Committee B05 on COPPER AND COPPER ALLOYS

Outline of Form of Specifications

6th Edition
Approved September 2004

ASTM Committee B05
On Copper and Copper Alloys

Outline of Form of Specifications
Sixth Edition

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This Sixth Edition of the Outline of Form accommodates the creation and approval by Committee B05 of a new electronic template for drafting B05 standards. The electronic template is included as Appendix A, and is also posted on the Committee B05 web page. As such, most of the committee recommended wording of sections is removed from the text of the Outline of Form. Also, a reference list of chemical analysis methods was added.

This white paper is under the jurisdiction of Standing Task Group #9100
Chaired by Subcommittee B05.91on Editorial and Publications

Task Group Members Consisting of Chairs of Subcommittees
B05.01, B05.02, B05.04, B05.05, B05.06, B05.07, B05.93, and members at large

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A S T M Committee B05 Outline of Form of Specifications

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INTRODUCTION

The purpose of the Committee B05 Outline of Form of Specifications is to assist committee members in the preparation of drafts of new specifications and the revision of existing specifications intended to be under the jurisdiction of one of the technical subcommittees of Committee B05. It is intended to:

a.) Explain and supplement Part B of the ASTM publication, "Form and Style of ASTM Standards (also known as the "Blue Book"),

b.) Serve as a guide in the drafting of new documents and revisions of existing standards, and

c.) Promote form and style uniformity.

In the event of conflict with regard to form or style or Society-mandated wording for certain sections, Part B of the Form and Style for ASTM Standards (Blue Book) shall govern.

It is to be understood that this document is a guide, and a document such as this cannot possibly address all conditions or situations which may be encountered in the drafting of a new document or in the revision of a standard.

Note – the Form and Style for ASTM Manual (the Blue Book) is published on the ASTM web site.

THE EDITORIAL REVIEW PROCESS

The Editorial subcommittee B05.91 is an administrative subcommittee that provides the service of editorial review to Committee B05 task groups in preparing draft documents for ballot. Items subject to editorial review prior to ballot are new documents, major revisions of standards (such as five-year reviews), and standards for reapproval without change.

It is highly recommended that the B05 electronic template, available on the committee web page, be used as a starting point in preparing drafts of new standards or in major revisions. The template contains the major items of B05 wording and language for many sections.

When a new document or a major revision is submitted for editorial review, it is requested that an electronic copy of the draft be submitted to the chairman of the Editorial Subcommittee for distribution and review. The task group will be returned an electronic copy with all the editorial comments. A hard copy will be provided if desired.

All documents submitted for editorial review are to be identified by draft number and date so they can be properly tracked. How a draft revision is prepared must be determined on an individual basis since the requirements are unlikely to be the same for any two documents. However, revisions shall always be based upon the most recent issue of the standard, which is available from ASTM in electronic format upon the request of the task group chairman.

In the case of standards to be balloted for reapproval without change, the Editorial Subcommittee Chairman need only be notified of intend and provided a copy of the latest issue of the standard.

The editorial review shall consist of, but not limited to, checking for:

- Required sections and content,
- Clarity of statements,
- Redundancy,
- Errors in grammar and spelling,
- open-ended statements, and
- misuse of notes in text.

Recommendations and comments may be offered concerning technical content; however, the technical correctness of the submitted document is the responsibility of the subcommittee with jurisdiction.

Subcommittee and Task Group members may call upon ASTM editors at Committee Weeks for editorial help, and throughout the year, they can call upon the B05 Editor for editorial assistance.

To avoid the misuse of “shall,” “should,” “may,” and “will,” the use of these terms is defined as follows, [from Blue Book, page iv]:

- shall - is used to indicate that a provision is mandatory.
- should - is used to indicate that a provision is not mandatory but recommended as good practice.
- may - is used to indicate that a provision is optional.
- will - is used to express futurity, never to indicate any degree of requirement.

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A. GENERAL

A1. Specification Function

A1.1 A specification is defined as a precise statement of a set of requirements to be satisfied by a material, product, system, or service that indicates the procedures for determining whether each of the requirements is satisfied.

