QUALITY ASSURANCE MANUAL

For

FABRICATION OF REINFORCED THERMOSET PLASTIC CORROSION RESISTANT VESSELS THROUGH SHOP FABRICATION, FIELD ASSEMBLY, FIELD REPAIR (FOR NEW CONSTRUCTION PRIOR TO BEING PLACED IN SERVICE), AND FIELD FABRICATION USING HAND LAY-UP, SPRAY-UP AND FILAMENT WINDING FABRICATION METHODS.

Strand Composites, LLC
228 W. Industrial Park Road
Harrison, Arkansas 72601

Third Edition – Revision 2 (04/09/2026)

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FORWARD:

The Quality program outlined within this manual is supported by policies and procedures contained within the Strand Composites, LLC's Policy & Procedure Manual.

All personnel who have defined responsibilities described in this Quality Assurance Manual or is described in the referenced procedures shall be instructed in the requirement specified. Personnel who have defined responsibilities may delegate functions to others instructed and, when required, qualified individuals but shall retain the responsibility that the function has been performed correctly.

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QA/QC Mgr. Approval: Michael Crain Date: 04/09/2026

ASME _____ Date: _____

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2.0 SUMMARY OF CHANGES

The following changes have been incorporated into the revision of this edition of the Strand Composites, LLC Quality Assurance Manual and are shown in red within. Errata are indicated within the text but not included in the list below.

Page	***Location***	***Change***
Cover	_____	Manual revision number & date
9	4.1	Updated Org Chart
6	_____	Updated Signature
8	_____	Updated Signature
11	4.2.4.4	Clarified
14	5.5	Updated
20	7.3	Updated
21	7.6	Clarified
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35	11.3	Updated
38	13.5	Clarified
39	14.2	Updated

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3.0 STATEMENT OF POLICY AND AUTHORITY

3.1 On March 2, 2012, Strand Composites Engineering & Construction, LLC was purchased in its entirety by Industrial Plant Services, Inc. of Houston, TX with the intention of continuing operations at 228 W. Industrial Park Road in Harrison, AR, under the name of Plant Maintenance Services, Inc. Subsequently, in September 2013, its parent group, APRM, Inc., was purchased by Capstreet Group, a private equity firm also located in Houston, TX. Capstreet Group made the decision, in 2014, to merge Plant Maintenance Services, Inc. with Thorpe Sunbelt Inc. As a result, the new company named Thorpe Plant Services, Inc. with operations at 228 W. Industrial Park Rd., Harrison, AR was created. On July 1, 2020, this location was purchased in its entirety to be operated under the name Strand Composites, LLC.

Strand Composites, LLC assumes responsibility for ASME RTP-1 certifications previously performed by all previous certificate holders at this location through Tankinetics, Inc. (the original company name).

3.2 The management of Strand Composites, LLC is committed to meet all the requirements of the ASME RTP-1 Reinforced Thermoset Plastic Corrosion-Resistant vessels and vessel parts, as a minimum, and the Quality Assurance Program described in this manual for the fabrication of ASME RTP-1 Reinforced Thermoset Plastic Corrosion-Resistant equipment by shop fabrication and shop subassembly, fabrication of types I, II, and X laminates using hand lay-up, spray-up and filament winding fabrication methods, performance of and subcontracting of design by rules, and design by stress analysis, performance of Hydrostatic and Vacuum testing, and subcontracting of Acoustic Emission, Vacuum, Hydrostatic and mechanical laminate testing controlled by the above location and performance of field assembly, field repair for new construction before being placed into service and field fabrication.

3.3 The QA/QC Manager is responsible for the preparation, revision, approval and issuance of the Quality Assurance Manual and the management, administration and control of the Quality Assurance Program. The QA/QC Manager is independent of the production and marketing groups and has the authority, responsibility and organizational freedom to identify Quality Assurance problems and to initiate, recommend and provide solutions, and verify resolution of these problems.

3.4 In the event of disagreement, between department heads and the QA/QC Manager, the problem shall be brought to the attention of the General Manager for resolution. The resolution shall not negate the requirements of ASME RTP-1 Standard or this manual.

Signed:  Date: 04/09/2026

General Manager

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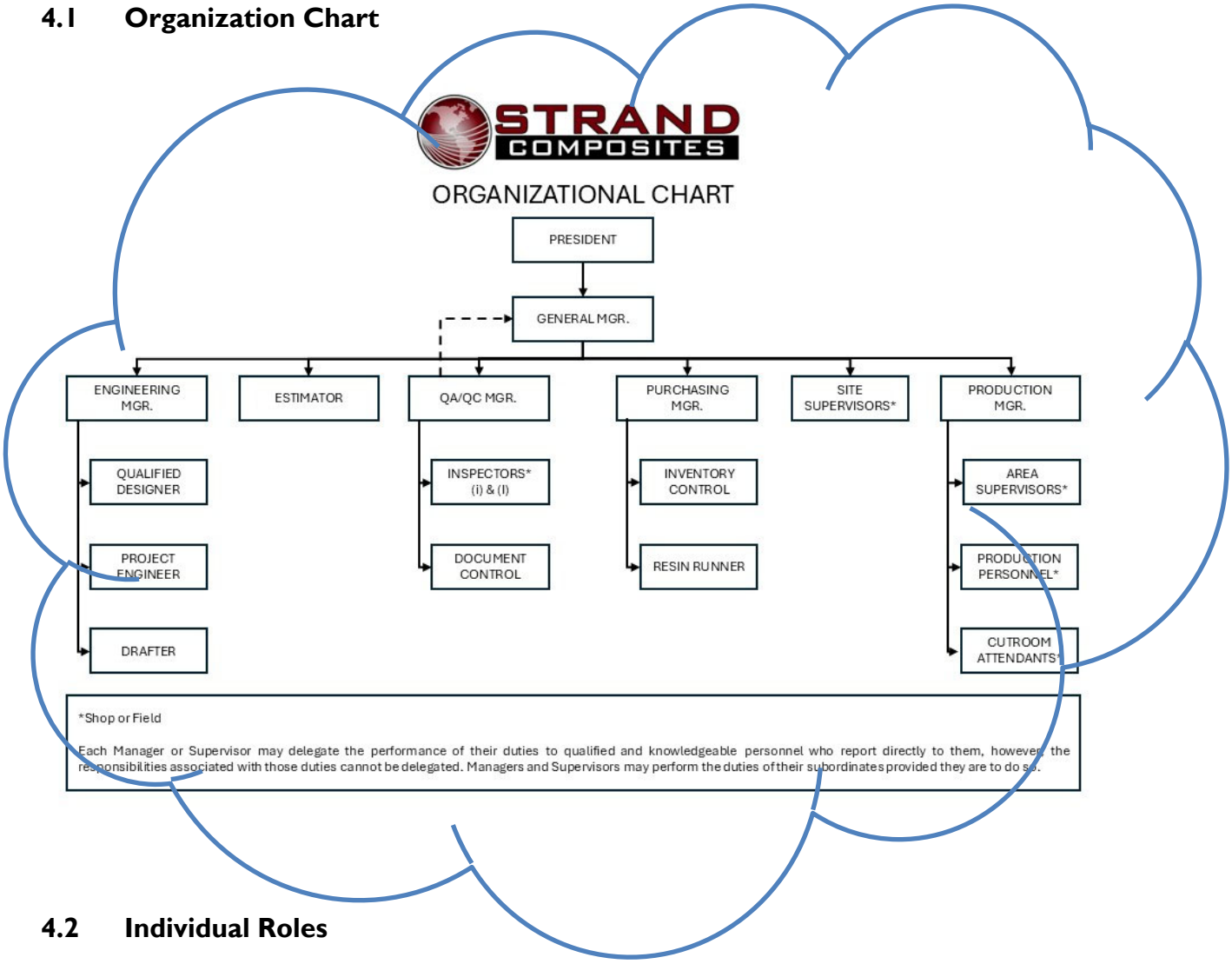
4.0 ROLES & RESPONSIBLITIES

4.1 Organization Chart



4.2 Individual Roles

4.2.1 General Manager

It shall be the General Manager's responsibility to ensure the functions outlined in this manual are performed.

4.2.2 Purchasing Manager

It shall be the Purchasing Manager's responsibility to perform the functions outlined in section 8.0.

4.2.3 Qualified Designer

Acceptable Qualified Designers shall have a four (4) year engineering degree that includes exposure to fundamental subject matter relevant to the design of tanks and

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pressure vessels; Professional Engineer registration in one or more of the states of the United States or provinces of Canada and have at least five (5) years experienced in the design of related tanks and pressure vessels including design calculations for pressure , sustained and occasional loads, and cyclic or thermal loading conditions and experienced in fabrication including material selection of FRP tanks and vessels using the RTP-1 Standard or other recognized international fiberglass vessel or tank code or standard. The Qualified Designer shall be approved by the Engineering Manager.

4.2.4 Inspector (I)

4.2.4.1 The Inspector (I) is an employee of Strand Composites, LLC and works for the QA/QC Manager.

4.2.4.2 The Inspector (I) is responsible for verifying all designated inspections are completed.

4.2.4.3 The Inspector (I) shall have access to the UBRS, Design Report and shall be furnished all drawings, calculations, specifications, procedures, RTP-1 Inspection Test Plan / Inspector's Summary [QF206] (Exhibit 7), repair procedures, records, test results, and any other documents as are required to perform his duties.

4.2.4.4 All NCRs are submitted to the Inspector (I) for performance of Post-Repair Inspection and acceptance. Repair procedures shall be in accordance with Section 11 of this manual.

4.2.4.5 The Inspector (I) shall witness all pressure tests.

4.2.4.6 The vessel records, together with the completed Form 1-2 Fabricator's Data Report [QF026] (Exhibit 17) signed by the Inspector (I), are submitted to the CI for review.

4.2.4.7 A controlled copy of this Quality Assurance Manual is made available to the Inspector (I) by the QA/QC Manager.

4.2.4.8 The Inspector (I) shall be provided free access to the facility while RTP-1 fabrication work is being performed – including suppliers' facilities when requested.

4.2.4.9 The Inspector (I) shall be provided adequate office facilities.

4.2.4.10 The Inspector (I) shall meet the following qualifications:

a. Able to read and write English and have three (3) years of experience in the RTP Corrosion Resistance Industry
b. Knowledge of ASME RTP-1
c. Knowledge of keeping and maintaining records
d. Knowledge of this Quality Assurance Program and Shop procedures

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e. Knowledge and ability to evaluate and monitor procedures
f. Knowledge of use of instruments of measurement

4.2.5 Certified Individual (CI)

4.2.5.1 The CI is an employee of Strand Composites, LLC and is responsible for the protection of the ASME Single Certification Mark. The CI can be the Inspector (I).

4.2.5.2 An annual audit of the implementation of this Quality Assurance Program shall be performed by the CI to verify that it is current and in effective operation.

4.2.5.3 The CI shall verify that both the Inspector (I)-and the inspector (i) are qualified in accordance with 4.2.4.10 and 4.2.6.3 and that Laminator and Secondary Bonder certifications are in order. Inspection qualification acknowledgement shall be by the application of the CI's initials and date in the upper-right corner of the Quality Personnel Qualification Record. Laminator and Secondary Bonder qualifications shall be reviewed through Craft Tracker monitoring.

4.2.5.4 The responsibilities and activities of the Inspector (I) and inspector (i) will be reviewed by the CI who will verify that they are in accordance with the requirements of RTP-1. Verification shall be through monitoring the activities as outlined within this manual and documented in a journal maintained by the QA/QC Manager.

4.2.5.5 The CI shall verify that all corrective actions resulting from an ASME audit are properly resolved.

4.2.5.6 Upon vessel completion and subsequent to the completion of all inspections by the Inspector (I), the CI shall authorize the application of the ASME Single Certification Mark and "RTP" designator and sign the Fabricator's Certificate of Compliance on the Form 1-2 Fabricator's Data Report and/or Form 1-3 Fabricator's Partial Data Report [QF179] (Exhibit 21).

4.2.5.7 The Certified Individual (CI) shall possess a current National Board of Boiler & Pressure Vessel Inspectors certification. This requires successful completion of biennial testing through National Board and the remittance of an annual registration fee.

4.2.5.8 The Certified Individual (CI) shall verify corrective actions taken for vessel nonconformities are in accordance with this quality assurance manual.

4.2.5.9 The CI and Inspectors (I) and (i) qualification records shall be kept in the Strand Composites, LLC Quality Assurance file by the Certified Individual (CI).

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4.2.5.10 The CI shall meet the following qualifications:

a. Education and experience – minimum of high school diploma with five (5) years of experience in the RTP Corrosion Resistance Industry
b. Demonstration of inspection ability to the Strand Composites, LLC President
c. Satisfactory expertise and experience according to the complexity of the assignment
d. Knowledge of ASME RTP-1
e. Knowledge of this Quality Assurance Program and Shop procedure
f. Knowledge and ability to evaluate and monitor procedures and performance
g. Knowledge of keeping and maintaining records
h. Shall be appointed by the Strand Composites, LLC President

4.2.6 Inspector (i)

4.2.6.1 The Inspector (i) is an employee of Strand Composites, LLC and works for the QA/QC Manager.

4.2.6.2 The inspector (i) responsibilities shall include material receiving inspections required material tests (or review and acceptance of the Certificates of Compliance (reinforcements) and Analysis (Resin matrix) and thickness [QF063] (Exhibit 16) and other dimensional checks [QF093] (Exhibit 27), Barcol hardness testing [QF028] (Exhibit 13), acetone sensitivity testing, verification of flange/fitting placement [QF162] (Exhibit 24), visual inspection and other inspections as directed by the QA/QC Manager.

4.2.6.3 The inspector (i) shall meet the following qualifications:

a. Able to read and write English and have one 1 year of experience in the RTP Corrosion Resistance Industry
b. Knowledge of ASME RTP-1
c. Knowledge of keeping and maintaining records
d. Knowledge of this Quality Assurance Program and Shop procedures
e. Knowledge and ability to evaluate and monitor procedures
f. Knowledge of use of instruments of measurement

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5.0 QUALITY ASSURANCE MANUAL CONTROL

5.1 The QA/QC Manager will be responsible for the preparation, review, approval and user notification of the posting of the electronic Quality Assurance and Policy and Procedure Manuals to the public server in accordance with a list of manual users on the Quality Acknowledgement Summary [QF155] (Exhibit 1) per Procedure QP-1032.

5.2 Manual users shall acknowledge their review of the Quality Assurance Manual by signing and dating a Quality Acknowledgment form [QF157] (Exhibit 32) and returning to the QA/QC Manager per Procedure QP-1032.

5.3 The QA/QC Manager shall obtain a copy of new editions of the RTP-1 Standard from an authorized seller at the time of issue and review for possible changes required to the Quality Assurance Program. If revisions are necessary, they shall be incorporated into the program and implemented within six (6) months from RTP-1 edition issue date per Procedure QP-1032.

5.4 Manual approval by the QA/QC Manager will be indicated by signature and date in the space provided at the end of the Contents listing.

5.5 All revisions to the Quality Assurance Manual shall be approved by the QA/QC Manager and submitted to ASME for review and acceptance prior to issue or implementation per Procedure QP-1032. A controlled copy shall be issued to ASME through ca@ASME.org Implementation shall be within thirty (30) days from receipt of ASME written acceptance. Any revision shall cause the entire manual to be revised.

5.6 The latest revised text shall be indicated by blue font and the latest revised information on forms exhibited shall be encircled in a "cloud". Revision zero (0) of new editions are excluded.

5.7 This manual shall be revised in total with revision indicated by an incremental increase in the revision number and date noted on the cover page. At the QA/QC Manager's discretion, a new edition may be issued at which time the revision number shall revert to zero (0) and the edition number shall increase by one (1) and no changes will be shown as indicated in 5.6 above.

5.8 A controlled copy of the Quality Assurance Manual is available for use by the Inspector (I) and the Certified Individual (henceforth referred to as CI). A copy, along with records and procedures, shall be provided by the QA/QC Manager to ASME for survey/auditing purposes.

5.9 A controlled copy of the Quality Assurance Manual shall be provided to contracted Qualified Designers by the QA/QC Manager for the limited purpose of a specific project for which the Designer is engaged.

5.10 The policies and procedures referenced within this manual refer to the current

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edition/revision of the Strand Composites, LLC's Policy & Procedure Manual and shall be controlled in the same manner as this manual with the exception that ASME acceptance is not required.

5.11 Section 17.0 of this manual contains exhibits of forms that are used in this program and are controlled by the QA/QC Manager. A spreadsheet shall be maintained by the QA/QC Manager that assigns the document identification [QF number] and lists the form title and current revision. The forms shown shall be revised when a change to the form is made resulting in the removal of information. In such case, this manual shall be revised. When a form is revised to add information or to correct existing information, a manual revision shall not be required; however, the newest revision of any exhibit shall be captured in the next manual revision.

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6.0 ASME CERTIFICATION

6.1 It is the responsibility of the CI to maintain the Certificate of Authorization and the ASME RTP-1 Single Certification Mark and National Board stamp. Application for recertification shall be made by the QA/QC Manager at least six (6) months prior to the expiration of the three-year certificate.

6.2 The QA/QC Manager shall evaluate and approve part suppliers as well as all subcontracted services. RTP parts shall be procured from an ASME RTP-1 ASME Certificate of Authorization holder carrying the ASME Single Certification Mark with the RTP designator.

6.3 The QA/QC Manager shall maintain all reports and records related to the fabrication of demonstration laminates per Procedure QP-1017. Strand Composites, LLC shall re-demonstrate its ability to fabricate laminates at intervals no greater than five (5) years in accordance with RTP-1, Part 7, 7-600(b)(1) or (2). Reports and records shall include a Re-Demonstration Laminate Certification [QF211] (Exhibit 42), Form NM6-2 Component Data Sheet [QF128] (Exhibit 44) for Demonstration Laminates and the test reports as a minimum.

6.4 Laminators and Secondary Bonders shall be qualified in accordance with RTP-1 Mandatory Appendix M-5 and Procedures QP-1018 and QP-1019. The QA/QC Manager shall certify Form M5-1 Laminator Qualification Report [QF176] (Exhibit 35) accompanied by the Table 7-2 Dimensional Requirements Verification [QF243] (Exhibit 14) or Form M5-2 Secondary Bonder Qualification Report [QF177] (Exhibit 36) and shall maintain all reports and Forms NM6-2 Component Data Sheets [QF128] (Exhibit 44) related to the qualification of Laminators and Secondary Bonders and ensure that these individuals are currently qualified. Laminators and Secondary Bonders shall requalify if they have been inactive for six (6) months. Document Control shall utilize Craft Tracker spreadsheet to monitor craft activities and notify Area Supervisors when a Laminator or Secondary Bonder exceeds a three (3) month activity window. The CI will require requalification of Laminators and Secondary Bonders if there is cause to question their ability to produce laminates or bonds according to the RTP-1 Standard.

6.5 The QA/QC Manager shall maintain all test data sheets related to Design Basis Laminates per Procedure QP-1028 and ensure that the appropriate test data is available for the design of vessels.

6.6 Objective evidence of actions such as approve, review, accept, or verify shall be by signature or initials and date or by the application of a password-protected digital signature or stamp.

6.7 The QA/QC Manager shall act as the Strand Composites, LLC's point of contact for ASME Designee surveys and audits. Designees shall have access to this Quality Manual as well as all documents and areas covered under the scope of this quality management

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system.

6.8 The QA/QC Manager shall be responsible for resolving any deficiencies identified during an ASME audit or survey.

6.9 The CI shall notify ASME regarding any changes to the address, name, location or scope of the RTP Certificate.

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7.0 DRAWINGS, DESIGN CALCULATIONS, & SPECIFICATIONS

7.1 Job Number

The job number is assigned by the Estimator upon Strand Composites, LLC's acceptance of a purchase order and is used to identify all documents related to the job.

7.2 Design

Upon receipt of an order, Form 1-1 Users Basic Requirements Specification (UBRS) [QF017] (Exhibit 22) is reviewed and signed by the Project Engineer as the Authorized Fabricator's Representative or an individual otherwise assigned by the General Manager. The UBRS shall be used for the basis of design. All deficiencies and special requirements shall be reconciled with the customer prior to starting design work. The Project Engineer shall be responsible for the use and conversion of U.S. customary units vs. SI units per RTP-1.

