Designation: ~~B306 – 13~~ B306 – 20

Standard Specification for Copper Drainage Tube (DWV) [1]

This standard is issued under the fixed designation B306; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 This specification establishes the requirements for seamless copper tube (DWV) produced from Copper UNS No. C12200 and intended for sanitary drainage, waste, and vent piping.

NOTE 1—Fittings used for soldered or brazed connections in drainage, waste, or vent systems are described in ASME Standards B16.23 and B16.29 and CSA Standard B158.1.

NOTE 2—The assembly of copper drainage, waste, and vent systems by soldering is described in Practice B828.

NOTE 3—Solders for joining copper drainage, waste, or vent systems are described in Specification B32. The requirement for acceptable fluxes for these systems are described in Specification B813.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

~~1.3 The following hazard statement pertains only to the test method described in Section 16.2.3 of 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.*~~

1.3 The following hazard statement pertains only to the test method(s) described in this specification:

1.3.1 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

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*:[2]

B32 Specification for Solder Metal

~~B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast~~

B813 Specification for Liquid and Paste Fluxes for Soldering of Copper and Copper Alloy Tube

B828 Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings

B846 Terminology for Copper and Copper Alloys

B900 Practice for Packaging of Copper and Copper Alloy Mill Products for U.S. Government Agencies

~~E8~~E8/E8M Test Methods for Tension Testing of Metallic Materials~~ [Metric] E0008_E0008M~~

E18 Test Methods for Rockwell Hardness of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E243 Practice for Electromagnetic (Eddy Current) Examination of Copper and Copper-Alloy Tubes

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[1] This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.04 on Pipe and Tube.

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[2] 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~~standard's Document Summary page on the ASTM website.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition
~~E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)~~
2.2 *ASME Standards:*[4]
B16.23 Cast Copper Alloy Solder Joint Drainage Fittings—DWV
B16.29 Wrought Copper and Copper Alloy Solder Joint Drainage Fittings—DWV
ASME Boiler and Pressure Vessel Code
2.3 *CSA ~~Standards:~~Standard:*[5]
B158.1 Cast Brass Solder Joints Drainage, Waste, and Vent Fittings

3. Terminology

~~3.1 *Definitions:*~~
~~3.1.1 *tube, DWV, n*—seamless copper tube intended for sanitary drainage, waste, and vent piping and other nonpressure applications and conforming to the particular dimensions for tube commonly known as copper drainage tube.~~

3.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

~~3.2 *Definitions of Terms Specific to This Standard:*~~
~~3.2.1 *capable of*—the test need not be performed by the producer of the material. However, if subsequent testing by the purchaser establishes that the material does not meet these requirements, the material shall be subject to rejection.~~

4. Ordering Information

4.1 Include ~~this information for contracts or purchase orders for products furnished to this specification.~~the following specified choices when placing orders for product under this specification, as applicable:
4.1.1 ASTM designation and year of issue (for example, B306 – 02~~),~~);
4.1.2 Copper UNS No. or other internationally recognized copper designation;
4.1.3 Temper;
4.1.4 Dimensions (Section 11 and Table 1~~),~~);
4.1.5 ~~Total length, each size,~~Quantity—total weight or total length or number of pieces of each size; and
4.1.6 ~~When product is purchased for agencies of the U.S. Government.~~Intended application.

4.2 The following options are available ~~and shall be specified in the contract or purchase order~~ but may not be included unless specified at the time of placing of the order, when required:
4.2.1 Heat identification or traceability,
4.2.2 Tensile Test (Section 8.1~~)~~),
~~4.2.2 Electromagnetic (eddy-current) test (Section 9.2),~~
4.2.3 Pneumatic test (Section 9.3),
4.2.4 Certification (Section 20),
4.2.5 Test report (Section 21~~.~~),
4.2.6 When product is purchased for agencies of the U.S. government, and
4.2.7 Rockwell Hardness.

TABLE 1 Standard Dimensions, Weights, and Tolerances for Diameter and Wall Thickness

NOTE 1—All tolerances in this table are plus and minus except where otherwise noted.

