

GUIDE  
FOR  
ASME REVIEW TEAMS  
FOR  
REVIEW OF APPLICANTS  
FOR  
ASME RP CERTIFICATE OF AUTHORIZATION

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## **INTRODUCTION**

This Guide is prepared for the use of ASME Review Teams. It is not intended to replace or interpret the requirements of the ASME Boiler and Pressure Vessel Code (B&PVC).

In addition, to assist the ASME Review Team, this Guide will be provided to Applicants for ASME Certificates of Authorization for their use in cross referencing the paragraphs in their Quality Control (QC) Manual with the applicable control requirements of the Code, and as a guide as to what is expected for a demonstration of the QC System.

This Guide is based on Section X of the B&PVC. The Guide is subject to revision based on changes made in the aforementioned Sections in the B&PVC.

A Review must cover a QC Manual and its implementation. It is recognized that the scope of work, QC Manual, and Manual implementation will vary from Applicant to Applicant. Therefore, the ASME Review Teams are advised that all aspects of this Guide may not apply and that this Guide may not outline all possible aspects of each Review. The Manual need not follow the format of this Guide.

Questions of possible need for Code interpretation raised by Review Teams shall be submitted to the ASME Director, Accreditation and Certification. When a request for an interpretation is to be submitted by an Applicant, the Team Leader shall advise the Applicant that all such inquiries must be submitted to the Secretary, Boiler and Pressure Vessel Committee, and that a copy of the inquiry and reply should be provided by the inquirer to the Applicant's Authorized Inspection Agency and cognizant Jurisdiction, if appropriate.

Suggestions for revisions or clarification to this Guide should be directed to the ASME Director, Accreditation and Certification.

## **ASME BPVC-X QUALITY SYSTEM REVIEW CHECKLIST**

### **REVIEW DEMONSTRATION**

The purpose of the Review Demonstration is to evaluate the Applicant's Quality Control System (QCS) and its implementation. For evaluation of the QCS, the Applicant must demonstrate to current Code rules sufficient administrative and fabrication functions of the QCS to show that they have the knowledge and ability to produce the Code items typical of those covered by the QCS. It is expected that fabrication functions be demonstrated using typical Code work. However they may be demonstrated using current work, a mock-up, or a combination of the two. Any current Code work ongoing at the time of the joint review is subject to the Team's review.

While the Applicant must address each element of the Code in the QCS, the Applicant need only demonstrate those elements within the intended scope of activities that apply to their program.

Demonstration Item1: An Applicant for a single Certificate must demonstrate on an item or items that will be fabricated for the requested type and scope of Certificate of Authorization. The demonstration must be an implementation of ALL aspects of the QC System and shall include a demonstration of actual lamination method.

For Applicants requesting multiple class RP stamps, it is necessary to have a demonstration item or items with design calculations for each RP Class (except Class I). An item or items fabricated to each one of the requested class Certificates shall be used as the demonstration item (except Class II). However, if the demonstration item or items is not to the most stringent Code requirements, the Applicant must provide additional calculations or another documentation package that contains Code calculations to the most stringent Code requirements and administrative documentation to sufficiently demonstrate compliance with all aspects of the company's QC System.

For example, an Applicant for RP Class I and II Certificates could demonstrate their QCS on a Class I pressure vessel including design. However, due to the nature of Section X Class II requirements, in addition to the Class I demonstration, an Examination and Inspection Plan and Manufacturer's Design Report with supporting User Design Specification in accordance with Section X Class II shall be prepared and presented. Certification of the Design documents by an Engineer meeting the criteria as defined in Section X Class II shall also be demonstrated. In addition, since there are 4 fabrication methods for Class I and 2 for Class II and 1 for Class III, the demonstration item or items shall also demonstrate the QCS for any of the fabrication methods to be used for a RP Class I, II or III certificate.

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If computer calculations are to be used, the Applicant shall demonstrate that the computer program has the capability of producing acceptable calculations.

If the demonstration item or items is based upon current work that is being fabricated to a previous Code edition, the Applicant shall address changes in the Code that would require different actions in the demonstrations to be in compliance with the current Code.