When a revised UBRS is received, it shall follow the same process as the original. The Project Engineer or the Qualified Designer shall reconcile the design with the revised UBRS.

The Project Engineer shall ensure that the test reports are on file for the Design Basis Laminates (DBLs) to be used for the vessel design. The DBL(s) used by the Project Engineer to prepare the design calculations (where applicable) shall be referenced within the calculations. These reports shall be made available to the Inspector (I). When the DBL does not exist, the Project Engineer shall initiate the fabrication of the required laminate(s). The QA/QC Manager shall issue the Lab Work Order [QF025] (Exhibit 29) and arrange for all testing services.

The details of the Design Basis Laminates shall be listed in the DBL Catalog maintained by the Engineering Manager as reference for future designs. All pertinent information including resin, laminate type, thickness, lamination sequence, wind angle (as applicable) and test temperature shall be captured as a minimum.

Upon approval of the UBRS, the design calculations are prepared under the direction of the Project Engineer. It is the Project Engineers responsibility to ensure that the design calculations are Certified by a Qualified Designer meeting or exceeding the qualifications in paragraph 4.2.3.

The Qualified Designer, Project Engineer, Drafter or approved subcontracted party shall use the UBRS and design calculations to prepare the design drawings. When the Bill of Material (BOM) is a separate document, it shall be controlled in the same manner as a drawing.

Drawings shall include as a minimum:

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a. Date
b. Maximum Allowable Working Pressure at Maximum Temperature (°F) may be abbreviated "MAWP at Max. Temp."
c. Maximum Allowable External Working Pressure at Maximum Temperature (°F) may be abbreviated "MAEWP at Max. Temp."
d. Test pressure
e. BOM (or reference to BOM drawing)
f. Test and inspection requirements
g. Nameplate information and construction/attachment requirements
    - ASME RTP-1, 8-840 and 8-850
    - ASME CA-1, 5.1.4 through 5.1.8
h. Component Design thickness
i. Joint Design thicknesses
j. Design Lamination Sequences

A review by the Project Engineer and QA/QC Manager shall be indicated on page 1 of the design drawing (Rev. 0 and greater) through initials in the Revision block.

A Qualified Designer shall act in responsible charge of the certification of the Fabricator's Design Report. This requirement may supersede the organization described in Section 4.0 of this manual.

Completed design drawings (Rev. 0 or higher), calculations and UBRS are submitted to a Qualified Designer for review and certification of the fabrication drawings. Any disapproved documents shall be returned for correction and resubmission. Certification shall be shown by the application of the Qualified Designer stamp, signature and date of the signature or per the rules set forth by the state of the Professional Engineering registration.

At the completion of fabrication, the Fabrication Drawing shall be revised to include any changes or Change Notices [QF130] (Exhibit 20) (if applicable) then stamped "As Built". The As Built drawing shall be certified by a Qualified Designer provided the rules set forth by the state of the Professional Engineering registration allow. If the state of the Professional Engineering registration does not allow, the Inspector (I) shall stamp "As Built" on the last Fabrication Drawing revision ensuring all Change Notices have been incorporated in the last revision of the drawing. The As Built drawing shall be included within the Fabricator's Data Report.

A Fabricator's Design Report [QF121] (Exhibit 33) accompanied by design calculations, Fabrication Drawing and structural Nonconformance Reports (henceforth referred to as NCRs) [QF018] (Exhibit 8) shall be certified by a Qualified Designer selected by the Project Engineer. Any disapproved documents are returned for correction and resubmitted. Certification is shown by the application of the Qualified Designer's seal, signature and date of signature on the Fabricator's Design Report when work is complete.

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Revisions to design documents are prepared, reviewed and approved in the same manner as originals.

7.3 Design by Others

Design Reports (including calculations and drawings) provided by others shall be certified by a Qualified Designer to verify that the requirements of the RTP-1 Standard are met. All design documents shall be reviewed by a Strand Composites, LLC Project Engineer prior to acceptance.

Designs that do not utilize RTP-1 Table 2A-3 Minimum Values of Flat Laminates shall require a review by a Strand Composites, LLC's Project Engineer to verify the design is consistent with Strand's capabilities. The design shall be rejected when the variables are not comparable to the DBL's properties or when DBL properties are not available.

A Customer Requirements – Parts form [QF216] (Exhibit 45) defining relevant design and fabrication requirements shall be completed by the customer and accompanied by design documentation provided by others.

At the completion of fabrication of parts, a Form 1-3 Fabricator's Partial Data Report [QF179] (Exhibit 21) shall be completed including the attachment of documentation listed within the General Notes of the report (Documents that do not state "As-built" status shall be considered "As-Built" if included with Form 1-3 Fabricator's Partial Data Report). A copy of the documentation shall be provided to the customer with internal records to be retained per Section 13.0 of this manual.

A label shall be applied to each individual part. (Example in-set shown with Exhibit 21.) Label information shall include the following:

a. The official ASME Single Certification Mark w/ RTP designator
b. "Component" designator
c. Certified by Strand Composites LLC
d. Certificate number

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7.4 Design Report

The Project Engineer shall prepare a Design Report. The design report shall consist of the following:

a. Fabricator's Design Report [QF121] (Exhibit 33) (Cover page)
b. Table of Content
c. Design Calculations certified by the Qualified Designer
d. Design Drawings certified by the Qualified Designer (which shall include the required component and joint thickness and sequences.)
e. Structural Nonconformance Reports (NCR) (as applicable) [QF018] (Exhibit 8)

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f. Proof Test reports (when required) reviewed by the Qualified Designer as verification the design requirements have been met

The Design Report shall be considered "In Progress" until such time as the work is completed. Upon completion and testing of the vessel, the Fabricator's Design Report shall be produced, approved and certified by a Qualified Designer by means of application of the seals(s) with signature and date and provided to the Inspector (I) prior to final inspection.

7.5 Distribution of Drawings (Conforming with Section 7.2), and Other Controlled Documents.

Approved printed drawings, and other documents that are to be physically distributed to Production are Provided to Document Control who will prepare the Drawing Distribution List [QF002] (Exhibit 2) to reflect the distribution of the drawing to the required parties. (Refer to Procedure QP-1010.) Recipient signatures are not required.

The QA/QC Manager is responsible for ensuring the Inspector (I) has access to all drawings, calculations, UBRS, and other documents the Inspector (I) may require for review prior to the start of fabrication. An NCR [QF018] (Exhibit 8) shall be used to bring any discrepancies to the attention of the Project Engineer for resolution.

7.6 Revisions to design documents

Revisions to design documents are prepared, approved, and distributed in the same manner as the originals. Superseded distributed documents are retrieved by Document Control and destroyed. Document Control shall replace superseded drawings within relevant departments / areas upon revision. The Drawing Distribution List (QF002) [Exhibit 2] shall reflect the area(s) which received the revision. Electronic retention of superseded revisions of the design documents (such as drawings, calculations, UBRS forms etc.) shall be at the discretion of the Engineering Manager.

7.7 Change Notice

A Change Notice [QF130] (Exhibit 20) identifies an in-process change to a released drawing or may be used to certify a drawing for fabrication. Issued by the Project Engineer and co-signed by the QA/QC Manager, this document supersedes specific information upon reference and attachment to the front of the drawing per Procedure QP-1010.

Structural changes, as determined by the Project Engineer, require the certification of a Qualified Designer. Non-structural changes (changes that would not affect the thicknesses derived from the documents of the design report) require no certification.

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A Change Notice shall become a part of the drawing upon attachment to the drawing by Document Control. The original Change Notice shall be maintained within the Engineering job folder along with the pertinent drawing.

All specifics of issued Change Notices shall be incorporated into the next revision of the drawing. Incorporation of the Change Notice shall be verified by the Project Engineer and evidenced via initial of the drawing revision. Once incorporated into the drawing, the Change Notice becomes void. It is the responsibility of the inspector (i) to ensure all final revisions of the drawing included in the Fabricator's Design Report do not have associated change notices. When an inspector (i) is preparing the Final Inspection Package discovers a change notice is still attached to the Drawing they shall notify the Project Engineer a Drawing revision is required to incorporate the change notice. A Change Notice may not be used to certify an As Built revision.

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8.0 MATERIAL PURCHASING, RECEIVING AND STORAGE

8.1 Purchasing

The purchase of vessel specific components, services and materials shall begin with the Project Engineer completing a Purchase List [QF222] (Exhibit 46) and submittal to the Purchasing Manager. The Purchase List shall be updated and submitted to the Purchasing Manager when requirements are changed/added.

The Purchasing Manager will obtain required quotes from approved sources by sending an email to the prospective vendor. When the quote is returned, the Purchasing Manager will assign a Purchase Order from the Purchase Order Log (Exhibit 47) maintained on the Strand server and a purchase order (Exhibit 3) is issued to the vendor. An email will be sent to the vendor approving the purchase.

The purchase of general inventory (i.e., glass, resin, etc.) is inventory controlled and generated from the Autocrib System. When stock levels reach the predetermined minimum, Inventory Control will generate a list of stock to be ordered. The Purchasing Manager will review the list then generate and sign the purchase order. The order will be emailed to the vendor.

The arrangement of laboratory testing and calibration services shall be the responsibility of the QA/QC Manager who will request a Purchase Order . The Purchasing Manager will generate a purchase order and file per the above.

Changes to any purchasing form will be controlled in the same manner as the original.

8.2 Receiving Inspection

All incoming material is held in a designated area pending completion of the receiving inspection by Inventory Control. Small material and parts such as fasteners, gaskets, etc. may be bagged and tagged or otherwise identified to maintain traceability. All material shall be accompanied by the associated Certificate of Conformance (C of C) or Certificate of Analysis (C of A) and verified to match the material ordered prior to receiving into inventory. (Refer to Procedure QP-1024.)

Incoming inspection shall follow the requirements of RTP-1 Mandatory Appendix M1 and M2. The following forms (as applicable) shall be completed and maintained per Section 13 of this manual:

Form M1A-1 Veil and Mat Reinforcement Log Sheet [QF004] (Exhibit 4(a))
Form M1B-1 Roving Reinforcement Log Sheet [QF005] (Exhibit 4(b))
Form M1C-1 Fabric Reinforcement Log Sheet [QF006] (Exhibit 4(c))
Form M1D-1 Milled Fiber Reinforcement Log Sheet [QF007] (Exhibit 4(d))

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Form M2E-1 Resin Log Sheet [QF008] (Exhibit 4(e))
Form M2E-2 Curing Agents Log Sheet [QF009] (Exhibit 4(f))
Form M2F-1 Common Additives Log Sheet [QF010] (Exhibit 4(g))
Form M13-1 Balsa Wood Core Inspection Sheet [QF173] (Exhibit 4(h))

RTP-1 components and subassemblies fabricated by others shall be accompanied by a Form 1-3 Partial Fabricator's Data Report [QF179] (Exhibit 21) that includes necessary information traceable to the component(s) received and delivered -for inspection by the inspector (i) prior to release to Fabrication for use. Inspection shall include a review of the accompanying documents as well as confirmation that dimensions, thicknesses, Barcols and visual criteria meet specified requirements.

No resin, curing agents or catalysts shall be received into this facility without a Manufacturer's Certificate of Analysis (C of A). For general fabrication and RTP-1 stamped projects, acceptance of the C of A shall be according to RTP-1 M2-100, paragraph 2. Certificates shall be accepted by the (I) or (i) inspector. Acceptance shall be shown through signature and date or a computer-generated stamp that is password protected. When the C of A is used in lieu of testing, the date and the batch reference shall be documented on Form M2E-1 Resin Log Sheet [QF008] (Exhibit 4(e) and Form M2F-1 Common Additives Log Sheet [QF010] (Exhibit 4(g)) by the QA/QC Manager. When certificates are utilized, the date and lot number noted on the certificate shall be documented along with an accompanying statement: "As documented on Manufacturer's Certificate of Analysis".

Inventory Control shall ensure goods received are free of damage, dirt or debris and verify that the item(s) correlate to the order, are accompanied by the required certificates and entered into the Autocrib System.

Rejected items shall be identified as "Rejected" through the application of the QC Rejected sticker (Exhibit 6) and quarantined from General Inventory until returned to the Supplier or scrapped.

Laminators and Bonders shall inspect material at the point of use for defects, damage, dirt or debris, moisture, etc. Defective material shall be segregated from the Fabrication process and an inspector (i) shall be notified immediately. The inspector (i) shall apply the appropriate status sticker – Quality Hold or QC Rejected sticker (Exhibit 6) and quarantine pending determination of disposition.

Inventory Control shall file the electronic copy of the C of C for materials and C of A for resins, promoters and catalysts in the C of C folder located on the Local Storage drive.

When materials are cut or split, the required material information shall be transferred to each portion of the material to maintain traceability by the individual cutting the material. The inspector (i) shall audit cut rolls to verify that lot numbers are present.

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8.3 Customer Supplied Material

All components and material supplied by a customer are received and inspected as described above in section 8.2. The customer's Purchase Order and required Certificate of Analysis or Conformance, Manufacturer Certificate and Fabricator's Partial Data Report (when required for RTP-1 stamp application), including attached documents as required by RTP-1, will be provided to the QAQC Manager for review/acceptance and receiving inspection.

8.4 Procurement Records

The QA/QC Manager shall keep manufacturer's specifications in the Quality folder for materials used for vessel fabrication.

All records referenced in this section are available for review by the Inspector (I).

8.5 Storage

Inventory Control shall ensure that materials are stored in such manner as to maintain their integrity and identity.

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9.0 PRODUCTION FLOW AND INSPECTION

9.1 Fabrication

The fabrication of vessel components is controlled by means of the RTP-1 Inspection Test Plan [QF206] (Exhibit 7) prepared by Document Control then presented to the Inspectors (i) and (I).

Operations include fabrication, examination, inspection, testing, certification and stamping. The RTP-1 Inspection Test Plan [QF206] (Exhibit 7) and drawings shall specify all required dimensional checks to include thicknesses and Barcol readings. Fabrication Procedures shall be approved by the QA/QC Manager. The Policy & Procedures Manual shall be revised in whole and shall include all procedures used in Fabrication and Inspection and shall be controlled by edition and revision. The procedures shall be identified on the drawing by procedure, edition and revision numbers.

Examination and inspection activities shall be documented (as applicable) on:

a. Barcol Hardness Test Report [QF028] (Exhibit 13) (QP-1011)
b. Final Inspection Check Sheet [QF031] (Exhibit 28) (QP-1001 & QP-1002) w/ "Ok To Ship" sticker (Exhibit 5)
c. RTP-1 Average Major Part Thickness Analysis [QF063] (Exhibit 16) (QP-1008)
d. Flange Elevation/Projection Verification [QF162] (Exhibit 24) (PP-1008)
e. Nozzle Dimensions [QF093] (Exhibit 27) (QP-1009) w/ "Inspected By" sticker (Exhibit 5) applied
f. Post Cure Certificate (as applicable) [QF039] (Exhibit 30) (PP-1015)
g. Ignition Loss/Ply Sequence Verification (as applicable) [QF095] (Exhibit 31) QP-1012)
h. RTP-1 Overall Dimension Inspection [QF205] (Exhibit 39)
i. Incoming Inspection – Accessory & Attachment Items [QF207] (Exhibit 40) (QP-1024) w/ "Inspected By" sticker (Exhibit 5) applied

Where inspection identifies questionable or nonconforming conditions, a QC Reject sticker (Exhibit 6) is applied.

The RTP-1 Inspection Test Plan is sent to the QA/QC Manager to review for Quality Assurance requirements. Following approval, the QA/QC Manager will review the RTP-1 Inspection Test Plan and drawings with the Inspector (I) for designation of hold points, signified by the letter "H" by the desired item(s). These are to include those specified in RTP-1, Part 6. The Inspector (I) shall review all hold points with the inspector (i) prior to fabrication. It is the responsibility of the inspector (i) to notify the Inspector (I) of upcoming hold points.

Laminators and Secondary Bonders who carry a current qualification status shall fabricate or bond vessels or vessel parts as required by the Job Book issued by

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Document Control. Assistants may aid the Laminator or Bonder. Laminators may utilize one (1) to four (4) Assistants; Secondary Bonders may utilize one (1) to two (2) Assistants. (RTP-1, M5-100(b)(c).)

Ply sequences shall be documented on the Ply Count Form [QF015] (Exhibit 12) by the Laminator or Secondary Bonder. Parts that are fabricated or bonded as a lot – multiple units of same composition, size and laminated or bonded by the same individual(s) on the same day – may be documented on one (1) Ply Count Form. Individual units or bonds shall be identified by unique number or letter on the form and shall be traceable to the job number and drawing. Ply sequence verification of major components shall be by visual verification of cutout or burnout by the Inspector (I) and documented on the associated Ply Count Form via the application of a Cutout Verification Stamp (Exhibit 43) indicating the nozzle location inspected and method shown by the application of initials on the appropriate line: Visually Accepted or Burn-out Required.

Reinforcement material(s) shall be documented on the Material Requisition (QF056) (Exhibit 23) and/or Department Daily Inventory Request Form [QF233] (Exhibit 48). Resins and catalysts shall be documented on the Ply Count Form [QF015] (Exhibit 12). The Memo for Record [QF150] (Exhibit 26) is used to document pertinent information such as courtesy thickness checks, unusual occurrences, etc.

The Elevation View on the drawing shall be used to verify dimensions. A copy of the view will be printed on the RTP-1 Overall Dimension Inspection [QF205] (Exhibit 39) and actual measurements documented next to the noted requirements. Reference RTP-1 Fig. 4-9 for acceptable tolerances.

9.2 Proof Tests

When required by ASME RTP-1, the proof tests shall be performed by Strand Composites, LLC, an A2LA accredited or ISO certified (that includes internal self-audits) testing laboratory that has been evaluated and accepted by the QA/QC Manager (per RTP-1 6-930(d)(2)). (Refer to Procedure QP-1027.) If the laboratory conducting the tests is not accredited or certified to conduct the tests, the laboratory shall maintain annually calibrated testing equipment and the testing procedures shall be reviewed by the QA/QC Manager. The QA/QC Manager shall specify and document in the UBRS acceptable parties to review and approve the written procedures unless review and approval are conducted by a Qualified Designer. In all cases, the test results shall be reviewed by a Qualified Designer to determine whether they meet the design requirements.
The QA/QC Manager shall issue the Lab Work Order [QF025] (Exhibit 29), arrange testing services and receive the final report from the testing laboratory. Proof Tests shall be reviewed by a Qualified Designer to determine if the results meet the design requirements. Review shall be evidenced by the application of a seal, signature and date on the Fabricator's Design Report [QF121] (Exhibit 33).

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9.3 Visual Examination (VT)

Requirements for Visual Examination (VT) by Strand Composites, LLC Inspectors (I) and inspectors (i) performing visual examinations to the requirements of ASME RTP-1, shall be qualified and certified by the QA/QC Manager in accordance with the following:

a. Instruction in the fundamentals of VT Examination.
b. On-the-job training to familiarize the VT Examiner with the appearance and interpretation of indications of defects. The time frame for such training shall be sufficient to assure adequate knowledge of VT Examination.
c. Upon completion of the conditions outlined in this section, the VT Examiner shall be given an annual eye examination to determine if the examiner is qualified to perform the required examination and interpret results. This shall be documented on the Quality Personnel Qualification Record [QF168] (Exhibit 41).

Each VT examiner successfully meeting the above is certified by the QA/QC Manager who is responsible for documenting the completion of training and examination specified.

9.4 Pressure Tests

Vessels with MAWP > 0.5 psig shall be hydrotested at 110% to 120% of the design pressure. Vessels with MAWP ≤ 0.5 psig will be filled with water to at least its full-designated liquid capacity. (Refer to Procedure PP-1014.)

A Pressure / Hydrotest Plan [QF170] (Exhibit 25) shall be created by the QA/QC Manager per Procedure PP-1014 for all testing performed above atmospheric pressure (0.0 psig).

During the pressure/hydrostatic testing, vessels shall be supported similar to the way they will be supported during operation. The test pressure shall be held for a minimum of two (2) hours with no visible evidence of leakage. If leakage occurs, a condition of nonconformance shall be declared and the vessel in question shall be examined to determine the leak source. NCRs resulting from test failure shall be identified and corrected in accordance with RTP-1, M-7. After the condition has been resolved, the vessel shall be retested.

Vertical vessels may be hydrotested in the horizontal position when agreed upon by the User or User's Agent and the Fabricator. Such agreement shall be indicated on Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Exhibit 22).