Nominal or Standard Drainage Tube Size, in.	Outside Diameter, in. (mm)	Tolerance in Average Outside Diameter,[A] in. (mm)	Wall Thickness, in. (mm)		Theoretical Weight, lb/ft (kg/m)
			Actual	Tolerance	
1¼	1.375 (34.9)	0.0015 (0.038)	0.040 (1.02)	0.003 (0.076)	0.650 (0.967)
1½	1.625 (41.3)	0.002 (0.051)	0.042 (1.07)	0.003 (0.076)	0.809 (1.20)
2	2.125 (54.0)	0.002 (0.051)	0.042 (1.07)	0.004 (0.10)	1.07 (1.59)
3	3.125 (79.4)	0.002 (0.051)	0.045 (1.14)	0.004 (0.10)	1.69 (2.51)
4	4.125 (105)	0.002 (0.051)	0.058 (1.47)	0.007 (0.18)	2.87 (4.27)
5	5.125 (130)	0.002 (0.051)	0.072 (1.83)	0.008 (0.20)	4.43 (6.59)
6	6.125 (156)	0.002 (0.051)	0.083 (2.11)	0.008 (0.20)	6.10 (9.08)
8	8.125 (206)	+0.002 (0.051) −0.004 (0.10)	0.109 (2.77)	0.011 (0.28)	10.6 (15.8)

[A] The average outside diameter is the average, at any one cross section, of the maximum and minimum measured diameters (usually at or very close to 90° to each other).

[4] Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, ~~Three~~Two Park Ave., New York, NY 10016-5990, http://www.asme.org.
[5] Available from Canadian Standards Association (CSA), ~~5060 Spectrum Way, Mississauga, ON L4W 5N6, Canada, http://www.csa.ca.~~178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, http://www.csagroup.org.

5. Material and Manufacture

5.1 *Materials:*

5.1.1 The material of manufacture shall be ~~billets,~~ a form (billets, bars, or ~~tube~~tube) of the Copper UNS No. C12200 ~~and shall be~~ of such purity and soundness as to be suitable for processing into the ~~tubular~~ products ~~described.~~ prescribed herein.

5.2 *Manufacture:*

5.2.1 The ~~tube~~product shall be manufactured by such ~~hot- or cold-working~~ hot working or cold working processes as to produce a ~~homogeneous~~ uniform wrought structure in the finished product. ~~The tube shall be cold drawn to the finished size and wall thickness.~~

~~NOTE 4—Tubes are normally joined with soldered fittings.~~

5.2.2 The product shall be hot or cold worked to the finished size, and subsequently annealed, when required, to meet the temper properties specified.

NOTE 4—Tubes are normally joined with soldered fittings.

6. Chemical Composition

6.1 The material shall conform to the following requirements listed in Table 2 for UNS No. ~~C12200:~~C12200

~~Copper; incl silver, %~~	~~99.9~~
~~Phosphorous, %~~	~~0.015–0.040~~

specified in the ordering information.

6.1.1 Results of the analysis on a product sample shall conform to the composition requirements within the permitted analytical variance specified in Table 2.

6.1.2 These ~~specification~~composition limits do not preclude the presence of other elements. ~~When included in the contract or purchase order, and agreed upon by the manufacturer or supplier and the purchaser, limits shall~~By agreement between the manufacturer and purchaser, limits may be established and analysis required for unnamed elements.

7. Temper

7.1 Tube shall be furnished in the H58 ~~temper as defined in standard Classification~~ temper.~~B601~~.

8. Mechanical Property Requirements

8.1 *Tensile ~~Strength:~~ Strength Requirements:*

8.1.1 ~~The tubes shall have a minimum tensile strength of 36~~Products furnished under this specification shall conform to the tensile requirements prescribed in Table 3~~ksi (248 MPa)~~, when tested in accordance with Test Methods ~~E8~~E8/E8M.

