Subpart 2. If the applicable tables in Section II, Part D, Subpart 2 do not contain these properties for a permitted material or do not list them within the required temperature range, the Manufacturer may use other authoritative sources for the needed information. The Manufacturer’s Data Report shall note under “Remarks” the property values obtained and their source.

NOTE: If material physical properties are not listed, the Manufacturer is encouraged to bring the information to the attention of the ASME Committee on Materials (BPV Section II) so that the data can be added in Section II, Part D, Subpart 2.

**UG-5 PLATE**

Plate used in the construction of pressure parts of pressure vessels shall conform to one of the specifications in Section II for which allowable stress values are given in the tables referenced in UG-23, except as otherwise provided in UG-4, UG-10, UG-11, and UG-15.

**UG-6 FORGINGS**

(a) Forged material may be used in pressure vessel construction, provided the material has been worked sufficiently to remove the coarse ingot structure. Specifications and maximum allowable stress values for acceptable forging materials are given in the tables referenced in UG-23. (See Part UF for forged vessels.)

(b) Forged rod or bar may only be used within the limitations of UG-14.

(c) Forgings certified to SA-105, SA-181, SA-182, SA-350, SA-403, and SA-420 may be used as tubesheets and hollow cylindrical forgings for pressure vessel shells that otherwise meet all the rules of this Division, provided that the following additional requirements are met:

1. Forgings certified to SA-105 or SA-181 shall be subject to one of the austenitizing heat treatments permitted by these specifications.

2. One tension test specimen shall be taken from each forging weighing more than 5,000 lb (2,250 kg). The largest obtainable tension test specimen as specified by the test methods referenced in the applicable specification shall be used. Except for upset-disk forgings, the longitudinal axis of the test specimen shall be taken parallel to the direction of major working of the forging. For upset-disk forgings, the longitudinal axis of the test specimen shall be taken in the tangential direction. When agreed to by the Manufacturer, and when not prohibited by the material specification, test specimens may be machined from specially forged test blocks meeting the provisions provided in SA-266 or other similar specifications for large forgings.

3. For quenched and tempered forgings weighing more than 10,000 lb (4,500 kg) at the time of heat treatment, two tension test specimens shall be taken from each forging. These shall be offset 180 deg from each other, except that if the length of the forging, excluding test prolongations, exceeds 12 ft (3.7 m), then one specimen shall be taken from each end of the forging.

**UG-7 CASTINGS**

Cast material may be used in the construction of pressure vessels and vessel parts. Specifications and maximum allowable stress values for acceptable casting materials are given in the tables referenced in UG-23. These allowable stress values shall be multiplied by the applicable casting quality factor given in UG-24 for all materials except cast iron.

**UG-8 PIPE AND TUBES**

(a) Pipe and tubes of seamless material conforming to one of the specifications given in Section II may be used for shells and other parts of pressure vessels. Allowable stress values for the materials used in pipe and tubes are given in the tables referenced in UG-23.

(b) Integrally finned tubes may be made from tubes that conform in every respect with one of the specifications given in Section II. These tubes may be used under the following conditions:

1. The tubes, after finning, shall have a temper or condition that conforms to one of those provided in the governing specifications, or, when specified, they may be furnished in the “as-fabricated condition” where the finned portions of the tube are in the cold worked temper (as-finned) resulting from the finning operation, and the unfinned portions in the temper of the tube prior to finning.

2. The maximum allowable stress value for the finned tube shall be that given in the tables referenced in UG-23 for the tube before finning except as permitted in (3) below.

3. The maximum allowable stress value for a temper or condition that has a higher stress value than that of the tube before finning may be used, provided that qualifying mechanical property tests demonstrate that such a temper or condition is obtained and conforms to one of those provided in the governing specifications in Section II, and provided that allowable stress values have been established in the tables referenced in UG-23 for the tube material used. The qualifying mechanical property tests shall be made on specimens of finned tube from which the fins have been removed by machining. The frequency of tests shall be as required in the unfinned tube specification.

4. The maximum allowable internal or external working pressure of the tube shall be based on the root diameter and the minimum wall of the finned section, or the outside diameter and wall of the unfinned section together with appropriate stress values, whichever results in the lower maximum allowable working pressure. Alternatively, the maximum allowable external pressure for tubes with integral fins may be established under the rules of Mandatory Appendix 23.
(5) In addition to the tests required by the governing specifications, each tube after finning shall be subjected to a pneumatic test or a hydrostatic test as indicated below. UG-90(c)(1)(i) requirement for a visual inspection by the Inspector does not apply to either of these tests.

