ASME QUALITY CONTROL MANUAL

2017 EDITION

Integrated Flow Solutions (IFS)

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FOR SHOP FABRICATION AND CONSTRUCTION OF PRESSURE VESSELS & PARTS, BOILERS & BOILER EXTERNAL PIPING, at the above location and field sites controlled by this location in accordance with Section I and/or Section VIII, Division 1 of the ASME Boiler and Pressure Vessel Code, ASME B31.1 and metallic repairs and/or alterations in accordance with the National Board Inspection Code and Jurisdictional requirements.

Revision	Date	Description	Approved By	
			IFS	AI
0	12/14/17	Issued for Use	KT	BT
1	01/09/18	Title Page, Abbreviations & Definitions, 3.0 (Add Mech. Design Mngr.), 5.4, 6.11, Exhibit 13.4		

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ABBREVIATIONS & DEFINITIONS

ASME	American Society of Mechanical Engineers
ASME Code	American Society of Mechanical Engineers Boiler and Pressure Vessel Code
AI	Authorized Inspector
AIA	Authorized Inspection Agency
BOM	Bill of Material
C of C	Certificate of Compliance
Certify	Approve by signature/initials and date. May be electronic if password protected.
Code	American Society of Mechanical Engineers Boiler and Pressure Vessel Code and/or the National Board Inspection Code
Company	Refers to the Organization whose name is as indicated on the title page of this Manual and the Certificates of Authorization
Foreman	When used alone, shall indicate Shop Foreman or Field Foreman, as applicable
Department	Where Department is mentioned in this Manual the responsibility shall be with the manager of that department.
HT	Heat Treatment
IFS	Integrated Flow Solutions
MTR	Material Test Report
NBIC	National Board Inspection Code
NCR	Nonconformance Report
NDE	Nondestructive Examination
	RT - Radiographic Examination
	UT - Ultrasonic Examination
	MT - Magnetic Particle Examination
	PT - Liquid Penetrant Examination
PO	Purchase Order
PQR	Welding Procedure Qualification Record
PWHT	Post Weld Heat Treatment
QC	Quality Control

QCI	Quality Control Inspector (Shop or Field)
QCM	Quality Control Manager
Quality Control	When indicating a function to be performed shall mean that it is to be performed by the QCM or the QCI
Section	Followed by a roman numeral, shall mean that the section of the ASME Boiler and Pressure Vessel Code
Vessel	May be interrupted as Section VIII Pressure Vessel or Section I Power Boiler
WPQ	Welder/Welding Operator Performance Qualification Test Record
WPS	Welding Procedure Specification

1.0 GENERAL

1.1 Code Compliance

1.1.1 Engineering determines the required design conditions for the equipment to be built. The Project Manager determines the assignment of the work to be performed, where it will be built and who will build it, including which parts or items of equipment will be purchased. Buy-out items will be placed with suppliers that hold the appropriate Certificate or Authorization and Certification Marks for the type of work to be performed.

1.1.2 It is the responsibility of the Mechanical Engineer to specify the correct Code, Edition required for equipment and/or parts.

1.2 Manual Control

1.2.1 The QCM shall be responsible for the preparation, revision, approval, distribution and control of this ASME QC Manual. The Manual shall be submitted to the AI for his or her review and acceptance. The review and acceptance process shall be noted on the title page prior to implementation of the revision, by the QCM and AI's initials within the revision block.

1.2.2 The QCM is responsible for maintaining the QC Manual Issue Log (Exhibit 13.1) documenting the controlled copies of this manual that have been distributed for use. Obsolete copies will be returned to the QCM for destruction once new revision has been issued.

1.2.3 Non-Controlled Manuals may be issued, however may not be maintained after issuance. The word "Non-Controlled" will be written, stamped or watermarked on each page.

1.2.4 A controlled copy of the current Manual shall be made available to the AI at all times in the shop and at field locations.

1.2.5 The QCM shall review Code Editions to determine if the Manual is affected. Revisions required to be made to the Manual shall be implemented no later than 6 months after issue date.

1.2.6 Proposed or required revisions to the Manual shall be reviewed and accepted by the QCM and the AI prior to implementation.

1.3 Certification Marks

1.3.1 Certification Marks are under the administrative control of the QCM. These stamps are only to be used by assigned QC personnel. Certification Marks are maintained in secure storage when not in use.

2.0 AUTHORITY AND RESPONSIBILITY

This Manual outlines and defines the Quality Control System to ensure that the company is, at all times, in compliance with the minimum requirements of the ASME Section I, Section VIII Division 1, B31.1, and the National Board Inspection Code; hereafter referred to as the Code.

The President fully supports this Quality Control System and gives the Quality Control Manager complete authority, responsibility, and the organizational freedom to identify Quality Control problems and to initiate, recommend and provide solutions to these problems. The Quality Control Manager is responsible for implementing and maintaining the Quality Control System. It is the responsibility of the Quality Control Manager to reject material or workmanship that does not meet the requirements of the applicable Code. All personnel are hereby instructed to give full compliance to this Manual and the Code.

Any problems concerning Code compliance that cannot be resolved by the Quality Control Department shall be brought to the Quality Control Manager for final resolution without compromise of the Code or this Quality Control Manual.

Each Manager or Supervisor may delegate the performance of his or her duties to knowledgeable personnel who report directly to him or her, however, the responsibilities associated with those duties cannot be delegated.