8.1.2 Tensile tests need not be performed except when specified in the contract or purchase order.

8.1.3 Acceptance or rejection based upon mechanical properties shall depend on tensile strength.

8.2 *Rockwell Hardness:*

8.2.1 The Rockwell hardness ~~test, Test Methods~~values given in ~~E18~~Table 3~~, is a quick and convenient method of checking for general conformity to the tensile strength requirement. For general~~ are for general information and assistance in ~~testing, the approximate minimum hardness value is 30 as measured on the 30-T scale.~~testing and shall not be used as a basis for product rejection.

8.2.2 By agreement between the manufacturer and the purchaser, and when specified in the contract or purchase order, the product shall conform to the Rockwell hardness requirement prescribed in Table 3, when tested in accordance with Test Methods E18.

9. Nondestructive Testing

9.1 The tubes furnished shall be capable of conforming with the test requirements of any one of the following tests.

9.2 *Electromagnetic (Eddy-Current) Test:*

9.2.1 Each tube up to and including 3⅛~~-in. (79.4-mm)~~ in. (79.4 mm) outside diameter shall be subjected to ~~examination and the testing shall follow the procedures of Practice~~ examination.~~E243~~.

9.2.1.1 Tubes that do not actuate the signaling ~~device, after it has~~ device on the testing unit, after having been adjusted to ~~detect discontinuities that would be unacceptable for this application, shall have met~~ provide information on the suitability of the tube for the intended application, shall conform to the requirements of this test. Testing shall be in accordance with Practice E243.

~~9.2.2 This test is not required unless specified in the contract or purchase order.~~

TABLE 2 Chemical Composition – Wt %

Copper; incl silver, % (min)	99.9
Phosphorous, %	0.015–0.040

TABLE 3 Mechanical Property Requirements

Mechanical Properties	
Tensile Strength, (min) ksi (MPa)	Rockwell Hardness, Superficial 30-T min
36 (250)	30

9.3 *Pneumatic Test:*

9.3.1 Each tube shall withstand a minimum internal air pressure of 60 psi (400 kPa) for 5 s without leakage.

9.3.2 This test is not required unless specified in the contract or purchase order.

10. Purchases for U.S. Government Agencies

10.1 When specified in the contract or purchase order, product purchased for agencies of the U.S. Government shall conform to the requirements stipulated in the Supplementary Requirements.

11. Dimensions, Mass, and Permissible Variations

11.1 *General*—For the purpose of determining conformance with the dimensional requirements given in this specification, any measured value outside the specified limiting values for any dimension is subject to rejection at the option of the purchaser.

~~11.2 *Weights*—Theoretical weights for the nominal or standard dimensions given in Table 1 are for information only. Actual weights will vary in accordance with the dimensional tolerances given in the table.~~

11.2 *Wall Thickness and Diameter Tolerances*—Wall thickness and diameter tolerances shall be in accordance with Table 1.

11.3 *Roundness Tolerance*—The difference between the major and minor outside diameters as determined at any one cross section of the tube shall not exceed 1½ %, expressed to the nearest 0.001 in. (0.025 mm), of the outside diameter of the tube.

11.4 *Lengths and Tolerances:*

11.4.1 *Standard Length and Tolerances*—The standard length of the material shall be 20 ft (6.10 m). The length tolerance shall be plus 1 in. (25 mm), minus 0 in.

11.4.2 Tubes supplied in other than standard lengths and tolerances shall be in accordance with requirements established by agreement between the manufacturer or supplier and the purchaser.

11.5 *Squareness of Cut*—The departure from squareness of the end of any tube shall not exceed 0.016 in./in. (0.016 mm/mm) of diameter.

12. Workmanship, Finish, and Appearance

12.1 The product shall be free of defects, but blemishes of a nature that do not interfere with the intended application are acceptable.

13. Sampling

13.1 Lot size, portion size, and selection of sample pieces shall be as follows:

13.1.1 *Lot Size*—An inspection lot shall be 10 000 ~~lbs~~lb (5000 kg) or fraction thereof.

13.1.2 *Portion Size*—The number of pieces selected to be representative of the lot shall be as indicated in the following schedule:

Number of Pieces in Lot	Number of Pieces to be Selected
~~1 to 50~~	~~1~~
1 to 50	1
51 to 200	2
201 to 1500	3
Over 1500	2 % of total number of pieces in lot but not more than 10 samples

13.2 *Chemical Composition:*

13.2.1 The sample shall be taken in approximately equal weight from each portion piece selected in 13.1.2 and in accordance with Practice E255. The minimum weight of the composite shall be 150 g.