A1.2 Specifications may have three functions and, although many specifications serve all three, it is well that those drafting specifications keep these functions in mind so that the primary purposes are not confused.

A1.2.1 *Purchasing*

A1.2.1.1 Specifications facilitate dealings between the purchaser and the supplier. Sufficient requirements should be included to ensure that all batches, lots, or deliveries from any seller that conform to the specification will be satisfactory to the purchaser. Unnecessary requirements increase cost and should be avoided.

A1.2.2 *Standardization of Product*

A1.2.2.1 Standardization is an inevitable by-product of most specifications. In some cases it may be the primary function. Standardization involves a deliberate and possibly arbitrary choice of a limited number from the multiplicity of qualities, sizes, compositions, et cetera that may be available.

A1.2.3 *Providing Technical Data*

A1.2.3.1 All specifications contain technical information, but in some cases the designer requires more information than that provided for purchase or standardization. The Subcommittee having jurisdiction may, at its discretion, add such information of this type to standards either as requirements or in an appendix as nonmandatory information.

A1.3 *Open-End Agreements*

A1.3.1 There shall be no statements in specifications that allow agreement between the manufacturer and purchaser to lower the minimum requirements of the specification by such means as omitting tests that are a part of the specification, substituting or modifying a test method, or by changing the specification limits.

A2. ASTM SI Policy

A2.1 Every ASTM standard shall use or include SI units.

A2.1.1 SI units are units of the *International System of Units* [SI] and other units specifically approved in ASTM Practice E380 for use with SI. Examples of other units are hour, minute, liter, Celsius, metric ton.

A2.1.2 When the intent is to write an SI standard that is to be identified with an “M” after the number in the designation, the document must use hard SI units.

A2.1.3 “Soft” and “hard” conversions are defined as follows:

(a) *Soft Conversion* - A "soft" conversion to SI does not change anything. The numbers are merely editorially translated into SI units, with the same accuracy and tolerances as before. For example, a widget 12 in. long becomes 305 mm long or possibly 304.8 mm long, depending on the tolerances permitted for the original 12 in. (See Blue Book, Part H, H2.3).

(b) *Hard Conversion* - in a "hard" conversion, the SI numbers are changed to nicely rounded, easy to handle values, and the magnitude is changed. Thus the same 12 in. widget would probably be changed to 300 mm in a hard conversion. (See Blue Book, Part H, H2.4).

B. SUBJECT HEADINGS OF TEXT

B1. The following is the heading sequence for the specifications text. The headings listed are those most generally used. Other headings may be included for specialized subjects when the information is pertinent to the document under development; in which case, all instructions and guidance for that particular section shall be applied, and these headings should appear in the most appropriate place and sequence depending on their relationship to other sections.

The headings identified as mandatory are required by the Society. The headings identified with an asterisk (*) are required for Committee B05 documents, where applicable, either by inclusion or by reference to a general requirements specification. Not all of the headings may be required for a particular document. For example, when the document does not contain reference to any standard document within the text, it is not required to include a section on Referenced Documents. Or, in the case where no physical property requirements are given, the physical property section is not required.

Title [ASTM]
Designation [ASTM]
Scope [ASTM]
Referenced Documents [B05]
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Mechanical Property Requirements*
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Dimensions, Mass, and Permissible Variations [B05]
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[ASTM] Mandatory ASTM Society requirement
[B05] Required for B-5 Documents
[A] When reference is made to a general requirements specification, the sequence position of the General Requirements section in the product specification should be prior to the first section referenced, which is usually Terminology.
[B] Test methods that are detailed in specifications shall contain all of the mandatory headings shown in Part A, Section A1, of the Blue Book.

