QUALITY ASSURANCE MANUAL

2nd EDITION – Rev 0

4/10/2026

For Shop fabrication of Fiberglass Reinforced Plastic Pressure Vessels to ASME Code Section X, Class II requirements and Repair and Alteration to RP pressure equipment at this location and field sites controlled by this location.

STRAND COMPOSITES, LLC.
228 W. Industrial Park Rd | Harrison, AR 72601

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Approved By:

QA/QC Manager

4/10/2026

Date

Accepted By:

Authorized Inspector

4.10.2026

Date

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Section 1: Statement of Policy and Authority

1.1 The management of Strand Composites, LLC is committed to meeting all requirements of the

ASME Boiler and Pressure Vessel Code, Section X and the Quality Assurance System outlined within this manual for the Shop fabrication of "RP" Class II Reinforced Thermoplastic vessels and Shop and Field repairs and alterations of RP/RTP pressure equipment.

1.2 The QA/QC Manager is responsible for the preparation, revision, approval and issuance of this Quality Assurance Manual and the administration and implementation of the Quality Assurance Program. The QA/QC Manager has autonomy from Sales and Fabrication with the authority, responsibility, and organizational freedom to identify quality problems and to initiate, recommend and provide solutions and to verify resolution of said problems.

1.3 In the event of disagreement between department heads and the QA/QC Manager, the problem shall be brought to me for resolution. The resolution shall not negate the requirements of the Code nor this manual.



General Manager
Strand Composites, LLC

4/10/26
Date

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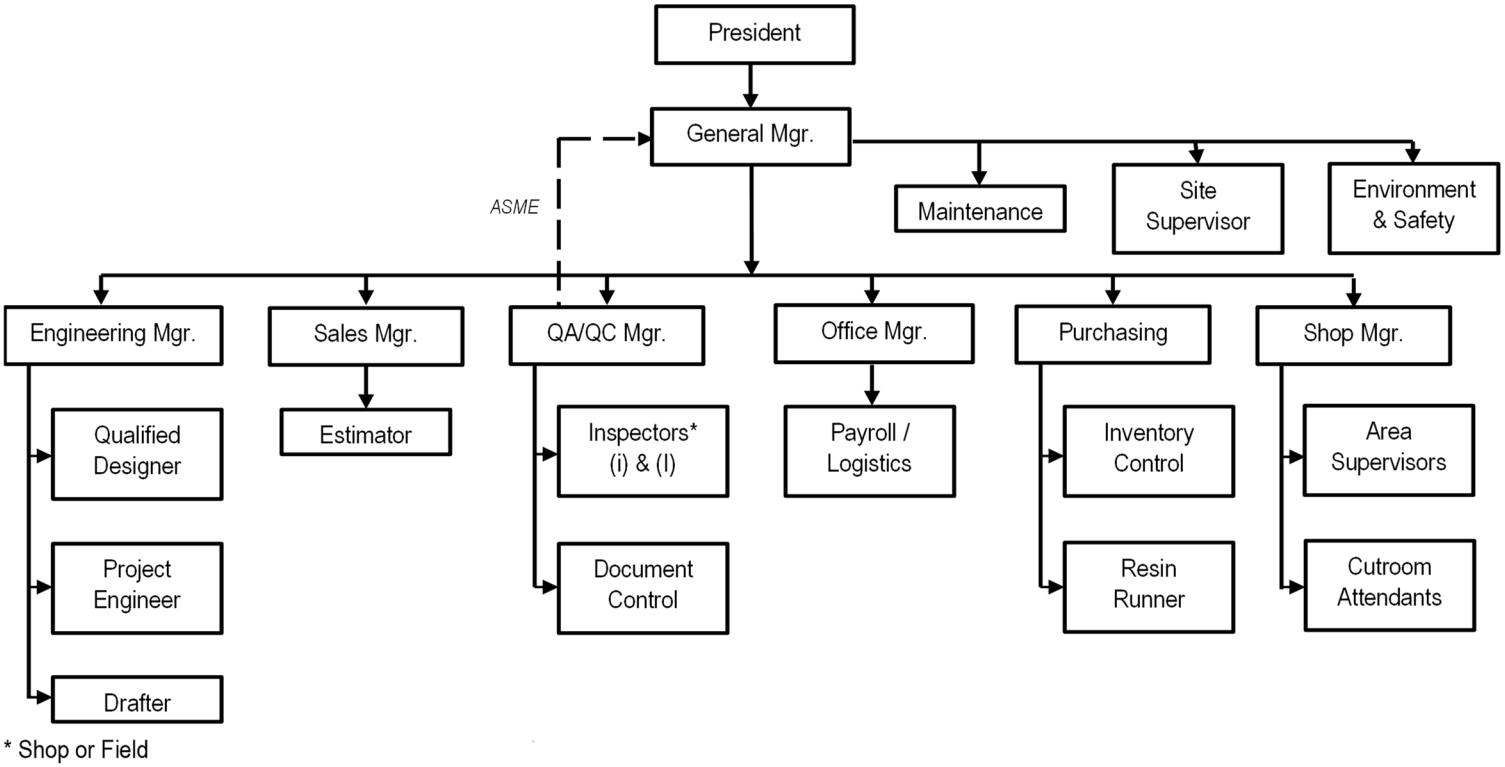
Section 2: Organization Chart



Each Manager or Supervisor may delegate the performance of their duties to qualified and knowledgeable personnel who report directly to them; however, the responsibilities associated with those duties cannot be delegated. Managers and Supervisors may perform the duties of their subordinates provided they are qualified to do so.

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Section 3: Manual Control

3.1 The QA/QC Manager shall be responsible for the preparation, review and issuance of the Quality Assurance Manual. Any reference to procedures – Production [PP] and Quality [QP] – herein refer to the current edition and revision of the Strand Composites, LLC Policy and Procedure Manual.

3.2 The QA/QC Manager shall review the NBIC and Code editions at the time of issue for possible changes to this manual per procedure QP-1032: Manual Reviews and Revisions. Necessary changes shall be incorporated within six (6) months from issue date. The review shall be documented by the QA/QC Manager's initials and date on the title page of the applicable Code document.

3.3 All revisions shall be per procedure QP-1032: Manual Reviews and Revisions and are approved by the QA/QC Manager and submitted to the Authorized Inspector (AI) for review and acceptance prior to implementation. Revisions will be by complete manual. Changes to text shall be shown in red font. Changes to graphics or forms are indicated by a red cloud. The cover page shall indicate the edition, revision and date. At the discretion of the QA/QC Manager, this manual may revert to revision "0" with the edition increased to the next level. Revision "0" of new editions shall reflect no changes as noted in this section.

Manual approval by the QA/QC Manager and acceptance of the Authorized Inspector (AI) will be indicated by signature and date in the space provided on the Table of Content page of this manual. Abbreviations and terms are listed on Appendix "A".

3.4 The QA/QC Manager shall be responsible for uploading this manual to the Common Server (L:) and the notification to the manual users listed on the Quality Acknowledgement Summary (QF155) [Exhibit 10].

Manual users shall acknowledge their review of this manual by signing and dating the Quality Acknowledgement (QF157) [Exhibit 8] and returning it to the QA/QC Manager.

No hard copies of this manual shall be distributed as "Controlled" copies. All printed copies of this document are considered "Uncontrolled" except for a copy provided for AI use. The AI shall return this copy to the QA/QC Manager prior to departing the premises.

Appendix "A"

Abbreviations and Terms Used in This Manual or Quality Program:

AE	Acoustic Emission
AI	Authorized Inspector (NBIC repairs and alterations will be RI)
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
BOM	Bill of Materials

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Code	ASME Section X, ASME Section V
(I)	Designated Inspector
(i)	Inspector who performs the Quality Control function
NBIC	National Board Inspection Code
NDE	Nondestructive Examination
PO	Purchase Order
Q.A.	Quality Assurance
QD	Qualified Designer
RI	Repair Inspector
RTP/RP	Reinforced Thermoplastic / Reinforced Plastic
UDS	User's Design Specification
VE	Visual Examination

Approval of Design Calculations and Design Drawings – The Qualified Designer (QD) is required to approve the Fabricator's Design Report which includes the calculations and drawings to meet the UDS and the Code.

Procedure Specification (ASME Form Q-120) – Procedures prepared for each stage of fabrication to give direction or instruction to Fabrication or test personnel. The Procedure Specification shall be approved by the QA/QC Manager for each job.

Files and Records – Documents referenced within this manual refer to hard (paper) or soft (electronic) formats or a combination of the two.

Qualified Designer (QD) – The individual responsible for complying with Code rules and demonstrating compliance with Code equations when such equations are mandatory. Formerly referred to as the Registered Professional Engineer (RPE).

User's Design Specification (UDS) – A document provided by the User or an Agent acting on behalf of the User. The UDS shall provide information as to operating conditions including intended use and material compatibility with the contents in such detail to provide the basis for design, material selection, fabrication, inspection and testing. The UDS may be in the form of a customer-supplied specification or Strand Composites, LLC' User's Design Specification (QF212) [Exhibit 15].

Certifications – All certifications, authorizations and approvals will be by written signature/initial and date. Alternatively, electronic methods of certification and approval may be used. When used, the electronic certification will be password protected and safeguarded so only authorized personnel may make the certification or approval.

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Section 4: Drawings, Design Calculations & Specifications

4.1 General Statement

Each order received by Strand Composites, LLC is assigned a job number by the Office Manager upon acceptance of the customer's PO. This job number shall be used to identify all documents related to the Code item.

4.2 Design

4.2.1 "RP" vessels fabricated by Strand Composites, LLC are limited to those designed to Section X, Class II.

4.2.2 Upon receipt of an order to be designed by Strand Composites, LLC, the UDS (QF212) [Exhibit 15] is reviewed and approved for adequacy and compliance to the Code requirements by the QD who shall meet the requirements of RD-1111. Any revision or deficiency shall be reconciled with the User or User's Agent prior to beginning design work.

4.2.3 Upon approval of the UDS, the design calculations are certified by a QD.

4.2.4 Using the Code Form Q-120 Procedure Specification for Class II Vessels, the Project Engineer shall establish essential variables for fabrication and assembly of pressure vessels and parts. Essential variables include:

Part 1 - Fabrication

- Fiber – manufacturer, designation, type and form
- Resin – manufacturer, designation and type
- Liner – material, manufacturer, designation and thickness
- Laminate fabrication – each separately fabricated vessel part (including number of plies, ply orientation and ply sequence)
- Cure method
- Barcol hardness
- Percent of fiber
- Filament Winding – bandwidth and spacing
- Use of fillers or pigments – material use and location

Part 2- Assembly

- Fiber reinforcement – manufacturer, designation, type and form
- Resin system – manufacturer, designation and type
- Surface preparation details for secondary overlay – method and length
- Secondary overlay laminate construction (including number of plies, ply orientation and ply sequence)
- Percent of fiber

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- Barcol hardness

4.2.4.1 When required, a Qualification Test Coupon (aka Lamina Sample) shall be fabricated to determine the elastic and strength constants for the specific fiber, resin, ply sequence and ply orientation used for the vessel laminate.

The Project Engineer shall be responsible for identifying the need for lamina testing and notification to the QA/QC Manager that test coupon fabrication/testing is required.

4.2.4.2 Deviation in fabrication from the qualified essential variables shall require new constants be determined by requalification. New design calculations must meet the UDS requirements and be certified by the QD.

4.2.4.3 Nonessential variable changes may be made without requalification provided the UDS is modified to show the changes.

4.2.4.4 It shall be the QA/QC Manager's responsibility to select a testing laboratory to test the qualification coupons. The specific test details shall be included in the Lab Work Order (QF025) [Exhibit 1] for the subcontractor to perform the required tests to be documented on the Material Property Test Report.

4.2.4.5 The UDS and qualification records used for design calculations shall be available for AI review. The AI shall have the right to witness or call for additional tests.

4.2.5 Using the UDS and calculations, Project Engineers or Drafters shall prepare the design drawing(s), specification(s) and BOM.

4.2.6 Completed design drawings, calculations, specifications and BOMs are submitted to the QD for review and approval. Any disapproved documents shall be returned for correction and resubmittal.

4.2.6.1 Approval is indicated by the application of the date with initials or signature or professional seal of the QD on the design documents – i.e. calculations and drawings.

4.2.6.2 Revision to the above design are prepared and approved in the same manner as originals.

4.3 Designed by Others

4.3.1 Calculations and drawings provided by others shall be certified by a QD as verification the requirements of the ASME Section X, Class II Code are met.

Prior to acceptance, designs require a review by a Strand Composites, LLC Project Engineer to verify the design is consistent with Strand capabilities. The design shall be rejected when the variables are not comparable or when internal data is not available.

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A Customer Requirements – Parts Form (QF216) [Exhibit 19] defining relevant design and fabrication requirements shall be prepared per procedure QP-1033: Quoting Certified Parts for Others to accompany design documentation provided by others.

4.3.2 When the design meets the Code requirements defined in Section 4.2 above, the documents are then controlled in the same manner as Strand Composites, LLC documents outlined in Section 4.2.5 above.

4.4 Fabricator's Design Report

4.4.1 The Fabricator's Design Report shall consist of the following:

- UDS setting forth the design conditions.
- Design drawings including Procedure numbers.
- Design calculations.
- Properly certified Partial Data Reports (Form RP-4) for parts fabricated by others (if applicable).
- Procedure Specification (Q-120) to which the vessel was fabricated.
- Acceptance test results including the Acoustic Emission (AE) Report.
- Documentation of the elastic and strength properties of the lamina(s) as specified in the Code.
- Material manufacturers' specification sheets for all materials used in lamina testing and laminate fabrication.

4.5 Distribution of Design Drawings, Calculations, Specifications and Bills of Material

4.5.1 Approved design drawings, specifications and Bills of Material are distributed by Document Control in accordance with the Drawing Distribution List (QF002) [Exhibit 11] and procedure QP-1010: Drawing Distribution. One copy of all design drawings, calculations, the UDS and BOMs shall be delivered to the QA/QC Manager for inclusion in the QA Job File.