13.2.2 Instead of sampling in accordance with Practice E255, the manufacturer shall have the option of sampling at the time casting are poured or from the semifinished product.

13.2.3 The number of samples taken during the course of manufacture shall be as follows:

13.2.3.1 When samples are taken at the time the castings are poured, at least one sample shall be taken for each group of castings poured simultaneously from the same source of molten metal.

13.2.3.2 When samples are taken from the semifinished product, a sample shall be taken to represent each 10 000 ~~lbs~~lb (5000 kg) or fraction thereof, except that not more than one sample per piece shall be required.

13.2.4 When the material composition has been determined during the course of manufacture, sampling of the finished product by the manufacturer is not required.

13.3 *Other Tests:*

13.3.1 Specimens for all other tests shall be taken from two of the sample pieces taken in 13.1.2. In the event only one sample piece is required, all specimens shall be taken from the piece selected.

14. Number of Tests and Retests

14.1 *Tests:*

14.1.1 *Chemical Analysis*—Chemical ~~Composition~~composition shall be determined ~~as the average of~~ in accordance with the element mean of the results from at least two replicate ~~determinations for each specified element with a limiting value.~~analyses of the sample(s).

14.1.2 *Tensile Strength*—The test results shall be reported as the average of results obtained from two test specimens taken from each of the samples pieces selected in 13.1.2 and each test specimen must conform to specification requirements.

14.1.2.1 In the event only one piece was selected for test, both test specimens shall be taken from the piece selected.

14.2 *Retests:*

14.2.1 When requested by the manufacturer or supplier, ~~he shall have the option to perform a retest when the test results~~a retest shall be permitted when results of tests obtained by the purchaser fail to conform ~~with the product specification requirement(s).~~to the requirements of the product specification.

14.2.2 ~~Retesting~~ The retest shall be as directed in ~~this specification~~ the product specifications for the initial test except ~~for~~ the number of test specimens ~~which~~ shall be twice that normally required for the ~~test. Test results for all specimens shall conform to the specification requirement(s) in retest and failure to comply shall be cause for lot rejection.~~specified test.

14.2.3 All test specimens shall conform to the product specification requirement(s) in retest. Failure to conform shall be cause for rejection.

15. Specimen Preparation

15.1 *Chemical Analysis:*

15.1.1 Preparation of the analytical specimens for the determination of chemical analysis shall be the responsibility of the reporting laboratory.

15.2 *Tensile Test:*

15.2.1 The tensile test specimen shall be of the full section of the tube and shall conform to the requirements specified in the section Specimens for Pipe and Tube in Test Methods ~~E8~~E8/E8M, unless the limitations of the testing machine precludes the use of such specimens.

15.2.2 Test specimens conforming to Specimen No. 1 in Fig. 13, Tension Test Specimens for Large-Diameter Tubular Products, of Test Methods ~~E8~~E8/E8M shall be used when a full-section specimen cannot be tested.

16. Test Methods

16.1 *Chemical Composition:*

16.1.1 In ~~case of dispute, chemical composition shall be determined as follows:~~cases of disagreement, test methods for chemical analysis shall be subject to agreement between the manufacturer or supplier and the purchaser. The following table is a list of published methods, some of which may no longer be viable, which along with others not listed, may be used subject to agreement.

Element	Test Method
~~Copper~~	~~E53~~
Copper	E53
~~Phosphorus~~	~~E62~~
Phosphorus	E62

16.1.2 Test method(s) ~~used~~ to be followed for the determination of element(s) ~~required by~~resulting from contractual or purchase order ~~agreements~~agreement shall be as agreed ~~upon~~ between the manufacturer or supplier and ~~the~~ purchaser.