B2. Subject Headings shall precede each section to orient the reader. Section and text paragraphs shall be numbered in accordance with the ***Guide for the Use of the Modified Numbering System*** in Part D of the Blue Book. The following is an example of how it should appear in a standard:

1. Scope

1.1 This specification establishes the requirements for... etc.

C. SUBJECT HEADING CONTENT

Introductory Note *- Explanations of section content requirements are detailed in this section. In Appendix A, published separately on the B05 web page, is an electronic template containing wording recommended for each section. In this 6th edition of the Outline of Form, the examples were removed to avoid redundancy and inconsistencies.*

C1. Title [ASTM]

C1.1 The title should be as concise as possible, yet complete enough to identify the material, product, system, or services for which the requirements are established by the document.

C2. Designation and Year of Issue [ASTM]

C2.1 *Designation* - The alphanumeric designation is assigned by ASTM Headquarters.

C2.2 *Year date* - After the designation, a hyphen is followed by the last two numbers of the year of acceptance or last revision. Reapprovals are the last date in parentheses. Footnote 1 is not changed with a reapproval. Note - The blue book includes definitions of date of issue and year date.

C3. Scope [ASTM]

C3.1 The Scope should be a brief summary of the product and product application.

C3.2 A statement shall be included in this section as to whether inch-pound or SI units are the standard, if the specification has a companion specification or is a dual designation specification.

C3.3 Include the prescribed caveat on safety hazards per mandatory blue book language, when one or more test methods are included other than by reference.

C3.3.1 The safety hazard caveat shall also appear in test methods, guides, and practices that involve the use of materials, operations, or equipment.

C3.4 Related documents not referenced in the text may be included as a footnote, or listed as References at the end of the standard cited by number if more than five are cited.

C4. Referenced Documents [B05]

C4.1 List in alphanumeric sequence the designation and complete title of all standards and other documents referenced, including standards and codes of other organizations.

C4.2 Provide footnotes to this section indicating the source of the documents. When referenced later in the text, us only the type of document (specification, test method, practice, guide, et cetera) and the designation letter and number. (e.g. Test Methods B 577).

C4.3 Do not use the year of issue when listing the referenced documents unless there is a technical reason for requiring a specific issue.

C5. General Requirements

C5.1 This section should be used for requirements that are available in a General Requirements specification and are included in the specification by reference When a product specification refers to a general requirements specification for applicable requirements, the reference shall be made in this section so as to alert the user that the details of the requirement(s) shall be found in another document.

C5.1.1 The utilization of a general requirements section in the drafting of a new specification or in the revision of a standard is not mandatory; however, it is recommended since considerable repetition within a group of similar documents would be avoided.

C5.2.1 In the case where a section in the general requirements section has been referenced and the same titled section appears in the product specification with requirements which either supplement or supersede the referenced general requirements section, use the explanatory clause 3.2 in the electronic template.

C6. Terminology [B05]

Note, for use of terminology in B05 standards, refer to the B05 Terminology Management Policy.

C6.1 When applicable, refer to Terminology B 846 for definitions of terms relating to copper and copper alloys, or to other existing ASTM terminology standards having general applications. Terms not appearing in other ASTM terminology standards and requiring other than dictionary definitions should be defined.

C6.1.1 Examples of ASTM terminology standards having general application are: E 44, Definitions of Terms Relating to Heat Treatment; E 6, Definition of Terms Relating to Mechanical Testing; E 1227 Terminology Relating to Chemical Analysis of Metals.

C6.2. *Definitions*

C6.2.1 Definitions shall be in dictionary-definition form, following the guidelines of Part E of The Blue Book and, when appropriate, include in this section definitions from any applicable terminology standard. The general requirements specifications B 248, B 249, B 250, B 251, and B 824 are examples of specifications incorporating definitions.

C6.3 *Definitions of Terms Specific to this Standard*

C6.3.1 Terms that are specific to the standard under development or revision shall appear in the Terminology section under this heading.

C7. Classification

C7.1 When more than one material, product or system is specified, each may be separated by type, and designated by Roman numerals. The first subdivision shall be based upon some major property, composition, or application of the product. Designate further subdivisions by grades according to pertinent property or properties and identify by Arabic numbers. When necessary, make additional divisions into classes identified by capital letters.