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The demonstration item or items shall be based on the latest Code Edition in effect at the time a complete Application is received by ASME.

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Quality Element and Sub-elements	QC Manual References
<p>1. General Quality Control System Requirements</p> <p>a. QC System is documented in detail in a QC Manual that addresses all requirements of the applicable Code Section and includes:</p> <ul style="list-style-type: none"> <li>i. a cover sheet that contains the company name and physical address as it will appear on the requested Certificate of Authorization</li> </ul> <p>Note: The cover sheet may also contain the effective date of the QC Manual, mailing address, phone number or other information desired by the Certificate Holder or Applicant.</p> <ul style="list-style-type: none"> <li>ii. a brief description of the products being fabricated and/or work being accomplished under the Code including applicability of QC System to shop activities, field activities or both;</li> <li>iii. control features to demonstrate Code compliance;</li> <li>iv. Manual revision control system;</li> <li>v. provision for review and approval of QC Manual to maintain it current;</li> <li>vi. provision for submittal of QC Manual revisions to the Authorized Inspector (AI) for acceptance prior to implementation including timely updating of all copies to reflect accepted revisions; and</li> <li>vii. provisions for the custody and control of the Certification Mark to prevent loss or unauthorized use.</li> </ul>	

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Quality Element Sub-elements and	QC Manual References
<p>b. In the case where the QC Manual exists in more than one language, at least one version is in English and identified as the authoritative version.</p> <p>c. Note: A glossary of terms is desirable from the standpoint of clarity if abbreviated titles of personnel and control documents are used throughout the QC Manual. This, however, is not mandatory.</p> <p>2. Authority and Responsibility</p> <p>a. The authority and responsibility for QC by management is documented.</p> <p>Note: In practice, a Statement of Policy and Authority must be signed by a senior company official responsible for Code activities (e.g., President, Vice President, Plant Manager, etc.).</p> <p>b. The authority and responsibility of those in charge of the QC System are clearly established and documented.</p> <p>c. Persons performing QC functions have sufficient and well defined responsibility, the authority, and the organizational freedom to identify quality control problems and to initiate, recommend and provide solutions.</p> <p>3. Organization</p> <p>a. An organization chart showing the relationship between management and engineering, purchasing, manufacturing, production, field assembling, field construction, inspection and quality control, as applicable, exists and reflects the actual organization.</p>	

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Quality Element and Sub-elements	QC Manual References
<p>Note: The purpose of this chart is to identify and associate the various organizational groups with the particular function for which they are responsible. The Code does not intend to encroach on the Certificate Holder's right to establish and, from time to time, alter whatever form of organization the Certificate Holder considers appropriate for their Code work.</p> <p>4. Drawings, Design Calculations, and Specifications</p> <p>a. Procedures exist which assure that the latest applicable drawings, design calculations, specifications and instructions, required by the Code, as well as authorized changes, are used for manufacture, assembly, examination, inspection and testing. Procedures include provision for:</p> <p>b. review of customer supplied documents for Code compliance;</p> <p>c. the preparation, review, approval and distribution of drawings, calculations, and specifications;</p> <p>d. [Applicable to RP Class II and III only] use of the user's Certified Design Specification including authorized changes;</p> <p>e. [Applicable to RP Class II only] providing the Manufacturer's Certified Design Report including authorized changes;</p> <p>f. [Applicable to RP Class II only] certification of Design Specification and Design Report by an engineer meeting the criteria defined in Section X RD-11</p>	