4.5.1.1 Distribution and retention may be by physical and/or electronic means or a combination thereof.

4.5.2 Whether drawings and the UDS are produced by Strand Composites, LLC or others, they shall contain enough information for efficient fabrication. Drawings shall contain the following as a minimum:

- Applicable Code section/year.
- Maximum design pressure and temperature.
- Minimum permissible temperature.
- Test pressure(s).
- BOM.
- NDE.
- Test and inspection requirements.

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- Procedure Specification number; and
- Revisions “0” and higher shall include the application of a QD’s stamp including signature and date of application. “As Built” documents shall be excluded from this requirement when local jurisdiction prohibits sealing “As Built” documents.
- Dimensions and tolerances.

4.5.3 No substitution of material is permitted.

4.5.4 The QA/QC Manager is responsible for providing the AI with all drawings, calculations, UDS, BOMs, and other documents the AI may require for review and acceptance prior to the start of fabrication.

4.5.4.1 The QA/QC Manager and the AI shall review, accept, sign, and date the Traveler (QF013) [Exhibit 2].

4.5.4.2 Any discrepancies shall be brought to the attention of the Project Engineer for resolution with input from the QD as necessary.

4.5.5 Revisions to design documents are made, approved and distributed in the same manner as the originals.

4.5.6 Superseded printed documents are retrieved and destroyed by Document Control. Copies of superseded drawings are retained in the Engineering Job File.

4.5.6.1 When an individual wishes to retain a superseded document, Document Control shall mark the copy “Void” and notify the QA/QC Manager.

4.5.6.2 No superseded document shall ever be used for the purpose of fabrication.

4.5.7 It shall be the responsibility of the Project Engineer to verify work has not progressed beyond a design change prior to implementing the revision.

4.6 Section X, Class II Parts Only

4.6.1 Parts fabricated for another Fabricator shall follow the requirements of this manual in the same manner as a complete vessel.

4.6.2 When Section 4.4 applies, a QD shall review the design documents to verify that Code requirements are met.

4.6.3 At the conclusion of fabrication, the QA/QC Manager shall sign the Certificate of Compliance and the AI shall sign the Certificate of Shop Inspection on Form RP-4 Fabricator’s Partial Data Report for Class II Vessels (QF080) [Exhibit 18]. The Partial Data Report shall indicate the extent of any design functions performed.

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4.6.4 Each part shall be identified by the application of a 2" X 4" (at minimum) label containing the following information:

- Official Certification Mark with the "RP" designator directing under the Mark
- The word "Part" under the "RP" designator
- The words "Class II" under "Part"
- Type of fabrication process indicated by the letters: "CM" = Contact Molding or "FW" = Filament Wound
- Fabricator's name preceded by "Certified by"
- Part description w/ serial number
- RP Certificate number with expiration date
- MAWP @ Maximum Allowable Temperature
- MAWEP @ Maximum Allowable Temperature
- Minimum Allowable Temperature (not less than -65°F)
- Fabricator's Serial Number
- Year Built

4.6.5 Section X, Class II parts may be registered with the National Board of Boiler and Pressure Vessel Inspectors.

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Section 5: Material Receiving, Control & Identity

5.1 Purchasing

5.1.1 All BOMs for Code parts and materials shall list applicable Code requirements (as required) including:

- Manufacturer specifications, designation, type, or grade
- Special requirements
- Marking and certification requirements

Metallic, multi-bolted flat flange covers, and their fasteners shall comply with all ASME Section VIII, Division 1 requirements.

5.1.2 Purchasing Manager shall prepare the Purchase Order (PO) [Exhibit 4] for materials unique to a specific vessel based on the exact information listed on the BOM.

5.1.3 Copies of BOMs are forwarded to the Q.A Manager for the Job File and to Inventory Control.

5.1.4 Any changes to BOMs will be controlled in the same manner as the original.

5.2 Receiving Inspection

5.2.1 All received materials shall be segregated pending completion of the receiving process per procedures PP-1002: Resin Promotion and QP-1024: Incoming Inspection/Receiving – Materials by Inventory Control.

5.2.1.1 Small material may be bagged, tagged or otherwise identified to maintain traceability by a method acceptable to the AI.

5.2.2 Using the BOM, Inventory Control shall examine all material for correct dimensions, marking, condition and damage.

5.2.3 A Receiving Inspection Log (QF038) [Exhibit 5] shall be completed to summarize materials to be used in the fabrication of the vessel or vessel part(s).

5.2.4 Material requiring batch or lot number traceability requires the QA/QC Manager to review the Manufacturer's Certificate of Analysis (C of A) for conformance to the applicable manufacturer's specification and the BOM. (For resin see Sec. 7).

5.2.5 Resin shall be traceable by the manufacturer name and the trade name or number of the resin. Batch numbers of the material shall be recorded on the Receiving Inspection Log by QA/QC Manager.

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5.2.6 Curing agents shall be ordered and received in a manner that verifies traceability to the manufacturer's name, designation and the generic name.

5.2.7 The QA/QC Manager shall initial and date the Receiving Inspection Log indicating the material is acceptable for use. A copy of the log shall be retained in the Job File.

5.2.8 When material or parts fail to meet the BOM or Code requirements, a notation shall be made on the Receiving Inspection Log. The item shall be tagged with a "Quality Hold" sticker [Exhibit 6] and controlled per Section 8 of this manual.

5.2.9 Prior to cutting material, the lot/batch number is transferred to maintain traceability by Cutroom Attendant.

5.3 Customer-Supplied Parts and Material(s)

5.3.1 All Code parts and materials supplied by the customer are received and inspected as described in Section 5.2.

5.3.2 The customer's PO and required C of A, manufacturer certificate and Fabricator's Partial Data Report (QF080) [Exhibit 18] shall be provided to Strand Composites, LLC for review and receiving inspection to ensure Code compliance.

5.3.2.1 When the PO is not available, the drawing, BOM and Procedure Specification will be used for receiving.

5.4 Procurement Records

5.4.1 Strand Composites, LLC shall keep on file published specifications for all glass and laminate materials used for vessel fabrication.

5.4.2 All records referenced in this section are available for review by the AI.

5.5 Storage and Testing

5.5.1 Inventory Control shall store materials as specified by the manufacturer.

5.5.2 The QA/QC Manager shall test materials as required by the Code and verify proper storage.

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Section 6: Production Flow, In-Plant Inspection & Check-Off

6.1 Fabrication

6.1.1 Fabrication of Code items is controlled by means of the Traveler (QF013) [Exhibit 2] which is prepared by the QA/QC Manager from the design drawings and Procedure Specification in accordance with Quality Process Flow [Exhibit 9] and procedure QP-1006: CCP Inspections.

6.1.2 Each Traveler is controlled by the job number and referenced drawings.

6.1.3 The Traveler shall control fabrication of pressure vessels and vessel parts per procedures PP-1007: Secondary Bonder and PP-1008: Installing Flanges, Fittings & Accessories. It shall also specify Code required dimensional checks.

6.1.4 The Traveler, drawings and Procedure Specification will be reviewed with the AI for designation of AI test and inspection points. The QA/QC Manager shall notify the AI of approaching test and inspection points.

6.1.4.1 The QA/QC Manager and the AI will initial and date the Traveler for this review prior to fabrication.

6.1.5 The Traveler contains space for the initials and date of the AI and QA/QC Manager for operations they accept.

6.1.5.1 Operations that can be performed in parallel shall be so indicated on the Traveler.

6.1.6 It shall be the Shop Manager's responsibility to use acceptable parts and materials for items fabricated or joined as required by the Traveler. This will be monitored and verified by the Inspector (I).

6.1.7 Vessel thickness of each vessel and vessel part shall be determined at a minimum of three (3) points along its length on each of its four (4) quadrants by the inspector (i). When vessels are longer than 5 ft (1.5 m), one (1) additional determination shall be made for each additional 5 ft (1.5 m) or portion thereof. The thickness determinations shall be made with mechanical gages, ultrasonic thickness tester (per procedure QP-1008: Thickness Gage Use) or other devices having an accuracy of ± 2% of true thickness. Results shall be recorded on the Section X Major Component Thickness Report (QF213) [Exhibit 17].

6.1.8 Dimensional checks shall be noted on the Flange Elevation/Projection Verification (QF162) [Exhibit 13] and the RTP-1 Overall Dimension Inspection (QF205) [Exhibit 16] by the inspector (i).

6.1.9 The Ply Count Form (QF015) [Exhibit 14] shall document the adhesive bonding and secondary lay-up compliance to the drawing.

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6.1.10 Resin cure shall be verified by the inspector (i) per procedure PP-1011: Barcol Hardness Testing and recorded on the Section X Barcol Hardness Report (QF214) [Exhibit 22].

6.1.11 Components shall be visually inspected to ASME Section X, Table 6-100.2 criteria.

6.2 Final Inspection

6.2.1 When Code fabrication is completed (including the curing process), the Inspector (I) shall perform the final inspection per procedure QP-1001: Final Inspection – Vessels. The QA/QC Manager shall review the Final Inspection Check Sheet (QF031) [Exhibit 12] prepared by the (I) and initial and date the Traveler when it meets applicable Code and dimensional requirements.

6.2.2 The AI shall make a final inspection (including an internal inspection) prior to the Acceptance and Hydrostatic Test and will initial and date the Traveler when satisfied it meets applicable Code requirements. See Section 6.3.

6.3 Acceptance and Hydrostatic Tests

6.3.1 The Acceptance and Hydrostatic Tests shall be witnessed by the QA/QC Manager and the AI.

6.3.2 The internal pressure shall be gradually increased to no more than one-half (1/2) test pressure then increased in steps of one-tenth (1/10) test pressure up to 110% (1.1 times) the design pressure not to exceed 2% per minute.

6.3.3 External test pressure shall be 100% (1.0 times) of external design pressure. Note: Attainment of external test pressure as full vacuum by reducing the pressure inside of a vessel is not possible due to the limitations of evacuation equipment. Where vacuum tests are required, the User or User's Agent, the AI and the Fabricator shall agree on the external pressure to be achieved during the test. Such agreement shall be reached prior to the start of fabrication and shall be documented on the User's Design Specification and the pressure test report.

6.3.4 The test fluid shall be water or other appropriate fluid.

6.3.5 The temperature of the fluid shall be sufficient to ensure that the vessel wall temperature is not less than 40°F.

If the maximum design temperature is less than 100°F, the maximum value shall be 100°F.

6.3.6 Dial indicating pressure gauges connected directly to the vessel used in testing shall be graduated over a range of about double the intended maximum test pressure but in no case shall the range be less than one and one-half (1-1/2) nor more than four (4) times that pressure.

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The spacing between graduations shall be such that the QA/QC Manager and the operator controlling the test shall be able to determine when the required test pressure has been applied.

6.3.6.1 A digital pressure gauge having a wider range of pressure may be used provided the readings give the same or greater degree of accuracy as obtained from dial pressure gauges.

6.3.7 When the test is accepted, the QA/QC Manager and the AI will sign and date the Traveler.

6.3.8 The vessel shall not be painted before hydrostatic testing.

6.4 Data Reports and Stamping

6.4.1 Upon completion of the Acoustic Emission (AE) Acceptance Test and all other required tests and inspections of fabricator Code items, the Form RP-3 Fabricator's Data Report for Class II Vessels [Exhibit 20] with Form RP-5 Fabricator's Data Report Supplementary Sheet [Exhibit 21] shall be completed and certified by the QA/QC Manager from the final records.

6.4.2 The completed Form RP-3 Fabricator's Data Report for Class II Vessels with Form RP-5 Fabricator's Data Report Supplementary Sheet together with the final records and Fabricator's Design Report will be presented to the AI for review. When the AI is satisfied that all applicable Code requirements have been met, they will authorize and witness the application of the ASME Certification Mark or verify the nameplate is attached to the correct Code vessel

6.4.3 The Certification Mark with "RP" designator and serial number shall be stamped on a nameplate with required data from RS-100. Alternatively, the other data may be printed or engraved on suitable material for molding as an integral part of the vessel so that the entire marking is visible on the finished vessel. When the Certification Mark is used, it shall be accompanied by the Certificate number and expiration date of the certificate.

6.4.4 All nameplates shall be permanently attached to the vessel via a bracket or molding into the vessel. Nameplate(s) shall be in the control of the QA/QC Manager until the AI has authorized their attachment.

6.4.5 The QA/QC Manager shall have custody and control of the ASME Certification Mark. The Mark shall not be applied without the authorization of the AI.

6.4.6 All records are returned to Document Control for retention as described in Section 11 and per procedure QP-1005: Quality Documentation Archiving.

6.5 Nonconformances

6.5.1 All nonconformities found during fabrication are controlled as described in Section 8.

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Section 7: Resin Control

7.1 Resin control is described in this section to maintain traceability and assure the resin used in fabrication is the same used for qualification of the design.

7.2 The resin manufacturer shall supply a Certificate of Analysis (C of A) containing the following information:

- Resin identification
- Batch number
- Date of manufacture

The manufacturer shall certify for each batch shipped the value of the properties listed in table RM-120.1 of ASME Section X. The manufacturer's tolerance limits shall also be stipulated on the C of A.

7.3 After being accepted at Receiving, the resin shall be stored in a manner that complies with the manufacturer's recommendation.

7.4 The Resin Runner shall maintain the Resin Mixing Log (QF143) [Exhibit 7] per procedure PP-1002: Resin Promotion including:

7.4.1 Assignment of an alpha code for each container of mixed resin.

7.4.2 The log shall indicate date mixed, procedure, container marking, lot/batch numbers and quantities and the date the resin is promoted.

7.5 Resin lots shall be tested by the Inspector (I) for the properties in Table RM-120.2 of ASME Section X to ensure the resin is within the manufacturer's specification.

7.5.1 The values obtained for viscosity and specific gravity for the resin alone shall be within the limits of the manufacturer's specification for that resin and as listed Procedure Specification. The resin testing shall be done at first usage.