Vessels designed for external pressure shall be evacuated in accordance with 6-950(c) and shall be held for a minimum of two (2) hours.

All hydrostatic/vacuum tests shall be recorded on the Witness of Hydrotest [QF033]

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(Exhibit 15) or the Witness of Vacuum Test [QF126] (Exhibit 19) by the shipping Area Supervisor. The results of the test shall be acknowledged by the Inspector (I) via signature on the form(s).

9.5 Acoustic Emission Examination (AE)

Acoustic Emission Examination (AE), if required by the UBRS, is performed by a qualified AE subcontractor whose written practice, personnel qualifications, written procedures and equipment calibration have been reviewed and approved for Standard compliance to the requirements of Appendix M-8 by the QA/QC Manager. (Refer to Procedure PP-1014 and QP-1016.)

AE procedures are as follows:

All AE procedures will be submitted for review to the Inspector (I), to be satisfied that the procedure meets the requirements of M-8.

All AE will be performed using written procedures that comply with ASTM E1067. The procedures shall be detailed enough to provide the technique to be used to meet all RTP-1 requirements and shall be reviewed by the QA/QC Manager. The Inspector (I) shall witness the tests and verify that the procedures were followed.

9.6 AE Reports

AE reports shall be evaluated, interpreted and accepted to the requirements of Appendix M-8. All reports of AE – including Acceptance Test Reports – shall be reviewed and accepted by the QA/QC Manager prior to submittal to the Inspector (I) for acceptance.

All AE reports shall be retained in files per Section 13 of this manual.

9.7 Final Inspection

The Inspector (I) shall examine the Fabricator's design records and reports and verify that the vessel conforms to the latest revision of the approved drawings and UBRS and that the Fabricator's Design Report has been certified by a Qualified Designer.

Upon completion of vessel fabrication, the Inspector (I) performs the final inspection (both internal and external) and completes the Final Inspection Check Sheet [QF031] (Exhibit 28). When the vessel meets all the requirements of the Standard, the Inspector (I) submits the fabrication package (design drawing, UBRS) and inspection records to the QA/QC Manager.

The inspector (i) shall prepare a Final Inspection Package consisting of the final revisions of the following and present to the Inspector (I):

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a. Design Report – including calculations, design drawings and Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Exhibit 22)
b. Completed forms:
   1) Barcol Hardness Test Report [QF028] (Exhibit 13)
   2) Final Inspection Check Sheet [QF031] (Exhibit 28)
   3) RTP-1 Average Major Part Thickness Report [QF063] (Exhibit 16)
   4) Flange Elevation / Projection Verification [QF162] (Exhibit 24)
   5) Nozzle Dimensions [QF093] (Exhibit 27)
   6) Post Cure Certificate (as applicable) [QF039] (Exhibit 30)
   7) Ignition Loss / Ply Sequence Verification (as applicable) [QF095] (Exhibit 31)
   8) Proof Test Report (as applicable)
   9) Witness of Hydro Test [QF033] (Exhibit 15)
   10) Witness of Vacuum Test (as applicable) [QF126] (Exhibit 19)
   11) Designated Inspector's Report [QF030] (Exhibit 34)
c. Form 1-3 Fabricator's Partial Data Report(s) [QF179] (Exhibit 21) (as applicable)
d. AE Test Report (as applicable)
e. The Nameplate to be applied to the vessel
f. Form 1-2 Fabricator's Data Report [QF026] (Exhibit 17)
g. Fabricator's Data Report [QF027] (Exhibit 18)

When paper records and documents are converted to a digital format (such as pdf), the individual making the conversion shall verify that the digital copy is an accurate reflection of the original in quality and content prior to the destruction of the paper version.

In addition to the Final Inspection Package, the vessel cutouts (each identified to its point of origin on the vessel) will be made available to the Inspector (I). At the conclusion of the fabrication/inspection process, cutouts shall be disposed of unless required by contract to be shipped to the customer.

The Inspector (I) will review the fabrication records and make a final inspection immediately following the Pressure Test (or the AE test when required) and will initial and date the RTP-1 Inspection Test Plan [QF206] (Exhibit 7) when satisfied it meets the requirements of the standard. (Refer to Procedures QP-1001 and QP-1002.) When the Inspector (I) has completed the final inspection, the Inspector (I) shall prepare a brief report summarizing the inspection activities and findings in the Designated Inspector's Report [QF030] (Exhibit 34) and signs the Inspector's Certification on the Fabricator's Data Report. The Inspector's Summary Report, Final Inspection Package and signed Form 1-2 Fabricator's Data Report shall be submitted to the CI.

It shall be the responsibility of the QAQC Manager to ensure that the tank is in suitable condition to permit reasonable and safe access for inspection and that the proper safety equipment is provided.

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9.8 Data Reports and Stamping

Upon completion of the Final Inspection per 9.7, the CI shall review the records and if found compliant, sign and date the Fabricator's Certificate of Compliance on the Form 1-2 Fabricator's Data Report and attach of the documents listed in 9.7, paragraph 2, (b)(1) through (b)(11) (Documents that do not state "As-built" status shall be considered "As-Built" if included with Form 1-2 Fabricator's Data Report). When the vessel does not require stamping with the ASME Single Certification Mark and RTP designator, a Certificate of Conformance [Exhibit 37] shall be provided to the customer in lieu of the Fabricator's Data Report.

All records are returned to Document Control. The Data Book shall be compiled for retention per Procedure QP-1031 as described in Section 13.

By signing the Fabricator's Data Report, the CI authorizes the application of the ASME Single Certification Mark and RTP designator and (as applicable) the National Board of Boiler and Pressure Vessel Inspectors' registration mark.

9.9 Nameplates

Shall:

a. Be paper or metallic.
b. Be produced and marked through casting, embossing, engraving, etching or any other process that will leave a legible and permanent image.
c. Be permanently attached through adhesive means or attachment by fasteners such as rivets.

The Inspector shall ensure the nameplate information meets the requirements of the UBRS and paragraph 8-850.

9.10 Nonconformities

All nonconformities found during fabrication are controlled as described in Section 11.

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10.0 RESIN CONTROL

10.1 Resin Control is described in this section to maintain traceability and assure the resin used in fabrication is of the same type used for the design basis laminate as specified in Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Exhibit 22).

10.2 Purchase Orders (Exhibit 3) shall require the Manufacturer to supply a Certificate of Analysis and to identify resin containers with the following information:

a. Manufacturer Name
b. Resin Identification
c. Batch Number
d. Date of Manufacture

Receiving inspection shall be in accordance with Section 8.2 of this manual.

10.3 The Resin Runner shall maintain the Resin Mixing Log [QF143] (Exhibit 38). The Resin Runner shall assign a sequential Alpha Code (example: AAA, AAB, AAC, etc.) for each container mixed. The mixing shall be by procedure PP-1002. Information from this log shall be used to identify the resin matrix on the smaller containers noting the resin type and Alpha Code.

10.4 Resin that exceeds twelve (12) months of manufacturing date or when conditions exist to call into question integrity of the resin shall be tested by the inspector (i) for the properties in ASME RTP-1, Appendix M-2 to ensure the resin is within the Manufacturer's specification. (Refer to Procedure QP-1013.) Smaller containers of resin shall be identified with the alpha code of the original container and the date drawn. Unused resin shall be returned to the original container. It shall be properly stored for future use. Rejected resin shall be disposed of according to government requirements.

The Laminator or Secondary Bonder at the workstation using the resin is responsible for using the properly mixed resin matrix in the proper amount as required by the Ply Count Form [QF015] (Exhibit 12). (Refer to procedure PP-1003.) The inspector (i) or Inspector (I) shall document verification of the acceptable resin on the RTP-1 Inspection Test Plan [QF206] (Exhibit 7).

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11.0 NONCONFORMITIES

11.1 Identification of Nonconformities

A nonconformity is any condition which does not meet all requirements of the RTP-1 standard, Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Exhibit 22), fabrication and control documents, or the requirements of this Quality Assurance Manual.

It is the duty of all employees to report nonconformities to the individual they report to who shall notify the inspector (i). Immediately after a nonconformity is found, the inspector (i) shall verify the condition and identify the nonconformity by attaching a "QC Rejected" sticker (Exhibit 6) and completing a Nonconformance Report (NCR) [QF018] (Exhibit 8). If practical, the nonconforming item shall be moved to a segregated "Hold" area.

Nonconforming conditions identified during the course of fabrication may be corrected as "in process" work and shall not require notifying the inspector (i) or the issuance of an NCR.

Strand Composites, LLC utilizes a manual system to issue NCRs. A NCR Log of NCRs issued is maintained within a spreadsheet [QF019] (Exhibit 9). (Refer to Procedure QP-1003.) The system is managed by the QA/QC Manager.

NCRs shall include (at a minimum):

The specific location on the vessel
A description of the nonconformity or imperfection
The method of correction in accordance with RTP-1 M-7
Date of correction
The identification of the Laminator or Secondary Bonder(s) who made the repair
Approval signatures for each correction

The NCR shall be forwarded to the Project Engineer for review, evaluation and determination of the disposition. The dispositions of work in progress shall be:

a. Use as is
b. Return for Repair
c. Scrap
d. Return to Vendor

Once the disposition has been determined, the Project Engineer shall prescribe an appropriate corrective action for "Return for Repair" classifications and approve then forward the NCR to the Inspector (I) for review and approval.

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Vessel repair classifications shall be:

a. Type I – Inner surface repairs
b. Type 2 – Interior layer repairs
c. Type 3 – Structural layer repairs
d. Type 4 – Dimensional Nonconformance Repairs
e. Type 5 – Under-cured Laminate Repairs
f. Type 6 – User's Dimensional Nonconformance Repairs

Unrepairable Nonconformities include:

a. Incorrect materials of laminate construction such as resins, curing agents, glass reinforcements, etc.
b. Incorrect structural laminate sequence
c. Incorrect laminate construction and thickness of the inner surface and interior layer
d. Incorrect wind angle for filament wound vessels
e. Out-of-roundness in excess of that permitted by ASME RTP-1 Fig. 4-1
f. Low Barcol hardness levels uncorrectable by post curing
g. Vessel dimensions such as diameter, height, head radius, etc. that are not in compliance with the basic vessel design calculations and the UBRS

When required by M-7, the Project Engineer shall obtain from a Qualified Designer the procedure and approval of the proposed repair issued as an attachment to the NCR form.

The final acceptance of the repair procedure and approval shall be from the Inspector (I).

All Non-Conformance activities shall be in accordance with RTP-1 Appendix M-7. Acceptance shall be in the form of the application of a signature and date to the NCR form or accompanying attachment.

11.2 Correction of Nonconformities

Corrective actions shall be carried out by qualified Laminators or Secondary Bonders using approved procedures conforming to RTP-1 M-7 approved by the Project Engineer, Inspector (I) and the Qualified Designer for structural repairs.

It is the responsibility of the Qualified Designer to determine if nonconformities require recertification of the design.

A "Scrap" or "Return to Vendor" disposition requires inspector (i) verification on the NCR that the item has been removed from the work area and is clearly identified through the application of a "QC Rejected" sticker (Exhibit 6) to prevent its inadvertent use prior to disposal. The inspector (i) shall initial next to the disposition designation on the NCR to verify.

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The Inspector (I) and inspector (i) will re-inspect the items dispositioned "Return for Repair" when the required corrective action has been completed. When satisfied that the item meets the requirements, the Inspector (I) will sign the NCR, remove the "Reject" sticker and permit the item to return to its proper sequence of fabrication.

The disposition of "Use as Is" shall be determined by the Project Engineer and Qualified Designer with notification to the vessel owner by the Project Engineer. Applicable design documents (i.e. drawings) shall be revised to indicate the nonconforming condition.

The CI shall verify that corrective actions taken are in accordance with this quality program. Verification shall be in the form of the application of a signature and date to the NCR form.

11.3 Records

Completed NCRs shall be maintained on the server at Local Storage (L): > NCRWIP until completion of the job at which time the closed-out NCRs will be scanned and inserted into the certified Design Report by Document Control. The pertinent information shall remain on the Nonconformance Log [QF019] (Exhibit 9).

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12.0 CALIBRATION OF MEASUREMENT AND TEST EQUIPMENT

12.1 General

All measurement and test equipment used for inspection, test or examination of RTP-1 activities shall be calibrated in accordance with this section. Instruments shall be stored in the QA Lab and checked out as needed.

12.2 Calibration Requirements

Each item of measurement, test and examination equipment which requires calibration shall be identified by marking with a unique Asset number. A spreadsheet listing measurement, test and examination equipment used in RTP-1 work shall be maintained in the calibration file by the QA/QC Manager.

The QA/QC Manager is responsible for maintaining all equipment in calibration. Instruments that do not possess a current calibration label shall not be used for official quality measurements.

Calibration is performed by a qualified testing laboratory (ISO 17025) having adequate standards traceable to National Standards. The Inspector (I) shall calibrate pressure gauges used for pressure testing by comparison to a calibrated Master Gauge. The calibrated shall be documented on the Pressure Gauges Calibration spreadsheet. Certification shall be obtained from the testing laboratory. Certification documentation shall be reviewed and accepted by the QA/QC Manager.

M&T equipment shall be calibrated at a frequency not to exceed fourteen (14) months and recorded on the Instrument Asset List. The list shall record the asset number, description, service status and calibration due date as a minimum.

Pressure gauges used for acceptance of hydrostatic and vacuum testing shall be calibrated against a dead weight tester or calibrated master gauge at least once every six (6) months or whenever there is reason to question their accuracy per Procedure QP-1025.

12.3 Records

A calibration certificate shall be maintained by the QA/QC Manager. The calibration certificate shall contain as a minimum:

a. Date of Calibration
b. Calibration Source
c. Instrument Identification
d. Standards used
e. Date for next calibration

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f. The procedure and revision utilized to perform the test. Instruments shall be identified by an Asset number or a calibration decal indicating a unique identification, or certificate number, date of calibration, person who performed calibration, and date of next calibration.

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13.0 RECORDS RETENTION

13.1 All records described in this Manual are collected upon completion during fabrication of a job by Document Control and maintained in the working QA job folder until the work is completed. Documents are reviewed by the QA/QC Manager for completeness and correctness prior to preparation of the Fabricator's Data Report and presentation to the Inspector (I) for review.

13.2 Copies of Form 1-2 Fabricator's Data Report [QF026] (Exhibit 17) or Form 1-3 Fabricator's Partial Data Report [QF179] (Exhibit 21) with attachments, after certification by the CI and the Inspector (I), are furnished to the user.

13.3 All copies of Forms 1-2 Fabricator's Data Report, attachments to Data Reports, Demonstration Laminate Certifications, Laminator and Secondary Bonder qualifications, Proof Tests and Design Basis Laminate testing are maintained in the storage files for at least five (5) years and are available for review.

13.4 The certified Design Report and associated design documents shall be retained in a manner acceptable to the user for at least five (5) years. A copy shall be provided to the user or the user's Agent.

13.5 The following documents shall be retained in storage files for at least five (5) years:

a. Records of Design Calculations
b. Design Report Documentation
c. Coupon tests results from which elastic and strength constants were obtained
d. Demonstration Laminate Report
e. Fabrication procedures
f. Quality Assurance records including test results
g. Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Exhibit 22)
h. Certified drawings
i. Nonconformance Report(s) (NCRs) [QF018] (Exhibit 8)

A Table of Contents shall be established for each job file and shall be maintained current by the QA/QC Manager.

The QA/QC Manager shall be responsible for maintaining the Demonstration Vessel documentation while Strand Composites LLC maintains an RTP Certificate of Authorization.

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14.0 NATIONAL BOARD REGISTRATION

14.1 When National Board registration is required, numbers shall be issued by the QA/QC Manager following the successful completion of the pressure/hydrostatic test and certification by the CI that all of the requirements of RTP-1 have been met. Numbers shall be issued without gaps beginning with one (1). The QA/QC Manager shall maintain a National Board Number Log which lists the date of issuance based upon the completion date of the vessel, date of submittal to National Board, item type and a manufacturer's serial number and shall submit the original Form 1-2 Fabricator's Data Report to the National Board within thirty (30) days after certification.

When National Board registration is not required, the QA/QC Manager shall log the vessel on the "RTP-1 Vessels Not Registered w/ National Board" log. Information required include as a minimum:

a. Date ASME stamp is applied
b. Strand Composites, LLC serial number
c. Customer ID
d. Tank size
e. Customer
f. Customer location
g. Service designation

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15.0 CERTIFIED INDIVIDUAL AUDIT

15.1 To assess the program described in this Quality Assurance Manual for adherence, and compliance with the requirements of RTP-1, an annual audit shall be performed once within a twelve (12) – but not to exceed fourteen (14) – month period as a minimum per Procedure QP-1026. The President shall approve each completed Certified Individual RTP-1 Internal Audit Plan & Report [QF020] (Exhibit 10).

15.2 The CI shall maintain the Quality Audit Log [QF021] (Exhibit 11) to control the status of audits. It shall be the CI's responsibility to schedule these audits.

15.3 The CI shall maintain the audit files and generate Nonconformance Reports (NCRs) [QF018] (Exhibit 8) for identified deficiencies. NCR numbers shall be identified on the RTP-1 Internal Audit Plan & Report.

15.4 All records generated from audits including the RTP-1 Internal Audit Plan & Report and Quality Audit Log shall be made available to the Inspector (I).

15.5 Copies of the complete RTP-1 Internal Audit Plan & Report are provided to the head of the affected department, and to the President for acceptance. Written Corrective Action Plans outlining steps taken to correct deficiencies shall be provided to the CI by the affected Department head(s) and a re-audit of the deficiencies shall be performed by the CI within thirty (30) days.

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16.0 FIELD FABRICATION, ASSEMBLY AND REPAIRS

16.1 Strand Composites, LLC retains overall responsibility for all field work, testing and inspection. The Inspector (I) shall be permitted free access, at all times, when work on the vessel is being performed. This includes fabrication, erection, testing or repair.

16.2 Laminate proof testing shall be required on all field fabricated vessels.

16.3 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.

16.4 When materials are received direct from the supplier, they shall be isolated from use until the receiving process has been completed by the inspector (i) in accordance with paragraph 8.2 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 quarantined 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.

16.5 Nonconforming conditions shall be reported via the Nonconformance Report (NCR) [QF018] (Exhibit 8) per Section 11.0 of this manual.

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17.0 EXHIBITS

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Exhibit 1: 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	
President (Acknowledgement not required)	
General Manager	
QA/QC Manager	
Inspector (I)	
inspector (i)	
Document Control	
Engineering Manager	
Qualified Designer #1	
Qualified Designer #2	
Qualified Designer #3	
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. 3

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Exhibit 2: Drawing Distribution List [QF002] (Side 1)

Drawing Distribution List

Job Number: _____

Eng./Drafter: _____

Revision	Date	Assembly	Assembly Cutroom	Layout	Nozzle QA	Quality Assurance	Shipping	Winding	Field		
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 t Director of Quality.
Missing or retained drawings **MUST** be documented on the back side of this forn

QF002, Rev. 13

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Exhibit 2: Drawing Distribution List [QF002] (Side 2)

Missing or Retained Document Log

Date	Rev.	Assigned To:	Missing	Retained		Initials

QF002, Rev. 13

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Exhibit 3: Purchase Order

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. 2

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Exhibit 4(a): Form M1A-1 Veil and Mat Reinforcement Log Sheet [QF004]

Form M1A-1 ... lorcement Log Sheet

Fabricator's name _____ Mat manufacturer _____

Address _____ Mat nomenclature _____

_____ Mat treatment (if given) [Note (1)] _____

_____ QC file no. _____ Mat weight [Note (2)] _____

1	2	3	4		5	6	7		8	
Roll No.	Reinforcement Production Date (If Given)	Lot No. [Note (1)]	Packaging Inspection		Width	Weight of ft^2 (m^2) Sample	Property Inspection (Cols. 5 and 6)		Visual Inspection	
			By	Date			By	Date	By	Date
1										
2										
3										
4										
5										
6										
7										
8										

Comments on visual and packaging inspection (indicate which roll):

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NOTES:
(1) Lot, batch, product code, or other label identification.
(2) Manufacturer's label weight.