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Quality Element and Sub-elements	QC Manual References
<p>5. Design Qualification (Class I and Class III)</p> <p>A production prototype qualification vessel shall be fabricated and subjected to the following tests which shall be documented on the quality control manual forms and accepted by the Authorized Inspector (AI) prior to production fabrication.</p> <ul style="list-style-type: none"> <li>a. Qualification checks and examinations including:               <ul style="list-style-type: none"> <li>i. Vessel thickness</li> <li>ii. Weight of resin and fiber</li> <li>iii. Vessel weight</li> <li>iv. Visual examination</li> </ul> </li> <li>b. A Barcol hardness test for resin cure.</li> <li>c. A volumetric expansion test to verify the laminates used have a modulus of elasticity within the range specified by the Designer.</li> <li>d. A cyclic pressure plus hydrostatic qualification pressure test to demonstrate acceptable life and design pressure.</li> <li>e. A hydrostatic qualification pressure test (Class I) or a hydrostatic burst pressure test (Class III) to determine design pressure. (Class I)</li> <li>f. Suitable tests, utilizing loads simulating the expected loadings of vessels subject to bending and shearing caused by any expected combinations of loadings listed in the Design Specification. (Class I)</li> <li>g. A temperature creep test to determine design adequacy at elevated temperatures. (Class III)</li> <li>h. A flaw test to determine capability to withstand the design pressure when damaged. (Class III)</li> <li>i. A permeability test to determine permeation rates on vessels with non-metallic liners or welded metallic liners. (Class III)</li> <li>j. A leak test on the completed vessel to determine tightness. (Class III)</li> <li>k. A torque test to determine if the vessel nozzle will rotate when tightened. (Class III)</li> </ul>	



**ASME BPVC-X QUALITY SYSTEM REVIEW CHECKLIST**

Quality Element and Sub-elements	QC Manual References
<ul style="list-style-type: none"> <li data-bbox="321 289 1089 359">l. A penetration test to determine the ability of the vessel to withstand an armor piercing bullet without failure. {Class III)</li> <li data-bbox="321 394 1089 499">m. An environmental test to determine if the cracks to the outer protective coating will cause failure to the vessel wall when subjected to chemical exposure. {Class III)</li> </ul> <p data-bbox="250 535 938 569">6. Production Flow and In-Plant Inspection and Check-Off</p> <ul style="list-style-type: none"> <li data-bbox="342 619 1081 789">a. Fabrication operations, including examinations and bursting test procedures (for RP Class III) are described in sufficient detail to permit the Authorized Inspector {AI} to determine at what stages specific inspections are to be performed. Specifically: <ul style="list-style-type: none"> <li data-bbox="397 840 1110 940">i. Provisions for the use of checklists, process sheets, travelers, etc., for listing of examinations and tests to be performed and for designation of inspection points;</li> <li data-bbox="397 993 1110 1094">ii. Such checklists, process sheets, travelers, etc. are made available to the Authorized Inspector prior to the start of fabrication; and</li> <li data-bbox="397 1146 1081 1247">iii. A basic production flow diagram exists and includes in-plant inspection and check-off points and means of recording the same.</li> </ul> </li> <li data-bbox="342 1283 1049 1383">b. Material test reports or certificates of compliance, examination reports, test records, and other fabrication records are available to the Authorized Inspector.</li> <li data-bbox="342 1430 1016 1493">c. Measures provide for transferring markings to assure traceability is maintained. <ul style="list-style-type: none"> <li data-bbox="418 1545 1097 1608">i. If a coded marking system is used, it is documented and acceptable to the Authorized Inspector.</li> </ul> </li> </ul>	

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Quality Element and Sub-elements	QC Manual References
<p>d. Measures assure that the Authorized Inspector is informed of approaching inspection points.</p> <p>e. AI concurrence is obtained for repairs to material or the vessel.</p> <p>f. Measures are established to assure that a final inspection is performed to assure all specified requirements have been met prior to obtaining AI's concurrence for application of the Certification Mark.</p> <p>g. Measures are established to provide for the preparation, certification, and distribution of the applicable Data Reports.</p> <p>h. Measures are established to control field activities, when applicable.</p> <p>Note: Procedures should fully describe AI coverage of ASME Code work on all shifts.</p> <p>i. Resin storage and handling</p> <ul style="list-style-type: none"> <li>i. Resin mixing procedures are specified; and</li> <li>ii. Measures are established covering storage, issuance, handling, and disposal of resins, catalysts, fillers, pigments or cements.</li> </ul> <p>j. Assembling and bonding</p> <ul style="list-style-type: none"> <li>i. Procedures exist covering: <ul style="list-style-type: none"> <li>1. assembly and fit-up of the pressure vessel and parts; and</li> <li>2. secondary-bonding of components</li> </ul> </li> </ul> <p>k. The program includes measures established to ensure the qualification of all procedure specifications to be used during the fabrication process.</p>	