7.5.2 The values obtained for gel-time and peak-exotherm temperature shall be for a particular resin/curing system test formulation and temperature and shall be within the limits listed in the Procedure Specification. The test formulation and temperature shall be representative of the formulations used during vessel fabrication. The tolerance limits for the test formulation (as listed in the Procedure Specification) shall be established by the resin manufacturer. The tolerance limits established shall be within a sufficiently narrow range such that test results outside this range would reflect deviations in component material characteristics and alert the Fabricator of possible material irregularities. Material tested and found to be inside the established tolerance limit range shall be deemed fit for use.

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7.6 Resins and catalysts are distributed to fabrication by the Resin Runner as required.

7.7 Smaller containers of resin shall be identified with the alpha code from the original container and the date it was drawn-off. Unused resin shall be returned to the original container and properly stored for future use.

7.7.1 Identification described above shall not be required for immediate use containers.

7.8 Resin set for disposal shall be transferred to disposal barrels to be picked up by an outside collection company.

7.9 The resin to curing agent ratio used shall become part of the Procedure Specification.

7.10 The Area Supervisor for the workstation using the resin is responsible for using the properly mixed resin as specified by the Procedure Specification and per procedure PP-1003: Resin Catalyzation.

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Section 8: Correction of Nonconformances

8.1 Identification of a Nonconformance

8.1.1 A nonconformance is any condition which does not comply with the applicable requirements of the Code, UDS (QF212) [Exhibit 15], fabrication and control documents and/or the requirements of this Quality Assurance Manual.

Examples of nonconforming conditions include visual defects and laminate under-thickness.

8.1.2 It shall be the responsibility of all employees to report nonconforming conditions to their supervisor who will in turn notify the Inspector (I).

8.1.3 After a nonconformance is found, the Inspector (I) shall verify the location and condition and identify the nonconforming material by applying a “Quality Hold” sticker [Exhibit 6] and initiating a Nonconformance Report (NCR) (QF018) [Exhibit 3] per procedure QP-1003: Nonconformance Reports. The NCR shall describe the location and nature of the nonconformance.

8.1.3.1 The President or the General Manager are authorized to accept a disposition and/or corrective action when the Engineering, Shop or QA/QC Manager is unavailable.

8.1.3.2 The Engineering Manager is authorized to accept/assign a disposition and/or corrective action when the Project Engineer is unavailable.

8.1.3.3 The QA/QC Manager is authorized to accept/assign a disposition and corrective action when the Inspector (I) is unavailable.

8.1.3.4 No one is authorized to accept/assign dispositions and corrective action on behalf of the QD and AI.

8.1.4 When practical, the nonconforming item shall be removed and contained within a “Hold” area.

8.1.5 The NCR and recommended disposition signed by the Inspector (I) shall be forwarded to the Project Engineer for determination of necessary dispositions and/or corrective action(s).

8.1.6 The NCR, along with prescribed correction action(s) shall be acknowledged by the Project Engineer, Shop Manager and QA/QC Manager.

8.1.7 Prior to execution of a structural corrective action or modification, the QD and AI shall review the NCR and acknowledge acceptance of the disposition and prescribed corrective action(s) by signing and dating the NCR.

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8.2 Correction of Nonconformance(s)

8.2.1 Use-As-Is

8.2.1.1 When the disposition is Use-As-Is, the QA/QC Manager shall confer with the Project Engineer who may choose to consult with the applicable QD and/or the customer.

8.2.1.2 Any required revision to the UDS, design drawings, design calculations, Procedure Specification, Design Report and procurement documentation shall be done as described in this manual.

Such dispositions must meet the UDS and Code requirements and have AI concurrence.

8.2.2 Repair

8.2.2.1 All dispositions requiring repair shall be made using procedures approved by the Project Engineer and QA/QC Manager. Repairs affecting the vessel or part structure shall be approved by the QD and accepted by the AI.

8.2.2.2 Code items repaired by bonding shall be submitted to the AI for acceptance of the method and extent of repair and required designated inspection point(s) prior to making the repair.

8.2.2.3 It shall be the responsibility of the QD to determine whether deviations to the essential design variables listed in the Procedure Specification will require requalification of the design.

Changes to nonessential variables do not require revision of the Procedure Specification.

8.2.3 Scrap/Return to Vendor

8.2.3.1 QA/QC Manager verification on the NCR that the item has been removed from the work area and the item(s) marked to prevent inadvertent use prior to disposal.

8.2.4 Reinspection and Release

8.2.4.1 The Inspector (I) shall reinspect the item(s) dispositioned as in Sections 8.2.1 and 8.2.2 when the required action has been completed and documented on the NCR.

8.2.4.2 When satisfied that the item meets the UDS and Code requirements, the QA/QC Manager shall sign the NCR, the “Quality Hold” sticker shall be removed, and the item shall be permitted to return to its proper fabrication sequence.

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8.3 Completed Nonconformance Reports (NCRs)

8.3.1 Completed NCRs are returned to Document Control for review and filing per procedure QP-1003: Nonconformance Reports and QP-1005: Quality Documentation Archiving.

8.3.2 All records of nonconformance are made available to the AI for review and acceptance by the QA/QC Manager.

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Section 9: Nondestructive Examination (NDE)

9.1 General

9.1.1 Acoustic Emission (AE) Examination is required by the Code and is performed by an NDE subcontractor whose written practice, personnel qualifications and certifications, written procedures and equipment calibration have been reviewed and approved for Code compliance by the QA/QC Manager and shall be available to the AI.

9.1.2 The Project Engineer determines the NDE requirements and lists them on the drawing.

9.2 AE Procedures

9.2.1 All AE testing will be performed using written procedures in accordance with ASME Section X, Article RT-6, ASTM E1067 and procedure QP-1020: Acoustic Emission (AE) Testing. AE Examiner have been approved by a Level III appointed by letter from the QA/QC Manager for Strand Composites, LLC

Procedures shall be detailed enough to provide the technique to be used to meet all applicable Code requirements and shall be reviewed by the QA/QC Manager for acceptance.

9.2.2 All AE procedures shall be submitted for review by the AI who may require requalification for just cause.

9.3 AE Personnel

9.3.1 The QA/QC Manager shall verify that all AE personnel are properly qualified in accordance with the subcontractor's written practice meeting the requirements of RT-111.

9.3.2 NDE personnel qualification records shall be made available for review by the AI who may require requalification if reason exists to question their ability to perform the examination.

9.4 NDE Examination and Reports

9.4.1 AE examination shall be evaluated, interpreted and accepted by an NDE Level II or III.

9.4.2 All reports of NDE, including Acceptance Test Reports, shall be reviewed and approved by the QA/QC Manager prior to submittal to the AI for acceptance.

9.4.3 All NDE reports shall be retained in files per Section 11 of this manual.

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9.5 Requirements for Visual Examination (VE) by Strand Composites, LLC

9.5.1 Personnel performing VE to the requirements of ASME Section X shall be qualified and certified by the QA/QC Manager in accordance with the following:

9.5.1.1 Instruction in the fundamentals of VE.

9.5.1.2 On-the-job training to familiarize the examiner with the appearance and interpretation of discontinuities.

The timeframe for such training shall be sufficient to assure adequate knowledge of VE.

9.5.1.3 An eye examination performed at least annually to determine optical capability of VE personnel to perform the required examinations.

A minimum of Jaeger J-1 Standard Chart at a distance of not less than 12 inches in at least one (1) eye shall be required.

The ability to distinguish and differentiate contrast between colors is required.

9.5.2 Upon completion of the conditions outlined in this section, VE personnel shall be given an oral/ performance examination to determine if they are qualified to perform the required examination and interpret results.

9.5.3 VE personnel successfully meeting the above criteria shall be certified by the QA/QC Manager and noted on the Quality Personnel Qualification Record (QF168) [Exhibit 23].

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Section 10: Calibration of Measurement & Test Equipment

10.1 General

10.1.1 All measurement and test equipment used for final acceptance of Code items shall be calibrated in accordance with this section.

10.2 Procedure

10.2.1 Each instrument of measurement, test and examination which require calibration shall be identified by an asset number.

10.2.2 The QA/QC Manager is responsible for maintaining all equipment calibrations.

10.2.3 Calibration is performed by a testing laboratory having adequate standards traceable to National Standards.

Certified records of calibration will be reviewed and approved by the QA/QC Manager.

10.2.4 The frequency of calibration is determined by the QA/QC Manager not to exceed 14 months.

10.2.5 Pressure gauges used for acceptance testing shall be calibrated against a dead weight tester or calibrated master gauge at least every six (6) months (or whenever there is reason to question accuracy) per procedure QP-1025: In-House Pressure Gauge Calibration/Verification.

10.2.6 Acoustic Emission (AE) equipment shall be calibrated in accordance with Section 5, Article 11. The calibration shall be verified by the QA/QC Manager as evidenced by signature and date or password-protected computerized stamp.

10.3 Records

10.3.1 Strand Composites, LLC measuring, and test equipment used for final acceptance shall be listed on a spreadsheet that is maintained by the QA/QC Manager. The spreadsheet shall identify the instrument, status (in/out of service) and calibration date.

10.3.2 Measurement and test equipment shall be identified through the use of a calibration decal that indicates equipment's date of calibration, person who performed calibration and date of next calibration.

10.3.3 Calibration records, including those for subcontractor's equipment, are maintained by the QA/QC Manager and are available for review by the AI.

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Section 11: Records Retention

11.1 All records described in this manual are collected at the completion of the job by Document Control and reviewed for completeness and correctness prior to the preparation of the Form RP-3 Fabricator's Data Report for Class II Vessels [Exhibit 20] and Form RP-5 Fabricator's Data Report Supplementary Sheet [Exhibit 21].

11.2 After certification by the QA/QC Manager, the Form RP-3 Fabricator's Data Report for Class II Vessels and Form RP-5 Fabricator's Data Report Supplementary Sheet is furnished to the User and registered with the National Board of Boiler and Pressure Vessel Inspectors.

11.2.1 The Fabricator's Partial Data Report for Class II Vessels (QF080) [Exhibit 18] shall be furnished to the National Board of Boiler and Pressure Vessel Inspectors and in duplicate to the fabricator contractually responsible for the completed vessel when Strand Composites, LLC is furnishing parts.

11.3 A Fabricator's Design Report consisting of the items listed in Section 4.5 of this manual and per procedure QP-1005: Quality Documentation Archiving shall be retained in a manner acceptable to the User for ten (10) years and shall be available to the AI.

11.3.1 A copy shall be provided to the User or User's Agent.

11.4 All Form RP-3 Fabricator's Data Reports for Class II Vessels and Form RP-5 Fabricator's Data Report Supplementary Sheets are maintained for at least ten (10) years and are available for review by the AI.

11.5 Records of Design Calculations, coupon tests from which elastic and strength constants were obtained, the Procedure Specification that detail the materials used and the laminate ply sequence and ply orientation, fabrication procedures and quality control records and the test results shall be retained for a period of five (5) years. The above noted documents shall be dated and properly certified by the QA/QC Manager.

11.6 National Board registration numbers shall be controlled and issued by the QA/QC Manager following the successful completion of the hydrostatic and acceptance tests.

The QA/QC Manager shall maintain a record showing the date of issue, type of item and fabricator's serial number.

11.6.1 The QA/QC Manager shall submit to the National Board within thirty (30) days after certification both the original copies of the Form RP-3 Fabricator's Data Report for Class II Vessels and Form RP-5 Fabricator's Data Report Supplementary Sheet and/or RP-4 Fabricator's Partial Data Report for Class II Vessels for Code "RP" stamped vessels.

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11.6.2 Original copies of Forms RP-3 Fabricator's Data Report for Class II Vessels, RP-5 Fabricator's Data Report Supplementary Sheet and/or RP-4 Fabricator's Partial Data Report for Class II Vessels shall be mailed to: National Board, 1055 Crupper Ave., Columbus, OH 43229

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Section 12: Authorized Inspector (AI)

12.1 The Authorized Inspector (AI) is an inspector who has a valid National Board Authorized Inspector commission and is employed by an ASME accredited Authorized Inspection Agency (AIA).

12.1.1 Strand Composites, LLC shall maintain an inspection agreement with the ASME accredited AIA of record.

12.2 The AI designated hold points will be inserted on the Traveler (QF013) [Exhibit 2] before fabrication for those operations the AI may wish to witness or verify.

Work shall not proceed beyond the AI hold point(s) without authorization from the AI.

12.3 The QA/QC Manager is the company liaison with the AI and is responsible for keeping the AI advised of the progress of the work to ensure that designated inspections may be completed.

12.4 The AI shall have access to the UDS (QF212) [Exhibit 15], Forms RP-3 Fabricator's Data Report for Class II Vessels [Exhibit 20], RP-5 Fabricator's Data Report Supplementary Sheet [Exhibit 21] and RP-4 Fabricator's Partial Data Report for Class II Vessels (QF080) [Exhibit 18] and shall be furnished all drawings, calculations, UDS, fabrication procedures, Travelers, repair procedures (effecting structural defects or modifications), records, test results and all other documents as required to perform their duties.

12.5 All Nonconformance Reports (NCRs) (QF018) [Exhibit 3] reflecting structural repairs or generated from deficiencies identified during a self-audit are submitted to the AI for acceptance per procedure QP-1003: Nonconformance Reports.

12.6 The QA/QC Manager will notify the AI in advance of acceptance and hydrostatic testing and all hold points to allow the AI to witness the operation.

12.7 Vessel records, together with completed Forms RP-3 Fabricator's Data Report for Class II Vessels, RP-5 Fabricator's Data Report Supplementary Sheet and/or RP-4 Fabricator's Partial Data Report for Class II Vessels signed by the QA/QC Manager are submitted to the AI for review. The AI shall authorize the application of the ASME Certification Mark when satisfied all applicable Code requirements have been met and then sign the Data Report.