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Exhibit 4(b): Form M1B-1 Roving Reinforcement Log Sheet [QF005]

Form M1B-1 Roving Reinforcement Log Sheet

Fabricator's name _____ Roving manufacturer _____

Address _____ Roving nomenclature _____

_____ Roving yield _____

_____ QC file no. _____

1	2	3	4		5	6		7	
Ball No.	Reinforcement Production Date (If Given)	Lot No. [Note (1)]	Packaging Inspection		Yield	Property Inspection (Column 5)		Visual Inspection	
			By	Date		By	Date	By	Date
1									
2									
3									
4									
5									
6									
7									
8									

Comments on visual and packaging inspection (indicate which roll):

_____

_____

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NOTE:
(1) Lot, batch, product code, or other label identification.

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Exhibit 4(c): Form M1C-1 Fabric Reinforcement Log Sheet [QF006]

Form M1C-1 Fabric Reinforcement Log Sheet

Fabricator's name _____ Fabric manufacturer _____

Address _____ Fabric nomenclature _____

_____ Fabric weight _____

_____ QC file no. _____ Fabric construction _____

1	2	3	4		5	6	7	8		9	
Roll No.	Reinforcement Production Date (if Given)	Lot No. [Note (1)]	Packaging Inspection		Width	Weight	Construction	Property Inspection (Cols. 5, 6, and 7)		Visual Inspection	
			By	Date				By	Date	By	Date
1											
2											
3											
4											
5											
6											
7											
8											

Comments on visual and packaging inspection (indicate which roll):

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NOTE:
(1) Lot, batch, product code, or other label identification.

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Exhibit 4(d): Form M1D-1 Milled Fiber Reinforcement Log Sheet [QF007]

Form M1D-1 Milled Fiber Reinforcement Log Sheet

Fabricator's name _____ Fiber manufacturer _____

Address _____ Fiber nomenclature _____

_____ Fiber length _____

_____ QC file no. _____

1 Package No.	2 Reinforcement Production Date (If Given)	3 Lot No. [Note (1)]	4 Packaging Inspection By	4 Packaging Inspection Date	5 Visual Inspection By	5 Visual Inspection Date
1						
2						
3						
4						
5						
6						
7						
8						

Comments on visual and packaging inspection (indicate which package):

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NOTE:
(1) Lot, batch, product code, or other label identification.

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Exhibit 4(e): Form M2E-1 Resin Log Sheet [QF008]

Form M2E-1 Resin Log Sheet

Manufacturer _____ QC Contact _____

Resin _____ Address _____

Spindle no. _____ Telephone no. _____

Emergency telephone no. _____

Date	Lot No.	Gel Time @ 77°F (25°C) (Minutes)	Viscosity @ 77°F (25°C) (cps)		Specific Gravity @ 77°F (25°C)	Visual Examination
			@ 60 rpm	@ 6 rpm		
Manufacturer's Specification:						

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Exhibit 4(f): Form M2E-2 Curing Agent Log Sheet [QF009]

Form M2E-2 Curing Agents Log Sheet

Manufacturer _____ QC contact _____

Curing agent _____ Address _____

Standard resin _____ Telephone no. _____

Emergency telephone no. _____

Date	Lot No.	Gel Time @ 77°F (25°C) (Minutes)	Visual Examination

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Exhibit 4(g): Form M2F-1 Common Additives Log Sheet [QF010]

Form M2F-1 Common Additives Log Sheet

	Raw Materials Inspection	Inspector	Date
Manufacturer	As Received		
	In Use Quality Problems		
Product Name			
Lot Number			
Additive Purpose			
Manufacturer	As Received		
	In Use Quality Problems		
Product Name			
Lot Number			
Additive Purpose			
Manufacturer	As Received		
	In Use Quality Problems		
Product Name			
Lot Number			
Additive Purpose			
Manufacturer	As Received		
	In Use Quality Problems		
Product Name			
Lot Number			
Additive Purpose			

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Exhibit 4(h): Form M13-1 Balsa Wood Core Inspection Sheet [QF173]

Form M13-1 Balsa Wood Core Inspection Sheet

Fabricator's name _____ Balsa wood manufacturer _____

Address _____ Balsa wood core type _____

_____ Balsa wood core nomenclature _____

_____ QC file no. _____

☐ Receiving inspection

☐ Point of use inspection

1	2	3	4		5		6		7		8
Package No.	Balsa Wood Production Date (if Given)	Lot. No. [Note (1)]	Packaging Inspection		Moisture Content Inspection		Visual Inspection		Laminate Adhesion Check		Comments
			By	Date	By	Date	By	Date	By	Date	
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											

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NOTE: (1) Lot, pallet, product code, or other label identification.

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Exhibit 5: Acceptance Stickers









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Exhibit 6: Hold / Reject Stickers





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Exhibit 7: RTP-1 Inspection Test Plan [QF206] Pg. 1

RTP-1 Inspection Test Plan

Job: _____

Inspection hold points shall be designated when "H" is present in the line item below.

"I"		"P"		"CI"		"H"	Item
Date	Initials	Date	Initials	Date	Initials		
NA	NA	NA	NA			H	1-410: Inspector (I) qualifications have been verified and accepted.
				NA	NA	H	1-430: Design documents have been reviewed and the UBRS is complete w/ signatures and the calculations and fabrication drawing has been certified by a Qualified Designer.
				NA	NA	H	6-600: The materials used in the fabrication of this vessel comply with the requirements of RTP-1 and the UBRS.
				NA	NA	H	The resins used in the fabrication of this vessel comply with the requirements of RTP-1 and the UBRS
				NA	NA	H	M5-300(e) & M5-450(g): Laminator and Secondary Bonder qualifications were found to be current and satisfactory.
				NA	NA	H	6-300(b): All subcontracted parts including lifting trunnions, tie-downs, ladders, handrails, etc. have been inspected and are documented on the Accessory & Attachment Inspection form (QF207).
				NA	NA	H	6-920: Thicknesses and Dimensions have been verified and results are documented on the following forms: Nozzle Elevation Verifications (QF162), Nozzle Dimensions (QF093) & Overall Dimensions (QF205).
				NA	NA	H	6-910(b)(d): Resin cure has been verified and the results are documented on the Barcol Hardness Report (QF028).
				NA	NA		6-700: All required inspections and measurements have been completed and verified to meet the requirements of the UBRS and RTP-1.
				NA	NA		6-930: Reinforcement sequences of Heads and Shell mods have been verified by visual inspection or burned-out and documented on Ignition Loss Report(s) (QF095). All cutouts have been inspected to RTP-1 Table 6-1.
				NA	NA	H	6-930: The Proof Test has been verified to have been reviewed by a Qualified Designer as evidenced by the application of the stamp to the Fabricator's Design Report (QF121) when applicable.
				NA	NA	H	M7-210(c) & (f): Repair procedures were reviewed and repairs have been verified to be compliant to RTP-1. Both are documented on the Nonconformance Report (QF018) – when applicable.

QF206, Rev. 3

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Exhibit 7: RTP-1 Inspection Test Plan [QF206] Pg. 2

RTP-1 Inspection Test Plan

			NA	NA	H	The hydrotest and/or vacuum test was witnessed and documented on the Witness of Hydrotest (QF033) and/or Witness of Vacuum Test (QF126)
			NA	NA	H	M8-200(c): The acoustic emission test has been witnessed and the report has been verified – when applicable.
			NA	NA	H	6-9400: The interior and exterior were inspected and determined to meet the inspection level listed on Table 6-1 as noted on the UBRS.
			NA	NA		6-900(a): As part of the Final Inspection Process, all documentation including design, testing/measurement, etc. have been reviewed.
			NA	NA	H	6-500: The information on the Fabricator's Design Report (QF121) has been verified to conform to the latest revision of the UBRS and drawing and has been certified by a Qualified Designer.
			NA	NA	H	1 520(b) & 6 300(j): The Fabricator's Data Report (or Partial Data Report) has been signed.
			NA	NA		7-500(c): The record keeping system was verified to meet the requirements of RTP-1.
			NA	NA		6 000(c): A copy of this document has been presented to the CI.

1. This document fulfils the RTP-1 requirements for 6-300(a); 8-900(d)
2. When the inspector (I) and the inspector (I) are the same individual, a "X" shall be placed in the Date and Initials boxes for that line item.
3. N/A shall be entered in the Date and Initials boxes in any line item that does not apply.

By application of signature and date below, the Inspector certifies the information contained within this report as true and accurate to the best of ability.

Inspector _____ Date _____

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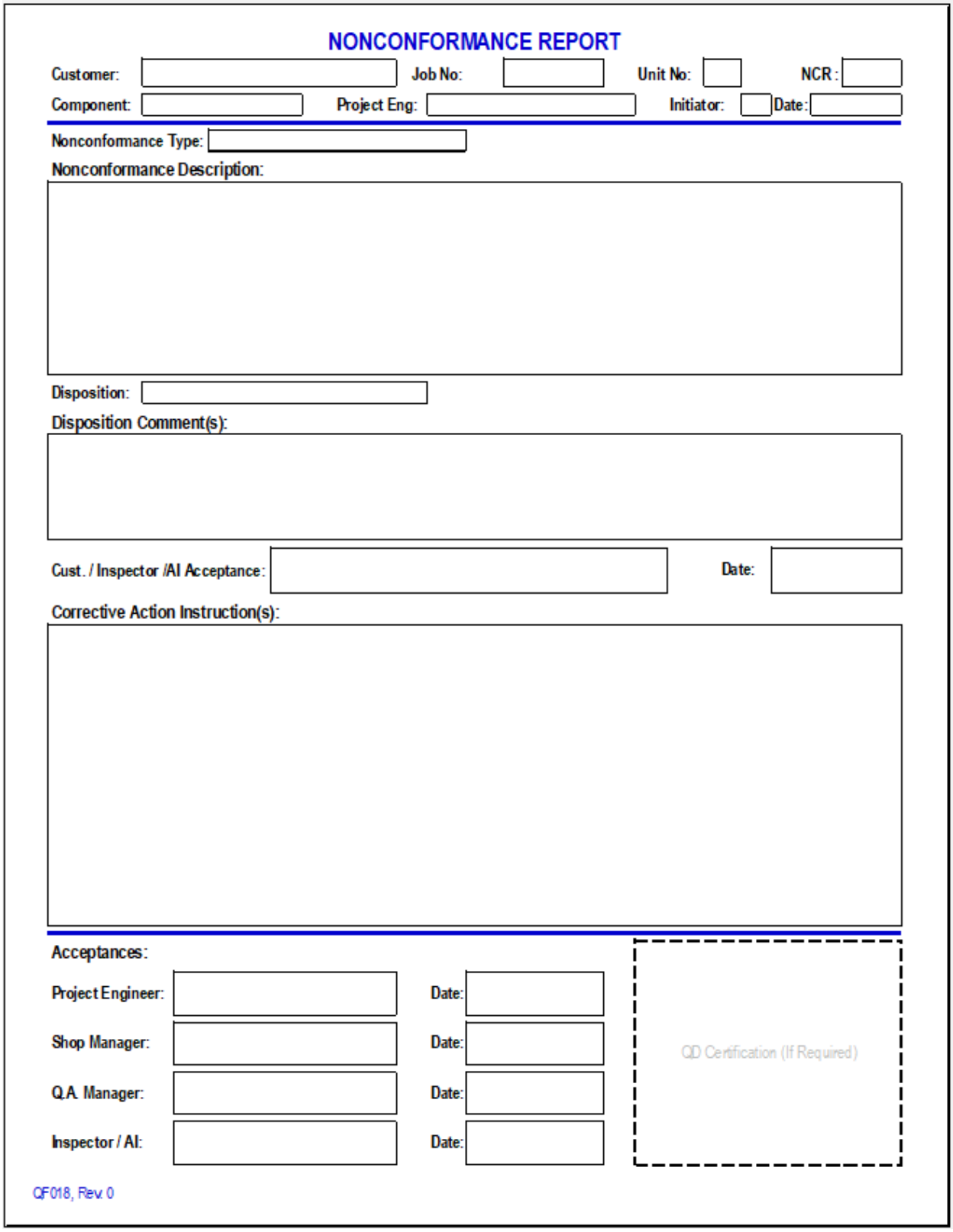
Exhibit 8: Nonconformance Report (NCR) [QF018] – Pg. 1



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:

QD Certification (If Required)

QF018, Rev. 0

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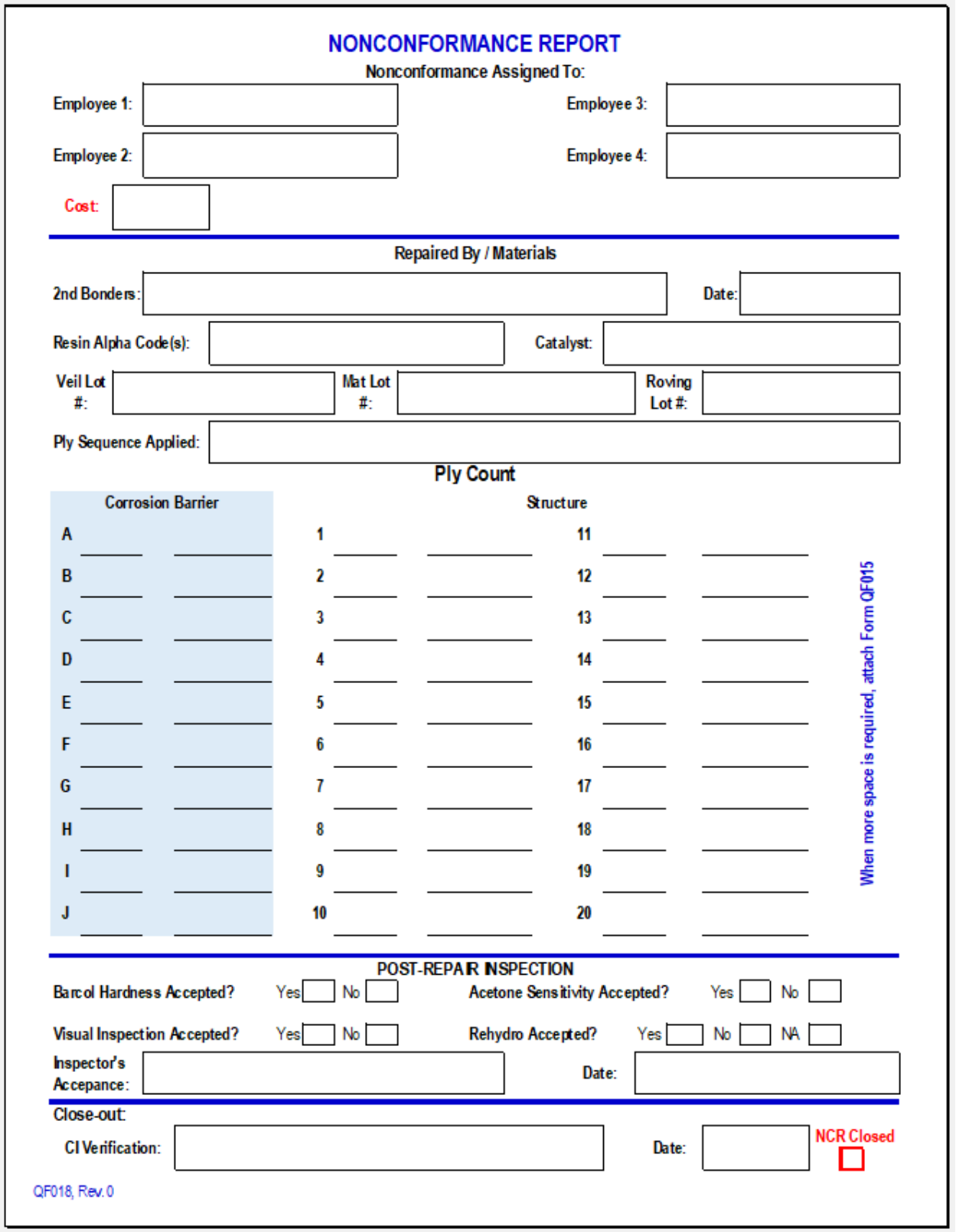
Exhibit 8: Nonconformance Report (NCR) [QF018] – Pg. 2



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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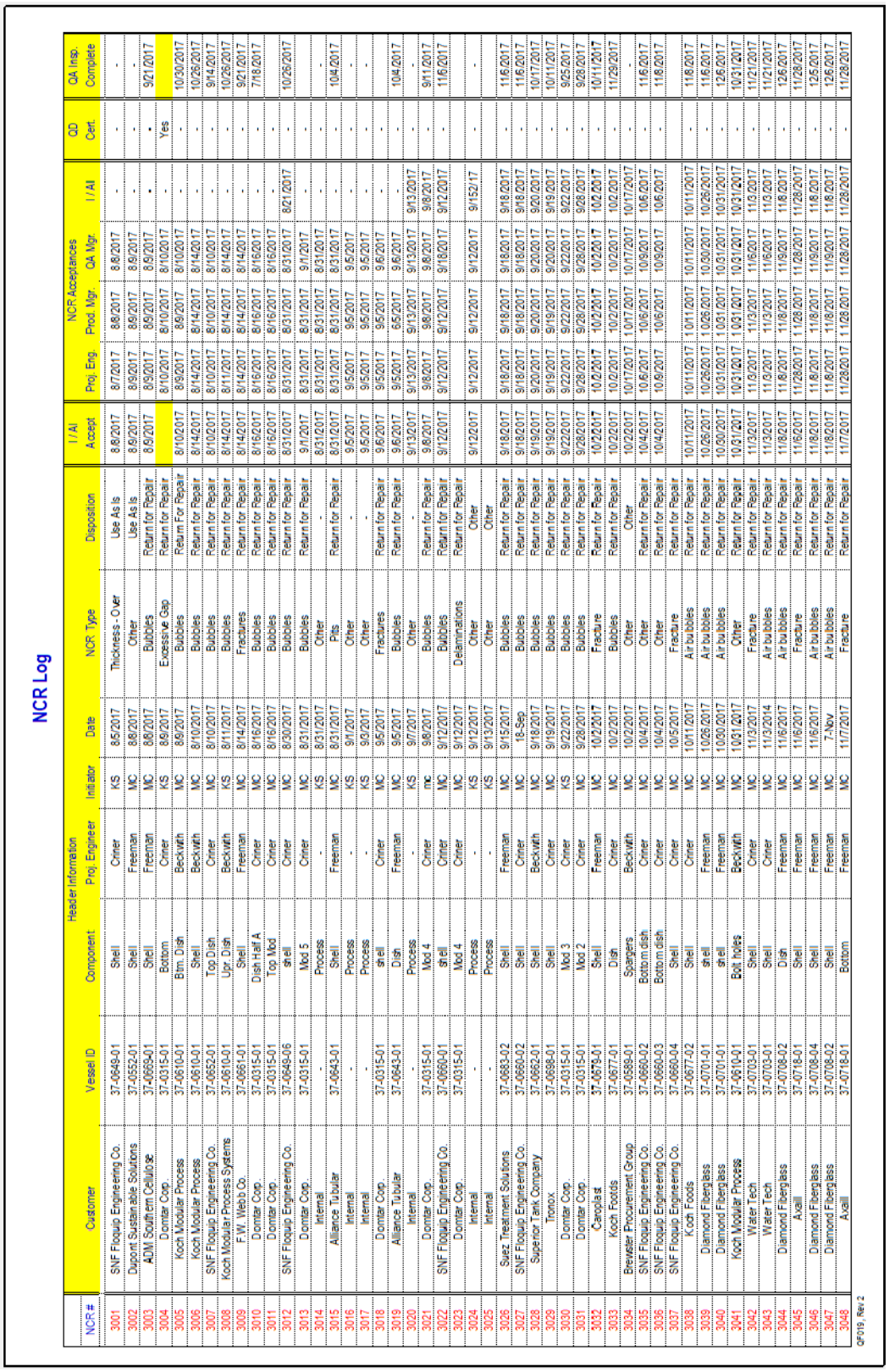
Exhibit 9: NCR Log