16.2 The finished product shall conform with the mechanical properties and other requirements of this specification when tested or examined in accordance with the following appropriate test method or practice:

Test	Test Method
~~Tensile~~	~~E8~~
Tensile	E8/E8M
~~Pneumatic~~	~~Section: 16.2.3~~
Pneumatic	Subsection 16.2.3
Electromagnetic examination (eddy current)	Practice E243
Rockwell Hardness	E18

16.2.1 Tensile strength shall be determined in accordance with Test Methods ~~E8~~E8/E8M.

16.2.1.1 Whenever test results are obtained from both full-size and machined specimens and they differ, the test results from the full-size specimens shall be used.

16.2.1.2 Test results are not seriously affected by variations in speed of testing. A considerable range of testing speed is possible; however, the rate of stressing to the yield strength shall not exceed 100 ksi (690 MPa)/min. Above the yield strength, the movement per minute of the testing machine head under load shall not exceed 0.5 in./in. (12.7 mm/mm) of gage length (or distance between grips for full-section specimens).

16.2.2 *Electromagnetic (Eddy-Current) Test*—Each tube up to and including 3⅛~~-in. (79.4-mm)~~ in. (79.4 mm) outside diameter, shall be subjected to an eddy-current test. Testing shall follow the procedures in Practice E243. Tubes shall be passed through an eddy-current test unit adjusted to provide information on the suitability of the tube for the intended application.

16.2.2.1 Either notch depth or drilled hole standards shall be used.

~~(*a*) Notch depth standards, rounded to the nearest 0.001 in., shall be 22 % of the wall thickness. The notch depth tolerance shall be ±0.0005 in.~~

(a) Notch depth standards, rounded to the nearest 0.001 in., shall be 22 % of the wall thickness. The notch depth tolerance shall be ±0.0005 in.

(b) Drilled holes shall be drilled radially through the wall using a suitable drill jig that has a bushing to guide the drill, care being taken to avoid distortion of the tube while drilling. The diameter of the drilled hole shall be in accordance with the following and shall not vary by more than +0.001, −0.000 in. of the hole diameter specified.

~~(b) Drilled holes shall be drilled radially through the wall using a suitable drill jig that has a bushing to guide the drill, care being taken to avoid distortion of the tube while drilling. The diameter of the drilled hole shall be in accordance with the following and shall not vary by more than +0.001, −0.000 in. of the hole diameter specified.~~

Tube Outside Diameter, in.	Diameter of Drilled Holes, in.	Drill Number
~~¼ to ¾, incl~~	~~0.025~~	~~72~~
¼ to ¾, incl	0.025	72
~~Over ¾ to 1, incl~~	~~0.031~~	~~68~~
Over ¾ to 1, incl	0.031	68
~~Over 1 to 1¼, incl~~	~~0.036~~	~~64~~
Over 1 to 1¼, incl	0.036	64
~~Over 1¼ to 1½, incl~~	~~0.042~~	~~58~~
Over 1¼ to 1½, incl	0.042	58
~~Over 1½ to 1¾, incl~~	~~0.046~~	~~56~~
Over 1½ to 1¾, incl	0.046	56
~~Over 1¾ to 2, incl~~	~~0.052~~	~~55~~
Over 1¾ to 2, incl	0.052	55

Tube Outside Diameter (mm)	Diameter of Drilled Holes (mm)	Drill Number
~~(6.0 to 19.0, incl)~~	~~(0.635)~~	~~72~~
(6.0 to 19.0, incl)	(0.635)	72
~~(Over 19.0 to 25, incl)~~	~~(0.785)~~	~~68~~
(Over 19.0 to 25, incl)	(0.785)	68
~~(Over 25 to 32, incl)~~	~~(0.915)~~	~~64~~
(Over 25 to 32, incl)	(0.915)	64
~~(Over 32 to 38, incl)~~	~~(1.07)~~	~~58~~
(Over 32 to 38, incl)	(1.07)	58
~~(Over 38 to 45, incl)~~	~~(1.17)~~	~~56~~
(Over 38 to 45, incl)	(1.17)	56
~~(Over 45 to 50, incl)~~	~~(1.322)~~	~~55~~
(Over 45 to 50, incl)	(1.322)	55