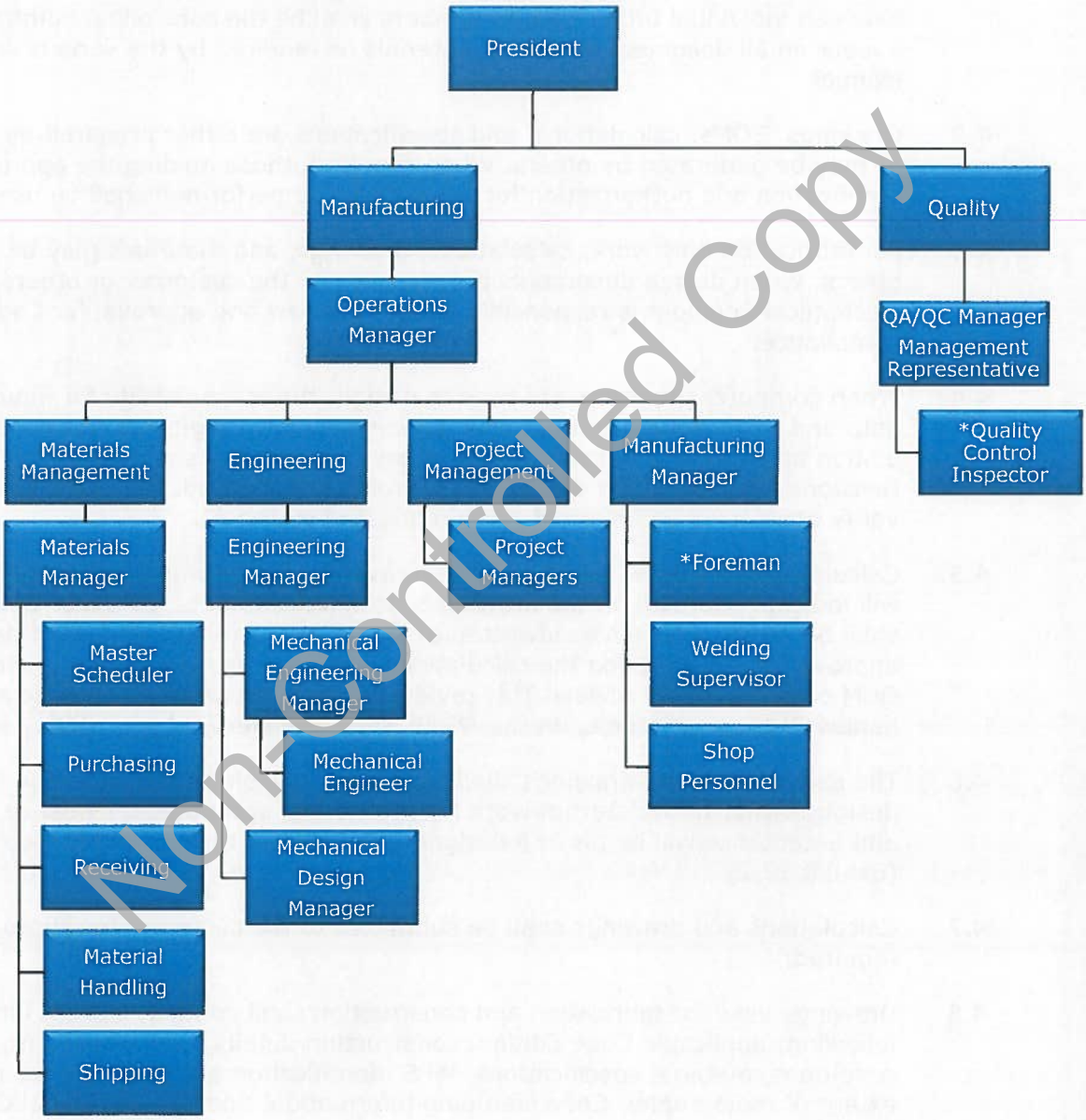
Integrated Flow Solutions
6461 Reynolds Road
Tyler, TX 75708

William Marsh
President

01/09/18
Date

3.0 ORGANIZATION

ORGANIZATIONAL CHART
(* Denotes shop/field function)



4.0 DRAWINGS, CALCULATIONS, AND SPECIFICATIONS

4.1 A job number shall be assigned by the company computer system for all new construction and for all repairs and alterations. The job number shall be included in the equipment's serial number and in the case of duplicate units for a job; appropriate and unique suffixes shall be assigned to the serial number to distinguish between individual units. These numbers shall be the controlling numbers and shall appear on all documentation and materials as required by the various sections of this Manual.

4.2 Drawings, BOMs, calculations, and specifications are either prepared by Engineering, or may be generated by others. When required, those holding the appropriate certification and authorization for the work to be performed shall be used.

4.3 For fabrication only work, calculations, drawings, and materials may be provided by others. When design documents are supplied by the customer or others, the Mechanical Engineer is responsible for their review and approval for Code compliance.

4.4 When computer programs are used in design, the responsibility for input of correct data and verification of output shall be controlled by Engineering. Prior to Code edition and addenda becoming mandatory, engineering shall perform a review of the revisions to determine if computer programs are affected. Alternative calculations to verify output will be provided when requested by the AI.

4.5 Calculations and drawings shall be reviewed for Code compliance by Engineering and will indicate approval on the drawing & design documents. Evidence of this approval shall be shown by their handwritten or electronic name or initials and date. Once approved by Engineering the calculations and drawings will be transmitted to the QCM or designee for review. This review will be indicated by signature and date, handwritten or electronic, on the ASME Shop Traveler (Exhibit 13.2).

4.6 The calculations and drawings shall be made available to the AI by the QCM or designee prior to the start of work for review and acceptance. Evidence of the review and acceptance will be his or her signature and date on the ASME Shop Traveler (Exhibit 13.2).

4.7 Calculations and drawings shall be submitted to the customer for approval, when required.

4.8 Drawings used for fabrication and construction shall contain, but not limited to, the following: applicable Code Edition, construction details, heat treatment, design conditions, material specifications, WPS identification and/or reference number, extent of radiography, Code stamping information, and any additional Code requirements.

4.9 The BOM (Exhibit 13.3) shall be a part of the construction drawings, prepared and approved by Engineering from design documents and shall include all Code ordering requirements for the material to comply with Section II and to any additional requirements of the fabrication Code using SA, SB material.

4.10 Engineering shall maintain the drawings, BOM, calculations, and specifications in the job file.

4.11 Once approved and accepted by Engineering, QCM or designee, and the AI, documents will be transmitted to the Foreman, QCI, and Purchasing for execution of work, as a minimum. Others will be issued the documents based upon the distribution set up at the start of the project. Questions by personnel shall be resolved with the Mechanical Engineer prior to start of fabrication.

4.12 Drawings, calculations, BOM, specifications, or any other documentation required, at field sites will be transmitted by Engineering. When received, the Foreman will Issue the new documents, destroy the old documents (if applicable).

4.13 Revisions to the drawings, BOM, or calculations are reviewed in the same manner as the originals. It is the responsibility of the Foreman or designee to pick up and destroy or mark "VOID" all superseded drawings.