NCR Log

NCR #	Customer	Vessel ID	Header Information Component	Proj. Engineer	Initiator	Date	NCR Type	Disposition	I / AI Accept	NCR Acceptances Proj. Eng.	Prod. Mgr.	QA Mgr.	I / AI	QD Cert.	QA Insp. Complete
3001	SNF Floquip Engineering Co.	37-0649-01	Shell	Criner	KS	8/5/2017	Thickness - Over	Use As Is	8/8/2017	8/7/2017	8/8/2017	8/8/2017	-	-	-
3002	Dupont Sustainable Solutions	37-0552-01	Shell	Freeman	MC	8/8/2017	Other	Use As Is	8/9/2017	8/9/2017	8/9/2017	8/9/2017	-	-	-
3003	ADM Southern Cellulose	37-0669-01	Shell	Freeman	MC	8/8/2017	Bubbles	Return for Repair	8/9/2017	8/9/2017	8/9/2017	8/9/2017	-	-	9/21/2017
3004	Domtar Corp.	37-0315-01	Bottom	Criner	KS	8/9/2017	Excessive Gap	Return for Repair		8/10/2017	8/10/2017	8/10/2017	-	Yes	
3005	Koch Modular Process	37-0610-01	Btm. Dish	Beckwith	MC	8/9/2017	Bubbles	Return For Repair	8/10/2017	8/9/2017	8/9/2017	8/10/2017	-	-	10/30/2017
3006	Koch Modular Process	37-0610-01	Shell	Beckwith	MC	8/10/2017	Bubbles	Return for Repair	8/14/2017	8/14/2017	8/14/2017	8/14/2017	-	-	10/26/2017
3007	SNF Floquip Engineering Co.	37-0652-01	Top Dish	Criner	MC	8/10/2017	Bubbles	Return for Repair	8/10/2017	8/10/2017	8/10/2017	8/10/2017	-	-	9/14/2017
3008	Koch Modular Process Systems	37-0610-01	Upr. Dish	Beckwith	KS	8/11/2017	Bubbles	Return for Repair	8/14/2017	8/11/2017	8/14/2017	8/14/2017	-	-	10/26/2017
3009	F.W. Webb Co.	37-0661-01	Shell	Freeman	MC	8/14/2017	Fractures	Return for Repair	8/14/2017	8/14/2017	8/14/2017	8/14/2017	-	-	9/21/2017
3010	Domtar Corp.	37-0315-01	Dish half A	Criner	MC	8/16/2017	Bubbles	Return for Repair	8/16/2017	8/16/2017	8/16/2017	8/16/2017	-	-	7/18/2017
3011	Domtar Corp.	37-0315-01	Top Mod	Criner	MC	8/16/2017	Bubbles	Return for Repair	8/16/2017	8/16/2017	8/16/2017	8/16/2017	-	-	
3012	SNF Floquip Engineering Co.	37-0649-06	shell	Criner	MC	8/30/2017	Bubbles	Return for Repair	8/31/2017	8/31/2017	8/31/2017	8/31/2017	8/21/2017	-	10/26/2017
3013	Domtar Corp.	37-0315-01	Mod 5	Criner	MC	8/31/2017	Bubbles	Return for Repair	9/1/2017	8/31/2017	8/31/2017	9/1/2017	-	-	
3014	Internal	-	Process	-	KS	8/31/2017	Other	-	8/31/2017	8/31/2017	8/31/2017	8/31/2017	-	-	-
3015	Alliance Tubular	37-0643-01	Shell	Freeman	MC	8/31/2017	Pits	Return for Repair	8/31/2017	8/31/2017	8/31/2017	8/31/2017	-	-	10/4/2017
3016	Internal	-	Process	-	KS	9/1/2017	Other	-	9/5/2017	9/5/2017	9/5/2017	9/5/2017	-	-	-
3017	Internal	-	Process	-	KS	9/3/2017	Other	-	9/5/2017	9/5/2017	9/5/2017	9/5/2017	-	-	-
3018	Domtar Corp.	37-0315-01	shell	Criner	MC	9/5/2017	Fractures	Return for Repair	9/6/2017	9/5/2017	9/5/2017	9/6/2017	-	-	-
3019	Alliance Tubular	37-0643-01	Dish	Freeman	MC	9/5/2017	Bubbles	Return for Repair	9/6/2017	9/5/2017	9/5/2017	9/6/2017	-	-	10/4/2017
3020	Internal	-	Process	-	KS	9/7/2017	Other	-	9/13/2017	9/13/2017	9/13/2017	9/13/2017	9/13/2017	-	-
3021	Domtar Corp.	37-0315-01	Mod 4	Criner	mc	9/8/2017	Bubbles	Return for Repair	9/8/2017	9/8/2017	9/8/2017	9/8/2017	9/8/2017	-	9/11/2017
3022	SNF Floquip Engineering Co.	37-0660-01	shell	Criner	MC	9/12/2017	Bubbles	Return for Repair	9/12/2017	9/12/2017	9/12/2017	9/18/2017	9/12/2017	-	11/6/2017
3023	Domtar Corp.	37-0315-01	Mod 4	Criner	MC	9/12/2017	Delaminations	Return for Repair							
3024	Internal	-	Process	-	KS	9/12/2017	Other	Other	9/12/2017	9/12/2017	9/12/2017	9/12/2017	9/15/17	-	-
3025	Internal	-	Process	-	KS	9/13/2017	Other	Other							
3026	Suez Treatment Solutions	37-0683-02	Shell	Freeman	MC	9/15/2017	Bubbles	Return for Repair	9/18/2017	9/18/2017	9/18/2017	9/18/2017	9/18/2017	-	11/6/2017
3027	SNF Floquip Engineering Co.	37-0660-02	Shell	Criner	MC	18-Sep	Bubbles	Return for Repair	9/18/2017	9/18/2017	9/18/2017	9/18/2017	9/18/2017	-	11/6/2017
3028	Superior Tank Company	37-0662-01	Shell	Beckwith	MC	9/18/2017	Bubbles	Return for Repair	9/19/2017	9/20/2017	9/20/2017	9/20/2017	9/20/2017	-	10/17/2017
3029	Tronox	37-0698-01	Shell	Criner	MC	9/19/2017	Bubbles	Return for Repair	9/19/2017	9/19/2017	9/19/2017	9/20/2017	9/19/2017	-	10/11/2017
3030	Domtar Corp.	37-0315-01	Mod 3	Criner	KS	9/22/2017	Bubbles	Return for Repair	9/22/2017	9/22/2017	9/22/2017	9/22/2017	9/22/2017	-	9/25/2017
3031	Domtar Corp.	37-0315-01	Mod 2	Criner	MC	9/28/2017	Bubbles	Return for Repair	9/28/2017	9/28/2017	9/28/2017	9/28/2017	9/28/2017	-	9/28/2017
3032	Cargolas	37-0678-01	Shell	Freeman	MC	10/2/2017	Fracture	Return for Repair	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	-	10/11/2017
3033	Koch Footos	37-0677-01	Dish	Criner	MC	10/2/2017	Bubbles	Return for Repair	10/2/2017	10/2/2017	10/2/2017	10/2/2017	10/2/2017	-	11/29/2017
3034	Brewster Procurement Group	37-0589-01	Spargers	Beckwith	MC	10/2/2017	Other	Other	10/2/2017	10/17/2017	10/17/2017	10/17/2017	10/17/2017	-	-
3035	SNF Floquip Engineering Co.	37-0660-02	Bottom dish	Criner	MC	10/4/2017	Other	Return for Repair	10/4/2017	10/6/2017	10/6/2017	10/9/2017	10/6/2017	-	11/6/2017
3036	SNF Floquip Engineering Co.	37-0660-03	Bottom dish	Criner	MC	10/4/2017	Other	Return for Repair	10/4/2017	10/9/2017	10/9/2017	10/9/2017	10/6/2017	-	11/6/2017
3037	SNF Floquip Engineering Co.	37-0660-04	Shell	Criner	MC	10/5/2017	Fracture	Return for Repair							
3038	Koch Foods	37-0677-02	Shell	Criner	MC	10/11/2017	Air bubbles	Return for Repair	10/11/2017	10/11/2017	10/11/2017	10/11/2017	10/11/2017	-	11/6/2017
3039	Diamond Fiberglass	37-0701-01	shell	Freeman	MC	10/26/2017	Air bubbles	Return for Repair	10/26/2017	10/26/2017	10/26/2017	10/30/2017	10/26/2017	-	11/6/2017
3040	Diamond Fiberglass	37-0701-01	shell	Freeman	MC	10/30/2017	Air bubbles	Return for Repair	10/30/2017	10/31/2017	10/31/2017	10/31/2017	10/31/2017	-	12/6/2017
3041	Koch Modular Process	37-0610-01	Bolt holes	Beckwith	MC	10/31/2017	Other	Return for Repair	10/31/2017	10/31/2017	11/01/2017	10/31/2017	10/31/2017	-	10/31/2017
3042	Water Tech	37-0703-01	Shell	Criner	MC	11/3/2017	Fracture	Return for Repair	11/3/2017	11/3/2017	11/3/2017	11/6/2017	11/3/2017	-	11/21/2017
3043	Water Tech	37-0703-01	Shell	Criner	MC	11/3/2014	Air bubbles	Return for Repair	11/3/2017	11/3/2017	11/3/2017	11/6/2017	11/3/2017	-	11/21/2017
3044	Diamond Fiberglass	37-0708-02	Dish	Freeman	MC	11/6/2017	Air bubbles	Return for Repair	11/8/2017	11/8/2017	11/8/2017	11/9/2017	11/8/2017	-	12/6/2017
3045	Axiall	37-0718-01	Shell	Freeman	MC	11/6/2017	Fracture	Return for Repair	11/6/2017	11/28/2017	11/28/2017	11/28/2017	11/28/2017	-	11/28/2017
3046	Diamond Fiberglass	37-0708-04	Shell	Freeman	MC	11/6/2017	Air bubbles	Return for Repair	11/8/2017	11/8/2017	11/8/2017	11/9/2017	11/8/2017	-	12/5/2017
3047	Diamond Fiberglass	37-0708-02	Shell	Freeman	MC	7-Nov	Air bubbles	Return for Repair	11/8/2017	11/8/2017	11/8/2017	11/9/2017	11/8/2017	-	12/6/2017
3048	Axiall	37-0718-01	Bottom	Freeman	MC	11/7/2017	Fracture	Return for Repair	11/7/2017	11/28/2017	11/28/2017	11/28/2017	11/28/2017	-	11/28/2017

QF019, Rev 2

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Exhibit 10: Certified Individual RTP-1 Int. Audit Plan & Report [QF020] (Pg. 1)

Certified Inspector RTP-1 Internal Audit Plan & Report

No: _____

Job Audited: _____ Audit Completion Date: _____

Manual Section	Requirement	Compliant?	Responsible Party	Comments
Cover	Is the current ASME accepted revision is posted in the Public folder?	Yes No	QA Manager	
5.0	Is the Organization Chart in the manual is current?	Yes No	QA Manage	
6.7	Are the Demonstration Laminates current?	Yes No	QA Manager	
7.2	Has the UBRS been completed properly. Correct signatures?	Yes No	Project Engineer	
7.2	Are the Design Basis Laminates on file?	Yes No	Project Engineer	
7.2	Have the calculations been prepared and stamped by an Qualified Desiener?	Yes No	Project Engineer	
7.2	Has the drawing (Rev. 0 or higher) been stamped by an RPE? Are all necessary approvals noted?	Yes No	Project Engineer	
7.6	Does the drawing include: a) Date b) Max. allowable working pressure @ max. temp. c) Min. allowable working pressure @ max. temp. d) Test pressure e) BOM f) Test & inspection requirements g) Nameplate info	Yes No	Project Engineer	
7.7	Did the current revision of the drawing capture all changes noted on Change Notices issue to the previous revision?	Yes No	Project Engineer	
7.8	Were Change Notices issued for structural changes certified by an Qualified Designer?	Yes No	Project Engineer	

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Exhibit 10: Certified Individual RTP-1 Int. Audit Plan & Report [QF020] (Pg. 2)

Certified Inspector RTP-1 Internal Audit Plan & Report

Manual Section	Requirement	Compliant?	Responsible Party	Comments
8.2	Are the Material Receiving Logs being maintained?	Yes No	Purchasing Manager	
8.2	Are material C of Cs and C of As being maintained? Is the information easily retrievable?	Yes No	Purchasing Manager	
8.2	Is the area where material is stored clean, orderly and free of damaged goods?	Yes No	Purchasing Manager	
8.2	Are rejected materials properly identified and separated from general use goods?	Yes No	Purchasing Manager	
9.1	Are thicknesses being taken and documented correctly?	Yes No	QA Manager	
9.1	Are Barcols being taken and documented correctly?	Yes No	QA manager	
9.1	Are small components being inspected and documented correctly?	Yes No	QA Manager	
9.1	Are the Nozzle Elevations being documented correctly?	Yes No	Layout Super/ QA Manager	
9.1	Is the Traveler acknowledgements current?	Yes No	QA Manager	
9.2	Are Ply Count Sheets being completely properly?	Yes No	Shop Manager	
9.2	Is the Proof Test available and all requirements met? Are the lab's certifications current?	Yes No	QA Manager	
9.3	Are the Quality Personnel Qualification Records up to date? Eye exams?	Yes No	QA Manager	
9.5	Are the AE provider's records current?	Yes No	QA Manager	
9.8	Is the data book complete? Are all required documents present? Is the Data Report accurate?	Yes No	QA Manager	
10.2	Are the C of As on file for the utilized resin(s)?	Yes No	Purchasing Manager	
10.3	Is the resin(s) listed on the Resin Log Sheet (QF008)?	Yes No	Inventory Control	

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Exhibit 10: Certified Individual RTP-1 Int. Audit Plan & Report [QF020] (Pg. 3)

Certified Inspector RTP-1 Internal Audit Plan & Report

Manual Section	Requirement	Compliant?	Responsible Party	Comments
11.1	Do NCRs include: Location on vessel; Description of defect; RTP-1 method of repair; ID of Laminator or Border performing the repair?	Yes No	QA Manager	NCR #_____ VCR #_____ NCR #_____
11.1	Have all the necessary approvals been obtained? Has a Qualified Designer certification been obtained (as needed)?	Yes No	QA Manager	
12.3	Are the calibration records up-to-date?	Yes No	QA Manager	Asset #_____ Asset #_____ Asset #_____
13.6	Have Fabricator's Data Raports been submitted to National Board within 30 days of completion?	Yes No	QA Manager	
14.0	Are Quality Personnel Qualification records complete and updated?	Yes No	QA Manager	

Action Items: *Action items listed below must be addressed by the assigned individual(s) within 30 days.*

NCR #	Responsible Individual(s)	Required Action	Closed By/Date

Audit Closed:

_____ Certified Individual _____ Date _____ VP/Business Unit Manager _____ Date

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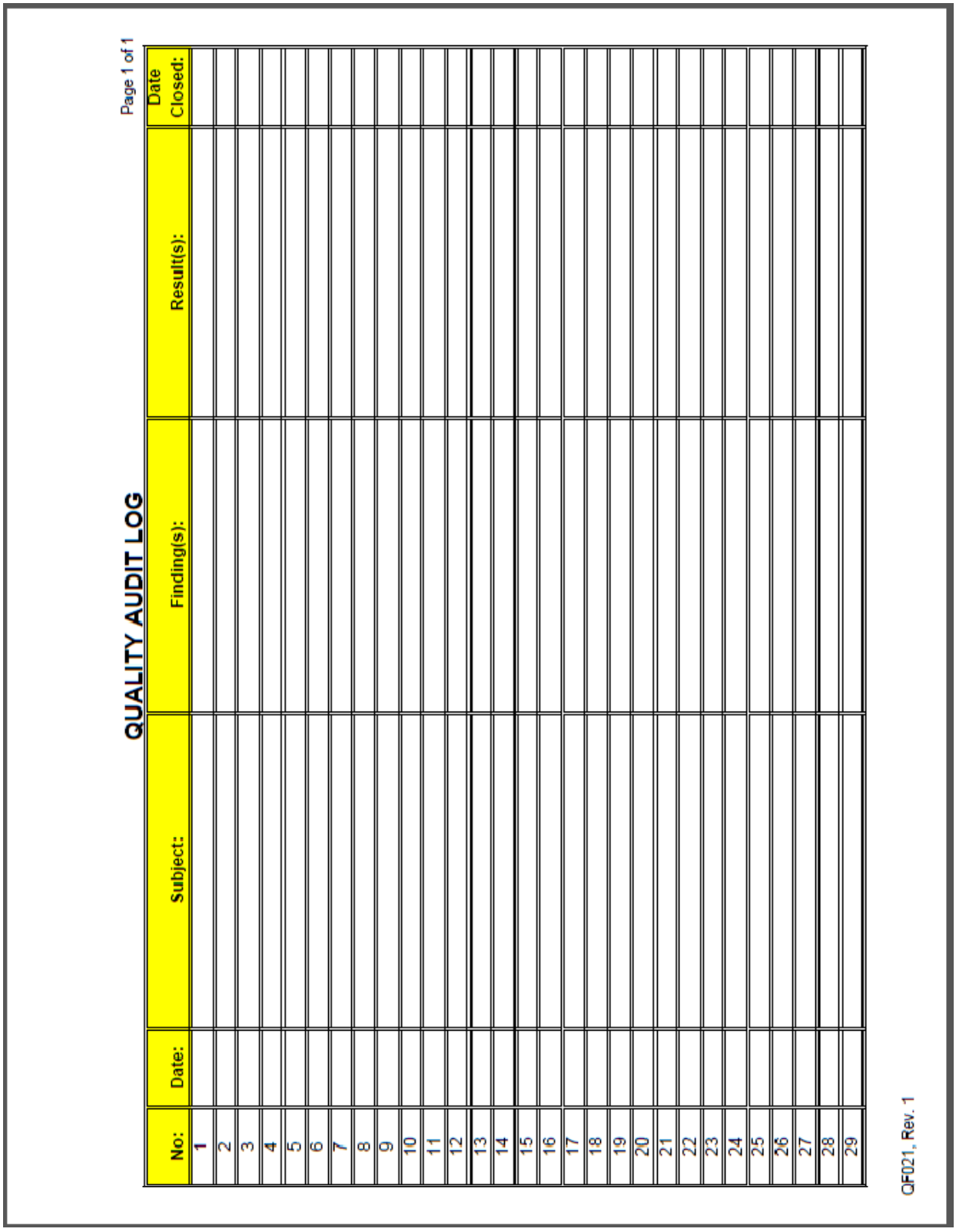
Exhibit 11: Quality Audit Log [QF021]



Page 1 of 1

QUALITY AUDIT LOG

No:	Date:	Subject:	Finding(s):	Result(s):	Date Closed:
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
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29					

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Exhibit 12: Ply Count Form [QF015] (Side 1)

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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Exhibit 12: Ply Count Form [QF015] (Side 2)

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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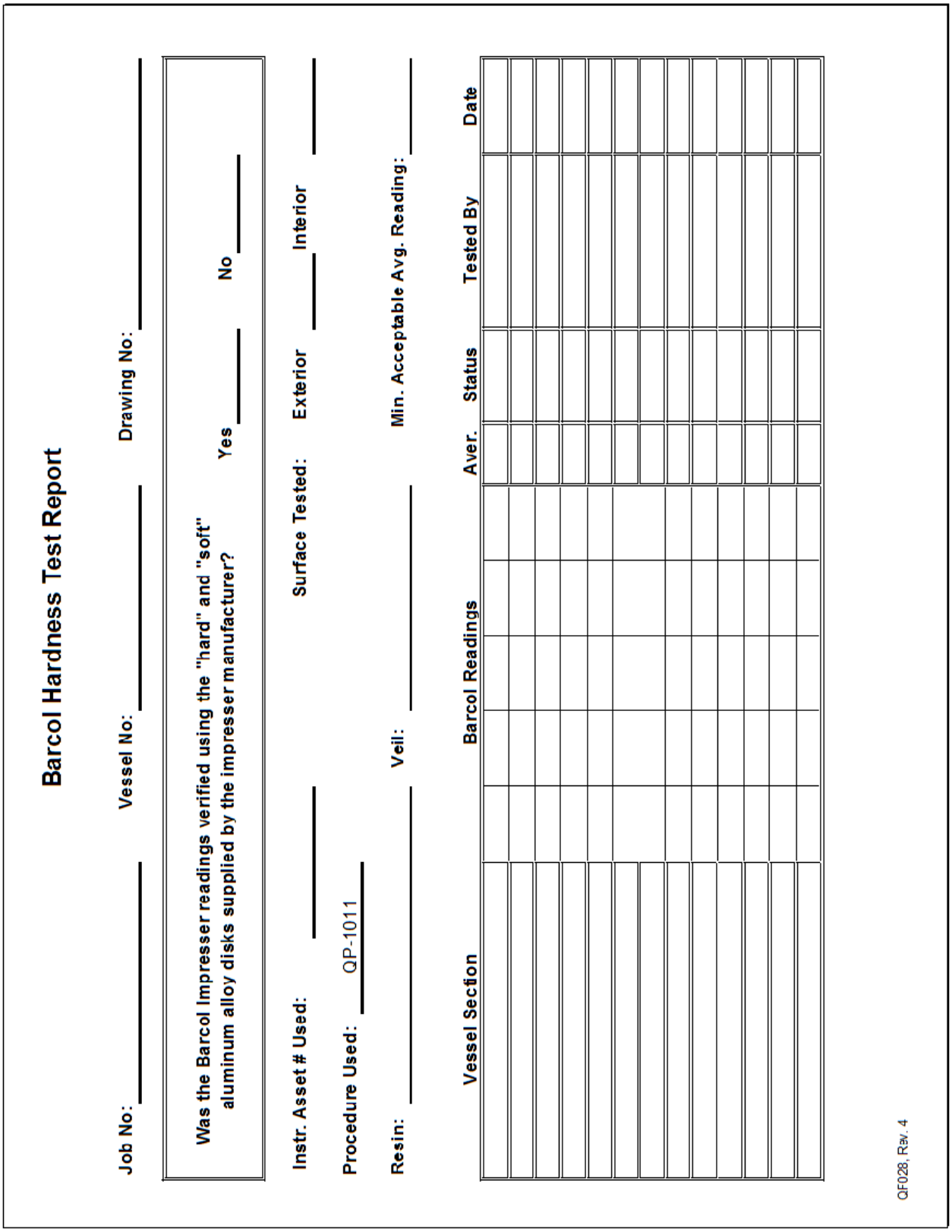
Exhibit 13: Barcol Hardness Test Report [QF028]



Barcol Hardness Test Report

Job No: _____ Vessel No: _____ Drawing No: _____

Was the Barcol Impresser readings verified using the "hard" and "soft" aluminum alloy disks supplied by the impresser manufacturer? Yes _____ No _____

Instr. Asset # Used: _____ Surface Tested: Exterior _____ Interior _____

Procedure Used: QP-1011

Resin: _____ Veil: _____ Min. Acceptable Avg. Reading: _____

Vessel Section	Barcol Readings												Aver.	Status	Tested By	Date

QF028, Rev. 4

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Exhibit 14: Table 7-2 Dimensional Requirements Verification [QF243]

Table 7-2 Dimensional Requirements Verification

This sheet shall be completed for each flat panel Demonstration and Laminator Qualification Laminate panel fabricated.