12.8 A controlled copy of the Quality Assurance Manual shall be made available to the AI by the QA/QC Manager.

12.9 The AI shall review the changes to the Quality Assurance Manual for acceptance prior to implementation.

12.10 The AI and the Authorized Inspector Supervisor (AIS) shall have free access where Code work is being performed including supplier facilities when requested.

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12.11 The QA/QC Manager will aid the AI during required monitoring of the Quality Assurance System.

12.12 The QA/QC Manager shall accompany and assist the AI Supervisor during required audits.

12.13 The AI shall be provided office facilities.

13.14 The QA/QC Manager shall notify ASME in writing when the agreement with an AIA is cancelled or changed to another AIA.

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Section 13: Self-Audit

13.1 A self-audit shall be performed annually per procedure QP-1026: Quality System Audits to assess the status and adequacy of the program described in this manual for adherence and compliance with Code and customer requirements.

13.2 The QA/QC Manager shall approve and sign each Quality Assurance Audit Plan and Report.

13.3 The QA/QC Manager shall maintain the Quality Audit Log to control the status of audits. It shall be the responsibility of the QA/QC Manager to schedule and conduct audits.

13.4 The QA/QC Manager shall maintain the audit files and review audit findings to determine if Nonconformance Reports (NCRs) (QF018) {Exhibit 3] are necessary for specific in-house material or fabrication findings.

13.5 Records generated from audits shall be maintained for a period of one (1) year and made available to the AI for review.

13.6 Copies of audit reports and NCRs are provided to the heads of various departments as well as the President/General Manager for their assessment of program adequacy.

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Section 14: Repairs and Alterations

14.1 Responsibility

14.1.1 The QA/QC Manager shall be responsible for compliance with the Quality Assurance Manual for Shop and Field repairs or alterations to Code items.

14.1.2 Any work in the field shall be limited to Secondary Bonding.

14.1.3 The QA/QC Manager shall be responsible for preparation of repair procedures based upon customer specifications, jurisdictional and Code compliance.

The QA/QC Manager shall submit the procedure to the Repair Inspector (RI) who holds a valid and current National Board commission with an "R" endorsement for review and concurrence.

14.1.4 Routine repairs shall be carried out in accordance with the requirements of the NBIC, this manual, jurisdictional requirements, and shall conform to the applicable ASME Code Section; however, the requirement for in-process involvement of the Inspector (I) and stamping may be waived at the discretion of the RI provided all of the following conditions are met:

14.1.4.1 The QA/QC Manager shall be responsible for identifying, controlling and implementing routine repairs. Routine repairs shall be limited to the following:

- The addition or repair of non-load bearing attachments to pressure-retaining items where post curing is not required.

- Replacement and repair of damaged corrosion liner areas in shell and heads not exceeding 100 sq. in. (65 sq. cm) and not exceeding the original corrosion liner thickness.

14.1.4.2 The QA/QC Manager shall verify, to the satisfaction of the RI, that routine repairs are acceptable to the jurisdiction.

14.1.4.3 Prior approval for routine repairs shall be obtained from the RI.

14.1.4.4 Routine repairs shall be documented on Form "R-1" with the statement "Routine Repair" in the Remarks section.

14.2 Inspector Qualifications

14.2.1 The Strand Composites, LLC Inspector (I) shall be designated by the QA/QC Manager and shall have the following qualifications:

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14.2.1.1 No fewer than five (5) years of current verifiably documented experience in an occupational function that had a direct relationship to Reinforced Thermoplastic (RTP) fabrication and inspection, following customer or national standards and be directly involved in the following activities:

- Development of plans, drawings, procedures, inspection requirements, acceptance criteria and personnel qualification requirements
- Fabrication, construction and supervision of personnel in the production of assemblies or subassemblies
- Detection and measurement of nonconformities by application of visual or other nondestructive evaluation processes to written procedures
- Supervision of personnel engaged in material and component examination
- Repairs of equipment or supervision of personnel performing repairs
- Preparation of written procedures for assembly, acceptance, nondestructive evaluation or destructive tests
- Qualification of Secondary Bonders, Laminators and Welders to applicable codes, standards or specifications
- Operation techniques or activities used to fulfill quality control requirements for RTP fabrication or assembly
- Training in the occupational skills of fabrication or assembly of RTP equipment

14.2.1.2 The Inspector (I) shall meet the following visual and educational requirements:

- Able to read a Jaeger Type No. 1 standard chart at a distance of not less than 12 in. (305 mm)

- Capable of distinguishing and differentiating contrast between colors

- Possess visual acuity checked annually to assure natural or corrected near distance vision

- Completion of high school or hold a state or military approved high school equivalency diploma

14.2.1.3 QA/QC Manager shall certify that the Inspector (I) complies with the above qualification requirements.

14.3 Procedure – Repair and Alteration Methods

14.3.1 Repairs or alterations to RTP/RP pressure equipment are subject to the acceptance of the RI.

14.3.2 Prior to starting work, the QA/QC Manager shall provide the RI with a repair or alteration procedure certified by a QD, drawings, calculations, Traveler (QF013) [Exhibit 2], a copy of the original Forms RP-3 Fabricator's Data Report For Class II Vessels [Exhibit 20] and RP-5 Fabricator's Data Report Supplementary Sheet [Exhibit 21] or Fabricator Data Report for RTP-

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1 Vessels other documents the RI deems necessary to accept the repair or alteration and to establish hold points.

14.3.3 Engineering Review and Certification:

The repair or alteration plan shall be reviewed and certified by an engineer meeting the ASME Section X or RTP-1 criteria as applicable for an engineer certifying compliance of the appropriate calculations. The review and certification shall ensure that the work involved in the repair or alteration is compatible with the UDS (QF212) [Exhibit 15] or the UBRS. The certification shall also include any drawings and calculations.

14.3.4 Authorized Acceptance:

Following review and certification, the repair or alteration plan shall be submitted to the RI for review and acceptance. Repairs to pressure-retaining items shall not be initiated without the authorization of the RI. Subject to acceptance of the jurisdiction, the RI may give prior approval for routine repairs.

14.3.5 The QA/QC Manager shall arrange for RI access and will keep the RI informed of repair or alteration progress.

14.3.6 All material used in the repair or alteration of RPT pressure equipment shall meet the requirements of the original Code of construction.

14.3.7 Strand Composites, LLC shall provide the basis for alterations in accordance with the original code of construction. A copy of the original Forms RP-3 Fabricator's Data Report for Class II Vessels and RP-5 Fabricator's Data Report Supplementary Sheet or I-2 Fabricator's Data Report for RTP-1 vessels shall be obtained for use in the design of the alteration. When the original Fabricator's Data cannot be obtained, agreements on the methods of establishing design basis for the alteration shall be obtained from the RI and the jurisdiction.

14.3.8 When a defective or damaged vessel wall is to be repaired, the total structural laminate sequence removed as part of the repair shall be replaced. The replacement laminate shall provide structural properties meeting for exceeding the requirement of the original construction standard. When damage includes the corrosion barrier, a corrosion barrier of the same type shall meet or exceed the properties of the original construction shall replace the corrosion barrier removed.

14.3.9 Vessel repairs shall be classified into the following types: Type 1a, Type 1b, Type 2, Type 3, Type 4, Type 5, Type 6 and Type 7. Each type of repair shall have its own repair procedure as permitted in NBIC, Part 3.

14.4 Vessels Fabricated Using Elevated Temperature Cured Resin Systems

14.4.1 Strand Composites, LLC does not repair these vessels.

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14.5 Secondary Bonders

14.5.1 Secondary Bonders shall be qualified in accordance with the original Code of construction.

A spreadsheet that documents Secondary Bonder activity shall be maintained by the QA/QC Manager. Activity shall be traced by month.

In the event a Secondary Bonder exceeds a period of 18 months without demonstration of activity, the Bonder shall require requalification. When there is specific reason to question the Bonder's ability to make secondary bonds that meet the specification, the qualification shall be revoked. All other qualifications not questioned remain in effect.

14.5.2 A system shall be established for the assignment of a unique identification mark for each secondary bonder qualified in accordance with the NBIC and shall establish a written procedure whereby all secondary bonders can be identified as to the secondary bonder who made them. The procedure shall be acceptable to the (RI). The QA/QC Manager shall keep a record of all secondary bonded joints and the secondary bonders who made the joints.

14.6 Nondestructive Examination (NDE) and Pressure Testing

14.6.1 All required NDE and pressure testing shall be in accordance with Sections 6 and 9 of this manual and meet applicable requirements of the NBIC and the original construction code. As a minimum, all secondary bonded joints made for repairs and alterations shall be subject to a Barcol hardness test in accordance with ASTM D-2583 and an acetone wipe test for all polyester and vinyl resins. A visual inspection in accordance with NBIC Part 3, Table S4.12 is always required. The criteria for visual acceptance shall be the same as the original code of construction.

14.7 Acceptance Inspection

14.7.1 Before signing the appropriate NBIC report form, the RI shall:

- Review the drawings
- Ensure the secondary bonding was performed in accordance with the original code of construction
- Witness any pressure or acoustic emission (AE) test
- Ensure that the required NDE have been satisfactorily performed
- Verify that other functions necessary to assure compliance with the requirements of this code have been performed

14.8 Stamping

14.8.1 The QA/QC Manager shall retain custody and control of the "R" symbol stamp.

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14.8.2 Stamping and nameplate information shall meet the requirements of the NBIC and shall be attached only in the presence of the RI. The letters “RP” shall be stamped below the “R” symbol stamp.

14.9 Records

14.9.1 As applicable, the repair and alteration (including a description of the relocation of the original code stamping or certification mark on nameplate) is documented on the current NBIC For R-1 or R-2.

14.9.2 Final records (including the applicable “R” forms) are prepared and certified by the QA/QC Manager and presented to the RI for review and acceptance.

14.9.3 “R” form repairs, record or documents pertaining to a repair or alteration will be retained in accordance with the NBIC and procedure QP-1005: Quality Documentation Archiving. All records to substantiate the repair or alteration shall be maintained for a minimum of five (5) years. All records referenced in this section are available for review by the RI.

14.9.4 The QA/QC Manager shall maintain an ASME National Board Tank Log for “R” forms registered with National Board.

14.10 Distribution of “R” Forms

14.10.1 Legible copies of the completed “R-1”, together with attachments, shall be distributed to the Owner or User, the RI, the Authorized Inspection agency responsible for in-service inspections and the jurisdiction if required. Unless otherwise required by the jurisdiction, Form R Reports shall be completed and certified by the Strand Composites and the RI no more than 90 days following the completion of construction activities or the completion of design activities when no construction work is performed. Strand Composites shall submit the completed R Form the completed form, meeting the requirements of the NBIC, to the National Board no more than 30 days following certification.

14.10.2 Legible copies of the completed “R-2 with attachments shall be distributed by the “R” certificate holder performing the alteration, the RI and the Owner or User and the jurisdiction if required.

14.10.3 R-1 and R-2 forms shall be registered with the National Board.

14.10.4 The QA/QC Manager shall maintain a “R” Stamp Log [Exhibit 24] of all “R” forms registered with the National Board. The log shall include as a minimum the registration number, form type, description of work performed, date of acceptance by the “RI” and the date the report was submitted to the National Board.

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Section 15: Field Fabrication, Assembly, and Repairs

15.1 The field site shall be organized into designated areas by the Site Supervisor. Areas shall include: Storage for resin, catalyst, promoter, solvent and other chemicals; resin mixing and dispensing, bulk reinforcement and core material storage; tools, maintenance materials and measuring and test equipment.

15.2 When materials are received directly from the supplier, they shall be isolated from use until the receiving process has been completed by the inspector (i) in accordance with paragraph 5.2 of this manual and materials have been accepted. This process includes a visual inspection of packaging, Packing List reconciliation and QA/QC Manager acceptance of Certificates of Analysis'. Nonconforming material(s) shall be isolated from use and the Purchasing Manager notified immediately.

Joint and assembly kits shall be verified as complete and ready for shipment in the Shop by the Inspector (I) before being dispatched to the field.

15.3 Nonconforming conditions shall be reported via the Nonconformance Report (NCR) [QF018] (Exhibit 3) per Section 8.0 of this manual.

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Exhibit 1: Lab Work Order (QF025)

Lab Work Order

Sample ID: _____ **P.O. No:** _____

Laminate Thickness/Ply /Sequence: _____

Test Temperature: _____

Required Tests:

1. **Sample Thickness:** Sample Size (each): _____

   A. *Four (4) thicknesses shall be taken 1-2" from each corner and two (2) from the middle of the sample. Measure the specimens used for the Glass Content testing.*
   B. *The highest thickness and glass content (weight percent) reading taken shall be no more than 115% of the lowest reading taken. This result shall be noted in the final report.*
   C. *The six (6) readings shall be averaged and verified to be from 85% to 115% of the thickness noted in the header above. This result shall be noted in the final report.*
   D. *The identification of measuring instruments used shall be noted in the final report.*

2. **Tensile:** ☐ X-Direction (Axial/Warp) ☐ Y-Direction (Hoop/Weft) Sample Size (each): _____

   A. *Per ASTM D638, D3039 (at 77°F) or D5083. The standard utilized shall be referenced in the final report.*
   B. *Tensile modulus shall be determined using data between 400 and 1,300 microstrain unless another strain range better represents the flat portion of the curve. Any strain range other that 400 and 1,300 microstrain shall be reported with the modulus value.*
   C. *Specimens shall be in accordance with ASTM D5083, para. 6.1.1 except that actual laminate thickness shall be used. Report to the nearest 0.001 inches.*
   D. *The identification of equipment and measuring instruments used shall be noted in the final report.*

3. **Flexural:** ☐ X-Direction (Axial/Warp) ☐ Y-Direction (Hoop/Weft) Sample Size (each): _____

   A. *Per ASTM D790. Note the standard utilized in the final report.*
   B. *The molded surface (corrosion barrier) shall be tested in compression.*
   C. *Report thicknesses to the nearest 0.001 inches.*
   D. *The identification of equipment and measuring instruments used shall be noted in the final report.*

4. **Glass Content:** ☐ Ply Sequence Verification Sample Size (each): _____

   A. *Per ASTM D2584. Note the standard utilized in the final report.*
   B. *Four (4) specimens shall be taken 1-2" from each corner and two (2) from the middle of the sample.*
   C. *Burn at 1,050°F (± 50°F).*
   D. *Report shall include the following information:*
      1. *Pyrolysis temperature*
      2. *Specimen weight (in grams) before ignition*
      3. *Weight (in grams) of specimen plus crucible before and after ignition*
      4. *Ignition loss for each specimen (in grams)*
      5. *Resin content of each specimen and average weight percentage*
      6. *Glass content of each specimen and average weight percentage*
   E. *The identification of equipment and measuring instruments shall be noted in the final report.*
   F. *The glass content (weight percent) reading taken shall be no more than 115% of the lowest reading taken. This result shall be noted in the final report.*
   G. *When "Ply Sequence Verification" is checked above, separation of the residual undisturbed glass plies shall be separated carefully and counted and/or weighed to confirm standard lay-up sequence. Identify the sequence (1, 2, 3, etc.) and include a photograph of the final result.*

See page 2 for Notes and References

QF025, Rev 7 Page 1 of 2

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Lab Work Order

Notes:

When checked, the item(s) listed apply to this order:

☐ Completed form _____ shall accompany the final report.