5.0 MATERIAL CONTROL

5.1 The Mechanical Engineer defines material requirements on the BOM which is submitted to Purchasing to prepare Purchase Orders (Exhibit 13.5). He or she will also identify the need for material test reports or certificate of compliance. It is the responsibility of Purchasing to order the material based upon the BOM and any additional requirements that are specified (see section 17.0 of this Manual for material purchased in the field).

5.2 Purchasing is responsible for seeing that all the necessary information is stated on the PO. The PO must include all material requirements from the BOM and all documentation requirements, as specified by Engineering and the Code. A copy of the PO is placed in the job file for retention.

5.3 When purchasing vessel shell sections, heads or other pressure boundary parts of carbon or low alloy steel and/or austenitic material which are cold formed; the required certification for the part shall indicate whether or not the specific cold forming requirements of the referencing Code have been met.

5.4 No material substitutions of type, grade, or product form is allowed, unless approved by Mechanical Engineer and accepted by the AI. If approved and accepted, affected documents such as calculations and drawings shall be revised as described in section 4.0 of the Manual.

5.5 Code material is received and checked against the PO for quantity, condition and material markings by the receiving personnel. Once this check is completed the material is placed in a designated hold area and a notification will be sent to QC in order to allow for receiving inspection to be performed by a QCI for compliance. Material identification markings should consist of the following at minimum: material specification designation, grade or type, class (if applicable), heat number, and Job number.

5.6 If pipe or plate material is ordered to be cut by the supplier into specified lengths or sizes, the supplier shall mark the piece with their company name in addition to the complete identification markings from the manufacture.

5.7 The QCI will inspect Code material for compliance to the PO and the Code once notified of receipt by receiving personnel. This inspection shall include the quantity, dimensions, material identification, physical defects, required documentation including MTR's and/or material certificates.

5.8 Welding filler materials will be ordered by verbal request of the QCM, Welding Supervisor, or Foreman based upon the applicable requirements of the approved WPS and ASME SFA Specification and/or AWS Classification. The welding filler material will be inspected upon receipt, to ensure proper identification and check for broken containers and shipping damage. If containers are opened or damaged, they will be returned to the supplier for disposal and to be replaced. Storage of welding filler material shall be as described in section 8.0 of this Manual.

5.9 Material Test Reports (MTR) and/or material certificates shall be reviewed for PO and Code compliance to applicable material specifications in Section II by the QCM or QCI who will sign or initial and date the document reviewed when acceptable. These documents shall become part of the job file and be presented to the AI for review.

5.10 Acceptable material shall be moved from the hold area and properly stored in an area designated for the job. If materials are too small to be marked individually they shall be place in a container marked with the job and/or serial number and properly stored in an area or on a pallet designated for the job.

5.11 Unacceptable material shall be marked "NONCONFORMING" and a Nonconformance Report (Exhibit 13.6) shall be completed by the QCI or a disposition given. This material will be segregated from code acceptable material. Control of nonconformities will be as per section 7.0 of this Manual. Repairs to Code materials shall be referred to the AI for his or her acceptance of the method of repair prior to performing any repairs.

5.12 Code material will be issued to the Foreman only after a QCI has verified that it is acceptable and complies with the applicable Code and any other specified requirements.

5.13 Material traceability for pressure retaining pipe and miscellaneous parts shall be maintained by job number, material specification, and heat number. Material traceability for non-pressure parts may be maintained by material specification. A color code marking system (Exhibit 13.7) acceptable to the AI may be used on materials that will have their material identification obliterated by grinding or welding.

5.14 Couplings or similar parts that will have their material identification obliterated by grinding or welding shall be identified by stamping using a coded marking system or color code marking system (Exhibit 13.7) acceptable to the AI.

5.15 For pressure retaining pipe and plate products the job number, material specification, and heat number shall be transferred to subdivided pieces. A material map may be prepared providing the aforementioned information to allow for full traceability of the part.

5.16 Customer supplied material is received and inspected as described above. The customer's PO and required MTRs or material certificates shall be provided to the QCI for review and receiving inspection to ensure Code compliance.

5.17 Materials for field application are normally received in the shop and then shipped to the field. In some cases, materials may be shipped directly to the field. In this case, the QCI in the field shall perform all receiving inspections as mentioned above.

5.18 Material delivered to subcontractors for rolling and/or forming shall be marked or tagged with the job or serial number and any other required identifying number to permit traceability to MTR.

5.19 When further testing at receiving or during fabrication of materials is performed by other than material manufacturer, documents shall be obtained to determine that they meet the requirements of the material specification or Code. The QCM or designee is responsible for review of documentation for compliance with procedures and Code.

6.0 EXAMINATION AND INSPECTION

6.1 The QCM is responsible for ensuring that the required examination, inspection, and testing is in accordance with the applicable Code. The QCM is responsible for the Quality activities performed in the shop and in the field. The QCI is responsible for carrying out the Quality activities in the shop and in the field.

6.2 The QCM or designee shall prepare the ASME Shop Traveler (Exhibit 13.2) for each Code vessel prior to fabrication and present it to the AI with the applicable drawings and calculations for review and acceptance. All applicable examination and inspection points listed on the Traveler are mandatory for Quality Control. The Traveler provides space for the AI to assign inspection HOLD points as well, and his or her initials and date when inspections have been performed.

6.3 Prior to start of fabrication, the QCI will review ASME Shop Traveler with the AI to allow the assigning of his or her inspection HOLD points.

6.4 The AI's assigned inspection HOLD points may not be passed without his or her initial's and date as acceptable, or by obtaining a verbal waiver of a HOLD point and documenting such waiver on the Traveler indicating the person who received the waiver and the date.

6.5 Material identification including specification and heat number for pressure retaining parts shall be on the Traveler and the applicable drawing, and on the drawing for all other material. When material identification markings are located where they will be removed during fabrication or the material is subdivided into two or more pieces, the QCI shall verify transfer of the material identification prior to cutting or immediately thereafter. Alternatively, material shall be identified by using a coded marking system (Exhibit 13.7) acceptable to the AI, and traceable to the MTR or the material specification, when no MTR is required.

6.6 The QCI is responsible for monitoring fabrication operations and notifying the AI of approaching inspections HOLD points including pressure testing. It is also their responsibility to review all examination, inspection, and test records prior to presenting them to the AI for review and acceptance.