ID: _____

Squareness: Laminate shall be 24" (± 1/16") square within ± 0.3° on each side.

	Measure	Square	
Side 1	_____	_____	
Side 2	_____	_____	
Side 3	_____	_____	
Side 4	_____	_____	In tolerance? _____

Flatness: The peak deviation from flatness of the inner surface shall not exceed 3/16".

Maximum gap measurement: _____ In tolerance? _____

Thickness: Average spot thickness shall be determined by RTP-1, para. 6-920 and shall be with tolerances established in Subpart 2C (Toler. -0 / +135%)

Required Thickness: _____

Area 1	_____	
Area 2	_____	
Area 3	_____	
Area 4	_____	
Area 5	_____	
Area 6	_____	
Average	#DIV/0!	
% of Spec	#DIV/0!	In tolerance? _____

Cut Edges: Shall be smooth and not jagged w/ no indention or chip > 1/32".

In tolerance? _____

Barcol Hardness: Shall be minimum of 90% of manufacturer's recommendation.

Acceptable Barcol: _____

Spot 1	_____	Average	#DIV/0!
Spot 2	_____		
Spot 3	_____	% of Spec	#DIV/0!
Spot 4	_____		
Spot 5	_____	In tolerance?	_____

Completed by: _____ Date: _____

QF243, Rev 0

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Exhibit 15: Witness of Hydro Test [QF033]

WITNESS OF HYDRO TEST

On _____ the following parties certify they have witnessed a hydro test of the FRP vessel for Job _____ Customer PO# _____

Customer Vessel ID: _____

TEST PARAMETERS

1. Vessel Orientation Vertical: ☐ Horizontal: ☐
2. Water Fill Level: _____
3. Internal Pressure: _____
4. Test Duration: *(hours)* _____
5. Gauge Asset #: _____
6. Procedure Used _____

This vessel has successfully completed the hydro test without leaking or cracking.

(A) Fabricator's Inspector / Agent: _____
(Printed Name)

_____
(Signature)

(B) Inspector / Authorized Inspector: _____
(Printed Name)

_____
(Signature)

(C) Customer Representative: _____
(Printed Name)

_____
(Signature)

QF033, Rev. 2

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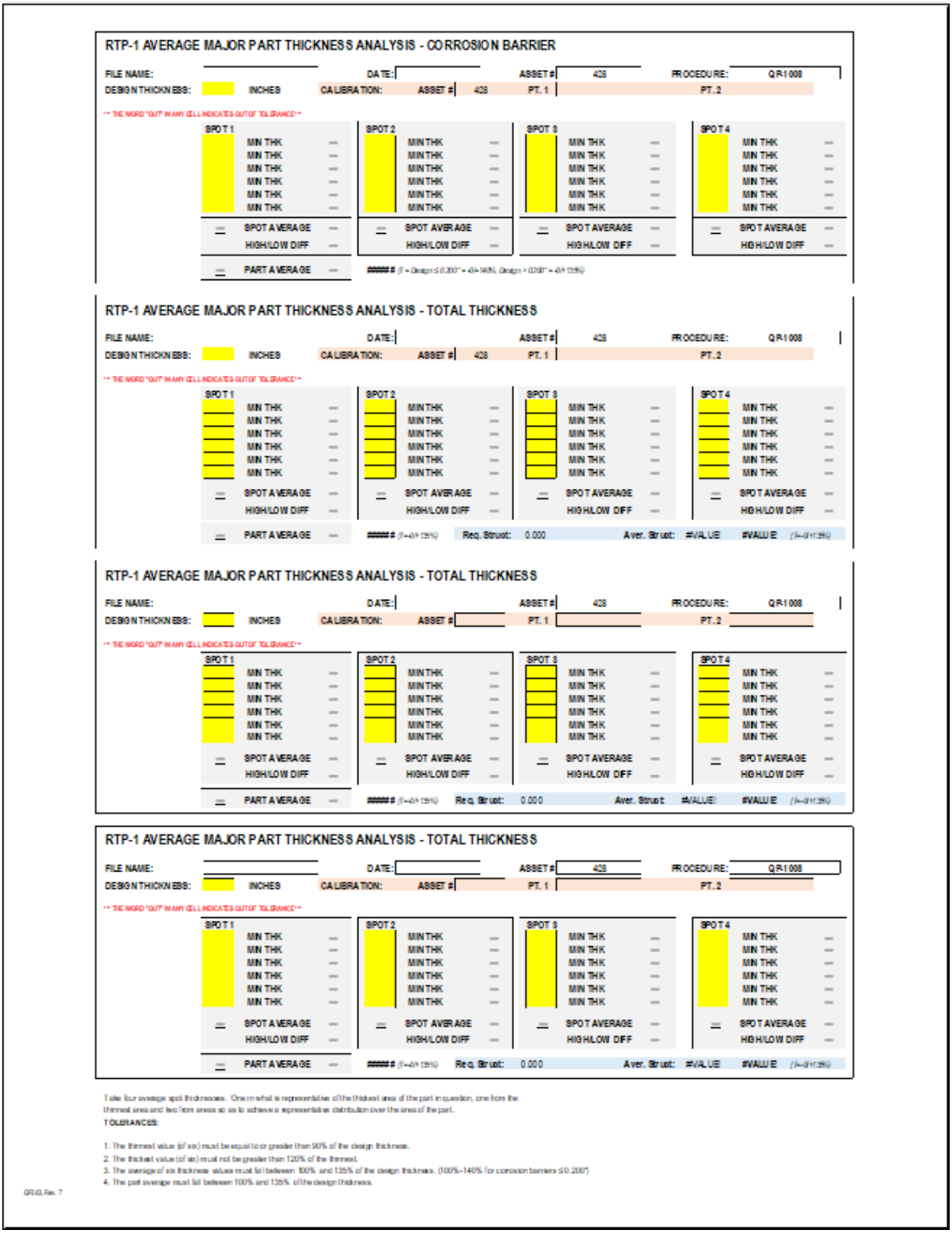
Exhibit 16: RTP-1 Average Major Part Thickness Analysis [QF063]



RTP-1 AVERAGE MAJOR PART THICKNESS ANALYSIS - CORROSION BARRIER

FILE NAME: DATE: ASSET # 428 PROCEDURE: QR-1008

DESIGN THICKNESS: INCHES CALIBRATION: ASSET # 428 PT. 1 PT. 2

** THE WORD "OUT" IN ANY CELL INDICATES OUT OF TOLERANCE **

SPOT 1	SPOT 2	SPOT 3	SPOT 4
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE
HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF
PART AVERAGE	##### (T = Design ≤ 0.200" = -0/+140%, Design > 0200" = -0/+135%)		

RTP-1 AVERAGE MAJOR PART THICKNESS ANALYSIS - TOTAL THICKNESS

FILE NAME: DATE: ASSET # 428 PROCEDURE: QR-1008

DESIGN THICKNESS: INCHES CALIBRATION: ASSET # 428 PT. 1 PT. 2

** THE WORD "OUT" IN ANY CELL INDICATES OUT OF TOLERANCE **

SPOT 1	SPOT 2	SPOT 3	SPOT 4
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE
HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF
PART AVERAGE	##### (T=-0/+135%)	Req. Strut: 0.000	Aver. Strut: #VALUE! #VALUE! (T=-0/+135%)

RTP-1 AVERAGE MAJOR PART THICKNESS ANALYSIS - TOTAL THICKNESS

FILE NAME: DATE: ASSET # 428 PROCEDURE: QR-1008

DESIGN THICKNESS: INCHES CALIBRATION: ASSET # PT. 1 PT. 2

** THE WORD "OUT" IN ANY CELL INDICATES OUT OF TOLERANCE **

SPOT 1	SPOT 2	SPOT 3	SPOT 4
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE
HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF
PART AVERAGE	##### (T=-0/+135%)	Req. Strut: 0.000	Aver. Strut: #VALUE! #VALUE! (T=-0/+135%)

RTP-1 AVERAGE MAJOR PART THICKNESS ANALYSIS - TOTAL THICKNESS

FILE NAME: DATE: ASSET # 428 PROCEDURE: QR-1008

DESIGN THICKNESS: INCHES CALIBRATION: ASSET # PT. 1 PT. 2

** THE WORD "OUT" IN ANY CELL INDICATES OUT OF TOLERANCE **

SPOT 1	SPOT 2	SPOT 3	SPOT 4
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
MIN THK	MIN THK	MIN THK	MIN THK
SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE	SPOT AVERAGE
HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF	HIGH/LOW DIFF
PART AVERAGE	##### (T=-0/+135%)	Req. Strut: 0.000	Aver. Strut: #VALUE! #VALUE! (T=-0/+135%)

Take four average spot thicknesses. One in what is representative of the thickest area of the part in question, one from the thinnest area and two from areas as so to achieve a representative distribution over the area of the part.

TOLERANCES:

1. The thinnest value (of six) must be equal to or greater than 90% of the design thickness.
2. The thickest value (of six) must not be greater than 120% of the thinnest.
3. The average of six thickness values must fall between 100% and 135% of the design thickness. (100%-140% for corrosion barriers ≤ 0.200")
4. The part average must fall between 100% and 135% of the design thickness.

QF063, Rev. 7

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Exhibit 17: Form 1-2 Fabricator's Data Report [QF026] (Side 1)

Form 1-2 Fabricator's Data Report
(As Required by the Provisions of ASME RTP-1)

1. Fabricated and certified by: _____ (name and address of Fabricator)

2. Fabricated for: _____ (name and address of Purchaser)

3. Location of installation: _____ (name and address)

4. Type: _____ (horiz. or vert. vessel) Vessel no.: _____ (mfr's. serial) _____ (dwg. no.) _____ (Nat'l Bd. no.) Year built: _____

5. Vessel fabricated in accordance with UBRS rev.: _____ (rev. and date) ASME RTP-1 edition: _____

6. Vessel designed according to Part 3A or 3B: _____ (indicate A or B or combination) Data pkg. and Design Report complete: _____

7. Laminate proof tests performed per para. 1-130: _____ (yes/no) . If yes, results reviewed and accepted: _____ (yes/no)

8. Fabricated for the following: Contents specific gravity: _____

Maximum allowable working pressure (specify units): _____ at maximum temp. (specify units): _____

Maximum allowable external working pressure (specify units): _____ at maximum temp. (specify units): _____

NDE: _____ (AE or other) Liner visual acceptance level: _____ (Table 6-1, Level 1 or 2) Struct. visual acceptance level: _____ (Table 6-1, Level 1 or 2)

Quantity limitations for gaseous air bubbles or blisters: _____

9. Shell: Type: _____ (type I, type II, type X) Nom. thk.: _____ (structural only) Liner: _____ (specify veil, sequence, or type of thermoplastic and thk.)

Dia.: _____ (specify units) Length: _____ (specify units) Barcol hardness: _____ (min. and max. measured)

10. Heads: Type: _____ (type I, type II, type X) Liner: _____ (specify veil, sequence, or type of thermoplastic and thk.)

	Location (top, bottom, ends)	Nominal Thickness (structural only)	Barcol Hardness (min. and max. measured)	Shape (ASME F&D, 2:1 elliptical, flat)
(1)	_____	_____ (specify units)	_____	_____
(2)	_____	_____ (specify units)	_____	_____

11. Safety relief or atmospheric vent size and location: _____ (identify location, item designation, type, and size)

12. Inspection openings: _____ (describe size, quantity, and general location)

13. Vessel fabricated for storage of: _____ (briefly describe chemicals to be contained or stored)

Declaration of critical service: _____ (yes or no) Remarks: _____

14. Supports: _____ (describe: if legs how many and size, if skirt describe, if support ring mat'l. and type, if saddles mat'l. and type)

15. Material selection: Resin (specific nomenclature & cure system): _____

_____ Resin manufacturer _____ Fabricator _____ End User

_____ Other (explain) _____

16. Fluid concentrations and temperatures as listed in the UBRS: _____

_____

QF026, Rev. 6

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Exhibit 17: Form 1-2 Fabricator's Data Report [QF026] (Side 2)

Form 1-2 Fabricator's Data Report (Cont'd)
(As Required by the Provisions of ASME RTP-1)

17. Nozzles/fittings:

Purpose/Use	Quantity	Size

FABRICATOR'S CERTIFICATE OF COMPLIANCE

We certify the information in this Data Report to be correct and that the vessel has been designed and fabricated in accordance with all requirements of ASME RTP-1 and the User's Basic Requirements Specification.

ASME RTP-1–_____ No. _____
(Certificate of Authorization and expiration date)

Date _____ _____ _____
(month / day / year) (Fabricator's name) (signature of Certified Individual)

_____ _____
(print or type name)

_____

_____

_____
(address of fabrication site)

INSPECTOR'S CERTIFICATION

I, the undersigned, employed by _____ of _____,
(print company name) (city and state)
have inspected the vessel described in this Fabricator's Data Report and believe that the Fabricator has constructed it in accordance with the requirements of ASME RTP-1. By signing this certificate, neither the Inspector nor his/her employer (if other than the Fabricator) makes any warranty, expressed or implied, concerning performance of the vessel.

Date _____ _____
(month / day / year) (Inspector's signature)

_____
(print or type name)

GENERAL NOTES:

(a) The following documents, all updated to as-built status, are required attachments to this Data Report:
(1) User's Basic Requirements Specification (UBRS)
(2) Design Report signed and stamped by the Qualified Designer
(3) drawings
(4) copies of all quality control forms used in the Fabricator's Quality Control Program during the course of fabrication
The above documents shall be part of the Fabricator's and End User's records. As an option, the data report may be submitted (without above documentation) to the National Board for vessel registration.

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Exhibit 18: Fabricator's Data Report (Supplemental Information) [QF027]

FABRICATOR'S DATA REPORT
(Supplemental Information)

1. Fabricated and certified by: _____

2. Fabricated for: _____

3. Location of installation: _____

4. Type: _____ Vessel no.: _____ (mfr's. serial) _____ (dwg. no.) _____ (Nat'l Bd. No.) Year built: _____

9. Nom. Thk.: _____

17. Nozzles/fittings:

Purpose/Use	Quantity	Size

QF027, Rev. 2

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Exhibit 19: Witness of Vacuum Test [QF126]

WITNESS OF VACUUM TEST

On _____ the following parties certify they have witnessed a vacuum test of the FRP vessel for Job# _____ Customer PO# _____

Customer Vessel ID: _____

TEST PARAMETERS

1. Vessel Orientation Vertical: ☐ Horizontal: ☐
2. External Pressure: _____
3. External Pressure Rate: *(approximate)* _____
4. Test Duration: *(hours)* _____
5. Gauge Asset #: _____
6. Procedure Used: _____

This vessel has successfully completed the vacuum test without leaking or cracking.

(A) Fabricator's Inspector / Agent: _____
(Printed Name)

_____
(Signature)

(B) Inspector / Authorized Inspector: _____
(Printed Name)

_____
(Signature)

(C) Customer Representative: _____
(Printed Name)

_____
(Signature)

QF126, Rev. 2

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Exhibit 20: Change Notice [QF130]

STRAND COMPOSITES

CHANGE NOTICE ____ of ____

Customer: _____ Structure Effected? Yes ☐ No ☐
Job No: _____ Date: _____
Change Notice No: _____ Issued By: _____

Reason for Change: _____ Customer Charge: Yes ☐ No ☐

For Action By: _____ _____ _____

Reference Drawings:
Dwg: _____ Sht#: ____ Rev: ____ Dwg: _____ Sht#: ____ Rev: ____

Dwg: _____ Sht#: ____ Rev: ____ Dwg: _____ Sht#: ____ Rev: ____

Change Description:

Apply QD Stamp(s) Here

Approved By: _____ - Proj. Eng. _____ - QA Mgr.

Distribution:

☐ Assembly	☐ Quality Assurance	☐ Winding
☐ Layout	☐ Cutroom	☐ Maintenance
☐ Nozzle	☐ Shipping	☐ _____

QF130, Rev. 2

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Exhibit 21: Form 1-3 Fabricator's Partial Data Report [QF179]

Form 1-3 Fabricator's Partial Data Report

FABRICATOR'S[1] PARTIAL DATA REPORT

We certify the information in this Partial Data Report to be correct and that the part(s) is designed and fabricated in accordance with all requirements of ASME RTP-1.

ASME RTP-1– _____

Description of part fabricated and inspected _____

Date _____ _____ _____

(month / day / year) (Fabricator's name) (signature of Certified Individual)

_____ _____

(print or type name)

_____

_____

_____

(address of fabrication site)

INSPECTOR'S CERTIFICATION

I, the undersigned, employed by _____ of _____, have inspected the part(s) described in this Fabricator's Partial Data Report and believe that the Fabricator has constructed such in accordance with the requirements of ASME RTP-1. By signing this certificate, neither the Inspector nor his/her employer (if other than the Fabricator) makes any warranty, expressed or implied, concerning performance of the part(s).

Date _____ _____

(month / day / year) (Inspector's signature)

_____

(print or type name)

GENERAL NOTES:

(a) The following documents, all updated to as-built status, are required attachments to this Data Report:
  (1) applicable design data signed and stamped by the Qualified Designer
  (2) drawings
  (3) copies of all quality control forms used in the Fabricator's Quality Control Program during the course of fabrication

(b) This form may be reproduced and used without written permission from ASME if used for purposes other than republication.

NOTE:

(1) The Fabricator referred to in this Partial Data Report is that Fabricator who constructed the part or portion of the vessel covered by this Partial Data Report.