☐ Final report shall include a summary page.

☐ Include all data with the report.

☐ Final report shall include a certification statement.

☐ Sample remnants shall be packaged together, identified with the sample identification and returned.

☐ Submit final report via electronic transfer (i.e. email). No hard copy report is required.

Reference Documents:

ASME RTP-1:	2A-300
	2A-400
	2B-200
	2B-300
ASTM:	D636
	D638
	D790
	D2584
	D3039
	D5083

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Exhibit 2: Traveler (QF013)

TRAVELER

Customer: _____ Job No.: _____

Tank No#.: _____ Drawing No.: _____

QA/QC Mgr.: _____ Date: _____
APPROVED

CI/AI: _____ Date: _____
REVIEWED

Process	QA/QC (I)	Date	CI/AI	Date
UBRS (QF017, Rev. 2) *(RTP-1 Only)*				
User's Design Specification *(Section X Only)*				
Calculation Review				
Drawing Review				
Procedure Specification *(Section X Only)*				
Material Verification & Review				
Thickness Verification (QF213)				
Barcol Verification (QF214)				
Proof Test Report Review *(If required)*				
Hydro/Vacuum or AE Test				
In-Process Inspector's Log (QF206) *(RTP-1 only)*				
Final Inspection Check Sheet (QF031)				
Internal Inspection *(Section X Only)*				
Fab. Data Report *(RTP-1)* / RP-3 *(Section X)*				
Nameplate Verification & Stamping				

RTP-1: All items considered "HOLD" points **Section X: AI shall indicate "HOLD" w/ "H"**

Remarks:

_____

_____

_____

QF013, Rev. 0

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Exhibit 3: Nonconformance Report (NCR) (QF018)

NONCONFORMANCE REPORT

Customer: | Job No: | Unit No: | NCR:

Component: | Project Eng: | Initiator: | Date:

Nonconformance Type:

Nonconformance Description:

Disposition:

Disposition Comment(s):

Cust. / Inspector /AI Acceptance: | Date:

Corrective Action Instruction(s):

Acceptances:

Project Engineer:		Date:	
Shop Manager:		Date:	
Q.A. Manager:		Date:	
Inspector / AI:		Date:	

RPE Certification (If Required)

QF018, Rev. 0

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NONCONFORMANCE REPORT

Nonconformance Assigned To:

Employee 1: _____ Employee 3: _____

Employee 2: _____ Employee 4: _____

Cost: _____

Repaired By / Materials

2nd Bonders: _____ Date: _____

Resin Alpha Code(s): _____ Catalyst: _____

Veil Lot #: _____ Mat Lot #: _____ Roving Lot #: _____

Ply Sequence Applied: _____

Ply Count

Corrosion Barrier			Structure				
A			1			11	
B			2			12	
C			3			13	
D			4			14	
E			5			15	
F			6			16	
G			7			17	
H			8			18	
I			9			19	
J			10			20	

When more space is required, attach Form QF015

POST-REPAIR INSPECTION

Barcol Hardness Accepted? Yes ☐ No ☐ Acetone Sensitivity Accepted? Yes ☐ No ☐

Visual Inspection Accepted? Yes ☐ No ☐ Rehydro Accepted? Yes ☐ No ☐ NA ☐

Inspector's Accepance: _____ Date: _____

Close-out:

CI Verification: _____ Date: _____ NCR Closed ☐

QF018, Rev. 0

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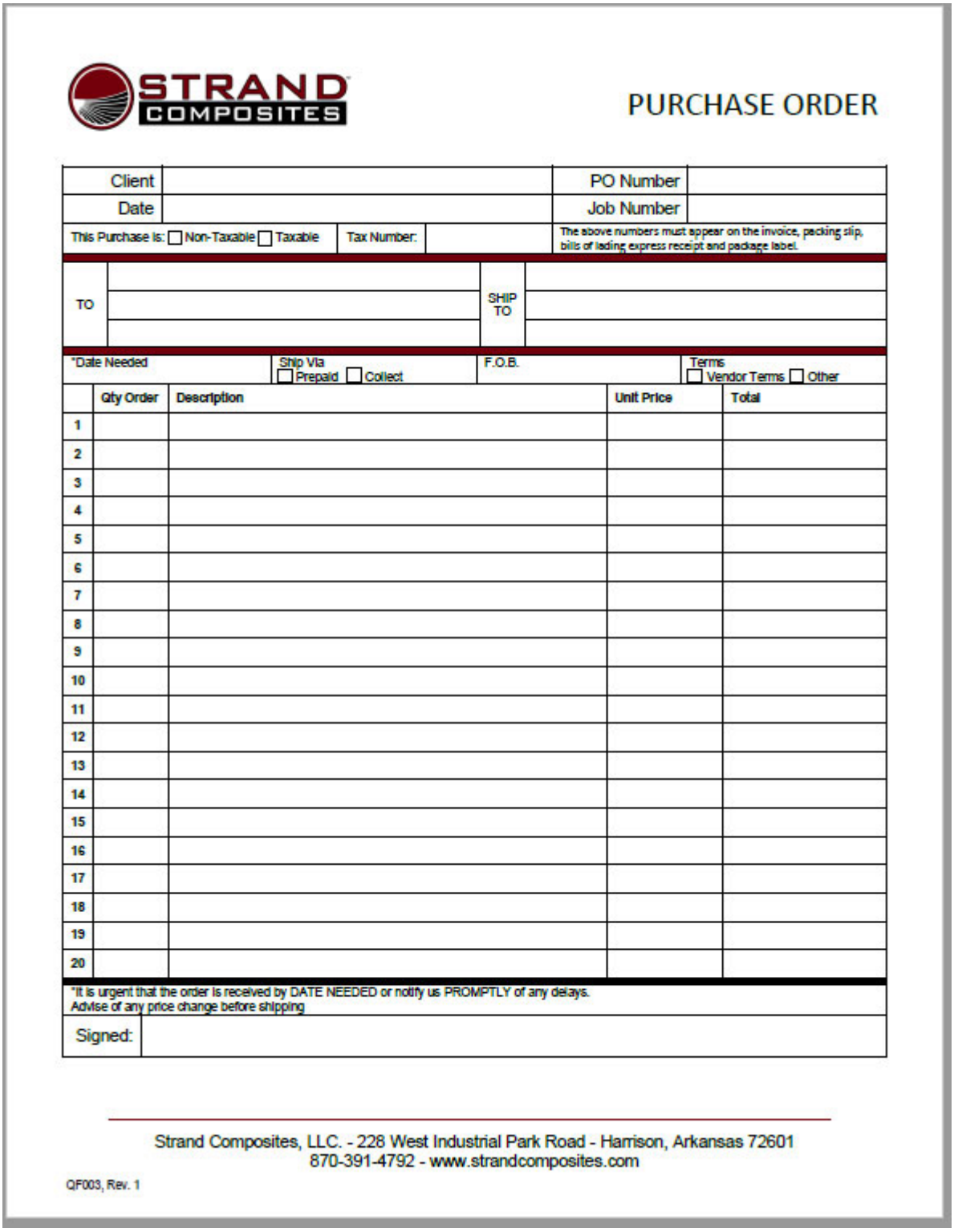
Exhibit 4: Purchase Order (PO)



STRAND COMPOSITES

PURCHASE ORDER

Client		PO Number	
Date		Job Number	
This Purchase is: ☐ Non-Taxable ☐ Taxable	Tax Number:	The above numbers must appear on the invoice, packing slip, bills of lading express receipt and package label.	

TO		SHIP TO	

*Date Needed	Ship Via ☐ Prepaid ☐ Collect	F.O.B.	Terms ☐ Vendor Terms ☐ Other

	Qty Order	Description	Unit Price	Total
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

*It is urgent that the order is received by DATE NEEDED or notify us PROMPTLY of any delays.
Advise of any price change before shipping

Signed:

Strand Composites, LLC. - 228 West Industrial Park Road - Harrison, Arkansas 72601
870-391-4792 - www.strandcomposites.com

QF003, Rev. 1

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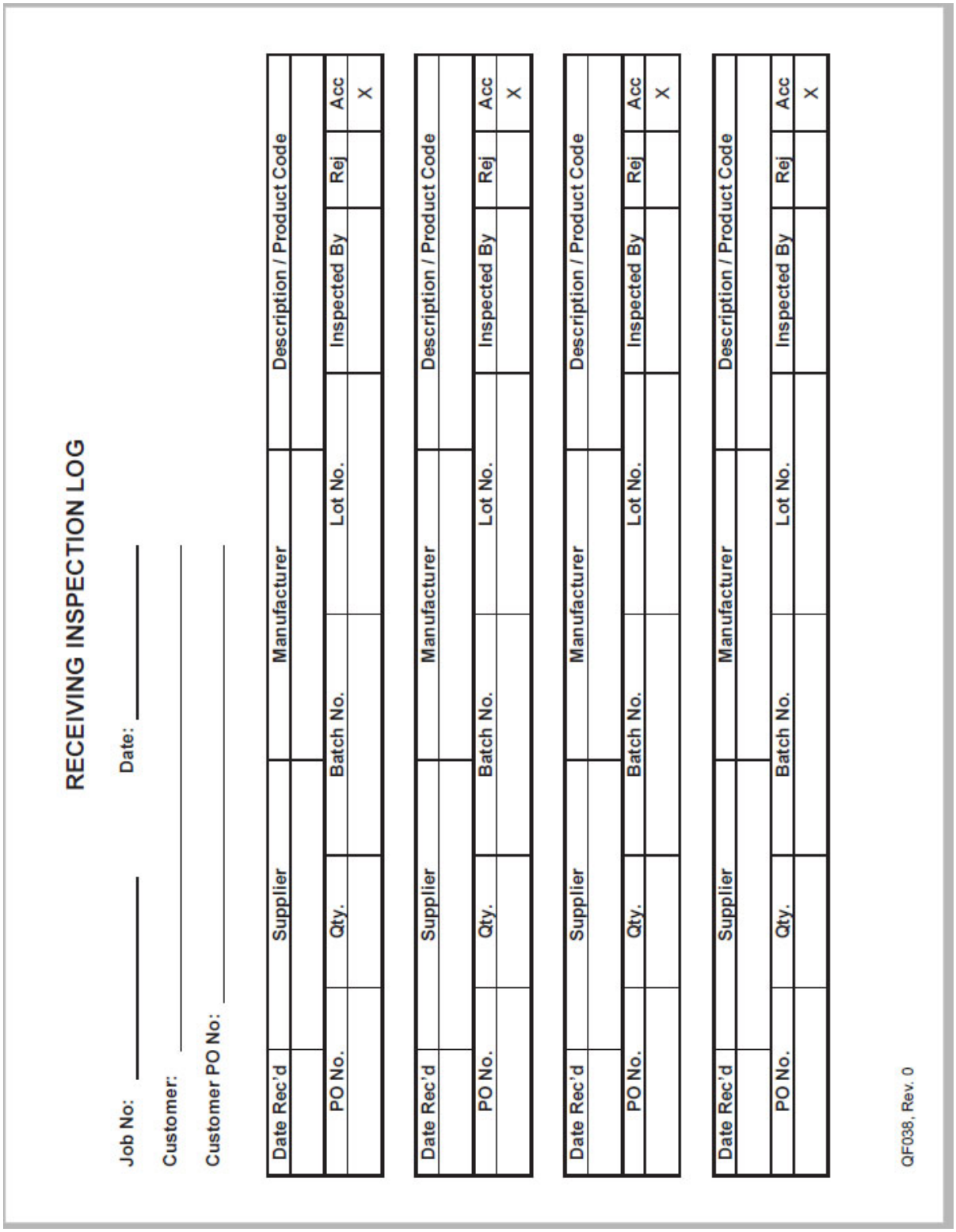
Exhibit 5: Receiving Inspection Log (QF038)



RECEIVING INSPECTION LOG

Job No: _____ Date: _____

Customer: _____

Customer PO No: _____

Date Rec'd	Supplier	Manufacturer	Description / Product Code			
PO No.	Qty.	Batch No.	Lot No.	Inspected By	Rej	Acc
						X

Date Rec'd	Supplier	Manufacturer	Description / Product Code			
PO No.	Qty.	Batch No.	Lot No.	Inspected By	Rej	Acc
						X

Date Rec'd	Supplier	Manufacturer	Description / Product Code			
PO No.	Qty.	Batch No.	Lot No.	Inspected By	Rej	Acc
						X

Date Rec'd	Supplier	Manufacturer	Description / Product Code			
PO No.	Qty.	Batch No.	Lot No.	Inspected By	Rej	Acc
						X

QF038, Rev. 0

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Exhibit 6: Inspection Stickers



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Exhibit 7: Resin Mixing Log (QF143)