6.7 The fit-up of all weld joints prior to welding shall be examined by the QCI and, when acceptable, recorded on the Traveler and/or the applicable drawing. At this time, the QCI shall record all material identification, as built into the vessel, on the Traveler and/or the applicable drawing.

6.8 When internal inspections of a vessel cannot be made by entering the vessel after the final closure weld is made, a complete as possible examination shall be made prior to the final closure.

6.9 The QCI will perform a final inspection to ensure that all specified requirements have been met and documented. This final inspection will be performed prior to obtaining concurrence from the AI and pressure testing.

6.10 The QCI shall witness pressure tests at required pressure. The AI will also witness the pressure test and the use of proper gauges and other equipment. The pressure tests will be conducted per Code at minimum. After acceptance at the test pressure, the QCI and the AI will perform a close visual examination of all weld joints.

6.11 The QCM shall be responsible for the assignment of National Board registration numbers to vessels or parts at final testing when registration is specified. A log of National Board numbers used shall be generated and maintained so that there are no skips or gaps of used numbers or duplication of numbers. The log shall show the National Board registration number assigned, manufacturer's serial number, vessel type, date that the National Board registration number was issued, date that the Manufacturer's Data Report was certified, and the date that the National Board registration number was submitted to the National Board.

6.12 The assigned National Board registration number shall be documented on the appropriate control drawing by the QCM or designee in red ink.

6.13 The QCM or QCI shall prepare the appropriate Manufacturer's Data Report, if not already prepared by the Mechanical Engineer. After ensuring its accuracy and completeness, the QCI shall place his or her signature on the Manufacturer's Data Report representing certification of the vessel or part. After the report has been signed by the QCI, it will be presented to the AI for review and signature (final certification) once he or she is satisfied the vessel or part is in compliance with the Code. The QCM or designee will submit the Manufacturer's Data Report to the National Board for each vessel or part either by mail or by the use of the National Board's Electronic Data Transfer (EDT) system. This will be executed in a manner to ensure that the submittal for National Board registration is within 30 days of final certification.

6.14 The QCM or designee is responsible for the correctness of the nameplate (Exhibit 13.8 Typical Nameplate) stamping or stamping on the vessel or part as specified on the drawing and application of the Certification Mark. This process shall be reviewed by the AI and recorded on the ASME Shop Traveler as evidence of acceptance of the stamping and Certification Mark application to the proper vessel or part. For Section I items, the Code symbol shall be applied in the presence of the AI.

6.15 Certification Marks will be in the custody and control of the QC Department. The Certification Mark may be applied to the nameplate, vessel, or part, however only with the concurrence of the AI.

7.0 CORRECTION OF NONCONFORMITIES

7.1 General

7.1.1 Nonconformities are any condition which does not comply with the applicable rules of the Code, this Manual, or any other specified requirements. Nonconformities must be corrected before the completed component can be considered to comply with the Code.

7.1.2 It is the duty of all employees to report nonconformities to their supervisor, who notifies a QCI immediately after the nonconformity is found.

7.1.3 When nonconformities are discovered, the QCI shall verify the condition and identify the nonconforming part by marking or tagging "NONCONFORMING". The nonconforming item shall be moved to a segregated hold area, when feasible, or controlled in a manner as to prevent the unintended use of and delivery to the customer until disposition for processing is complete. This "NONCONFORMING" marking or tag may only be removed by the QCI or QCM after disposition or correction of the nonconformity.

7.1.4 The QCI shall conduct a nonconforming material review, including other functions needed to determine if the nonconformance is valid. If the nonconformance is valid, disposition of the item is to be identified and recorded on a NCR (Exhibit 13.6). If the nonconformance is not valid, the item shall be returned to its intended processing.

7.1.5 The QCI is responsible for obtaining approvals for the disposition of nonconforming items.

7.1.6 Disposition of nonconforming items may be one of the following:

- Use As Is (UAI) – The nonconformance is of a very minor nature such as cosmetic, minor form discrepancies etc. that will not prevent the part from meeting the intended use and performance specifications. This disposition requires the internal authority and/or customer (if required) for approval.
- Rework or Repair (RW) – The nonconforming item can be corrected in such a manner that the finished material meets all specification requirements. This disposition requires review and acceptance by the AI along with internal authority and/or customer (if required) for approval.
- Return to Supplier (RTS) – The item does not meet the requirements of the Purchase Order and may be returned to the supplier for disposition.
- Scrap (Scrap) – The item is not usable for its intended purpose. The item must be marked, altered, or segregated, in such a way that it cannot be inadvertently used or sold while in storage, and disposed of appropriately.

7.2 Correction of Nonconformities

7.2.1 After the QCI has verified the nonconformity is valid and a NCR, including the disposition and required signatures for approval, has been generated, a Nonconformance tag shall be placed on the item containing, at minimum, item number, item description, job number, NCR number, and description of the disposition.

Note: Some or all nonconformities found during in-process fabrication may be reworked in order to achieve conformity without being reported as a nonconformance.

7.2.2 The Nonconformance report with approved disposition shall be presented to the AI for acceptance prior to disposition being executed and for the insertion of any inspection HOLD points he or she requires.

7.2.3 When the disposition has been identified to be "Use as Is", the reasons for accepting this disposition is stated by the QCM or QCI on the NCR and submitted to the AI for concurrence and acceptance. Any required revisions to drawings, calculations, or other required documents, as a result, are made as described in Section 4.0 of this Manual, with the same approvals as the original.

7.2.4 When the disposition has been identified as "Rework or Repair", the QCM or QCI records the rework or repair procedure on the NCR and presents it to the AI for review, acceptance, and designation of inspection HOLD points prior to start of rework or repair.

7.2.5 When the rework or repair is completed, the Foreman will notify the QCI to allow for inspection and acceptance of work performed.

7.2.6 The QCI shall be responsible for all inspection of rework or repair of the nonconforming item. When the inspection reveals that the rework or repair is acceptable, the AI will be notified that completion of the disposition has been accepted to allow for inspection, if required. The AI will be presented with the NCR for his or her review and acceptance.

7.2.7 If found to be acceptable by the AI, the QCI will remove the "NONCONFORMING" marking or tag and releasing the item back into production. Only the QCM or QCI may remove the "NONCONFORMING" markings or tags from items.

