



Designation: B1015 – 20

Standard Practice for Form and Style of Standards Relating to Refined Nickel and Cobalt and Their Alloys¹

This standard is issued under the fixed designation B1015; 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 practice covers the form and style for specifications under the jurisdiction of ASTM Subcommittee B02.07 Refined Nickel and Cobalt and Their Alloys. Anyone preparing new or revising existing specifications for this subcommittee shall follow the practices and procedures outlined herein.

1.2 This practice is a supplement to the current edition of Form and Style for ASTM Standards (Form Manual)². If there is a conflict between the documents, then this should be brought to the attention of B02.07. Until the conflict is resolved, the more stringent requirement of the two documents takes precedent.

1.3 The word “specifications” will be used throughout this document to describe B02.07 standards because the majority of B02.07 standards are categorized as such. Nevertheless, the instruction herein applies to any standards under the jurisdiction of B02.07.

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:³

- A488/A488M** Practice for Steel Castings, Welding, Qualifications of Procedures and Personnel
- B84** Test Method for Temperature-Resistance Constants of Alloy Wires for Precision Resistors
- B880** Specification for General Requirements for Chemical

- Check Analysis Limits for Nickel, Nickel Alloys and Cobalt Alloys
- B899** Terminology Relating to Non-ferrous Metals and Alloys
- E6** Terminology Relating to Methods of Mechanical Testing
- E8/E8M** Test Methods for Tension Testing of Metallic Materials
- E18** Test Methods for Rockwell Hardness of Metallic Materials
- E112** Test Methods for Determining Average Grain Size
- E139** Test Methods for Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
- E165/E165M** Practice for Liquid Penetrant Testing for General Industry
- E190** Test Method for Guided Bend Test for Ductility of Welds
- E213** Practice for Ultrasonic Testing of Metal Pipe and Tubing
- E228** Test Method for Linear Thermal Expansion of Solid Materials With a Push-Rod Dilatometer
- E290** Test Methods for Bend Testing of Material for Ductility
- E384** Test Method for Microindentation Hardness of Materials
- E426** Practice for Electromagnetic (Eddy Current) Examination of Seamless and Welded Tubular Products, Titanium, Austenitic Stainless Steel and Similar Alloys
- E571** Practice for Electromagnetic (Eddy-Current) Examination of Nickel and Nickel Alloy Tubular Products
- E1269** Test Method for Determining Specific Heat Capacity by Differential Scanning Calorimetry
- E1282** Guide for Specifying the Chemical Compositions and Selecting Sampling Practices and Quantitative Analysis Methods for Metals, Ores, and Related Materials
- E1417/E1417M** Practice for Liquid Penetrant Testing
- E1461** Test Method for Thermal Diffusivity by the Flash Method
- E1473** Test Methods for Chemical Analysis of Nickel, Cobalt and High-Temperature Alloys
- G28** Test Methods for Detecting Susceptibility to Intergranular Corrosion in Wrought, Nickel-Rich, Chromium-Bearing Alloys

¹ This practice is under the jurisdiction of ASTM Committee B02 on Nonferrous Metals and Alloys and is the direct responsibility of Subcommittee B02.07 on Refined Nickel and Cobalt and Their Alloys.

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² Available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, www.astm.org.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

G48 Test Methods for Pitting and Crevice Corrosion Resistance of Stainless Steels and Related Alloys by Use of Ferric Chloride Solution

G61 Test Method for Conducting Cyclic Potentiodynamic Polarization Measurements for Localized Corrosion Susceptibility of Iron-, Nickel-, or Cobalt-Based Alloys

2.2 *Other Standards:*

IEEE/ASTM SI 10 American National Standard for Metric Practice³

ASME BPVC IX Welding, Brazing, and Fusing Qualifications⁴

3. Terminology

3.1 *general specification, n*—a specification that covers common requirements for two or more types or categories of a product form.

3.2 *product specification, n*—a specification that covers requirements for a specific type or category of a product form.

3.3 For the definitions of additional terms used in this practice, refer to Form and Style for ASTM Standards; Terminology **B899**; and Terminology **E6**.