C7.1.1 An example of a classification standard is B 224.

C7.1.2 An example of material subdivided by grade is found in the Table of Chemical Composition of Specification B 170.

C8. Ordering Information

C8.1 This section shall appear in all product specifications as a checklist of items which should be included in an inquiry, contract, or purchase order.

C8.2 When the specification provides choices for purchase, such as various types, grades, classes, materials, or tests, the inquiry, contract, or purchase order should state which particular types, grades, classes, materials, sizes, tests, etc., are required.

C8.3 A listing of each such choice, together with a reference to the applicable section of the specification, will be of assistance in the wording of the inquiry, contract, or purchase order. This list should include the ASTM specification designation and year of issue to avoid possible misunderstandings between the contracting parties. The purchaser's attention should be directed to what product would be furnished by the manufacturer or supplier when the purchaser fails to specify one or more of the options.

C8.4 Under a subsection, list optional items to be specified at the time of the order.

C9. Material(s) and Manufacture [B05]

C9.1 This section should contain general statements regarding the material(s) from which the product is produced and the acceptable method(s) of manufacture.

C9.2 All statements should be meaningful. It is recommended that the alloys involved and kinds of processes used to achieve the properties should be stated.

C9.2.1 The past practice of using the following sentence should be discontinued: "The material shall be of such quality and purity that the finished product shall have the properties and characteristics prescribed in this specification."

C10. Chemical Composition[B05]

C10.1 Detailed chemical composition requirements and other chemical characteristics to which the material, product, or system must conform shall be provided. These requirements are usually presented in tabular form. It is most important that the following information be clearly indicated: (a) name of each constituent specified, (b) whether the requirement is a maximum or a minimum, (c) whether an allowance for measurement error is incorporated in these limits, (d) the measurement units applicable, and (e) references to notes or footnotes for further clarification.

C10.2 *Product (Check) Sample*

C10.2.1 When it is desirable to state a permissible analytical variance for a specific product, an introductory statement should be used to indicate the requirements. See 8.1.1 in the electronic template for recommended wording.

C10.2.2 The permitted variances may be incorporated in the chemical composition table or given a separate table.

C10.3 *Limits for Nonspecified Elements*

C10.3.1 Include a disclaimer statement regarding limits for nonspecified elements for all specifications containing chemical composition sections. See 8.2 of the electronic template. See 8.3 for language required for stating the limit for one of the specified elements to be listed as remainder.

C10.4 When presenting chemical limits, it is recommended to use the "-" symbol in the tables (e.g. 89.0 - 91.0), and to use "to" in the text (e.g. 89.0 to 91.0).

C10.5 In drafting or revising a standard specification, it is essential to identify a test procedure for determining conformance to each requirement. See part C22.4 for reference information about which chemical analysis methods are referenced for various elemental constituents.

C11. Temper[B05]

C11.1 The standard temper(s) of the products specified shall be stated in this section. Refer to Classification B 601 for temper designations for copper and copper alloys.

C11.2 If former designations are included, the former designations shall be used in conjunction with designations detailed in Classification B 601 designations when applicable.

C11.3 If tempers not classified in B 601 are used in the specification, details of the temper requirements must be explicitly stated.

C12. Grain Size for Annealed Tempers

C12.1 Use this section when grain size is the standard requirement for a copper or copper alloy in an annealed (OS) temper.

Note- In drafting a new document or revising a standard, it is essential to identify in the specification a test procedure for determining conformance to *each* requirement.

C13. Physical Property Requirements [B05]

C13.1 If specified, the requirements for electrical resistivity, coefficient of thermal expansion, specific gravity and similar properties are presented in this section; usually in tabular form.

C13.2 When a requirement is optional, it should be so stated and noted that it should be so specified in the contract or purchase order. An example is included in 11.1.2 of the electronic template.

Note - It is essential to identify in the specification a test procedure for determining conformance to *each* requirement.

C14. Mechanical Property Requirements [B05]

C14.1 The requirements for tensile strength, yield strength, elongation, and hardness are included in this section. The property requirements are frequently placed in a table.

