice E 691 to generate data specific to their materials and laboratory (or between specific laboratories). The principles of ##.2 thru ##.2.3 would then be valid for such data.~~

Note __#__ - -Caution—The explanation of "r" and "R" (##.2 through ##.2.3) are only intended to present a meaningful way of considering the approximate precision of this test method. The data in Table((s)) _____ should not be applied to acceptance or rejection of materials, as these data apply only to the materials tested in the round robin and are unlikely to be rigorously representative of other lots, formulations, conditions, materials, or laboratories. Users of this test method should apply the principles outlined in Practice E 691 to generate data specific to their materials and laboratory (or between specific laboratories). The principles of ##.2 through ##.2.3 would then be valid for such data.

##.2 Concept of "r" and "R" in Table((s)) _____ - - - If S_r and S_R have been calculated from a large enough body of data, and for test results that were averages [[or medians or other functions]] from testing __C__ of specimens for each test result, then:

##.2.1 Repeatability: Two results obtained within one laboratory shall be judged not equivalent if they differ by more than the "r" value for that material. – "r" is the interval representing the critical difference between two test results for the same material, obtained by the same operator using the same equipment on the same day in the same laboratory.

##2.2 Reproducibility: Two test results obtained by different laboratories shall be judged not equivalent if they differ by more than the "R" value for that material. - - "R" is the interval representing the critical difference between two test results for the same material, obtained by different operators using different equipment in different laboratories. [[See B above for restrictions]]

##.2.3 Any judgement in accordance with ##.2.1 or ##.2.2 would have an approximate 95 % (0.95) probability of being correct.

##.3 There are no recognized standards by which to estimate bias of this method.

[x] Supporting data are available from ASTM Headquarters. Request RR: D20-_____.

MODEL TABLES FOR P AND B STATEMENTS (USE EITHER FORM A OR FORM B AS DEEMED APPROPRIATE.)

Form A

Table # _____ (TITLE) _____

Material	Thickness or other Parameter	Average	Values expressed in Units of _____ S_r[A]	S_R[B]	r[C]	R[D]
(Name 1)	_____	_____	_____	_____	_____	_____
(Name 2)	_____	_____	_____	_____	_____	_____
(Name 3)	_____	_____	_____	_____	_____	_____
(etc.)	_____	_____	_____	_____	_____	_____

[A] S_r = within laboratory standard deviation for the indicated material. It is obtained by pooling the within-laboratory standard deviations of the test results from all of the participating laboratories:

$$S_r = [[(S_1)^2 + (S_2)^2 ..... + (S_n)^2]/n]^{1/2}$$

[B] S_R = between-laboratories reproducibility, expressed as standard deviation:

$$S_R = [S_r^2 + S_L^2]^{1/2}$$

where S_L = standard deviation of laboratory means.
[C] r = within-laboratory critical interval between two test results = 2.8 × S_r.
[D] R = between-laboratories critical interval between two test results = 2.8 × S_R.

Form B

Table # _____ (Title) _____

Material	Thickness or other Parameter	Average	Values expressed in Units of _____ V_r[A]	V_R[B]	r[C]	R[D]
(Name 1)	_____	_____	_____	_____	_____	_____
(Name 2)	_____	_____	_____	_____	_____	_____
(Name 3)	_____	_____	_____	_____	_____	_____
(etc.)	_____	_____	_____	_____	_____	_____

[A] V_r = within-laboratory coefficient of variation for the indicated material. It is obtained by first pooling the within-laboratory standard deviations of the test results from all of the participating laboratories:

$$S_r = [[(S_1)^2 + (S_2)^2 ..... + (S_n)^2]/n]^{1/2}$$

Then: V_r = (S_r divided by the overall average for the material)× 100
[B] V_R = between-laboratories reproducibility, expressed as coefficient of variation:

$$S_R = [S_r^2 + S_L^2]^{1/2}$$

where S_L = standard deviation of laboratory means.
Then: V_r = (S_R divided by the overall average for the material) × 100
[C] r = within-laboratory critical interval between two test results = 2.8× V_r
[D] R = between-laboratories critical interval between two test results = 2.8 × V_R

X4. GUIDELINES FOR TERMINOLOGY IN STANDARDS REFERENCED IN BOCA NATIONAL CODES

X4.1 The following is a compilation of terms and phrases which are commonly used in the writing of standards. Examples of both mandatory and nonmandatory language are included. While intended to be comprehensive, this compilation is not all-inclusive. Words used in the masculine gender include the feminine and neuter; the singular includes the plural and the plural the singular.