4. Subject Headings of Text

4.1 Subject headings of text are sections found in ASTM standards. Subject headings that are typical for B02.07 specifications, along with accompanying guidance for the segments' form and style, are presented in Section 5 onward.

4.2 The Form Manual designates some subject headings as “mandatory” or required; and some as “other” or optional. In this document, subject headings required to be in B02.07 specifications will have the word “mandatory” in parenthesis next to the heading. Optional headings will have nothing beside it.

4.3 The optional headings presented in this practice are commonly seen in B02.07 specifications. Not all these sections, however, appear in each specification because based on the specification's purpose, it may not be needed. When drafting a new B02.07 specification, it is wise to review existing specifications covering similar commodities for an idea of needed optional headings.

4.4 In some cases, a specification may require a subject heading not named in the following sections. When this occurs, it should be inserted in a way to preserve the logical sequence of sections.

4.5 The following sections are ordered in the sequence recommended by the Form Manual, Part B2. ASTM B02.07 specifications should follow this arrangement to the extent practical.

4.6 The discussion in the following sections are supplements to the Form Manual, Part B. The more stringent requirement of the two documents takes precedent.

5. Title (Mandatory)

5.1 The title will begin with the word “Standard”, followed by a word that classifies the standard. The title of the majority of B02.07 standards will begin with “Standard Specification...”

5.2 If the standard will be a general specification, then the title will next have the phrase “for general requirements...” followed by wording to identify the specific product form that it will cover.

5.3 If the standard will be a product specification, then the title will next contain additional concise wording that further classifies it by at least one of the following categories:

- Specific form,
- Principle alloying elements,
- Specific chemical composition,
- Specific application,
- Specific quality,
- Temperature usage.

5.4 The title should not contain UNS numbers; these are listed in the keyword section.

5.5 **Appendix X1** contains examples to assist with title formations.

6. Designation (Mandatory)

6.1 A designation will be assigned by ASTM Headquarters according to the rules of B4.1 in the Form Manual. It will have the form BXXXX.

6.2 The designation will be followed by a sequential number indicating the year of initial publishing (for example, BXXXX-21).

7. Scope* (Mandatory)

7.1 The scope will be the first section of the specification. Things that should be explained in the scope section include:

The specification's intended purpose in a simple, concise manner;

Alloy(s) that can be certified to the specification (along with associated grades, classes, and types);

The unit(s) that will be considered standard (for example, SI, non-SI, or dual-unit);

Any specification caveats (see Form Manual, part F);

The nature of supplementary requirements (see the supplementary requirements section of this specification for more information).

7.2 The scope should endeavor NOT to limit the specification temperature usage to specific temperature ranges and specific design applications.

7.3 The scope heading shall also contain an asterisk (Scope*) with the following note at the bottom of the page:

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

7.4 If a product specification will refer the user to requirements in another specification, then the scope section should also include:

A reminder of the need to also conform to that specification;

⁴ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

Which specification takes precedent if there are acceptance criteria conflicts.

NOTE 1—In B02.07 specifications, acceptance criteria of a product specification takes precedent over criteria in a general specification.

7.5 See [Appendix X1](#) for wording examples.

8. Referenced Documents

8.1 All B02.07 specifications should have a reference section listing relevant documents. Depending on the specification, these can include:

ASTM standards,

Codes or standards, or both, from other organizations (for example, ANSI, ASME, Federal Standards).

8.2 In the referenced documents section, list in alphanumeric sequence the designation and complete title of all documents referenced within the standard.

8.3 See section B6 of the Form Manual for more information and for handling of footnotes, year date, and adjuncts.

9. Terminology

9.1 All B02.07 specifications should have a terminology section defining the various product forms. To avoid redundant definitions, it is acceptable to point the user to another specification.

9.2 The terminology specifications used by B02.07 are Terminology [B899](#) and Terminology [E6](#).

10. Ordering Information

10.1 In general, the following statements should appear in the ordering information section of B02.07 specifications: It shall be the responsibility of the purchaser to specify all requirements that are necessary for product under this specification. Such requirements to be considered include, but are not limited to, the following.