**ASME BPVC-X QUALITY SYSTEM REVIEW CHECKLIST**

Quality Element and Sub-elements	QC Manual References
<ul style="list-style-type: none"><li>I. Provide for in-process inspection or monitoring, or both, as appropriate for activities affecting quality including:<ul style="list-style-type: none"><li>i. Inspection and distribution of received materials</li><li>ii. Laminate reinforcement sequence</li><li>iii. Component fabrication</li><li>iv. Assembly procedures</li><li>v. Laminate imperfections are within tolerances</li><li>vi. Control of resin handling and cure</li></ul></li><li>m. Tests are performed in accordance with specified, written test procedures or other appropriate documents approved by the designated organization including:<ul style="list-style-type: none"><li>i. Resin cure</li><li>ii. Dimension and laminate thickness</li><li>iii. Laminate mechanical properties</li><li>iv. Reinforcement control</li><li>v. Laminate imperfections</li></ul></li></ul>	

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Quality Element and Sub-elements	QC Manual References
<p style="padding-left: 40px;">vi. Pressure tests</p> <p style="padding-left: 40px;">vii. Acoustic emission tests</p> <p>7. Material Receiving Control and Identity</p> <p style="padding-left: 20px;">a. Procedures for material control exist to assure that the material received is properly identified and has documentation, including, as applicable, required material certifications or material test reports, to satisfy Code requirements as ordered.</p> <p style="padding-left: 20px;">b. The material control system assures that only the intended material is used in Code construction.</p> <p style="padding-left: 20px;">c. If substitution of materials is allowed, the applicable procedures for control of this activity are documented, including designation of the individual authorized to approve substitutions.</p> <p style="padding-left: 20px;">d. The title of the individual responsible for identifying the need for material test reports or certificate of compliance is designated.</p> <p style="padding-left: 20px;">e. The title of the individual responsible for performing a receiving inspection of Code materials is designated.</p> <p style="padding-left: 20px;">f. Information to be provided to the receiving inspector concerning the characteristics to be checked is documented.</p> <p style="padding-left: 20px;">g. A procedure exists for handling materials that are found to be nonconforming at receiving inspection.</p> <p style="padding-left: 20px;">h. If further material testing is required to be performed at receiving inspection or during manufacturing operations, the applicable procedures for control of this activity are documented.</p> <p style="padding-left: 20px;">i. Measures are established to assure the proper marking, handling and storage of materials.</p>	

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Quality Element and Sub-elements	QC Manual References
<p>j. Procedure for inspection of incoming materials including;</p> <ul style="list-style-type: none"> <li>i. Resin</li> <li>ii. Reinforcement</li> <li>iii. Curing agents</li> </ul> <p>8. Nonconforming Material and Repairs</p> <p>a. A procedure exists for the correction of nonconformities. Where AI involvement is required by the Code, the procedure is agreed upon with the AI. The procedure provides for:</p> <ul style="list-style-type: none"> <li>i. identifying those responsible for the resolution of nonconformities;</li> <li>ii. identifying and controlling further processing of nonconforming items until final disposition;</li> <li>iii. documenting the nonconformance and its disposition.</li> <li>iv. Note: A nonconformity is any condition which does not comply with the applicable rules of the Code, QC Manual or other specified requirements. Nonconformities must be corrected before the completed component can be considered to comply with the Code.</li> </ul> <p>9. Resin Control</p> <ul style="list-style-type: none"> <li>a. specification and mixing procedures</li> <li>b. storage, issuance, handling, and disposal of resins, catalysts, fillers, and pigments</li> <li>c. method used to maintain identification of resins during fabrication</li> </ul>	