C14.1.2 When a requirement is optional, or when the requirement of performance of the test is optional, it should be so stated.

C14.1.3 In the case where the approximate Rockwell hardness values are used as a quick test to indicate general conformance to a specification requirement, see 12.2 of the electronic template for an example of how it should appear.

Note - It is essential to identify in the specification a test procedure for determining conformance to *each* requirement.

C15. Performance Requirements

C15.1 Include in this section functional, environmental, and similar requirements (e.g. Microscopic Examination, Cuprous Oxide [Hydrogen Embrittlement Susceptibility], expansion Test, Flattening Test, and Mercurous Nitrate Test).

C15.1 When a requirement is optional, it should be so stated and so specified in the contract or purchase order.

Note – It is essential to identify in the specification a test procedure for determining conformance to *each* requirement.

C16. Other Requirements

C16.1 Requirements not covered elsewhere, such as Nondestructive Testing (Electromagnetic eddy current Examination, Hydrostatic Test, Pneumatic Test), Cleanness Test, Weld Quality Test, Orders for U.S. Government Agencies, etc., should be located in this part of the specification. These additional requirements should follow the performance requirements and should not be intermixed with the other sections.

C16.1.1 **Purchases for U.S. Government:** When product is purchased for agencies of the U.S. Government, the specification shall include this section. The section should appear immediately prior to the Dimensions, Mass, and Permissible Variations section of the specification.

C17. Dimensions, Mass, and Permissible Variations [B05]

C17.1 Only that part of the title which is applicable to the product need be addressed. The section may be self contained or it may reference another document such as a general requirements specification.

C17.2 This section shall be used for the details as to standard shape, mass, and size ranges which are usually presented in tabular form with a brief reference in the text. Separate sections may be necessary with the individual tables. The tables shall clearly indicate where divisions are made for the dimension ranges. For example ranges from 0 to 1 in., 1 to 2 in., 2 to 3 in. shall be more properly stated as 1 in. and under, over 1 to 2 in. inclusive, over 2 to 3 in., inclusive, etc.

C17.3 The permissible variations in dimensions, mass, etc., may be included in the same tables with minimal sizes. It shall be made clear that the tolerances specified are plus and minus or apply only in one direction.

C18. Workmanship, Finish, and Appearance [B05]

C18.1 Workmanship, finish, and appearance may be addressed separately for better clarity or a general statement may be used. Requirements for workmanship, finish, and appearance include (but are not limited to) the type of finish, the general appearance or color, the temper, and whether the product is clean, sound, and free of scale or defects which would render it unsuitable for the intended application. To avoid misunderstanding, these requirements should be clearly stated. Provisions for removal or repair of minor surface imperfections that are not considered cause for rejection should also be addressed.

C19. Sampling [B05]

C19.1 This section shall include lot size, portion size, selection of portion pieces, and the manner by which the sample shall be taken from the portion pieces selected.

C19.2 This subject is too complex to be addressed in this document. However, the Sampling section of Specification B 249, General Requirements for Wrought Copper and Copper Alloy Rod, Bar, and Shapes, is an example of how this section should appear in the standard.

C20. Number of Tests and Retests [B05]

C20.1 *Tests* - This section shall state the number of test specimens required to determine conformance to specification product property requirements.

C20.2 *Retests* - If the specification permits retesting, after the product fails to conform to specification requirements when tested by the purchaser, state the conditions and rules under which the retesting is permitted.

C21. Specimen Preparation [B05]

C21.1 Where special test specimen preparation is required, this section shall be included. Refer to a standard test method when possible and when an acceptable reference is not available, include sufficient information to allow acceptable reproduction of test results.

C21.2 This subject is too complex to be further addressed in this document; however, the Specimen Preparation section of Specification B 249, General Requirements for Wrought Copper and Copper Alloy Rod, Bar, and Shapes, is an example of how this section should appear in a standard.

C22. Test Methods [B05]

C22.1 In this section identify specific test methods by which conformance with the specification requirements may be determined. In addition to identifying the specific test method, include any additional information necessary for the proper application of the identified test method.