10.2 These statements should be followed by a list of the appropriate items to be shown in the purchase order or contract. Typically, the list would include:

10.2.1 Quantity (mass, length, or number of pieces);

10.2.2 Name of material;

10.2.3 ASTM specification designation and year date to which the product is to be furnished and be certified as meeting;

10.2.4 Revision level(s) (year date and subscript if any) of referenced documents, if specified;

10.2.5 Condition (hot rolled, cold rolled, cold drawn, annealed, heat treated);

10.2.6 Grade, class, and type designations;

10.2.7 Dimensions;

10.2.8 Shape and finish characteristics (surface finish, type of edge required);

10.2.9 If the material is to be inspected;

10.2.10 Requirements for certifications and for reporting chemical analyses and test results; and

10.2.11 Supplementary or other special requirements.

10.3 If practicable, each item may contain a parenthetical reference to the appropriate part of the specification to which it applies. As an example:

Certification (see Section XX),

Pipe (Appendix X).

11. Materials and Manufacture

11.1 This section should briefly state general requirements of materials. It should address applicable practices (for example, melting, refining, casting, mechanical working, fabrication); heat treatment; surface finishing; welding processes and procedures; coatings, etc.

11.2 This section should also mention the condition(s) in which the material can be supplied.

12. Chemical Composition

12.1 The preferred introduction for the chemical composition section is:

“The material shall conform to the requirements prescribed in Table...”.

12.2 The table’s columns shall contain a listing of the alloy(s) elements in the order demonstrated in [Annex A3](#). An element can either be spelled out or represented by its chemical symbol.

12.3 The table’s rows shall list the alloys by UNS number. When variations of one alloy exist in the same specification, then it may be subdivided according to the rules of the Form Manual, subsection B8.

12.4 The table shall also include:

Maximum, minimum, or range for each element;

The amount of each element (in percent or ppm);

References to table notes, when applicable.

NOTE 2—Listing niobium or tantalum as the sum of both elements was once common because it was difficult to separate these elements for analysis. While established specifications may still list sums of these elements, new specifications created after the first version of this document (2021 onward) should list these elements separately because current spectrographic analysis techniques easily separate these two elements.

12.5 This section will also include:

Detailed requirements regarding heat analysis;

Whether or not a product analysis is needed (in accordance with Specification [B880](#));

Any chemical composition limits (in accordance with Guide [E1282](#));

Information on methods and practices (in accordance with Test Methods [E1473](#)).

12.6 Each item should be covered in a separate subsection (paragraph). See [Appendix X2](#) for wording examples.

13. Physical Properties

13.1 If this section is deemed necessary for a specification, then it shall include applicable electrical and thermal properties (for example, electrical resistivity, thermal conductivity, etc.). The information should be listed in tabular form, and each standard used to test the physical property shall be listed in the reference and test methods sections.

13.2 Each physical property should be covered in its separate subsection (paragraph) that includes the acceptance criteria and directs the user to the appropriate table.

14. Mechanical Properties

14.1 This section shall include the acceptance criteria for an alloy's mechanical properties. Each property should be explained in a separate subsection (paragraph). Acceptance criteria should be listed in tabular form (see [Annex A3](#) for an example).

14.2 Mechanical properties usually covered in B02.07 specifications are tensile strength, hardness, or stress rupture testing, or any combination thereof. Depending on the product form, additional mechanical properties with the respective acceptance criteria may be included (for example, impact, flattening, flare, proof loading, wrap, crush, and coiling testing).

14.3 This section will be labeled "mechanical properties" if the specification contains several property requirements. If the specification contains only one specific mechanical property requirement (for example, tensile strength), then this section will adopt the name of the mechanical test (for example, Tensile Properties).

14.4 This section will be labeled "Mechanical Properties and Other Requirements" if the specification will cover items such as:

Metallurgical structure requirements (for example, grain size, decarburization, etch testing, micro-cleanliness, corrosion resistance, hardenability, etc.),

- Hydrostatic testing,
- Flange testing,
- Pressure testing,
- Air-under-water testing.