7.2.8 When the disposition has been identified as "Scrap or Return to Supplier", the QCM or QCI is required to verify that the item has been removed from the work area, and clearly marked to prevent inadvertent use prior to disposal or return. This verification is to be documented on the NCR.

7.2.9 Completed NCR shall be endorsed by the AI and the QCI indicating acceptance and closure. The completed NCR shall be filed in the Job File and noted on the Traveler as closed. It is the responsibility of the QCI to obtain the endorsements required as evidence of resolution.

7.2.10 Welding discontinuities determined by NDE to be unacceptable by Code are not documented on a NCR; however, the discontinuity found will be repaired and re-inspected by the original NDE used to detect the discontinuity.

8.0 WELDING CONTROL

8.1 General

8.1.1 All welding, including tack welding, on Code items will be performed using approved Welding Procedure Specifications (WPS) and Welders/Welding Operators conforming to the requirements of Section IX and the Code section applicable to the scope of work to be performed.

8.1.2 The Welding Supervisor or Foreman and designated QCI shall supervise Welders/Welding Operators in the performance of their qualification test under the control of the QCM. The required test specimens may be mechanically prepared and tested in house, by a testing laboratory, or radiographed as permitted in Section IX. Results of the examination will be reviewed for Code compliance by the QCI and Welding Supervisor. The QCI or Welding Supervisor shall generate the WPQ test record and certify it with signature and date.

8.1.3 The QCM or designee shall assign each Welder/Welding Operator a unique identification symbol to identify welds he or she has made. Welds shall have the Welder/Welding Operator unique identification symbol stamped adjacent to the weld at intervals of not more than 3 feet. If impression stamping is not permitted, or in lieu of, a weld map may be used to record the unique symbol for each weld or the weld may be marked using a marker.

8.1.4 The QCM or designee will maintain a list of qualified Welders/Welding Operators indicating the processes and variables for which he or she is qualified. A current copy of this list will be made available to the Welding Supervisor and Foreman.

8.1.5 Continuity of Welder/Welding Operator qualifications will be maintained by the QCM with the assistance of the QCI and Welding Supervisor. Each active qualified Welder/Welding Operator will be listed on the Bulk Continuity Report (Exhibit 13.9) indicating the date on which the Welder/Welding Operator was last witnessed welding in each process qualified. This report will be generated approximately every three months by the QCM or designee and given to the Welding Supervisor or QCI for recording of welding activities witnessed to maintain continuity. Once completed the report will be return for record and input into the system. Welding activities to maintain continuity shall be witnessed by the Welding Supervisor and/or QCI.

8.1.6 Welders/Welding Operators shall be re-qualified when one of the following occurs:

- A change in a performance essential variable
- They have not welded with a process for more than six months
- When there is reason to question their ability to make sound welds.

8.1.7 It is the responsibility of the QCI, Welding Supervisor and/or Foreman to ensure that the Welders/Welding Operators are qualified to perform the welding activity assigned.

8.1.8 The QCM or designee shall prepare WPSs for the shop and field. WPS's will be revised when there is a change in a nonessential variable. Copies of WPSs, PQRs and WPQs shall be available to the AI for review.

8.1.9 Copies of approved WPSs for each job will be provided to the Foreman, Welding Supervisor, QCI, and Welders/Welding Operators. The Foreman and Welding Supervisor are responsible for ensuring that the Welder/Welding Operator maintains a copy of the WPSs at their work station for the work that is being executed.

8.1.10 When procedure qualification is required due to a change in an essential or supplementary essential variable a procedure qualification test will be prepared. Qualification test coupons are to be welded under the supervision of the Welding Supervisor, Foreman, and/or a QCI. All required variables are to be recorded during welding. The preparation and testing of the specimens will be performed in accordance with Section IX and the applicable Code section by an outside testing laboratory. The report prepared and submitted by the laboratory documenting the testing performed shall be reviewed by the QCM for Code compliance. If acceptable, a PQR will be prepared and certified by the QCM or designee.

8.1.11 In-house tack welds shall be made by a qualified Welder/Welding Operator using an approved WPS. If tack welds are to be incorporated into the final weld they shall be feather edge ground and visually inspected prior to inclusion in the final weld. Defective tack welds will be removed before welding by grinding or carbon arc gouging. Subcontractor's tack welds shall be made using a company approved WPS or the subcontractor's WPS may be used after review and acceptance by the QCM or designee. Subcontractor's tack welds shall be removed.

8.1.12 Welding filler materials shall be ordered and received as required in the material control section 5.0 of this Manual. Materials are to be stored in a dry area until opened for use.

8.1.13 Electrodes, cut or spooled wire shall be issued by the Welding Supervisor or Foreman. Welders/Welding Operators are not to draw material from the storage area without the presence of the Welding Supervisor or Foreman.

8.1.14 Welders/Welding Operators shall be issued electrodes, cut wire, or spooled wire only for their own use and only those materials for use under one welding procedure at a time. He or she shall not draw multiple types of electrodes unless required by the welding procedure.

8.1.15 Bare spooled wire and cut wire shall be stored in the original containers until issued to the Welder/Welding Operator for use by the Welding Supervisor or Foreman. Spool wire not completely used-up shall be covered and left on the wire feeder or removed and returned to the storage area at the end of each shift.

8.1.16 Once issued, bare cut wire shall be kept in the factory container or tube at the Welder station until needed for use. Wire should be withdrawn one at a time so as not to lose heat/lot traceability. Any unused portions of tubes shall be returned to the storage area at the end of the shift.

8.1.17 Low hydrogen covered electrodes shall be stored in heated ovens maintained in accordance with Section II Part C or as recommended by the manufacturer once the container is opened.

8.1.18 Low hydrogen covered electrodes are issued for a maximum of 4 hours use, after which, or at completion of welding or shift, they are returned or scrapped. Returned electrodes are examined for condition, cleanliness and identification prior to placing them into a segregated return holding oven for a

minimum of 8 hours before re-issue. Unidentified, damaged or dirty electrodes are scrapped.

8.1.19 All records referenced in this section are available for review by the AI who may request at any time the re-qualification of a WPS or Welder/Welding Operator.