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Quality Element and Sub-elements	QC Manual References
<p>10. Assembly, Fit-Up, and Dimensions Control</p> <ul style="list-style-type: none"> <li>a. assembly and fit-up of the pressure vessel and vessel parts to ensure compliance with fabrication drawings</li> <li>b. adhesive bonding and secondary lay-up of components to ensure compliance with fabrication drawings</li> <li>c. dimensional checks as specified by the Code and to ensure compliance with fabrication drawings</li> </ul> <p>11. Calibration of Measurement and Test Equipment</p> <ul style="list-style-type: none"> <li>a. A procedure exists for the calibration of examination, measuring and test equipment used in fulfillment of applicable Code requirements.</li> <li>b. Measures are established that assure calibration records are maintained and that status indicators are used to indicate the current calibration status of equipment.</li> </ul> <p>12. Forms</p> <ul style="list-style-type: none"> <li>a. Appropriate forms shall be included and cross-referenced with the items of this Appendix as applicable;               <ul style="list-style-type: none"> <li>i. process or traveler's sheets</li> <li>ii. in-plant inspection and check-off forms</li> <li>iii. procedures and performance qualification forms</li> <li>iv. Data Report Forms</li> <li>v. Other appropriate forms</li> </ul> </li> </ul> <p>13. Self-Auditing</p> <ul style="list-style-type: none"> <li>a. Procedures are in place for regular management review of the status and adequacy of the Quality Control System.</li> </ul>	

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Quality Element and Sub-elements	QC Manual References
<p><b>14</b> Authorized Inspector</p> <p>a. An inspection agreement is established and maintained with an ASME accredited Authorized Inspection Agency. All required inspections are to be performed by the AIA of Record (the AIA identified on the application). Alternatively, When the purchaser requests another AIA (Secondary AIA) to perform inspection on its projects or Code jobs or whenever the AIA of Record cannot provide coverage for inspections at a specific field site the following shall be included in the QC Manual:</p> <ul style="list-style-type: none"> <li>i. Description of how different AIA's will perform activities under their Certificate(s) of Authorization;</li> <li>ii. Ensure the Certificate Holder has a contract or agreement with the AIA performing the shop/field activities; and</li> <li>iii. Show evidence that this program has been accepted by the AIA of Record.</li> </ul> <p>Note: The provisions for the use of an AIA other than the AIA of Record is not intended for use by a shop working with Mass Production of pressure vessels.</p> <p>b. A controlled copy of the QC Manual is available to the AI at the plant or construction site where Code activities are being carried out.</p> <p>c. The AI has access to all drawings, calculations, specifications, procedures, process sheets, repair procedures, records, test results, and any other documents as necessary for the AI to perform their duties.</p> <p>d. Provisions exist for providing a liaison between the AI and the Manufacturer/Installer.</p> <p>e. Provisions exist for free access for the AI and the Inspection Supervisor to all areas involving Code activities.</p> <p>f. Provisions exist to assure that all Code required inspections by the AI are performed.</p>	

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Quality Element and Sub-elements	QC Manual References
<p style="margin-left: 40px;">g. ASME is notified whenever the agreement is cancelled or changed to another accredited Authorized Inspection Agency</p> <p><b>15. Nondestructive Examination</b></p> <p style="margin-left: 20px;">a. Provisions exist for identifying the appropriate NDE procedures applicable to the scope of Code work. These provisions assure that:</p> <ul style="list-style-type: none"> <li>i. NDE personnel are qualified in accordance with the applicable Code Section requirement;</li> <li>ii. NDE examinations are performed in accordance with written procedures when required;</li> <li>iii. The AIA can require demonstration by NOE personnel of an NDE examination or NOE procedures for cause;</li> <li>iv. NDE equipment is calibrated.</li> </ul> <p><b>16. Records Retention</b></p> <p style="margin-left: 20px;">a. Procedures exist for the maintenance of Manufacturer's Data Reports, radiographs and records as required by the applicable Section of the Code.'</p> <p><b>17. Sample Forms</b></p> <p style="margin-left: 20px;">a. Forms used to control functions relative to quality are included within the QC Manual and their use explained in the text of the QC Manual.</p>	