NOTE 3—If deemed appropriate due to length of discussion, instructions for a property may have its own section. It should be placed immediately after this section.

14.5 This section may also include heat treatment criteria. The acceptance criteria may be expressed in either a minimum value or range.

14.6 If a property is to be measured but there is no corresponding ASTM standard test method, then the test details are to be included in this section. If another organization has a test method specification for the property, then reference this specification as a footnote (see part B18.2 and A1.1 of the Form Manual for more information).

15. Nondestructive Testing and Examination

15.1 This section should include applicable nondestructive evaluation (NDE) acceptance criteria for each alloy(s). Common NDE techniques used for alloys in B02.07 specifications include liquid penetrant, radiographic, ultrasonic, and eddy current.

15.2 Each requirement, along with its acceptance criteria, should be explained in a separate subsection (paragraph). The type of NDE test acceptance criteria to be included depends on the specification's scope. If the specification requires the

individual performing the NDE examination to be certified, then this shall be stated. See [Appendix X2](#) for example wording.

15.3 If a quality is to be measured but there is no corresponding ASTM test method specification, then the test details are to be included in this section. If another organization has a test method specification for the property, then reference this spec as a footnote (see part B18.2 and A1.1 of the Form Manual).

16. Dimensions, Mass, and Permissible Variations

16.1 This section will give details as to standard shape, mass, and size ranges of an alloy(s)' product form(s). It will also specify, each with a separate subsection (paragraph), the acceptance criteria or limitations for flatness, out-of-round, camber, bowing, mating, corners, cut lengths, straightness (maximum curvature), machining allowances, ends, and other things like these.

16.2 The information shall be in tabular form (see [Annex A3](#)), having a brief reference statement(s) pointing the user to the table (see [Appendix X2](#) for wording examples). The section should have a separate table for each product form, shape, or type, or any combination thereof; deformation processes or production routes (for example, hot-worked, cold-worked). The table(s) should clearly indicate where the various size ranges are divided (see [Annex A3](#) for table example).

17. Workmanship, Finish, and Appearance

17.1 This section will stipulate the degree of skill with which the alloy(s)' product form must be made as well as the acceptable quality of the finished product. It should clearly indicate acceptance criteria for items including, but not limited to:

- General appearance,
- Soundness,
- Surface finish (along with individual descriptions),
- Edge requirements,
- End finish.

17.2 For clarity and uniformity, the nomenclature should be according to recognized industry standards. See [Appendix X2](#) for wording examples.

18. Sampling and Resampling

18.1 This section is needed if the specification will qualify a product material based on a unit (for example, a heat of material, a coil or wire). It will include, but is not limited to, information such as:

- From what, where, and how to extract the sample;
- Acceptable mass, dimensions, and orientation;
- The number of samples that need to be tested.

18.2 When statistical sampling methods are used to qualify a lot and qualification is based on the examination of some individual units, then the sampling plans and implementation procedures should be included in the specification's annex. The sampling plans should include the lot size, the number of units to be sampled, and the number that must be acceptable for the

lot to be qualified. If the plans and procedures are in another ASTM standard, then a reference to them is sufficient.

18.3 A specification may include sample replacement (resampling) provisions for occasions when a specimen is damaged/fails for reasons not attributable to typical material properties or conditions (for example, defective machining, casting imperfections, errors during sample preparation). Such provisions will be listed in this section. See [Appendix X2](#) for wording examples.

19. Number of Tests and Retests

19.1 This section should stipulate the amount of test units or specimens, or both, required to determine an alloy(s)' product conformance. It will specify the amounts needed for each property test method.

19.2 If a specification allows retesting, then this section will have a separate subsection (paragraph) explaining the stipulations. This will include, but is not limited to, the following:

Retesting criteria (for example, original specimen broke out gauge marks);

The number of additional tests needed;

Limits of acceptance;

Whether or not there are any procedural differences when dealing with replacement samples.

19.3 See [Appendix X2](#) for wording examples.

20. Rework and Retreatment

20.1 This section is needed in a specification if it is permissible to rework (for example, grind or weld repair), reheat treat, or retest, or any combination thereof, the samples of a lot that failed to meet requirements. This section should indicate how many re-dos are permitted. It should also indicate whether additional or different samples, or both, can/need to be included.