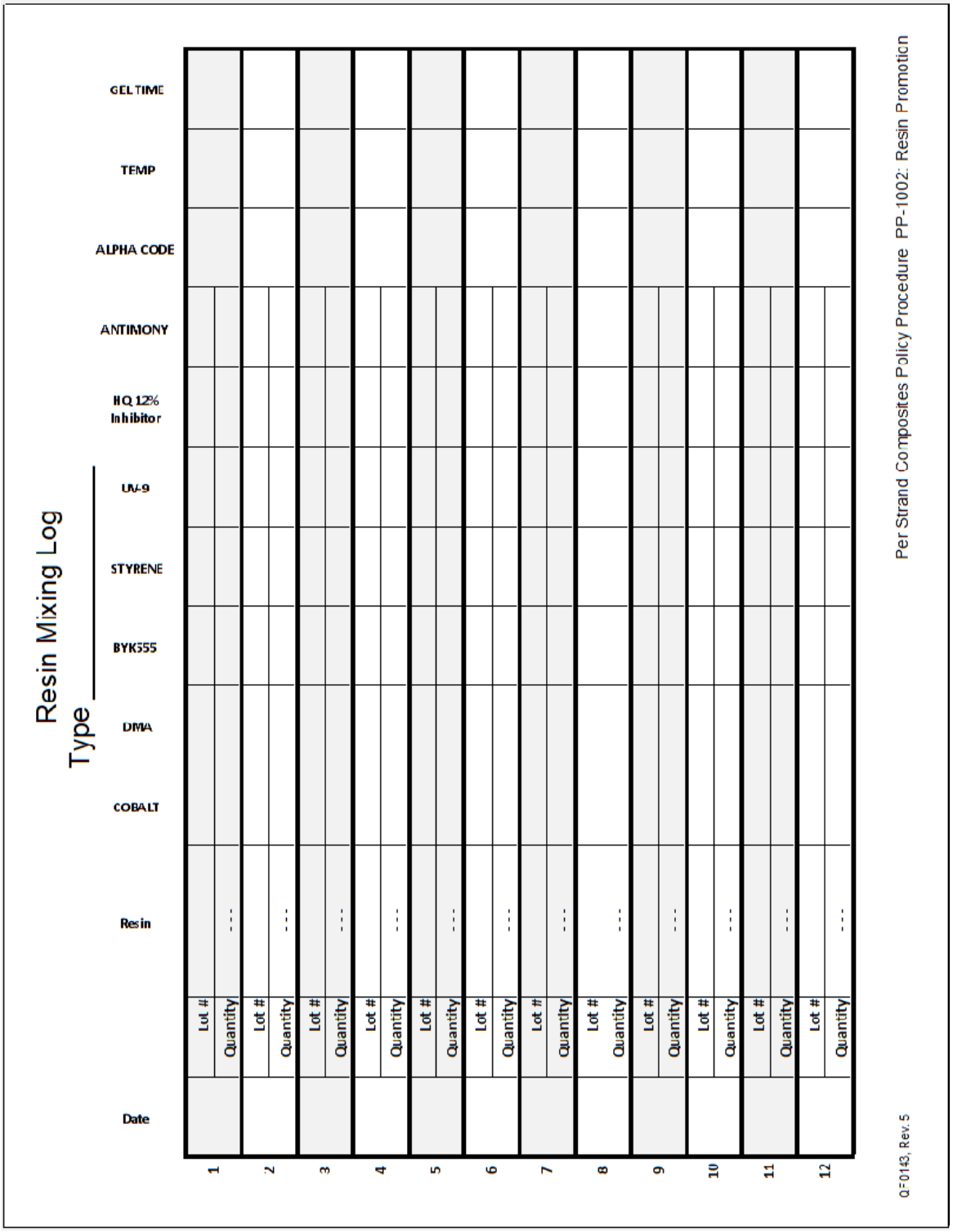

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Exhibit 8: Quality Acknowledgement (QF157)

Quality Acknowledgement

I, _____ verify that I have been informed the noted documents below have changed effective _____.

☐	RTP-1 Quality Manual	Edition: _____	Rev.	_____
☐	Section X Quality Manual	Edition: _____	Rev.	_____
☐	Policies and Procedures Manual	Edition: _____	Rev.	_____

Document(s) can be viewed at:

I understand a printed copy will not be provided and printed versions prior to or after this notice shall be deemed "Uncontrolled" and invalid for the purpose of design, manufacturing, inspection or any other office use.

By virtue of my signature below, I acknowledge receipt of notice and that I have reviewed the noted changes.

_____ Signature

_____ Date

Note: This document must be signed and returned to Document Control no later than _____.

QF157 Rev. 2

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Exhibit 9: Quality Process Flow

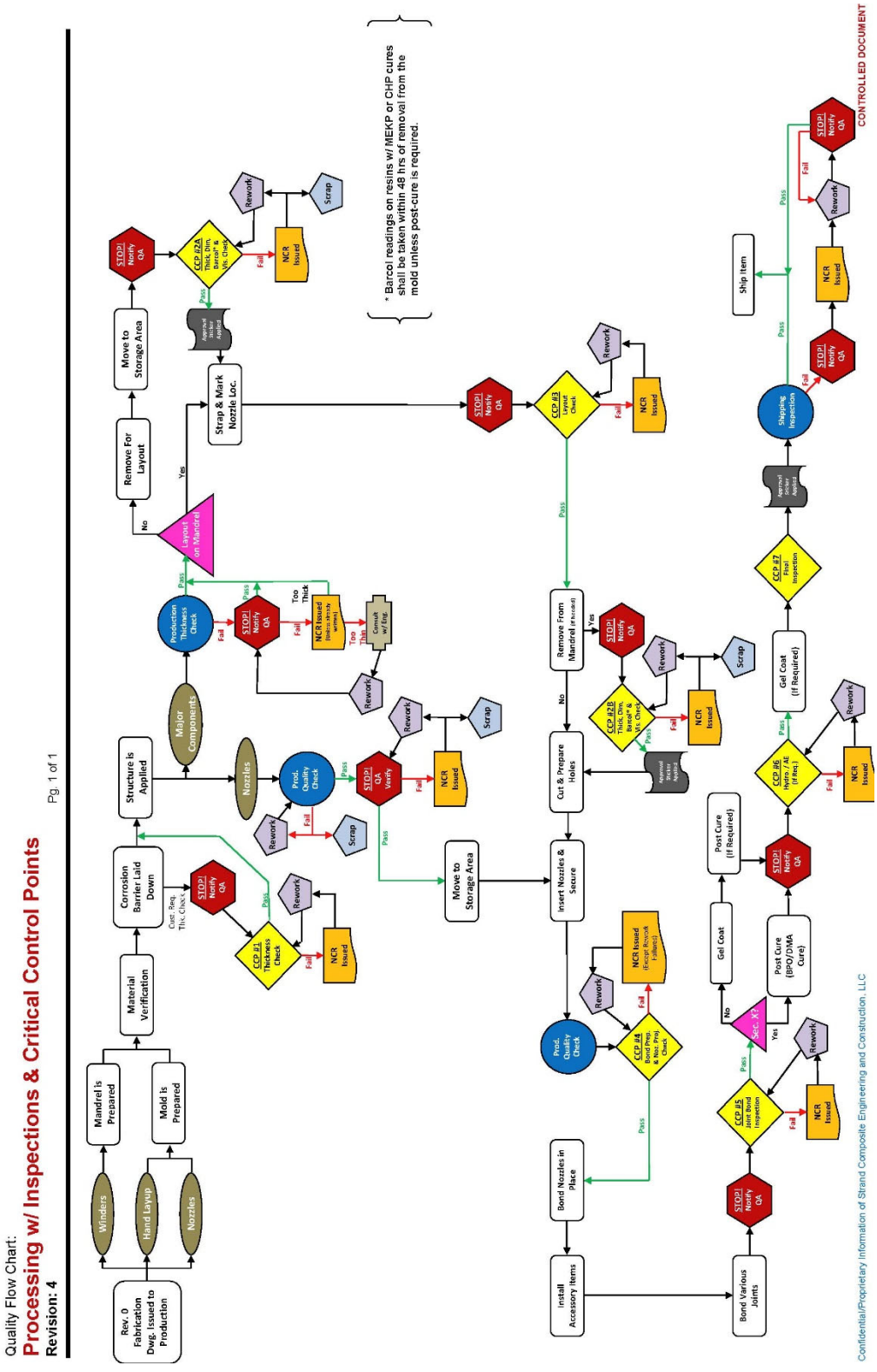

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Exhibit 10: Quality Acknowledgement Summary (QF155)

Quality Acknowledgement Summary

RTP-1 Quality Manual Edition: _____ Rev. _____
Section X Quality Manual Edition: _____ Rev. _____
Policies and Procedures Manual Edition: _____ Rev. _____

Notified	Date Acknowledged
ASME / Authorized Inspector	
General Manager	
Quality Assurance Manager	
Inspector (I)	
inspector (i)	
Document Control	
Engineering Manager	
Qualified Designer #1	
Qualified Designer #2	
Project Engineer #1	
Project Engineer #2	
Drafter	
Sales Manager	
Estimator	
Office Manager	
Purchasing Manager	
Inventory Control	
Shop Supervisor	
Winding/Contact Molding Supervisor	
Layout Supervisor	
Nozzle/Pipe Supervisor	
Assembly Supervisor	
Shipping Supervisor	
Field Supervisor #1	
Field Supervisor #2	
Field Supervisor #3	

QF155 Rev. 0

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Exhibit 11: Drawing Distribution List (QF002)

Drawing Distribution List

Job Number: _____

Eng./Drafter: _____

Revision	Date	Assembly	Layout	Nozzle QA	Quality Assurance	Receiving	Shipping	Winding				
0												
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
16												
17												
18												
19												
20												

"X" in box indicates drawing was issued to that department.
"P" indicates that the drawing revision was Provisional.

Important Note:
All previously issued drawings **MUST** be collected and destroyed at the time a revision is distributed. Retention of an obsolete drawing **MUST** be approved by the Director of Quality.
Missing or retained drawings **MUST** be documented on the back side of this form.

QF002, Rev. 11

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Exhibit 12: Final Inspection Check Sheet (QF031)

FINAL INSPECTION CHECK SHEET

Job No: _____ Vessel No: _____ Customer: _____

Inspector: _____ Date: _____
Print Name

The items listed below shall be verified at the time of Final Inspection and status shall be noted by marking the appropriate checkbox. When a deficiency is identified, a Nonconformance Report shall be issued when identified in the line item with a "*" symbol otherwise, list deficiencies in the comment section of this form.

	Accepted	Rejected	NA
Exterior:			
Gel Coat (color & condition) *	☐	☐	☐
Orientation (dish, manway, etc.) *	☐	☐	☐
Anchor lugs (quantity, orientation) *	☐	☐	☐
Lifting lugs (quantity, orientation) *	☐	☐	☐
Gussets (type, quantity) *	☐	☐	☐
Flange face(s) (chips, scrapes, backfacing, resin drips, etc.) *	☐	☐	☐
Blinds (type, installed)	☐	☐	☐
Special Marking (logo, ID number(s), level designation(s), etc.) *	☐	☐	☐
Control Panel(s) *	☐	☐	☐
Accessories (ladders, platforms, etc.) *	☐	☐	☐
Interior			
Cleanliness	☐	☐	☐
Secondary lay-ups & sealing *	☐	☐	☐
Acetone sensitivity *	☐	☐	☐
Documentation Review			
Thickness Report(s)	☐	☐	☐
Barcol Hardness Report	☐	☐	☐
Nozzle Elevation Report	☐	☐	☐
Postcure Certificate	☐	☐	☐
Hydro / Vacuum Test Certificate	☐	☐	☐

Comment(s):

_____

_____

_____

Statement of Release:
The item identified on this form has completed the QA Inspection Process and is released for shipment.

_____
Insp. Initials

QF031, Rev. 4

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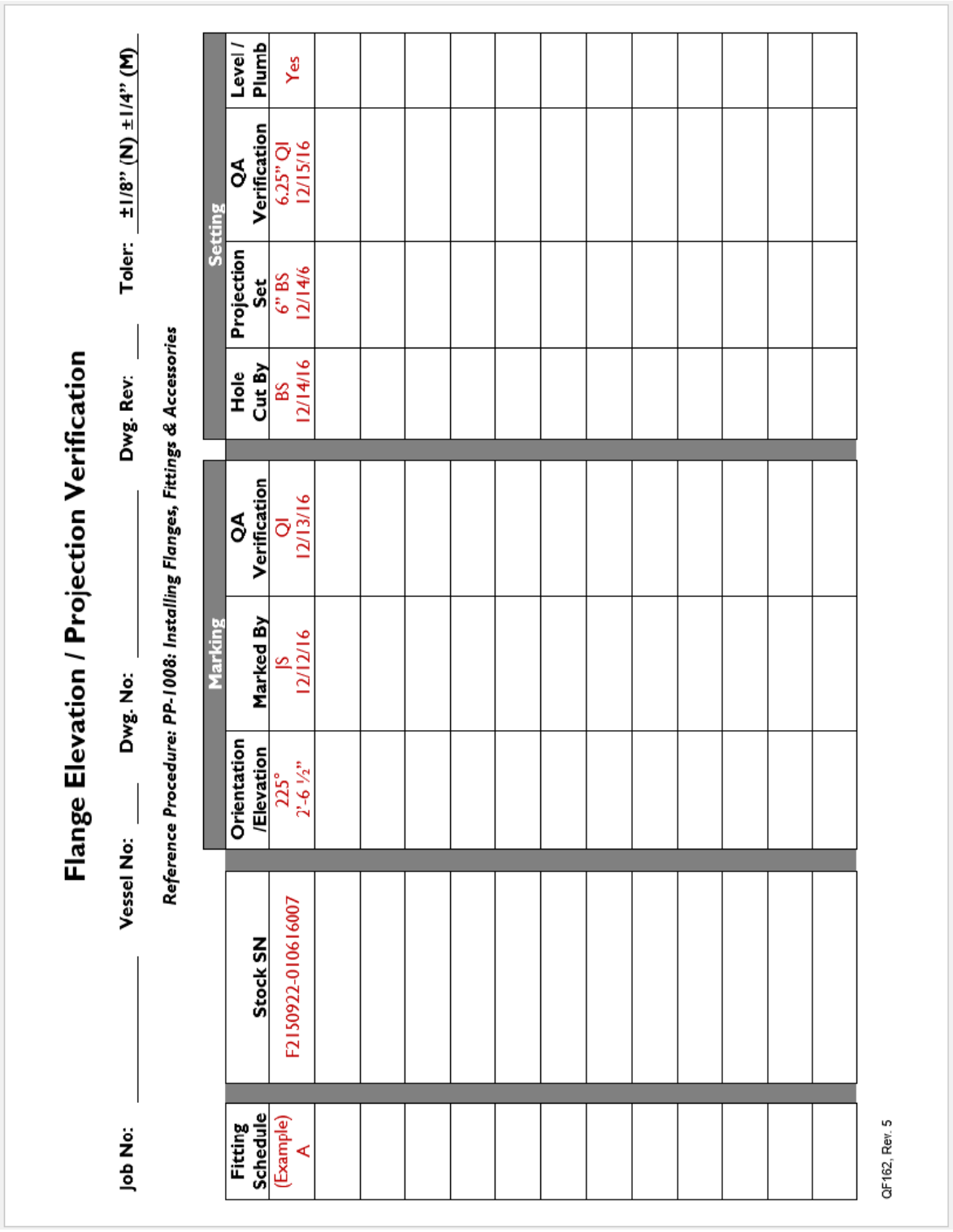
Exhibit 13: Flange Elevation/Projection Verification (QF162)