Example:

RTP
Component
Stamped 2020

Certified by:
Strand Composites, LLC
228 W. Industrial Park Road, Harrison, Arkansas 72601
Phone: 391-4782
ASME RTP-1 Cert. #RTP-015. Exp. 12/23/2023

Part/SN:
RTP-1 Type II 24" Cover / 37-0817-24-C1
Resin: Hetron 922 Catalyst: MEKP Veil: 1 Nexus
Inspection Level: 2

QF179 Rev. 4

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Exhibit 22: Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Pg. 1)

Form 1-1
User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) (Cont'd)

Page 4 of 4
RTP Edition No. 2025
UBRS Revision No. _____

6. Approval of UBRS

6.1 Authorized User's representative:
Name _____ Title _____

Signature _____ Date _____

6.2 Authorized Fabricator's representative:
Name _____ Title _____

Signature _____ Date _____

Additional requirements: _____

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Exhibit 22: Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Pg. 2)

Form 1-1
User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) (Cont'd)

RTP Edition No. 2025
UBRS Revision No. _____

[ ] Additional inspection aids/methods [refer to para. 6-940(c)] _____

3. Material selection
   3.1 Material selection by:
   [ ] Resin manufacturer (include data per section 4 of this document)
   [ ] Fabricator (include data per section 4 of this document)
   [ ] End User. Applicable User's specifications/standards, codes, ordinances, FDA requirements, etc. (list and specify; attach copies of local code/ordinance requirements) _____
   [ ] Other _____
   3.2 Material of construction:
   Resin _____ Catalyst/cure system _____
   Veil _____ Barcol hardness per 6-910(b)(3) and 6-910(b)(4) _____
   [ ] Lift lugs: [ ] RTP [ ] Carbon steel [ ] Other _____
   [ ] Hold-down lugs: [ ] RTP [ ] Carbon steel [ ] Other _____
   3.3 Bolting material type or standard:
   Internal _____ External _____ Accessory _____

4. Chemical service data (shall be provided when Fabricator or resin manufacturer is making material selection) _____
   4.1 Description of process function and process sequence: _____
   4.2 Contents:

Chemical Name	Concentration Max. %	Concentration Min. %	Exposure Time

   4.3 pH range: _____ max. _____ min.

5. Design
   5.1 Design conditions:

	Operating (for reference only)	Design
Internal pressure		
External pressure		
Temperature		
Specific gravity		
	Normal (used for seismic design only)	**Maximum**
Liquid level		

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Exhibit 22: Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Pg. 3)

Form 1-1
User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) (Cont'd)

Page 3 of 4
RTP Edition No. 2025
UBRS Revision No. _____

Wind/seismic/snow code (include edition or year) _____
Basic wind speed _____ MPH (m/s) Risk/occupancy category _____ Exposure _____
Elevation above grade _____ ft (m) Topographic factors _____
Latitude _____ Longitude _____ Site class _____
Site-specific ground motion coefficient _____
Snow load _____ psf (kPa)
Capacities: Operating _____ gal (L) Flooded _____ gal (L)

5.2 Mechanical agitator: [ ] Required [ ] Not required
Dead load _____ lb (N)
Static bending moment _____ ft-lb (N·m)
Dynamic bending moment _____ ft-lb (N·m)
Torque _____ ft-lb (N·m)
Horsepower _____ hp (W)
Impeller speed _____ RPM Impeller diameter _____ in. (mm)
Number of impellers _____ Foot bearing: [ ] Yes [ ] No

5.3 Heating and cooling:
[ ] Electric panels
[ ] Steam coil
[ ] Steam sparger
[ ] Heat exchanger
[ ] Other _____

5.4 Mechanical and other forces:
[ ] Violent chemical reaction
[ ] Subsurface introduction of gas or vapor
[ ] Subsurface introduction of steam
[ ] Transmitted mechanical load/force
[ ] Impact due to introduction of solids
[ ] Vacuum from pump down (or vessel draining)
[ ] Vacuum from cool down
[ ] Other _____

5.5 Corrosion barrier excluded from structural calculations:
[ ] Yes
[ ] No

5.6 Declaration of *critical service* (only by User or User's Agent; refer to para. 1-210):
[ ] Yes
[ ] No

5.7 Operation and Environmental Factor (must be greater than or equal to 1.0): _____

5.8 Hydrostatic test gaskets
[ ] Specified service gasket _____ Specific type _____
[ ] Fabricator's standard _____ Specific type _____
[ ] Other _____

QF017, Rev.6

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Exhibit 22: Form 1-1 User's Basic Requirements Specification (UBRS) [QF017] (Pg. 4)

Form 1-1
User's Basic Requirements Specification (UBRS) (As Required by the Provisions of ASME RTP-1) (Cont'd)

Page 4 of 4
RTP Edition No. 2025
UBRS Revision No. _____

6. Approval of UBRS
   6.1 Authorized User's representative:
   Name _____ Title _____
   Signature _____ Date _____
   6.2 Authorized Fabricator's representative:
   Name _____ Title _____
   Signature _____ Date _____

Additional requirements: _____

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QF017, Rev.6

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Exhibit 23: Material Requisition [QF056]

Material Requisition

NOTICE: **Absolutely NO materials may be issued to ANY job without presenting this Material Requisition to the Inventory Control or Cut Room Attendants.**

Job No: _____ Vessel No: _____ Part No: _____

Date	Description	Lot/Batch No:	Issued By

QF056, Rev. 1

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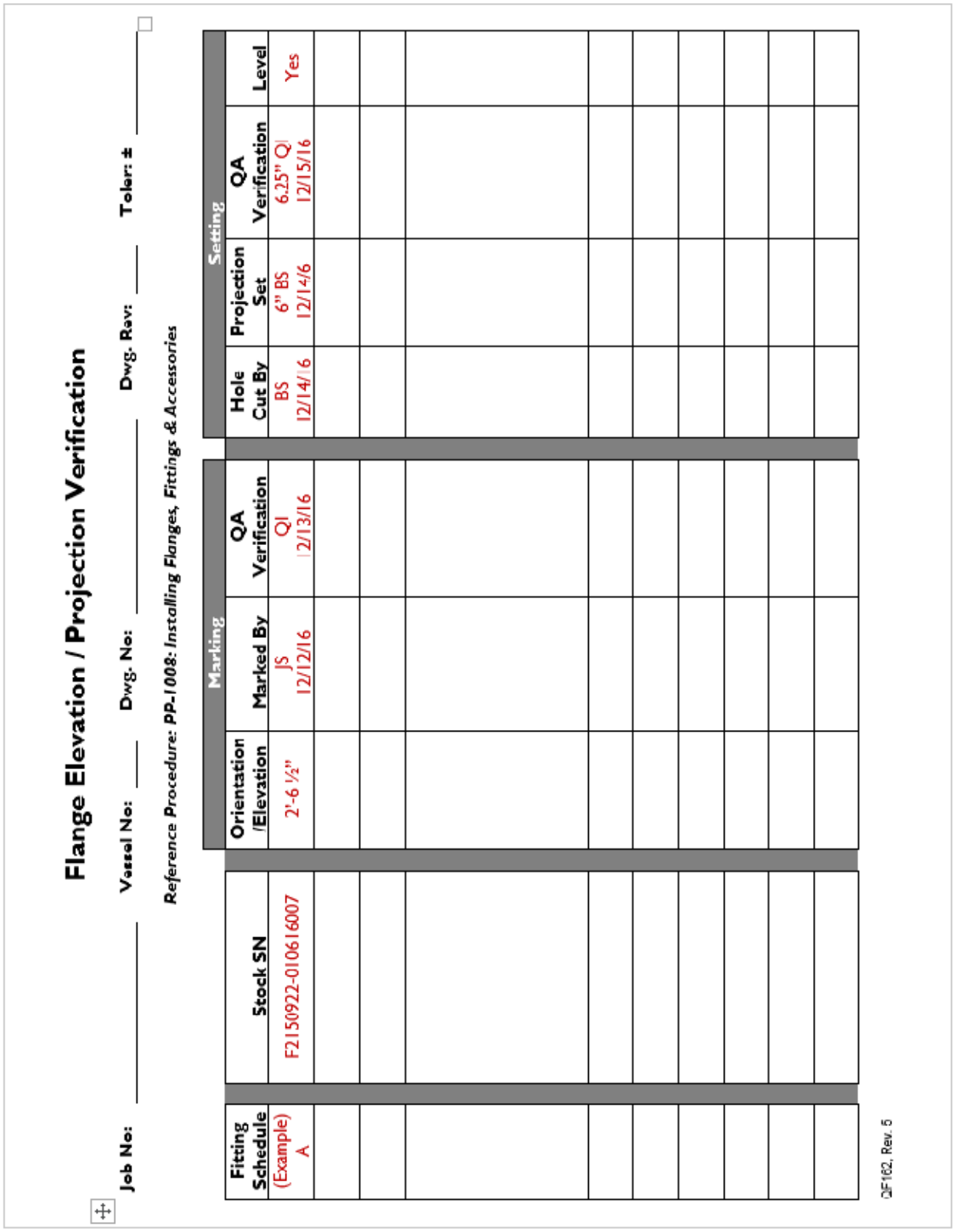
Exhibit 24: Flange Elevation / Projection Verification [QF162]



Flange Elevation / Projection Verification

Job No: _____ Vessel No: _____ Dwg. No: _____ Dwg. Rev: _____ Tolar: ± _____

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
(Example) A	F2150922-010616007	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. 6

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Exhibit 25: Pressure / Hydrotest Plan [QF170] (Page 1)

Pressure / Hydrotest Plan

Section 1: Test Specification

Job No: _____ Date Issued: _____

Internal Test Pressure: _____ Internal Pressure Test Duration: _____

Fluid Level: _____ Acoustic Emissions Test: Yes No

External Test Pressure: _____ External Pressure Test Duration: _____

Acoustic Emissions Test: Yes No (Max. Attainable = -12.0 psig or lower.)

Special Testing Requirements or Instruction:

Test in the Vertical Horizontal position.

Pressure Gauge: _____; Fill/Drain: _____; Pressure Increase/Vacuum: _____

Follow instructions outlined in Strand Procedure PP-1014: Hydro/Vacuum & AE Testing. If AE tested, follow the instruction of the AE Technician until testing is complete. If the required hold period extends beyond 30 mins., continue to hold pressure until that time is reached.

_____shall oversee the test.

Setup Diagram Attached: Yes No Specification Approved By: _____

Section 2: Torque Log:

STD: 1" – 18": Maximum = 25 ft-lb; 24" – 36": Maximum = 50 ft-lb [Unless otherwise noted elsewhere.]

Call-Out	Torque Record	Call-Out	Torque Record

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Exhibit 25: Pressure / Hydrotest Plan [QF170] (Page 2)

Pressure / Hydrotest Plan

Section 3: Test Procedure

The following procedure is intended for use as a guideline for atmospheric and pressure hydro testing and vacuum testing with or without acoustic emission evaluation.

3A: Hydro (Internal Pressure) Test

- Obtain test set-up instructions or diagram from the Quality Department.

  Note: As a minimum, provisions should be made for adequate venting, filling and draining, pressurization and depressurization and gauge attachment. With the exception of the pressure gauge connection, all connections should be fitting with a suitable valve.

- Make sure all vessel flange and blind flange faces are clean, flat, smooth and free of any resin drips, imperfections or any other obstructions that could interfere with gasket seating. Check bolt holes and spotfacing for any irregularity that could interfere with correct washer seating against the back flanges.

- Using the test set-up instructions, new gaskets and appropriate fasteners, install blind flanges only finger tightening nuts.

  Important Note: The term "Appropriate Fasteners" refers to bolts, nuts and washers that are of the appropriate diameter, length and strength for each individual flange. Fasteners on any individual fitting should not be mixed sizes, types, materials or ratings. Bolts should be in good condition, straight, not stretched from over tensioning and with nuts that can be easily threaded to the bolt shoulder and properly lubricated. (Teflon coated fasteners do not require lubrication.)

- Using the enclosed Cross Pattern Tightening Sequence, mark the pattern on the blind using a Sharpie marker.

- Tighten bolts in accordance with the attached Torque Sequence Chart and record each increase as required.

  Note: Bolt torqueing should be accomplished with the use of a certified torque wrench. NO IMPACT WRENCHES ARE ALLOWED) and by turning nuts rather than bolts.

- Install calibrated pressure gauge (obtained from Quality) in the designated location.

  Note: Pressure should be measured at the vessel top – above hydrostatic head. A lower elevation gauge placement is permissible provided the test pressure is adjusted to compensate for the fluid height above gauge elevation.

- Fill vessel with water to the specified level.

  Note: Hydrotest liquid level for atmospheric vessels is the highest operational liquid level specified by the end user and is typically not above the vessel's upper tangent line. Pressure vessels must be completely filled with water leaving little or no air inside.

- If the vessel is to be subjected to an Acoustic Emission (AE) evaluation, allow the AE technician to set up his testing equipment.

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Exhibit 25: Pressure / Hydrotest Plan [QF170] (Page 3)

Pressure / Hydrotest Plan

- Begin pressurization.

  Note: Pressure should be increased gradually at a rate of 2 to 3 PSIG per minute until the specified test pressure is reached. The test pressure should be maintained for the specified test duration. If the vessel is to be monitored for AE, follow the AE technician's instruction for pressurization, hold points and hold duration.

  No visible leakage is allowed during hydrostatic testing. Loss of pressure may occur due to leakage through valves.

- When the Pressure / Hydrotest are complete, the vessel may be depressurized and drained.

  Note: If the vessel is to undergo vacuum testing, go to Section 3B, otherwise go to Section 4.

3B: Vacuum (External Pressure) Test

Important Note: If the vessel is to undergo a vacuum test, the vessel must be completely empty and the evacuation must be accomplished using vacuum pump. If the vessel is to undergo AE evaluation during the vacuum test, the AE test equipment should be already set-up.

- Make sure that all openings have been properly closed.
- Attach the vacuum pump to the pressure inlet connection with an appropriately sized tubing.
- Begin pressurization.

  Warning: Vessel exposure to external pressure greater than that for which it is designed can be detrimental to the vessel's structural integrity and, in some cases, bring about sudden catastrophic failure which can endanger personnel.

  Note: In most cases, it is acceptable to evacuate continuously until the specified external test pressure is reached and then held for the specified test duration. If the vessel is undergoing AE evaluation, follow the AE technician's instructions regarding pressure hold points and durations. Minor pressure loss during the test can be expected and tolerated. In some cases, it may be necessary to run the vacuum pump continuously in order to maintain pressure at an acceptable level.

- When the vacuum test is complete the vessel may be depressurized.

Section 4: Post Test Inspection

Once all tests are completed and the vessel is (de)pressurized, emptied and cleaned, the vessel should be entered and inspected for signs of damage that may have occurred during testing.

Note: The use of impact wrenches for disassembly IS permitted.

Section 5: Test Certification

Test certification is accomplished by completing a Hydro Test Certificate to the Quality Department.

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Exhibit 25: Pressure / Hydrotest Plan [QF170] (Page 4)

Pressure / Hydrotest Plan

NUMBER OF BOLTS	BOLT NUMBER SEQUENCE TO BE MARKED CLOCKWISE ON FLANGE. THE NUMBER ASSIGNED AT EACH BOLT LOCATION REPRESENTS THE SEQUENCE ORDER FOR TIGHTENING THE BOLT.
4	1, 3, 2, 4
8	1, 5, 3, 7, 2, 6, 4, 8
12	1, 9, 5, 3, 11, 7, 2, 10, 6, 4, 12, 8
16	1, 9, 5, 13, 3, 11, 7, 15, 2, 10, 6, 14, 4, 12, 8, 16
20	1, 17, 9, 5, 13, 3, 19, 11, 7, 15, 2, 18, 10, 6, 14, 4, 20, 12, 8, 16
24	1, 17, 9, 5, 13, 21, 3, 19, 11, 7, 15, 23, 2, 18, 10, 6, 14, 22, 4, 20, 12, 8, 16, 24
28	1, 25, 17, 9, 5, 13, 21, 3, 27, 19, 11, 7, 15, 23, 2, 26, 18, 10, 6, 14, 22, 4, 28, 20, 12, 8, 16, 24
32	1, 25, 17, 9, 5, 13, 21, 29, 3, 27, 19, 11, 7, 15, 23, 31, 2, 26, 18, 10, 6, 14, 22, 30, 4, 28, 20, 12, 8, 16, 24, 32
36	1, 33, 25, 17, 9, 5, 13, 21, 29, 3, 35, 27, 19, 11, 7, 15, 23, 31, 2, 34, 26, 18, 10, 6, 14, 22, 30, 4, 36, 28, 20, 12, 8, 16, 24, 32
40	1, 33, 25, 17, 9, 5, 13, 21, 29, 37, 3, 35, 27, 19, 11, 7, 15, 23, 31, 39, 2, 34, 26, 18, 10, 6, 14, 22, 30, 38, 4, 36, 28, 20, 12, 8, 16, 24, 32, 40
44	1, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 3, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 2, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 4, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40
48	1, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 3, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 2, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 4, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48
52	1, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 3, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 2, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 4, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48
56	1, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 53, 3, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 55, 2, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 54, 4, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48, 56
60	1, 57, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 53, 3, 59, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 55, 2, 58, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 54, 4, 60, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48, 56
64	1, 57, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 53, 61, 3, 59, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 55, 63, 2, 58, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 54, 62, 4, 60, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48, 56, 64
68	1, 65, 57, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 53, 61, 3, 67, 59, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 55, 63, 2, 66, 58, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 54, 62, 4, 68, 60, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48, 56, 64
72	1, 65, 57, 49, 41, 33, 25, 17, 9, 5, 13, 21, 29, 37, 45, 53, 61, 69, 3, 67, 59, 51, 43, 35, 27, 19, 11, 7, 15, 23, 31, 39, 47, 55, 63, 71, 2, 66, 58, 50, 42, 34, 26, 18, 10, 6, 14, 22, 30, 38, 46, 54, 62, 70, 4, 68, 60, 52, 44, 36, 28, 20, 12, 8, 16, 24, 32, 40, 48, 56, 64, 72
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Exhibit 26: Memo for Record [QF150]

Dept:

MEMO FOR RECORD

Job #:

Date	Person Notified	Notes

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Exhibit 27: Nozzle Dimensions [QF093]

NOZZLE DIMENSIONS

Job #: _____ (Specification)

Asset #: _____

Date: _____ ND: _____ Dia: _____ Insp. By: _____

Flg. Thick:	Neck Thick:	HubThick:
1)	1)	1)
2)	2)	2)
3)	3)	3)
4)	4)	4)
5)	5)	5)
6)	6)	6)
7)	7)	7)
8)	8)	8)
9)	9)	9)
10)	10)	10)
Aver.	Aver.	Aver.

For flanges requiring greater than 10 checks, use back of this form to record measurements.

Bolt Hole Ø: _____

Hub Length: _____

Bolt Circle Diameter: _____

Flange Flatness: _____

Comments:

Table 6-1
Minimum Nozzle Flange Thickness Checks

No. Holes, *N*	Minimum Number of Thickness Measurements Required: Flange Thickness, *T*, at Bolt Hole [Notes (1), (2)]	Neck Thickness, *tn*, at Nonflange End of Nozzle	Hub-Reinforcement Thickness, *hr*, at Base of Hub [Note (3)]
4	4	4	4
8	4	4	4
12	6	6	6
16	8	6	6
20	10	8	8
>20	10 or *N*/4, whichever is greater	Per para. 6-920(f)	10 or *N*/4, whichever is greater

QF093. Rev. 6

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Exhibit 28: 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

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Exhibit 29: Lab Work Order [QF025] (Side 1)

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

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Exhibit 29: Lab Work Order [QF025] (Side 2)

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 30: Post Cure Certificate [QF039]

POST CURE CERTIFICATE

Date: _____

Job Number: _____ **Time Started:** _____

Time/Temp. Required: _____ **Time Stopped:** _____

Chart Recorder Asset # 328 **Procedure #:** PP-1015

_____ _____ _____

Printed Name: *Signature:* *Title:*

Affix Chart Here

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Exhibit 31: Ignition Loss / Ply Sequence Verification [QF095]

Ignition Loss / Ply Sequence Verification

Test Date: _____ Job No.: _____

Sample Description: _____ Procedure: QP-1012

Type of Sample: _____ Liner Only _____ FW Structure Only
_____ FW Structure w/ Liner _____ Hand Lay-Up

Sample No:	1	2	3	4	5	6	Klin Temp: _____ (Spec = 1000-1100°F)
Sample Thickness:							
Crucible Weight:							
Crucible + Sample Wt.: *(Pre-Burn)*							
Sample Only Wt.:	0	0	0	0	0	0	
Crucible + Sample Wt.: *(Post-Burn)*							
Ignition Loss:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Average: #DIV/0!
Precentage of Glass:	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	Average: #DIV/0!