20.2 When welding is permitted to bring a deficient product up to par with specification requirements, it is necessary to define the appropriate processes and procedures (for example, the ones applicable based on the intended end use of the part). They can either be defined in this section; or the specification can refer the user to another ASTM standard or industry code. See [Appendix X2](#) for wording examples.

21. Specimen Preparation

21.1 This section is included in a specification only if existing ASTM test methods do not explain specimen preparation for a particular test. It would include information such as, but not limited to, the following:

How to make specimens with enough details to ensure reproducibility;

Whether or not specimens are to be prepared in accordance with the recommendations of the manufacturer;

Whether or not material from which specimens are to be machined should come from a certain area; or be attached to a certain area of the product;

If a specimen can be used to satisfy more than one test requirement.

21.2 See [Appendix X2](#) for wording examples. Figures are also acceptable to use for explanations.

21.3 If ASTM test methods exist for all needed specimen preparations, then this section is not needed. The corresponding standards will be listed in the "Reference" and "Test Method" sections of the specification.

22. Test Methods

22.1 After a brief explanatory sentence(s), this section will list in tabular form applicable ASTM standard test methods needed to measure property conformance. Ones to be included depend on the specification's scope.

22.2 Common test methods used for alloys under B02.07's jurisdiction are listed in [Table 1](#).

23. Inspection

23.1 This section should contain brief sentences on stipulations for product inspection. Common stipulations include, but are not limited to, the following:

Whether or not the purchaser and manufacturer have to agree on the inspection requirements;

Whether or not the inspection requirements shall be stated in either the contract or the purchase order.

23.2 The section will explain such details as who will do the inspection, where it will be done, assurance that the producer will not impede the inspection, assurance that the test will not cause unnecessary interference, etc. See [Appendix X2](#) for wording examples.

24. Rejection and Rehearing

24.1 If this section is included in a specification, it will define the benchmarks of rejected test results. It will include such information as:

Who should be notified of the rejection;

How the notification will be transmitted;

What recourse a manufacturer has if a product form is rejected;

TABLE 1 Common Test Methods used for B02.07 Alloys

Test Method	ASTM Designation
Electrical Resistivity	B84
Tension	E8/E8M
Rockwell Hardness	E18
Grain Size	E112
Stress Rupture	E139
Liquid Penetrant	E165/E165M E1417/E1417M
Bend Testing	E190 E290
Ultrasonic Testing	E213
Thermal Expansion	E228
Microhardness	E384
Electromagnetic (Eddy-Current) Testing	E426 E571
Specific Heat	E1269
Thermal Diffusivity	E1461
Chemical Analysis	E1473
Corrosion Test	G28 G48 G61

What should be done with the rejected product, pending disposition.

24.2 This section will also indicate if the manufacturer is allowed to make a claim for a rehear (retest) of rejected product forms. If allowed, then the stipulations will be listed in this section. See **Appendix X2** for wording examples.

24.3 If desired, separate sections for “Rejection” and “Rehearing” can be created in a specification.

25. Certification

25.1 This section will explain if and what type of documentation is needed to be given to the purchaser as guarantee that the product form was tested in accordance with and meets all acceptance criteria of the specification.

25.2 This section should also indicate if certificates need notarization; and if electronic certificates are acceptable. See **Appendix X2** for wording examples.

25.3 B02.07 specifications shall require a test report and certificate of compliance be furnished to the purchaser. The specification will either have this section stipulating these requirements; or refer to a specification with these requirements.

26. Product Identification

26.1 B02.07 specifications should have this section to stipulate what information should be stamped or marked on an alloy’s product form as well as its respective label or tag, or both. Information can include, but is not limited to:

- ASTM designation;
- Date;
- UNS number (including grade, class and type if applicable);
- Lot or heat number;
- Manufacturer’s name, brand, or trademark.