Typical mandatory terms (including all variations of these terms):

are	must
is	shall
is capable of	shall not be required
is not intended to prohibit	shall not....unless
is not prohibited from	shall not....except where
is not required	will

Typical nonmandatory terms (including all variations of these terms):

advise	may
aspire	maybe
can	might
consider	ought/ought to
could	permitted (is permitted)
chance (on the chance)	possible

desire	practice
encourage	presume
feasible	probable
grant	reasonable
guide (to act as a guide to the user)	recommend/recommendation
guideline	request
imply	should
infer	suggest/suggestion
likely (and the like)	wound
	urge

Other terms (including all variations of these terms):

safe, safely:	*When this term appears, it should either be replaced with a detailed outline of what constitutes safe or safely or be followed by such detailed information.*
nationally recognized: design practice: good design practice: accepted method: good design practice: accepted method:	*When this phrase is used, it should be replaced with a reference to a specific document or follow the phrase with a detailed list of the elements regulated by the design method.*
approved method:	*When this phrase is used it should be followed by a detailed outline of the elements that will provide a user of the document for determining what must be present if it should be "approved," for example, by an approved design method that takes into account the list of specific details that must be accounted for in the design.*
shall be permitted:	*This phrase is typically unnecessary unless a specific condition, method, or item is specifically "prohibited" within a document it is always permitted". When the phrase is used to indicate a conditional provision, that is, "shall be permitted... provided," we suggest that the statement be written to indicate when an element is not to be allowed rather than when it is permitted..* *Example: To tell the user that plain concrete can only be used in an assembly when it is not required to have a fire-resistance rating.* *Recommended wording:* *Plain concrete shall not be used in an assembly required to be fire-resistance rated.* *Rather than:* *Plain concrete shall be permitted to be used provided the assembly is not required to have a fire-resistance rating.*

X5. EXAMPLES OF CORRECTIVE TEXT

The following is an example of the use of **bold** text for additions and strikeouts for deletions: In this example, the old text is shown in X5.1, the desired corrected text is shown in X5.2, and the suggested format for the balloted change using bold and strikeouts is shown in X5.3.

X5.1 *Old Text* —Standard Guide for Annual Review of Standards for Plastics Including the Model Precision and Bias Statement

X5.2 *Desired Text:* Standard Guide for Annual Review of Test Methods and Specifications for Plastics

X5.3 *Balloted Text:* Standard Guide for Annual Review of Standards **Test Methods and Specifications** for Plastics Including the Model Precision and Bias Statement.

X5.4 To use the double-column technique, copy the document into the left-hand column of a two-column page. Place notations regarding the desired change in the right-hand column. The following is an example of using double columns to show proposed changes:

Standard Guide for Annual Review of Standards for Plastics Including the Model Precision and Bias Statement	>>> change title to:	Standard Guide for Annual Review of Test Methods and Specifications for Plastics

SUMMARY OF CHANGES

This section identifies the location of selected changes to this guide. For the convenience of the user, Committee D20 has highlighted those changes that may impact the use of this guide. This section may also include descriptions of the changes or reasons for the changes, or both.

D 4968 – ~~98~~02:

(*1*) ~~Revisions included a change~~ Specified ASTM material specifications in ~~the scope of the document from one which gave instructions on how to write a precision~~ 7.7.4, 7.14.2, and ~~bias statement for a test method to one which provides instructions on how to assess all Committee D20 test methods and specifications for revision.~~ 7.18.2.

D 4968 – 00:

(*1*) Added new paragraph 7.18.2 and renumbered subsequent sections.

D 4968 – 98:

(*1*) Revisions included a change in the scope of the document from one which gave instructions on how to write a precision and bias statement for a test method to one which provides instructions on how to assess all Committee D20 test methods and specifications for revision.