C22.2 There are some copper alloys whose chemical compositions include element(s) with specified limiting values for which no recognized analytical test method is known to be published in the literature. When such a test method can not be obtained from the manufacturer of a product produced from such an alloy, who obviously has the in-house analytical capability, for inclusion in the specification, the following statement should appear immediately after the list of test methods:

> **X.X. 1 Since no recognized test method is known to be published, the determination of [specify the element or elements] shall be subject to agreement between the manufacturer and the purchaser.**

C22.2.1 When such a needed test method has been published by a recognized authority for a particular element, the above statement is no longer valid for that element, and the published test method shall be referenced.

C22.3 Most, if not all, standard specifications permit an agreement between the manufacturer and the purchaser to establish limits and required analysis for unnamed element(s); however, since it cannot be

predetermined which element(s) may be subject to this agreement, test method(s) for such element(s) do not have to be identified within the standard.

C22.4 List reference test methods in case of disagreement. Refer to the following table on Chemical Analysis Methods for aid in determining appropriate reference chemical analysis methods.

C22.4.1 *General* - The following table is a guide compilation of available chemical analysis methods for coppers and copper alloys listed by elemental alloy constituent or impurity and applicable range (by weight %). The applicable test methods should be specified in the Test Methods section of a product specification for use in cases of dispute. The Committee B05 Liaison to Committee E01 on Methods of Analysis can be consulted if there are any questions about the listed methods. *Note: Commonly accepted methods not included here may be used for routine chemical analysis.*

Element	**Range or % max**	**Test Method(s)**	**Applicability[1]**
Aluminum (Al)	2 - 12 > .10	E 478; Titrimetric E 54; Gravimetric	General General
Antimony (Sb)	0.05-0.70	E 62	General
Arsenic (As)	0.0-0.50	E 62	General
Cadmium (Cd)	2 -25 ppm	E53	Coppers
Carbon (C)	0.0-0.50	E 76	Nickel-Copper alloys
Chromium (Cr)	0.003 – 2.0 0.30 – 0.70	ISO 4744 E 118	General General
Cobalt (Co)	0.01 – 0.5	E 75; Photometric	7xxx series alloys
Copper (Cu)	> 50 99.75 – 99.99	E 478; Electrolytic & Photometric E 53; Electrolytic	General Coppers
Iron (Fe)	0.003-1.25 1.0 max 0.0-5.0 9.0 – 11.0 48.5-51.5	E 478; Photometric E 75; Atomic Absorption E 54 E 4748; Titrimetric E 4748; Titrimetric	General 7xxx series alloys General Ferro coppers Ferro coppers
Lead (Pb)	0.002-15.0 2.0-30.0	E 478; Atomic Absorption E 478; Titrimetric	General General
Manganese (Mn)	0.10-12.0 0.10-12.0 28 - 32	E 62 E 75; Photometric E 581 Titrimetric	General 7xxx series alloys General
Nickel (Ni) (incl Colbalt (Co))	0.03-5.0 4.0 – 50.0	E 478; Photometric E 478; Gravimetric	General General
Phosphorus (P)	0.01-1.2 1 - 15	E 62 E 1371; Gravimetric	General Phosphor coppers
Silicon (Si)	0.005-5.50 0.1 – 5.0	E 54; Perchloric Acid Dehydration E 62	General 6xxx series alloys
Silver (Ag)	0.01 – 5.0 .01- .12	E 54 E 478; Atomic Absorption	General Silver Bearing Copper
Sulfur (S)	0.05-0.08 0.001 – 0.5	E 76; Direct Combustion E 76; Gravimetric	Nickel-Copper alloys
Tellurium (Te)	0.003 – 0.05 0.4 – 1.0	ISO 7602 Part 1 E/F E 121	General Copper-Tellurium Alloys
Tin (Sn)	0.01-1.0 0.50-20.0	E 478; Photometric E 478; Titrimetric	General General
Zinc (Zn)	0.02-2.0	E 478; Atomic Absorption	General

	2.0-40.0	E 478; Titrimetric	General

[1]Always, refer to the test method involved for the scope, specific details and limitations.