Ply Sequence

Comment: _____

Report Prepared By: _____

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Exhibit 32: 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 _____.

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Exhibit 33: Fabricator's Design Report [QF121)

Fabricator's Design Report

Design Code Reference: _____

Fabricator: _____

_____

_____

Job Number: _____

Drawing Number: _____ Rev: _____

The undersigned certifies that the Rev. _____ design calculations for the subject job meet the requirements of the customer's UBRS Rev. _____, the referenced fabrication drawing and the requirements of ASME RTP-1 _____, and (when applicable) the results of the Proof Test # _____ meet or exceed the requirements of the design.

_____ _____

Printed Name Date

Qualified Designer

Title

(Apply Stamp Here)

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Exhibit 34: Designated Inspector's Report [QF030]

DESIGNATED INSPECTOR'S REPORT

Job No: _____
Date: _____

On the above date, the fabrication of vessel number _____ was declared complete. Being duly authorized by the customer and Strand Composites, LLC Quality Assurance Manager, I serve as the Designated Inspector.

I have reviewed all records to verify that the Design Report, which includes the design calculations, design drawing(s) and design test reports (as required) have been prepared in accordance with the UBRS.

All material including resin, reinforcements and other components have met the required traceability requirements and the manufacturer's certification. Materials were properly marked and stored to assure their integrity.

I have reviewed and verified that the personnel responsible for fabrication, lamination and secondary bonding are in fact certified in accordance with ASME RTP-1 guidelines and that all qualification records are on file.

During fabrication, Strand Composites, LLC personnel followed the quality assurance guidelines set forth in the Quality Assurance Manual which has been found compliant with the RTP-1 document. Fabrication was governed by written procedures.

Strand Composites, LLC was careful to ensure that only certified material compliant with job requirements were used to fabricate vessel parts and that procedures were carried out to assure quality.

As parts were fabricated, Strand Composites, LLC QC personnel performed thickness and visual tests and (when required) supplied me with written test results. An RTP-1 ITP Inspector's Summary was initialed and dated as processes were verified to be satisfactorily completed. As parts were accepted, they were properly stored for later assembly.

Upon completion, the vessel was subjected to pressure/hydro-tests required by RTP-1. No evidence of leakage was detected.

I have reviewed all quality control documents and inspection checklists and found that all work, inspections, and tests had been carried out in accordance with the fabricator's quality program. Documentation of part thicknesses, Barcol hardness, acetone sensitivity and hydrostatic test report are included in the QA package.

_____ _____
Signature Date

_____
Printed Name

Inspector (I)
Title

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Exhibit 35: Form M5-1 Laminator Qualification Report [QF176]

Form M5-1 Laminator Qualification Report

Data by Fabricator:

Fabricator _____ Laminator _____

Address _____ Last qualification date _____

_____ Lamination date _____

_____ Quality Control Manager _____

Fabrication process _____ Resin type _____

Laminate type _____ Catalyst type _____

Data by Test Laboratory:

Test laboratory _____ Test report no. _____

Lab technician _____ Testing date _____

Specimen Number	Specimen Thickness	Specimen Width	Test Speed	Peak Load	S_x	S_y	E_x	E_y
1								
2								
3								
4								
5								
				Average				

Type ▮ laminates require properties in the warp direction only.

Test laboratory representative _____ Date _____
(signature)

Certification:

The Laminator whose name appears above is qualified under the provisions of RTP-1, Part 7 and Mandatory Appendix M-5.

Quality Control Manager _____ Date _____
(signature)

Laminator _____ Date _____
(signature)

GENERAL NOTES:
(a) This form may be reproduced and used without written permission from ASME if used for purposes other than republication.
(b) Attach copies of Table NM6-2 (Component Data Sheet) and laboratory test report to this Laminator Qualification Report.

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Exhibit 36: Form M5-2 Secondary Bonder Qualification Report [QF177]

Form M5-2 Secondary Bonder Qualification Report

Fabricator _____ Secondary Bonder _____

Address _____ Last qualification date _____

_____ Secondary bonding date _____

Quality Control Manager _____ Test laboratory _____

Qualified Laminator _____ Lab technician _____

Pipe fabrication date _____ Testing date _____

Data by Fabricator:

Specimen Number	Pipe Circumferences		
	C_1	C_2	C_3

$H_a = L_a - D_a$

$S_b = \frac{P}{C_a H_a}$ [minimum allowable = 2,000 psi (13.8 MPa)]

Data by Test Laboratory:

Test laboratory representative _____ Date _____

(signature)

Specimen Number	Shear Collar Height				Relief Bore Depth				Shear Height H_a	Peak Load P	Shear Strength S_b
	L_1	L_2	L_3	L_a	D_1	D_2	D_3	D_a			

The following certify that they have executed their responsibilities and tests in accordance with the requirements of ASME RTP-1, para. M5-400:

Secondary Bonder _____ Date _____

(signature)

Quality Control Manager _____ Date _____

(signature)

Secondary Bonder ☐ is qualified ☐ is not qualified

GENERAL NOTES:

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(b) Attach copies of Table NM6•2 (Component Data Sheet) to this Secondary Bonder Qualification Report. One Component Sheet is to apply to the pipe test piece per Fig. M5-1; the other is to apply to the overlay per Fig.M5-2. Identify each Component Data Sheet accordingly.

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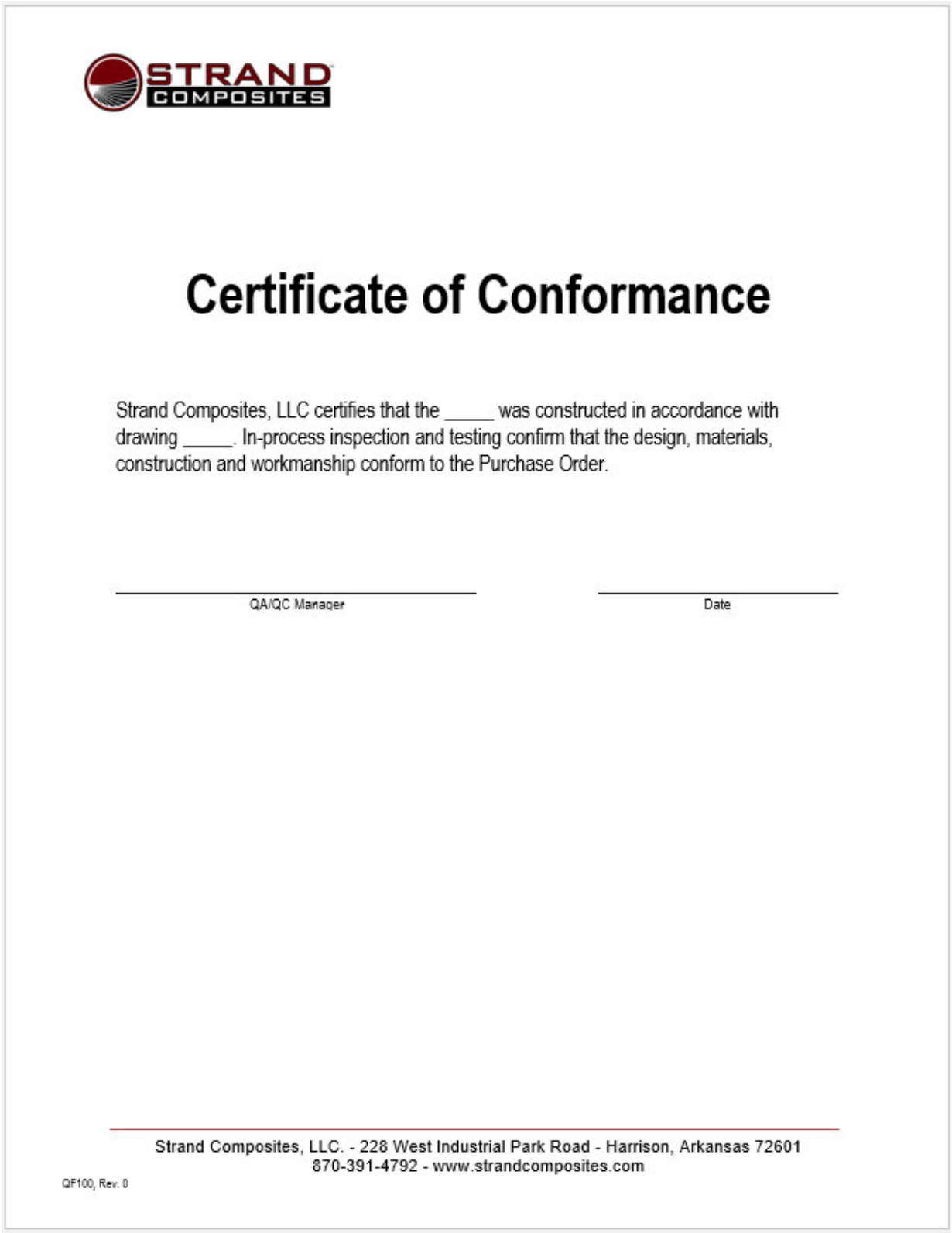
Exhibit 37: Certificate of Conformance [QF037]



STRAND COMPOSITES

Certificate of Conformance

Strand Composites, LLC certifies that the _____ was constructed in accordance with drawing _____. In-process inspection and testing confirm that the design, materials, construction and workmanship conform to the Purchase Order.

_____ QA/QC Manager

_____ Date

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

QF100, Rev. 0

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Exhibit 38: Resin Mixing Log [QF143]

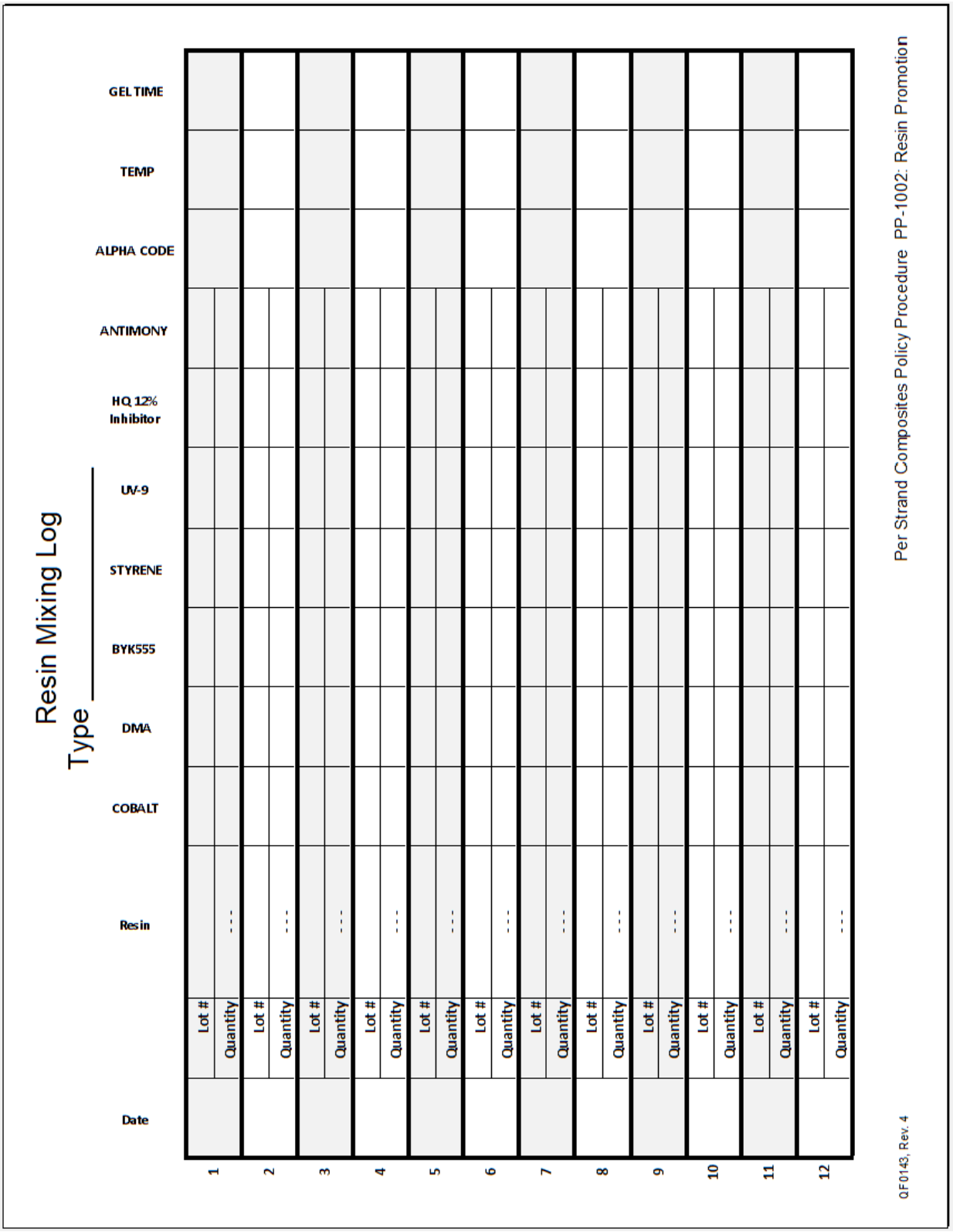

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Exhibit 39: RTP-1 Overall Dimension Inspection [QF205]

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 40: Incoming Inspection – Accessory & Attachment Items [QF207]

Incoming Inspection – Accessory & Attachment Items

Reference Fabrication Drawing

Job No: _____

Date: _____

Inspector: _____

Item ID: _____

Is the C of C (and MTR if needed) available? _____ Yes _____ No

(If no, hold item(s) until proper documentation is received.)

Material Requirement: _____ Correct? _____ Yes _____ No

(If no, reject)

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Exhibit 41: Quality Personnel Qualification Record [QF168]

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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-2 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 42: Re-Demonstration Laminate Certification [QF211]

Strand Composites, LLC
228 W. Industrial Park Road, Harrison, Arkansas 72601
870-391-4792

Re-Demonstration Laminate Certification

I, _____ certify that the Re-Demonstration Laminates identified as:

- SDL-_____-TI-M (Type I, Hand Lay-Up) - _____
- SDL-_____-TII-M (Type II, Hand Lay-Up) - _____
- SDL-_____-TX-M (Type I, Hand Lay-Up w/ Type X wet (bath) continuous Filament Winding & Type II Hand lay-up Uniwoven - _____
- SDL-_____-TX-SU (Type I, Spray-Up w/ Type X wet (bath) continuous Filament Winding & Type II Hand lay-up Uniwoven - _____

were constructed Strand Composites LLC in accordance with RTP-1, _____ edition, Part 7 and Strand Composites LLC's Procedure QP1017, revision ___; were identified in accordance with RTP-1 _____ edition, Part 7, 7-900(a) and (b); and were tested by _____ located at _____; and ISO 9001:2008 accredited independent testing laboratory in accordance with RTP-1 _____ edition, Part 7, 7-1000 (7-620(g) and (h) and 7-700).

Certified summary of physical and mechanical testing results attesting to compliance or noncompliance to the RTP-1, _____ edition requirements and attached inspection and test data are identified on laboratory test reports:

- _____, Dated: _____
- _____, Dated: _____
- _____, Dated: _____
- _____, Dated: _____

The test reports and inspection and test data have been reviewed by me, _____, and found to be in compliance with RTP-1, _____ edition, Part 7, 7-1000 and 7-700 requirements (Barcol Hardness, Acetone Sensitivity, Tensile Strength and Tensile Modulus of Elasticity, Glass Content and Reinforcing Sequence).

The next required date for re-demonstration of the capabilities of _____ via demonstration laminate testing of Type I, Hand Lay-up; Type II, Hand Lay-up and Type X, Hand Lay-Up with Filament Winding) is _____.

_____ _____
Certified Individual (CI) / Authorized Agent *Date*

_____ _____
Inspector Verification *Date*

QF211, Rev. 0

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Exhibit 43: Cutout Verification Stamp

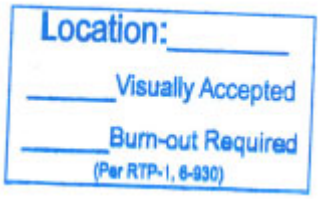

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Exhibit 44: Form NM6-2 Component Data Sheet [QF128]

Form NM6-2 Component Data Sheet

Shop order no.: _____ Lay-up date: _____

Component identification: _____

_____

Resin nomenclature: _____ Lot no.: _____

Curing agent system: _____

Curing Agent	*Amount By %*
COBALT: [ ] Octoate (_____ % active)	_____
[ ] Naphthenate (_____ % active)	_____
DMA	_____
MEKP	_____
CHP	_____
BPO (_____ % active)	_____

Laminate sequence: _____

_____

Veil type: _____ Manufacturer: _____

Product code/lot no.: _____ Prod. date: _____

Mat type: _____ Manufacturer: _____

Product code/lot no.: _____ Prod. date: _____

Fabric type: _____ Manufacturer: _____

Product code/lot no.: _____ Prod. date: _____

Roving type: _____ Manufacturer: _____

Product code/lot no.: _____ Prod. date: _____

Machine settings [Note (1)]: _____

_____

_____

Barcol hardness readings [Note (2)]: _____ _____ _____ _____ _____

Acetone sensitivity [Note (3)]: [ ] Compliance [ ] Noncompliance

_____

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NOTES:
(1) On machine-made components, pertinent machine settings must be recorded.
(2) Test to be conducted in accordance with para. 6-910(b)(1) of ASME RTP-1.
(3) Test to be conducted in accordance with para. 6-910(b)(2) of ASME RTP-1.

QF128 Rev. 2

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Exhibit 45: Customer Requirements – Parts [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 a Qualified Designer 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: _____ 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 46: Purchase List [QF222]

STRAND COMPOSITES

Purchase List

JOB DESCRIPTION: _____ DATE: _____

JOB NUMBER: _____

VENDOR NAME: _____

REQUESTED BY: _____ APPROVED BY: _____

PART NUMBER	PART DESCRIPTION	QUANTITY	PRICE	EXT. PRICE

Exhibit 47: PO Log [Example]

Strand Composites PO

				JLLED BY	Vendor	n-Sheet Entered?	COMMENTS
4	3/28/2019	1405421	37-0719	dmg	Miller Hardware		timbers
5	3/28/2019	1405422	4150...00	dmg	Abatix		3 harnesses
6	3/28/2019	1405423	6310...060	dmg	Yarbrough Cable		orange slings
7	3/28/2019	1405424	6310..060	dmg	Mcmaster Carr		
8	3/28/2019	1405425	6960...000	dmg	Tridell		crane work
9	3/28/2019	1405426	37-0886	dmg	St Louis Testing		
0	3/28/2019	1405427	6310..060	dmg	Praxair		
1	3/29/2019	1405428	6310..060	dmg	United Rentals		
2	3/29/2019	1405429	4150..000	dmg	Abatix		batterie & jet drill
3	3/29/2019	1405430	4150..00	dmg	Comp One		Comp One
4	3/29/2019	1405431	6310..060	dmg	Global Industrial		42" Fan
5	3/29/2019	1405432	6310...060	dmg	Global Industrial		2 platform steps
6	3/29/2019	1405433	37-0719-002	dmg	United Rentals		scissor lift
7	4/1/2019	1405434	37-0887	dmg	Ozark Custom Engravers		nameplate
8		1405435					
9		1405436					
0		1405437					
1		1405438					
2		1405439					
3		1405440					
4		1405441					
5		1405442					
6		1405443					
7		1405444					
8		1405445					
9		1405446					
0		1405447					
1		1405448					
2		1405449					
3		1405450					
4		1405451					
5		1405452					
6		1405453					

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Exhibit 48: Department Daily Inventory Request Form [QF233]

STRAND COMPOSITES

DEPARTMENT DAILY INVENTORY REQUEST FORM

DEPARTMENT		REQ. BY		DEL DATE	
JOB NUMBER		PROCESS		SHEET	OF

QTY LBS	RESIN/CHEMICALS	GT MIN	QTY	ROLL GOODS	QTY	CONSUMABLES
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		
	LOT			LOT		

QF233, Rev. 1

(1000 – WINDING) (2000 – LAYOUT) (4000- ASSEMBLY) (6000 – SHIP/DETAIL) (7000 – FLANGES) (8000-AUTO PIPE WIND) (8200 – MANUAL PIPE) (9100-FIELD) (9300-STEEL FLOOR) (9700-GELCOAT)

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