Flange Elevation / Projection Verification

Job No: _____ Vessel No: ____ Dwg. No: _____ Dwg. Rev: ____ Toler: ±1/8" (N) ±1/4" (M)

Reference Procedure: PP-1008: Installing Flanges, Fittings & Accessories

Fitting Schedule	Stock SN	Marking			Setting			
		Orientation /Elevation	Marked By	QA Verification	Hole Cut By	Projection Set	QA Verification	Level / Plumb
(Example) A	F2150922-010616007	225° 2'-6 ½"	JS 12/12/16	QI 12/13/16	BS 12/14/16	6" BS 12/14/6	6.25" QI 12/15/16	Yes

QF162, Rev. 5

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Exhibit 14: Ply Count Form (QF015)

Reviews: _____ Operator
_____ Supervisor
_____ Doc. Control

Ply Count Form

☐ Field

Job No: _____ Vessel No: _____ Part ID/SN: _____

☐ Laminator ☐ Bonder Name: _____ Comp. Date: _____

Int. CB Resin: _____ Alpha Code: _____ Catalyst: _____ Lot or Batch No: _____

Struct. Resin: _____ Alpha Code: _____ Catalyst: _____ Lot or Batch No: _____

Ext. CB Resin: _____ Alpha Code: _____ Catalyst: _____ Lot or Batch No: _____

Noz. Dia: _____ Noz. Rating: _____ Length: ☐ Std. ☐ Other: _____

Int. CB Ply Seq: _____
Struct. Ply Seq. #1: _____
Struct. Ply Seq. #2: _____
Struct. Ply Seq. #3: _____
Struct. Ply Seq. #4: _____
Ext. CB. Ply Seq: _____

Structure
(QA must verify thickness before Ext. Corrosion Barrier is applied)

Ply #	Type	Initials	Ply #	Type	Initials	Ply #	Type	Initials
Int. Corrosion Barrier (QA must verify thickness before Structure is applied)								
A			1			20		
B			2			21		
C			3			22		
D			4			23		
E			5			24		
F			6			25		
G			7			26		
H			8			27		
I			9			28		
J			10			29		
			11			30		
			12			31		
Ext. Corrosion Barrier			13			32		
K			14			33		
L			15			34		
M			16			35		
N			17			36		
O			18			37		
			19			38		

QF015, Rev. 10

Material Key: A = A-Veil; C = Chop; FW = Filament Wind; G = Carbon Veil; K = ¾ oz. Mat; M = 1.5 oz. Mat; N = Nexus; R = 24 oz. Woven Roving; U = Uniwoven; V = C-Veil

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Ply Count Form

Ply #	Type	Initials	Ply #	Type	Initials	Ply #	Type	Initials
39			75			111		
40			76			112		
41			77			113		
42			78			114		
43			79			115		
44			80			116		
45			81			117		
46			82			118		
47			83			119		
48			84			120		
49			85			121		
50			86			122		
51			87			123		
52			88			124		
53			89			125		
54			90			126		
55			91			127		
56			92			128		
57			93			129		
58			94			130		
59			95			131		
60			96			132		
61			97			133		
62			98			134		
63			99			135		
64			100			136		
65			101			137		
66			102			138		
67			103			139		
68			104			140		
69			105			141		
70			106			142		
71			107			143		
72			108			144		
73			109			145		
74			110			146		

QF015, Rev. 10

Material Key: A = A-Veil; C = Chop; FW = Filament Wind; G = Carbon Veil; K = ¾ oz. Mat; M = 1.5 oz. Mat; N = Nexus; R = 24 oz. Woven Roving; U = Uniwoven; V = C-Veil

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Exhibit 15: User's Design Specification (QF212)

User's Design Specification (UDS)

(ASME Section X, RG-310)

Section X Edition No: _____
UDS Revision No: _____

Specification No.: _____
User Firm Name: _____
User's Agent Firm Name: _____
Title of Equipment: _____
User's Designation No.: _____
Installation Location (Name & Address): _____

UDS prepared by User or User's Agent:

Name: _____ Phone No.: _____ Date: _____
Address: _____

1. Equipment Description:

2. Material of Construction:

Resin: _____ Catalyst/Cure System: _____
Liner(s): _____

3. Chemical Service Data:

3.1 Description of process function and process sequence:

3.2 Contents (i.e. chemical name & concentration range, pH, etc.):

4. Design Conditions:

4.1 Operating:

Internal Pressure: _____ psig
External Pressure: _____ psig
Temperature: _____ °F
Specific Gravity: _____
Liquid Level: _____

QF212, Rev 1

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User's Design Specification (UDS)

(ASME Section X, RG-310)

Section X Edition No: _____

UDS Revision No: _____

4.2 Design:

Internal Pressure: _____ psig
External Pressure: _____ psig
Min. Allowable Temperature: _____ °F
Max. Allowable Temperature: _____ °F
Specific Gravity: _____
Liquid Level: _____

5. Approvals & Acceptance:

5.1 Authorized User's Representative:

Signature: _____ Title: _____ Date: _____

5.2 Authorized Fabricator's Representative:

Signature: _____ Title: _____ Date: _____

Comments:

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Exhibit 16: RTP-1 Overall Dimension Inspection (QF205)

RTP-1 Overall Dimension Inspection

Reference RTP-1 Fig. 4-9 for Fabrication Tolerances

Job No: _____

Date: _____

Inspector: _____

QF205, Rev. 0

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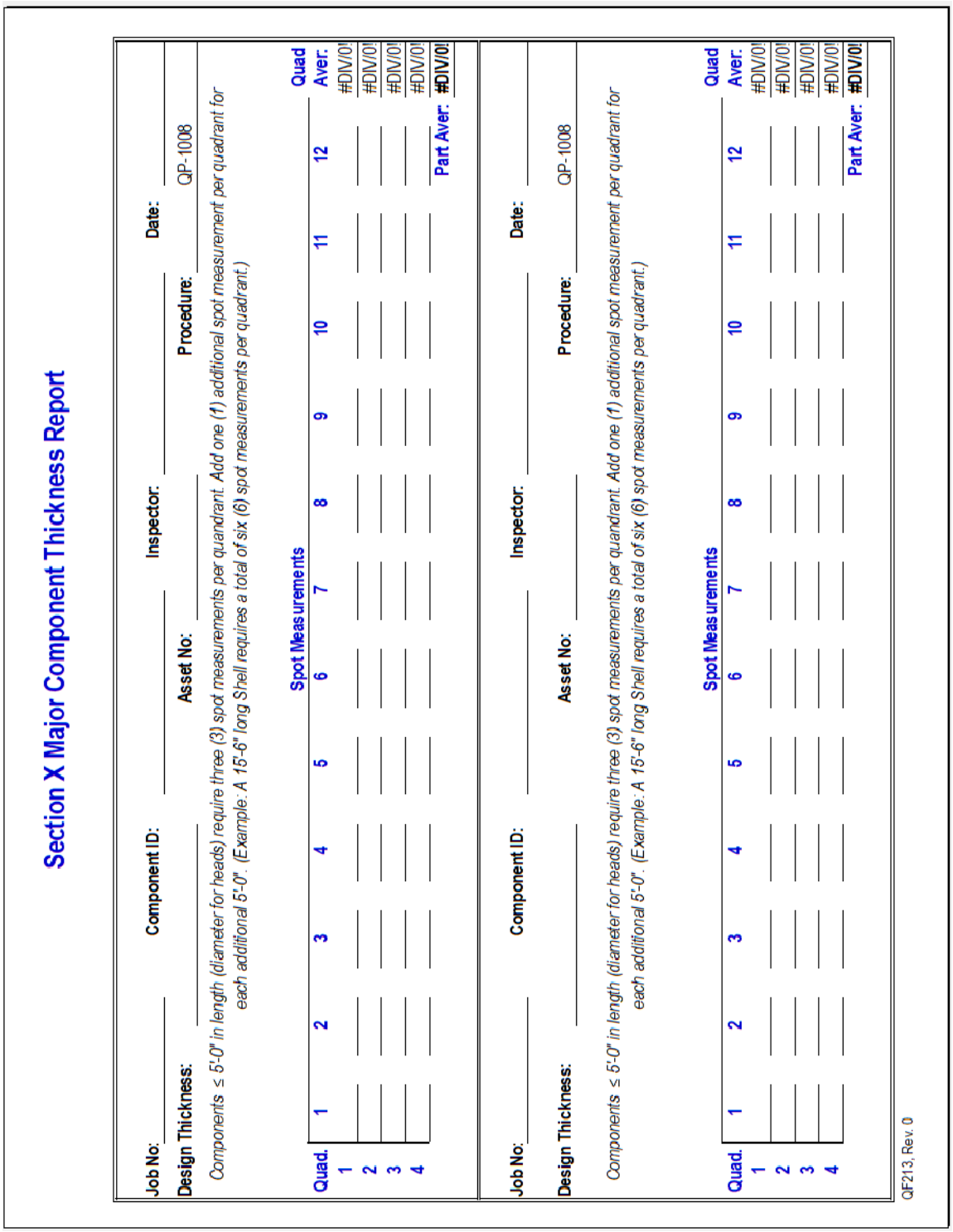
Exhibit 17: Section X Major Component Thickness Report (QF213)



Section X Major Component Thickness Report

Job No: _____ Component ID: _____ Inspector: _____ Date: _____

Design Thickness: _____ Asset No: _____ Procedure: QP-1008

Components ≤ 5'-0" in length (diameter for heads) require three (3) spot measurements per quandrant. Add one (1) additional spot measurement per quadrant for each additional 5'-0". (Example: A 15'-6" long Shell requires a total of six (6) spot measurements per quadrant.)

Quad.	Spot Measurements												Quad Aver:
	1	2	3	4	5	6	7	8	9	10	11	12	
1													#DIV/0!
2													#DIV/0!
3													#DIV/0!
4													#DIV/0!
												Part Aver:	#DIV/0!

Job No: _____ Component ID: _____ Inspector: _____ Date: _____

Design Thickness: _____ Asset No: _____ Procedure: QP-1008

Components ≤ 5'-0" in length (diameter for heads) require three (3) spot measurements per quandrant. Add one (1) additional spot measurement per quadrant for each additional 5'-0". (Example: A 15'-6" long Shell requires a total of six (6) spot measurements per quadrant.)

Quad.	Spot Measurements												Quad Aver:
	1	2	3	4	5	6	7	8	9	10	11	12	
1													#DIV/0!
2													#DIV/0!
3													#DIV/0!
4													#DIV/0!
												Part Aver:	#DIV/0!

QF213, Rev. 0

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Exhibit 18: Fab. Partial Data Report - Class II Vessel (QF080)

FORM RP-4
FABRICATOR'S PARTIAL DATA REPORT FOR CLASS II VESSELS
A Part of a Fiber-Reinforced Plastic Pressure Vessel Fabricated by One Fabricator for Another Fabricator

As Required by the Provisions of the ASME Boiler and Pressure Vessel Code

1. (a) Fabricated and certified by ① (name and address of Fabricator of part)
   (b) Fabricated for ② (name and address of Purchaser of vessel)
2. Identification—Fabricator's serial no. of part ③
3. (a) Constructed according to Drawing no. ④ Dwg. prepared by ⑤
   (b) Description of part fabricated and inspected ⑥
4. Part fabricated in accordance with Procedure Specification Number and Revision _____ Date _____
5. ASME Section X ⑦ (Edition Year) ⑧ (Code Case No.)
6. SHELL: Type ⑨ (contact molded, filament wound) Nominal thickness _____ Fibers _____ (glass, etc.) Resin _____ (epoxy, etc.)
   Nominal weight _____ Diameter _____
   Length _____ Barcol hardness _____
7. HEADS: Type ⑩ (contact molded, centrifugally cast, filament wound)
   Attachment ⑪ (integral, adhesive bonding, bolted, quick opening, etc.)