C22.4.2 *Special Cases* – The following special cases exist whereby the reference chemical analysis method for the desired impurities is included in an annex in the standard:

- Tough-Pitch Fire-Refined Copper – Refer to the Annex of B 216.
- Cathode Copper Impurities – Refer to the Annex of B 170.
- Copper-Beryllium Alloys – Refer to the Annex of B 194

C22.5 Flattening Test for Seamless Copper and Copper Alloy Tubing

C22.5.1 Inch-pound units - The following wording applies to ASTM B68, B111, B359, and B395:

xx. Performance Requirements
xx.x Flattening Test
xx.x.x When specified in the contract or purchase order, the flattening test described in the Test Method section in xx.x shall be performed.
xx.x.x.x During inspection, the flattened areas of the test-specimen shall be free of defects, but blemishes of a nature that do not interfere with the intended application are acceptable.

xx. Specimen Preparation
xx.x Flattening Test
xx.x.x A test specimen shall be cut to a length that will allow the tube to be flattened at three (3) places along the length, with each flattened area to be at least 2 in. in length. When the temper is other than annealed, the sample may be annealed prior to testing.

xx. Test Method
xx.x Flattening Test
xx.x.x Each test specimen shall be flattened in a press at three (3) places along the length, each new place to be rotated on its axis approximately one third turn from the last flattened area. Each flattened area shall be at least 2 in. in length. A flattened test-specimen shall allow a micrometer caliper set at three (3) times the wall thickness to pass freely over the flattened area. The flattened areas of the test specimen shall be inspected for surface defects.

C22.5.2 SI Units - The following wording applies to ASTM B68M, B111M, B359M and B395M:

xx. Performance Requirements
xx.x Flattening Test
xx.x.x When specified in the contract or purchase order, the flattening test described in the Test Method section in xx.x shall be performed.
xx.x.x.x During inspection, the flattened areas of the test-specimen shall be free of defects, but blemishes of a nature that do not interfere with the intended application are acceptable.

xx. Specimen Preparation
xx.x Flattening Test

xx.x.x A test specimen shall be cut to a length that will allow the tube to be flattened at three (3) places along the length, with each flattened area to be at least 50mm in length. When the temper is other than annealed, the sample may be annealed prior to testing.

xx. Test Method
xx.x Flattening Test
xx.x.x Each test specimen shall be flattened in a press at three (3) places along the length, each new place to be rotated on its axis approximately one third turn from the last flattened area. Each flattened area shall be at least 50 mm in length. A flattened test-specimen shall allow a micrometer caliper set at three (3) times the wall thickness to pass freely over the flattened area. The flattened areas of the test specimen shall be inspected for surface defects.

C23. Significance of Numerical Limits

C23.1 This section provides the rounding procedures for numerical limits associated with specification requirements. See the table included in the electronic template for standard requirements.

C24. Inspection [B05]

C24.1 This section should contain general information regarding the inspection requirements of the product.

C25. Rejection and Rehearing [B05]

C25.1 This section should describe the conditions under which rejection shall be permitted and the basis for reconsideration when requested by the manufacturer or supplier.

C26. Certification [B05]

C26.1 This section should be included in all specifications, and when included, the following is how it shall appear in the standard. Use the template language or blue book mandatory wording. Refer to the ASME Boiler and Pressure Vessel Code where appropriate.

C27. Test Report [B05]

C27.1 This section **shall** be included in all specifications containing a Certification section. Use the mandatory wording included in the electronic template.

C27.2 For some products it may be desirable to identify this section as "Mill Test Report," "Foundry Test Report," et cetera.

C28. Product Identification

C28.1 When this section is required, the wording to be used will be dictated by the product and the circumstances of the application.

C29. Packaging and Package Marking [B05]

C29.1 This section should be included in all standards.