(a) an internal pneumatic test of not less than 250 psi (1.7 MPa) for 5 sec without evidence of leakage. The test method shall permit easy visual detection of any leakage such as immersion of the tube under water or a pressure differential method.9

(b) an individual tube hydrostatic test in accordance with UG-99 that permits complete examination of the tube for leakage.

**UG-9 WELDING MATERIALS**

Welding materials used for production shall comply with the requirements of this Division, those of Section IX, and the applicable qualified welding procedure specification. When the welding materials comply with one of the specifications in Section II, Part C, the marking or tagging of the material, containers, or packages as required by the applicable Section II specification may be accepted for identification in lieu of a Test Report or a Certificate of Compliance. When the welding materials do not comply with one of the specifications of Section II, the marking or tagging shall be identifiable with the welding materials set forth in the welding procedure specification, and may be accepted in lieu of a Test Report or a Certificate of Compliance.

**UG-10 MATERIAL IDENTIFIED WITH OR PRODUCED TO A SPECIFICATION NOT PERMITTED BY THIS DIVISION, AND MATERIAL NOT FULLY IDENTIFIED**

(a) Identified Material With Complete Certification From the Material Manufacturer. Material identified with a specification not permitted by this Division and identified to a single production lot as required by a permitted specification may be accepted as satisfying the requirements of a specification permitted by this Division, provided the following conditions are satisfied:

1. Recertification by an Organization Other Than the Vessel or Part Manufacturer. Not permitted.

2. Recertification by the Vessel or Part Manufacturer

(a) Documentation is provided to the Certificate Holder demonstrating that all applicable requirements (including, but not limited to, melting method, melting practice, deoxidation, chemical analysis, mechanical properties, quality, and heat treatment) of the specification permitted by this Division, to which the material is to be recertified, have been met.

(b) The material has marking, acceptable to the Inspector, for identification to the documentation.

(c) When the conformance of the material with the permitted specification has been established, the material shall be marked as required by the permitted specification.

(b) Material Identified With a Specification Not Permitted by This Division and Identified to a Particular Production Lot as Required by a Specification Permitted by This Division but Which Cannot Be Qualified Under (a). Any material for which the documentation required in (a) is not available may be accepted as satisfying the requirements of the specification permitted by this Division, provided that the conditions set forth below are satisfied:

1. Recertification by an Organization Other Than the Vessel or Part Manufacturer. Not permitted.

2. Recertification by the Vessel or Part Manufacturer

(a) When documentation demonstrating complete conformance to the chemical requirements is not available, chemical analyses are made on different pieces from the lot to establish a mean analysis that is to be accepted as representative of the lot. The pieces chosen for analysis shall be selected at random from the lot. The number of pieces selected shall be at least 10% of the number of pieces in the lot, but not less than three. For lots of three pieces or less, each piece shall be analyzed. Each individual analysis for an element shall conform to the limits for product analysis in the permitted specification, and the mean for each element shall conform to the heat analysis limits of that specification. Analyses need only be made for those elements required by the permitted specification (including its general specification); only those elements for which documentation is not available must be tested.

(b) When documentation demonstrating complete conformance to the mechanical property requirements is not available, mechanical property tests are made in accordance with the requirements of the permitted specification, and the results of the tests conform to the specified requirements; only those properties for which documentation is not available must be tested.

(c) When documentation demonstrating complete conformance to the heat treatment requirements is not available, the material is heat treated in accordance with those specification heat treatment requirements, either prior to or during fabrication. (See also UG-85.)

(d) All other applicable requirements (including, but not limited to, melting method, melting practice, deoxidation, chemical analysis, mechanical properties, grain size, and quality) of the specification permitted by this Division, to which the material is to be recertified, have been demonstrated to have been met.

(e) The material has marking, acceptable to the Inspector, for identification to the documentation.

(f) When the conformance of the material with the permitted specification has been established, the material shall be marked as required by the permitted specification.

(c) Material Not Fully Identified. Material that cannot be qualified under the provisions of either (a) or (b), such as material not fully identified as required by the permitted specification or unidentified material, may be