8.2 Added Welding Requirements

8.2.1 Welders/Welding Operators not in the employment of IFS may be used to weld components provided all of the following conditions are met:

- All Welders/Welding Operators shall be qualified by IFS per 8.1 above.
- All Welders/Welding Operators shall be assigned a unique identification symbol by IFS.
- All welding shall be in accordance with IFS welding procedures.
- All Welders/Welding Operators shall be completely and exclusively administered and technically supervised by IFS.
- IFS shall have the authority to assign and remove Welders/Welding Operators without the involvement of any other organization.
- All Code construction is the responsibility of IFS.

8.2.2 WPSs and PQRs of acquired companies may be utilized without requalification provided:

- IFS reviews the WPS and PQR for Code compliance and takes responsibility by the QCM signing and dating acknowledgement of the review.
- The documents reflect the name of IFS as the new owner.

8.2.3 Welders/Welding Operators performance qualifications of acquired companies may be utilized without re-qualification provided:

- IFS reviews the qualification records for Code compliance and takes responsibility by the QCM signing and dating acknowledgement of the review.
- The qualification records reflect the name of IFS as the new owner.
- The WPQ reflects the name of the company who gave the test.

9.0 NONDESTRUCTIVE EXAMINATION

9.1 NDE required by Code is performed by IFS or a qualified NDE subcontractor.

9.2 The types of NDE methods used shall be Visual (VT), Radiographic (RT), Ultrasonic (UT), Magnetic Particle (MT), and Liquid Penetrant (PT). All methods NDE shall be performed using written NDE procedures. The procedures shall be detailed enough to provide the technique to be used to meet the requirements of the construction Code and Section V, as applicable, including equipment calibrations.

9.3 The QCM will appoint a NDT Level III by letter. The appointed NDT Level III will provide a letter of acceptance to act as the company NDT Level III for VT, RT, UT, MT, and PT.

9.4 IFS may perform VT, MT, and PT NDE methods. A qualified NDE subcontractor will perform VT, RT, UT, MT, and PT methods.

9.5 When applicable, an in house MT or PT procedure shall be prepared and certified, by the appointed NDT Level III, in accordance with the applicable Code.

9.6 When applicable, the in house personnel responsible for performing MT or PT for the applicable Code work shall be qualified and certified in accordance with the company written practice for NDE Personnel training, qualification, and certification which shall use the recommended practices of SNT-TC-1A, latest accepted Code Edition.

9.7 The NDE subcontractor's written practice shall contain provisions for training, experience, qualification, and certification using SNT-TC-1A, latest accepted Code Edition/Addenda. This written practice, the certification and examination records of personnel shall be reviewed by the QCM or designee for acceptance.

9.8 The NDE subcontractor's NDT Level III qualifications, certifications, and written practice for certification of personnel shall be reviewed by the QCM or designee for acceptance.

9.9 NDE personnel qualification records will be made available for review by the AI who may request re-qualification if he or she has reason to question their ability to perform the examination.

9.10 All NDE procedures will be demonstrated to the satisfaction of the AI who may request re-qualification. The written NDE procedures will be made available for review by the AI.

9.11 At any time, and with or without cause, the AI may request a demonstration of NDE procedures to his or her satisfaction.

9.12 All NDE to be performed shall be documented on a NDE Work Order (Exhibit 13.10) specifying the work to be performed, including all details.

9.13 NDE performed by a subcontractor shall be at the direction of the QCI.

9.14 The QCI shall verify the follow prior to and during the performance of NDE:

- Personnel performing NDE are properly qualified for the NDE method being performed.
- Calibration of equipment is current.
- Approved procedures are being used.

9.15 NDE reports, including radiographic film, shall be evaluated, interpreted, and accepted by a Level II or III. All reports of NDE, including radiographic film, shall be reviewed and accepted, by the QCI, prior to making them available to the AI for his or her acceptance. Radiographic film viewing facilities and density comparing equipment shall be made available at the time of review of film by the QCI and the AI.

9.16 NDE records including RT film shall be retained as per paragraph 12.4 of this Manual.

10.0 HEAT TREATMENT

10.1 When heat treatment of an item is required by Code or the specification, the requirements will be indicated in the "Design Data" section of the drawing. Heat treatment will be performed in accordance with written procedures.

10.2 Heat treatment will be performed by a subcontractor either in the shop, at the field site, or at subcontractor's location.

10.3 A heat treatment procedure shall be prepared the by QCM or designee and approved prior to performing any heat treating. If a subcontractor's heat treating procedure is to be used it shall be reviewed and accepted by the QCM or designee. The procedure shall include the following at a minimum:

- Method of heating and cooling
- Temperature gradients for heating and cooling
- Thermocouple placement and method of attachment
- Time and temperature of heat treatment hold period
- Any additional requirements for heat treatment
- Required records

10.4 The QCM shall review and accept the heat treatment procedure and the subcontractor's controls, recording equipment to be used, and calibration records (see section 11.0 of this Manual for calibration frequency) to ensure Code compliance before placement of an order.

10.5 Items to be heat treated shall be tagged with a metal tag or stamped with the job and/or serial number and any other required identifying numbers. This identification shall be recorded on a Heat Treatment Work Order Form (Exhibit 13.4) along with other information required by the form prior to heat treatment, or shipment to the subcontractor location for heat treatment. Upon return, of items sent to subcontractor location for heat treatment, the QCI shall inspect the items for identification, distortion, and shipping damage.

10.6 The subcontractor shall provide the company with records of heat treatment. These records shall be signed and dated by the operator or subcontractor's personnel and shall consist of the following:

- Heat treatment charts which shall include the date
- Job and/or serial number of the item or items
- Identification of the procedure used
- Evidence of current calibration of temperature recorders
- The number and location of thermocouples

10.7 The QCI shall review heat treatment charts and documentation for compliance with the procedure and the Code, and indicate this review and acceptance by initials, and date of the records. Unacceptable items will be handled per section 5.0 of this Manual, acceptance of items will be recorded on the Traveler.

10.8 The heat treatment charts, written procedures and calibration records shall be made available to the AI for his or her review and acceptance.

11.0 CALIBRATION AND TESTING

11.1 All equipment used for inspection and testing operations shall be handled and stored in a manner that will not jeopardize their intended functional characteristic. Such equipment includes, but is not limited to, pressure test gauges, micrometers, and calipers. Any damaged equipment shall be removed from service and discarded or repaired.