(a)

	Location (Top, Bottom, Ends) ⑫	Nominal Thickness	Barcol Hardness	Nominal Weight	Shape or Contour (Describe, giving radii, angle, ratios, where appropriate)
(1)					
(2)					

(b) If bolted, bolts used ⑬ (Material, Spec. no., T. S., size, number)
(1) _____
(2) _____

(c) If quick opening or other ⑭ (Describe or attach sketch)
(1) _____
(2) _____

(d) If filament wound, describe pole pieces or head fittings ⑮
(1) _____
(2) _____

8. Fabricated for
   Maximum allowable working pressure _____ at maximum allowable temperature _____
   Minimum allowable temperature [when less than –20°F (–29°C)] _____
9. NDE _____ (AE, RT, etc.)
10. SAFETY VALVE OUTLETS: Number ⑯ Size _____ Location _____
11. NOZZLES ⑰

Purpose (Inlet, Outlet, Drain)	Number	Diameter or Size	Type	Material	Thickness	Reinforcement Material	How Attached

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FORM RP-4 (CONT'D)

12. INSPECTION OPENINGS (18)

Manholes: No. _____ Size _____ Location _____

Handholes: No. _____ Size _____ Location _____

Threaded: No. _____ Size _____ Location _____

13. SUPPORTS: (19) Skirt _____ (Length) Lugs _____ (Number, Length) Legs _____ (Number, Length) Other _____ (describe)
(n/a if not applicable)

Attached _____ (where and how)

14. REMARKS _____ (20)

(21) **CERTIFICATE OF COMPLIANCE**

We certify that the statements made in this Fabricator's Partial Data Report are correct and that all details of materials, fabrication, and workmanship of this vessel conform to Section X of the ASME BOILER AND PRESSURE VESSEL CODE, Fiber-Reinforced Plastic Pressure Vessels, Class II.

Date _____ Signed _____ (Fabricator) by _____ (representative)

Certificate of Authorization no. _____ Expires _____ (date)

(22) **CERTIFICATE OF SHOP INSPECTION**

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by _____ of _____ have inspected the part of a pressure vessel described in this Fabricator's Partial Data Report on _____ (date) and state that, to the best of my knowledge and belief, the Fabricator has constructed this part in accordance with the applicable Sections of the ASME BOILER AND PRESSURE VESSEL CODE.

By signing this certificate, neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the part described in this Fabricator's Partial Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this inspection.

Date _____

_____ Commission _____
(Authorized Inspector's signature) (National Board Authorized Inspector Number)

(07/23)

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Exhibit 19: Customer Requirements – Parts Form (QF216)

Customer Requirements – Parts

(Required for Certified RTP-1 or Section X, Class II part fabrication)

Note: *A completed copy of this form accompanied by RPE certified design calculations shall be provided prior to the completion of quote/bid for certified RTP-1 or Section X, Class II parts.*

Part 1: General

Customer Name: _____ Strand Specification No: _____

Part Description: _____

_____

_____

Standard/Code: _____ Visual Inspection Level: _____

Part 2: Materials

Resin: _____ Catalyst/Cure System: _____

Veil(s): _____ Min. Barcol Hardness: _____

Part 3: Service (Required when Strand Composites provides the design/drawing(s))

Describe the service of the part(s). Include concentrations, pressure(s), temperature, etc.

_____

_____

_____

_____

_____

Is part(s) intended for Critical Service application? ☐ Yes ☐ No

Part 4: Customer Authorization

Name: _____ Title: _____

Signature: _____ Date: _____

Part 5: Strand Review (For Strand Composites use only)

Strand Project Engineer Acceptance: _____ Date: _____

QF216, Rev. 1

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Exhibit 20: Form RP-3 Fab. Data Report for Class II Vessels

FORM RP-3
FABRICATOR'S DATA REPORT FOR CLASS II VESSELS

As Required by the Provisions of the ASME Boiler and Pressure Vessel Code

1. Fabricated and certified by _____ (1) (name and address of Fabricator)
2. Fabricated for _____ (2) (name and address of Purchaser)
3. Location of Installation _____ (3) (name and address)
4. Type _____ (4) (horizontal, vertical, or sphere) Vessel No. _____ (Fabricator's serial no.) _____ (CRN) _____ (5) (Drawing no./Revision no.) _____ (6) (National Bd. no.) Year Built _____
5. Vessel fabricated in accordance with Design Specification Number and Revision _____ (7) Date _____
   and Procedure Specification Number and Revision _____ Date _____
6. ASME Section X _____ (8) (Edition Year) _____ (9) (Code Case No.)
7. (a) Vessel designed according to Method _____ (A or B) (b) Fabricator's Design Report on file _____ (yes or no)
   (c) (1) Elastic constants used for design according to Method A: E_x _____, E_y _____, E_z _____, ν_{yz} _____
   (2) Elastic and strength constants used for design according to Method B. Add additional columns as required.

Structural layer from inside	1	2	3	4	5	6	7	8	9
Type of construction: mat, fil. wound, woven roving, etc.									
Thickness									
Fiber content									
E_x									
E_y									
E_z									
ν_z									
X									
X_c									
Y									
Y_c									
S									
Fiber angles for woven roving layers									

   (3) Effective laminate engineering constants for Method B analysis based on information in 7(c)(2) above. (See AD-509.)
   E_1 _____ E_2 _____ E_6 _____ ν_{21} _____ ν_{12} _____ E_8 _____ E_9 _____
8. (a) SHELL: Fibers _____ (glass, carbon, aramid, etc.)
   Resins _____ (epoxy, polyester, furan, phenolic, etc.)
   (b) HEADS: Fibers _____ (glass, carbon, aramid, etc.)
   Resins _____ (epoxy, polyester, furan, phenolic, etc.)
9. Fabricated for
   Maximum allowable working pressure _____ (10) at maximum allowable temperature _____
   Minimum allowable temperature [when less than –20°F (–29°C)] _____
   Pressure test type: (hydrostatic, pneumatic, or combination) at _____ (11). Total weight of completed vessel _____
   NDE _____ (AE, RT, etc.)
10. SHELL: Construction _____ (12) (hag molded, centrif. cast, filament wound) Nominal thickness _____ (13)
    Diameter _____ Length _____ Barcol hardness _____ (14)
11. HEADS: Construction _____ (15) (contact molded, filament wound)
    Attachment _____ (16) (integral, adhesive bonding, bolted, quick opening, etc.)

(a)	Location (Top, Bottom, Ends)	Nominal Thickness	Barcol Hardness	Nominal Weight	Shape or Contour (Describe, giving radii, angle, ratios, where appropriate)
(1)	(17)				
(2)					

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FORM RP-3 (CONT'D)

(b) If bolted, bolts used (Material, Spec. no., T.S., size, number) (18)

(1) _____

(2) _____

(c) If quick opening or other (describe or attach sketch) (19)

(1) _____

(2) _____

(d) If filament wound, describe pole pieces or head fittings (20)

(1) _____

(2) _____

12. SAFETY OR SAFETY RELIEF VALVE OUTLETS: Number _____ (21) Size _____

Location _____

13. NOZZLES (22)

Purpose (Inlet, Outlet, Drain)	Number	Diameter or Size	Type	Material	Thickness	Reinforcement Material	How Attached (Bonded or Integrally Attached)

Attached _____ (where and how)

14. INSPECTION OPENINGS: (23)

Manholes: No. _____ Size _____ Location _____

Handholes: No. _____ Size _____ Location _____

15. SUPPORTS: (n/a if not applicable) Skirt _____ (24) (Length) Lugs _____ (Number, Length) Legs _____ (Number, Length) Other _____ (describe)

Attached _____ (where and how)

16. VESSEL FABRICATED FOR STORAGE OF _____

17. REMARKS _____ (25)

(Brief description of purpose of the vessel, such as air tank, water tank, LPG storage, etc. *If description of the purpose of the vessel does not clearly indicate the contents of the vessel state what the contents are to be.* Describe any unusual features of design or construction not covered by Items 3 to 16 inclusive.)

(26) CERTIFICATE OF DESIGN

Fabricator's Design Report on file at _____

Fabricator's Design Report certified by _____ PE State _____ (27) Reg. no. _____

We certify the statements in this Data Report to be correct.

Date _____ Signed _____ (Fabricator) by _____ (authorized representative)

Our Certificate of Authorization no. _____ to use the Certification Mark with RPDesignator expires _____ (date)

(28) CERTIFICATE OF SHOP INSPECTION

I, the undersigned, holding a valid commission issued by the National Board of Boiler and Pressure Vessel Inspectors and employed by _____ of _____ have inspected the pressure vessel described in this Fabricator's Data Report on _____ (date) and state that, to the best of my knowledge and belief, the Fabricator has constructed this pressure vessel in accordance with the applicable Sections of the ASME BOILER AND PRESSURE VESSEL CODE.

By signing this certificate, neither the Inspector nor his employer makes any warranty, expressed or implied, concerning the pressure vessel described in this Fabricator's Data Report. Furthermore, neither the Inspector nor his employer shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this inspection.

Date _____

_____ (Authorized Inspector's signature) Commission _____ (29) (National Board Authorized Inspector Number)

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Exhibit 21: Form RP-5 Fab. Data Report Supplementary Sheet

FORM RP-5 FABRICATOR'S DATA REPORT SUPPLEMENTARY SHEET

As Required by the Provisions of the ASME Code Rules, Section X

1. Fabricated and certified by _____ (1) (Name and address of Fabricator)
2. Fabricated for _____ (2) (Name and address of Purchaser)
3. Location of installation _____ (3) (Name and address)
4. Type _____ (4) (Horizontal, vertical, or sphere) _____ (Tank, separator, etc.) _____ (5) (Fabricator's Serial No.)

_____ CRN _____ (Drawing no./Revision no.) _____ (6) (Nat'l. Board No.) _____ (Year built)

Data Report Item Number	(7) Remarks

Certificate of Authorization: (8) Type _____ No. _____ Expires _____

Date _____ Name _____ (Fabricator) Signed _____ (Representative)

Date _____ Name _____ (Authorized Inspector) Commission _____ (9) (National Board Authorized Inspector Number)

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Exhibit 22: Section X Barcol Hardness Report (QF214)

Section X Barcol Hardness Report

Vessel ID: _____ Component: _____ Inspector: _____ Date: _____

Resin: _____ Veil Type / Quantity: _____ Barcol Min: _____

Proc. No: QP-1011 Asset No: _____ Calib: ☐ 43-48 ☐ 87-89 Surface Tested: ☐ Exterior ☐ Interior

Calculating The Required Number of Barcol Impressions

1) Divide the length (or diameter) by 5.
2) Round up to the nearest whole number.
3) Multiply by 3.

Example: Shell = 18'-0" Long
18 / 5 = 3.6 - round up to 4
4 X 3 = 12

Requires 12 checks per quadrant.

READINGS:							
	Q1		Q2		Q3		Q4	
1		16		16		16		16
2		17		17		17		17
3		18		18		18		18
4		19		19		19		19
5		20		20		20		20
6		21		21		21		21
7		22		22		22		22
8		23		23		23		23
9		24		24		24		24
10		25		25		25		25
11		26		26		26		26
12		27		27		27		27
13		28		28		28		28
14		29		29		29		29
15		30		30		30		30

Q1 Aver: #DIV/0! Q2 Aver: #DIV/0! Q3 Aver: #DIV/0! Q4 Aver: #DIV/0!

Part Average: #DIV/0!

Vessel ID: _____ Component: _____ Inspector: _____ Date: _____

Resin: _____ Veil Type / Quantity: _____ Barcol Min: _____

Proc. No: QP-1011 Asset No: _____ Calib: ☐ 43-48 ☐ 87-89 Surface Tested: ☐ Exterior ☐ Interior

Calculating The Required Number of Barcol Impressions

1) Divide the length (or diameter) by 5.
2) Round up to the nearest whole number.
3) Multiply by 3.

Example: Shell = 18'-0" Long
18 / 5 = 3.6 - round up to 4
4 X 3 = 12

Requires 12 checks per quadrant.

READINGS:							
	Q1		Q2		Q3		Q4	
1		16		16		16		16
2		17		17		17		17
3		18		18		18		18
4		19		19		19		19
5		20		20		20		20
6		21		21		21		21
7		22		22		22		22
8		23		23		23		23
9		24		24		24		24
10		25		25		25		25
11		26		26		26		26
12		27		27		27		27
13		28		28		28		28
14		29		29		29		29
15		30		30		30		30

Q1 Aver: #DIV/0! Q2 Aver: #DIV/0! Q3 Aver: #DIV/0! Q4 Aver: #DIV/0!

Part Average: #DIV/0!

QF214, Rev. 0

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Exhibit 23: Quality Personnel Qualification Record (QF168)

STRAND COMPOSITES

Quality Personnel Qualification Record

_____ has been instructed in the fundamentals of Visual Examination and has received on-the-job training to identify and interpret laminate imperfections in accordance with ASME RTP-1 Table 6-1 (Table 6-100.2 for Section X) and has been verified to meeting the qualification requirements outlined within the RTP-1 Quality Assurance Manual (Section 14) for the noted classifications.

☐ inspector (i) ☐ Inspector (I) ☐ Certified Individual (CI)

_____ _____

QA/QC Manager Date

Record of Annual Eye Examination

An eye examination to determine optical capability has been administered. The Associate has passed (at a minimum) the Jaeger J-1 Standard Chart Examination at a distance of not less than twelve (12) inches in at least one (1) eye and is capable of distinguishing and differentiating contrast colors.

Date	Initials

Date	Initials

Date	Initials

Date	Initials

QF168, Rev. 0

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Exhibit 24: R-Stamp Log

Reg. No.	Form Type R-1	Form Type R-2	NB No.	Strand Tank No.	Customer Equipment No.	Customer	Location	Describe Type of Work	RTP	RP	AI Accept. Date	Date Sent To NB
1												
2												
3												
4	X		369	1360467N-08	V4046	JACOBS ENGINEERING	GREENVILLE, SC			X	5/29/2015	6/29/2015
5	X		346	1360467N-21	V4056	JACOBS ENGINEERING	GREENVILLE, SC			X	5/29/2015	6/29/2015
6	X		341	1360467N-16	V4051	JACOBS ENGINEERING	GREENVILLE, SC			X	5/29/2015	6/29/2015
7	X		367	1360467N-09	V5051	JACOBS ENGINEERING	GREENVILLE, SC			X	5/29/2015	6/29/2015
9												
10												
11												
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