16.2.2.2 Alternatively, at the option of the manufacturer, using speed insensitive eddy-current units that are equipped to select a fraction of the maximum imbalance signal, the following percent maximum imbalance signals shall be used:

Standard Tube Size, in.	Maximum Percent Imbalance Signal Magnitude
Up to ⅜, incl	0.2
½ to 2, incl	0.3
Over 2 to 3, incl	0.4

Standard Tube Size (mm)	Maximum Percent Imbalance Signal Magnitude
(Up to 9, incl)	0.2
(13 to 50, incl)	0.3
(Over 50 to 76, incl)	0.4

16.2.2.3 Tubes that do not activate the ~~signalling~~signaling device of the eddy-current tester shall be considered as conforming to the requirements of this test. At the option of the manufacturer, tubes with discontinuities indicated by the testing unit are not prohibited from being ~~reexamined~~re-examined or retested to determine whether the discontinuities are cause for rejection. Signals that are found to have been caused by minor mechanical damage, soil, or moisture shall not be cause for rejection of the tubes provided the tube dimensions are still within prescribed limits and the tube is suitable for its intended application.

16.2.3 *Pneumatic Test:*

16.2.3.1 The test method shall permit easy visual detection of leakage, such as having the tube under water or by the pressure differential method.

16.2.4 Rockwell hardness shall be determined in accordance with Test Methods E18.

17. Significance of Numerical Limits

17.1 For the purpose of determining compliance with the specified limits for requirements of the properties listed in the following ~~table,~~ table and for dimensional tolerances, an observed value or a calculated value shall be rounded as indicated in accordance with the rounding method of Practice E29:

Property	Rounded Unit for Observed or Calculated Value
Chemical composition Hardness	nearest unit in the last right-hand place of figures of the specified limit
Tensile strength	nearest ksi (5 MPa)

18. Inspection

18.1 The ~~manufacturer,~~manufacturer or ~~supplier,~~supplier shall inspect and make ~~test~~tests necessary to verify that the finished product ~~furnished~~ conforms to specification requirements.

18.2 Source inspection of the product by the purchaser ~~shall~~may be agreed upon between the ~~manufacturer,~~manufacturer or ~~supplier,~~supplier and the purchaser as part of the purchase order. In such case, the nature of the facilities needed to satisfy the inspector, representing the purchaser, that the product is being furnished in accordance with the specification shall be included in the agreement. All tests and the ~~inspection~~inspections shall be conducted so as not to interfere unnecessarily with the operations of the works.

18.3 ~~By mutual agreement, the manufacturer, or supplier, has the option of conducting~~When mutually agreed upon, the manufacturer or supplier and the purchaser shall conduct the final inspection simultaneously.

19. Rejection and Rehearing

19.1 *Rejection:*

19.1.1 Product that fails to conform to the ~~requirements of the product specification when inspected or~~ specification requirements when tested by the ~~purchaser, or purchaser's agent,~~ purchaser or the purchaser's agent is subject to ~~rejection at the option of the purchaser.~~ rejection.

19.1.2 Rejection shall be reported to the manufacturer or supplier ~~promptly and in writing.~~promptly. In addition, a written notification of rejection shall follow.

19.1.3 ~~When requested by the manufacturer or supplier, a rehearing shall be granted.~~In case of dissatisfaction with results of the test upon rejection, the manufacturer or supplier shall have the option to make a claim for rehearing.

19.2 *Rehearing:*

19.2.1 As a result of product rejection, the manufacturer or supplier ~~has~~ shall have the option to make claim for retest to be conducted by the manufacturer or supplier and the purchaser. Samples of the rejected product shall be taken in accordance with the product specification and ~~tested~~ subjected to test by both parties ~~as directed~~ using the test method(s) specified in the product ~~specification,~~specification or, alternatively, upon agreement ~~by~~of both parties, an independent laboratory ~~shall~~may be selected for the ~~tests~~test(s) using the test methods ~~prescribed~~specified in the product specification.

20. Certification

20.1 When specified in the contract or purchase order, 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.

20.2 When specified in the purchase order or contract that product is purchased for ASME Boiler and Pressure Vessel Code application, certification to this specification is mandatory.