C30. Key Words [B05]

C30.1 Key Words may be added editorially at any time to a standard Select key words from title and scope, products involved, et cetera.

C30.1.1 It is recommended that the copper or copper alloy UNS designations involved be included in the key words for the purposes of indexing and electronic searches.

C31. Summary of Changes

C31.1 This unnumbered section shall be included in all revised standards when published. The information in this section identifies the principle changes made to the standard since the last publication.

C31.1.1 The inclusion of this section is identified with an asterisk item in the Scope with the following first page footnote: "A Summary of Change section appears at the end of this standard."

C32. Supplementary Requirements

C32.1 For some product specifications, supplementary requirements may be specified. These requirements usually apply only when specified by the purchaser in the inquiry, contract or purchase order. Include an introductory qualifying statement about the requirements.

C32.2 Instead of including the details of the supplementary requirements in the product specification, the Supplemental Requirements section of a related general requirements specification, when available, may be referenced in the General Requirements section of the product specification.

C33. Quality Assurance

C33.1 This requirement, when included, shall be qualified by the statement, "When specified in the contract or purchase order." Reference to a suitable document, such as ASTM, ANSI, MIL, or other, may be made by agreement between the manufacturer or supplier and the purchaser.

C34. Annexes and Appendixes

C34.1 Additional information may be included in one or more annexes or appendixes to the specification. The words, "Mandatory Information" shall appear directly under the title of the annex, and "Nonmandatory Information" shall appear directly under the title of the appendix.

C34.2 *Annexes*

C34.2.1 Include in annexes any detailed test methods or information such as that on equipment or material that is a ***mandatory*** part of the specification, but too lengthy for inclusion in the main text. Annexes precede appendixes.

C34.3 *Appendixes*

C34.3.1 There are times when it is desirable to include in a specification additional information for general use and guidance, but does ***not*** constitute a mandatory part of the specification. It is appropriate to include such material in appendixes. Examples of such materials are tables showing the approximate relationship between tensile strength and hardness, lists of preferred thicknesses of plate, sheet, strip, and strip reproduced from other documents, tables of standard mass and standard sizes, et cetera.

D. APPENDIX

A. Electronic template for B05 documents. Refer to B05 committee web page.

E. SUMMARY OF CHANGES

Subcommittee B05.91 has identified the location of selected changes to this white paper since the publication of the Fifth Edition, February 2000. Revisions ensuing from prior editions are published below for historical continuity.

(1) An electronic template was included as an Appendix, posted separately on the B05 web page. The template contains the wording included in previous editions of the Outline of Form. This was

the result of Task Group 9128, approved on MCLB 01-03. Most of section C was modified such that the examples were taken out and referenced in the electronic template.

(2) A listing of chemical analysis methods was added to section C22 on Test Methods. This was the result of action of Task Group 9127, approved on MCLB 01-03.

(3) Updates to the editorial review practice were made.

(4) Section C30 was modified to recommend the inclusion of alloy designations in Key Words.

(5) A general review and revision of the introductory sections A and B were conducted.

(6) Language for the tube flattening test was added to section C22 on Test Methods as approved on MCLB 03-02.

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Revisions of the Fourth edition:

Note - For historical purposes, the summary of changes made to the fourth edition resulting in the fifth edition have been retained and are published below. Subcommittee B05.91 will retain these revisions in this location unless it becomes a problem of space.

Subcommittee B05.91 has identified the location of selected changes to this white paper since the publication of the Fourth Edition (September 1996).

(1) General Requirements section was editorially corrected to be located as paragraph C5, before Terminology, and the other involved paragraphs were renumbered.

(2) Paragraph C5, Terminology was revised to include reference to Committee B05 terminology standard B 846. This was approved on MCLB 99-01.

(3) In Paragraph C16, Other Requirements, an example of a Purchases for U.S. Government paragraph was added, as approved on MCLB 99-01.

(4) Paragraph C23, Significance of Numerical Limits, was revised as approved on MCLB 99-02.

(5) Paragraph C31, Summary of Changes, was revised as approved on MCLB 99-01.