26.2 The amount of necessary markings may vary for products forms. The product should, however, contain enough designators to provide unique piece identification. The product markings must include sufficient attributes to distinguish one piece from another, as even product forms certified to the same specification can vary with respect heat treatment, properties; or may originate from different ingots or molds.

27. Packing and Package Marking

27.1 If the specification is to stipulate requirements for packing, shipment, and storage of the product form, then it should have this section and explain the details here. Requirements may include such information as:

- How it can be packaged (for example, boxed, crated);
- The degree of protection needed for the product;
- How many product forms can be packaged together.

27.2 Specifics for package markings will also be in this section. Examples include:

- PO number;
- Alloy designation;
- Size;
- Name of supplier.

28. Keywords

28.1 This section will be the last section in the main body of a specification. It will contain terms for indexing. Appropriate terms for indexing include, but are not limited to:

- The product form (for example, plate, sheet, pipe);
- UNS number of all alloys contained in the specification;
- Specific application(s) addressed in the specification (for example, seamless, precipitation hardened).

28.2 See Section **33** for the keywords pertaining to this practice.

29. Supplementary Requirements

29.1 If B02.07 decides that supplementary requirements can be stipulated for a product form of an alloy(s); then the respective specification will have this section.

NOTE 4—If the same supplemental requirements of another widely used specification will be added to the new specification, then these requirements should be structured in the same order (for example, same subject heading, same numbering, same sequence). If practical, the new specification could simply refer the user to the requirements of the other specification.

29.2 The supplementary requirements section will be separate from the main body of the specification.

29.3 Supplementary requirements will only be enforceable when specified in the purchase order or contract, or both. Supplementary requirements are not permitted to relax the requirements in the main body of the standard; they will not allow the lowering of minimum requirements.

29.4 Supplementary requirements should be numbered in sequence, starting with the number S1. If supplementary requirements are deleted, cancelled, or replaced; then the subcommittee may elect to retain the original number to minimize specification changes and, by extension, the impact on specification users. In this case, a note shall be placed after the number indicating the change. If a replacement requirement in another specification or section will be used, then the note should explain where the user can find it.

30. Annexes and Appendixes

30.1 Annexes will contain mandatory information that is too lengthy to be included in the main body of the specification. It will be numbered in sequence, starting with A1.

30.2 An annex may include things like detailed sample plans that are required for a product form and not explained in any other ASTM standard.

30.3 Appendixes will contain nonmandatory information considered to be guidance. It will be numbered in sequence, starting with X1.

30.4 If annexes or appendixes are deleted or cancelled, then the subcommittee may elect to retain the original requirement number to minimize specification changes and, by extension, the impact on specification users. In this case, a note shall be placed after the number indicating the requirement has been deleted or cancelled. If a replacement requirement exists, the note can refer the user to the corresponding section.

31. References

31.1 If needed in a specification, this section will be an unnumbered section.

31.2 A B02.07 specification will only need a reference section if five or more literature references are cited in the specification.

32. Summary of Changes

32.1 This section shall be included in each specification as an unnumbered section at the end of the document. It will include a brief statement indicating which issue of the specification is being changed. A placeholder should be inserted for

the day of approval (for example, MONTH/DAY/YEAR). ASTM Headquarters will fill in the date after the revision has been approved.

32.2 Following the statement will be a list of changes that may impact the use of the standard. Changes should be listed by section or subsection. Reasons for them can be included.

32.3 ASTM Committee on Standards has agreed (see COS Minutes from 9/12/02) that entries to this summary of changes section will be retained for a period of eighteen months to ensure availability.

33. Keywords

33.1 cobalt; nickel; practice

SUPPLEMENTARY REQUIREMENTS

S1. Supplementary requirements are typically for, but not limited to, military or federal purposes.

S2. If it is desired that the product conforms to supplementary requirements that are stricter than the product and general specification(s), then this shall be stipulated through the purchase order.

S3. This practice currently does not contain any supplementary requirements.

iTeh Standards
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Document Preview

[ASTM B1015-20](#)

<https://standards.iteh.ai/catalog/standards/sist/201fd86a-870c-4c50-9f06-363f4901c676/astm-b1015-20>