11.2 It is the responsibility of the QCM or designee to ensure calibration records are maintained for equipment used on Code items. Records will be made available to the AI for his or her review at any time.

11.3 All measuring and test equipment used on Code items shall be identified by a unique number or serial number. This identification shall be reflected in the calibration data recorded on the Calibration Schedule (Exhibit 13.11) for pressure test gauges and measuring equipment.

11.4 All pressure test gauges used in the testing of Code items shall be calibrated annually. However, gauges shall be recalibrated at any time there is reason to believe they are in error. Gauges shall be calibrated with a standard dead weight tester or calibrated master gauge.

11.5 Measurement devices, such as micrometers and calipers, shall be calibrated any time there is reason to believe they are in error. Calibration shall be in accordance with the manufacturer's recommended procedures or to a known standard traceable to NIST or other equivalent nationally recognized standard.

11.6 In house NDE equipment shall be calibrated, when required, in accordance with the NDE procedures.

11.7 The calibration of subcontractor's equipment is the responsibility of the subcontractor and shall be monitored by the QCM and/or QCI.

11.8 Heat treatment temperature recorders shall be calibrated annually at minimum.

12.0 RECORD RETENTION

12.1 Records generated as a result of inspection, examination, fabrication, procedures, etc., are a part of basic communication and documentation for Quality Control. They provide objective evidence of the Quality of operations and the appropriate action taken. These records also provide management with the information needed to analyze Quality performance. While a job is in progress, it is the responsibility of the QCI to maintain associated records in the job file.

12.2 It is the responsibility of the QCM to see that job files are maintained for the required period of retention.

12.3 Manufacturer's Data Reports shall be prepared by the QCM or designee for shop and field work. Manufacturer's Data Reports shall be certified by the QCM or QCI.

12.4 Documents required by Section VIII, Division 1, Appendix 10, paragraph 10.13 shall be maintained by the QCM for a minimum of three years.

12.5 A copy of all Section I Manufacturer's Data Reports (not registered with the National Board), are to be maintained for a minimum of five years. For Section I, radiographic film and UT reports shall also be maintained for a minimum of five years.

12.6 The AI will be provided with a complete job file at the time he or she has been requested to certify the Manufacturer's Data Report.

12.7 Distribution of Manufacturer's Data Reports is the responsibility of the QCM and shall be as follows:

- If National Board registered, the original shall be submitted to the National Board within 30 days of certification date.
- One copy for company files
- One copy to the Owner/End User
- If requested, one copy to AI

13.0 SAMPLE FORMS

13.1 EXHIBITS

- 13.1 QC Manual Issue Log
- 13.2 ASME Shop Traveler
- 13.3 BOM (Bill of Materials)
- 13.4 Heat Treatment Work Order Form
- 13.5 Purchase Order
- 13.6 Nonconformance Report
- 13.7 Material Color & Stamp Coding Chart
- 13.8 Vessel Nameplate
- 13.9 Bulk Continuity Report
- 13.10 NDE Work Order
- 13.11 Calibration Schedule
- 13.12 Repair/Alteration Plan
- 13.13 Repair Log
- 13.14 Vessel Processing Flow Chart

EXHIBIT 13.1 QC MANUAL ISSUE LOG

QC MANUAL ISSUE LOG

MANUAL No.	EDITION No./Rev.	DATE ISSUED	ISSUED TO (TITLE)	SIGNATURE
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

EXHIBIT 13.2 ASME SHOP TRAVELER 1 OF 2

	ASME Shop Traveler (Exhibit 13.2)	QF-17-05
	Reviewed by: Carrie Hopkins / Approved by: Kevin Tuohy	

JOB No._____ DATE _____ REV. # _____ A.I. REV. # _____ NB # _____

ITEM # _____ SERIAL # _____ DWG. # _____ REV.# _____

MAWP _____ EXT. _____ MAX. TEMP. _____ MDMT _____

SPECIAL SERVICE (L,UB,LT) YES ☐ NO ☐ IMPACT TESTS REQUIRED YES ☐ NO ☐

DWG'S. & CALC'S REVIEWED BY ENG. _____ DATE _____

DWG'S. & CALC'S REVIEWED BY QC _____ DATE _____

DWG'S. & CALC'S REVIEWED BY A.I. _____ DATE _____

MATERIAL INSPECTION	QC/DATE	A.I./DATE
2. Mill Test Reports Reviewed		
3. Plate: Specification, Grade & Thickness		
Surface and edge condition		
4. Pipe: Specification, Grade & Thickness		
Surface and edge condition		
5. Heads: Specification, Grade, & Thickness		
Surface and edge condition		
UCS-79(d) requirements met		
6. Reinf. Pads: Spec.		
Size		
Thickness		
7. Flanges: Spec.		
Rating		
Bore		
Slip-on Flg. gap		
8. Partial Data Reports Reviewed		
FABRICATION INSPECTION	**QC/DATE**	**A.I./DATE**
9. Shell size (match heads) (bevels)		
10. Out of Roundness		
11. Edge off-set long. and girth seams		
12. Nozzle fit-ups		
13. Qualified Weld Proc.'s / Welder's I.D.		
14. Internal welds - size and appearance		
15. External welds - size and appearance		
16. Preheat requ'd. Yes ☐ No ☐ Chkd by:		
17. PWHT requ'd. Yes ☐ No ☐ Chkd by:		
18. PT ☐ MT ☐ testing required Chkd by:		
19. Extent of Radiography - RT1 ☐ RT2 ☐ RT3 ☐ RT4 ☐ None ☐ No. of Films:		
RT Int. by: Rev'd and Acept'd		
20. Internal Cleanliness		
21. Hydro ☐ Pneu ☐ Test PSIG Witnessed		
22. Nameplate stamping and application		
23. Mfr.'s. Data Report certified		
A.I. Hold Points indicated by number here →		

EXHIBIT 13.2 ASME SHOP TRAVELER 2 OF 2

	ASME Shop Traveler (Exhibit 13.2)	QF-17-05
	Reviewed by: Carrie Hopkins / Approved by: Kevin Tuohy	

JOB NO.: _____ **SERIAL #** _____

DRAWINGS, WELD PROCEDURES, & HOLD POINTS
REVIEWED BY QC _____ **DATE** _____
REVIEWED BY FABRICATION _____ **DATE** _____

			LONG. FIT-UP		LONG. WELD	
COURSE	MATERIAL	HEAT #	QC/DATE	A.I./DATE	QC/DATE	A.I./DATE
1						
	SERIAL #					
2						
	SERIAL #					

	QC/DATE	A.I./DATE
Verification of Serial Number Stamping/Etching on Shell		

	GIRTH FIT-UP		GIRTH WELD	
COURSE	QC/DATE	A.I./DATE	QC/DATE	A.I./DATE
1-2				
2-3				

			HEAD TO SHELL FIT-UP		HEAD TO SHELL WELD	
HEAD	MATERIAL	HEAT #	QC/DATE	A.I./DATE	QC/DATE	A.I./DATE
1						
	SERIAL #					
2						
	SERIAL #					

			NOZZLE FIT-UP		NOZZLE WELD	
NOZZLE #	MATERIAL	HEAT #	QC/DATE	A.I./DATE	QC/DATE	A.I./DATE

NOTES:

EXHIBIT 13.3 BOM (BILL OF MATERIALS)

BILL OF MATERIALS

MTR'S	ITEM	MARK	QTY	SIZE	DESCRIPTION	LENGTH	MATERIAL
	HEAT NUMBER					QC APPROVAL	
*	1	–	1	8"	PIPE, NPS, S/STD, SMLS	1'–9 1/8 "	SA–106B
*	2	–	2	8"	PIPE CAP, S/STD	–	SA–234 WPB
*	3	N1,2	2	2"	HALF CPLG 3000# THRD.	–	SA–105
*	4	–	1		PL 2 3/16 X 1/4	6"	SA–36
*	5	–	1		PL 7" X 1/4	9 1/4"	SA–36
*	6	–	2		PL 1/4 X 7 1/2 X 3 5/8	7 1/2"	SA–36
*	7	–	2		PL 1/4 X 8 X 2	8"	SA–36

EXHIBIT 13.4 HEAT TREATMENT WORK ORDER FORM

Heat Treatment Work Order Form

HT REQUEST NUMBER		DATE	
JOB. #	CUSTOMER	PAGE	
MATERIAL TYPE/GRADE(S)			
LOCATION OF PWHT			
TYPE OF HEAT TREATMENT:	LOCAL (ELECTRIC)	FURNACE	
GOVERNING CODE (ASME)			
HEATING RATE (CALCULATED)		MIN. HOLD TIME	
MIN. HOLD TEMP.		MAX. HOLD TEMP.	
COOLING RATE (CALCULATED)			
TYPE (VESSEL, PIPE)			

This form is to be filled out by Quality personnel or Engineer. Items on this list are verified *by the* operator or other authorized personnel. Thermocouple placement for vessels shall be in accordance with ASME Section VIII, UW-40.

ITEM #	PART / PIECE NUMBER	ITEM #	PART / PIECE NUMBER
1		21	
2		22	
3		23	
4		24	
5		25	
6		26	
7		27	
8		28	
9		29	
10		30	
11		31	
12		32	
13		33	
14		34	
15		35	
16		36	
17		37	
18		38	
19		39	
20		40	

EXHIBIT 13.5 PURCHASE ORDER

INTEGRATED FLOW SOLUTIONS

Purchase Order

Integrated Flow Solutions, LLC
P. O. Box 7095
6461 Reynolds Road (75708)
Tyler TX 75711
Phone: +1.903.595.6511

Order No.: 2052077
Order Date: 12/12/2017
Vendor PO:
Buyer: JanisBalusek
Ship Via: Delivered
Freight Terms: SHIPPING POINT

Vendor:

Tyler Industrial Supply
P.O. Box 120267
Tyler TX 75712
Phone: 903/592-1516

Deliver To:

Integrated Flow Solutions
6461 Reynolds Road
Tyler TX 75708

REFERENCE THIS ORDER ON ALL PACKING LISTS, INVOICES & CORRESPONDENCE

No.	Item	Description	Quantity	U/M	Due Date	Price	Net Amount
1	SAMPLE,VESSEL NOTES		1.000	Ea	12/12/2017	0.00000	0.00 US

ALL MATERIALS SHALL COMPLY WITH THE FOLLOWINGCODES AND STANDARDS AS APPLICABLE
A.) ASME B16.5,
B.) ASME B16.9,
C.) ASME B16.11,
D.) Mill Test Report Required unless noted
E.) Certificate of Compliance Required,
F.) All Pipe cut into subdivided sections by the Supplier shall have the complete identification transferred including the name or brand of the manufacturer to each unmarked section, The supplier shall also add their company name or brand to the marking.
G.) Certification IAW ASME VIII, Division 1, UG-80 (Rolled Shells), UG-81 (Formed Heads),
H.) Certification IAW ASME VIII. Division 1, UCS-79 and/or UCS-85, All API Steel must meet ASTM 36 Requirements
I.) Certification IAW ASME I, PG-80 or PG-81
J.) Partial data reports for pressure vessel parts requiring inspection under ASME Sect. VIII, Div.1 shall be furnished by such parts' manufacturer. Form U-2 or form U-2A for such parts shall be forwarded, in duplicate to IFS. These parts Include: Formed Heads, Rolled Plates, Quick opening closures, or any other part designed, constructed and inspected under ASME Section VIII, Div.1
K.) For Additional Inspection and Documentation Requirements see " ITP" Inspection and Test Procedure - ITP-2xxxx-01

Order Instructions:

EXHIBIT 13.6 NONCONFORMANCE REPORT

	Nonconformity Report	QF-12-04
	Reviewed by: Carrie Hopkins / Approved by: Michael Roberts	

Job No. _____ Date _____ NCR No. _____
Issued to: _____ Initiator Name _____ Position _____
Nonconformity identified during: ☐ Audit ☐ Process: ☐ Engineering ☐ Receiving ☐ Production ☐ Inspection ☐ Field

Description of Nonconformity:

Disposition:
☐ Use As Is ☐ Return to Supplier ☐ Rework or Repair ☐ Scrap ☐ Other:

Disposition Approval:

☐ IFS Quality Representative	☐ IFS Management	☐ Third Party Inspector
Signature _____	Signature _____	Signature _____
Date _____	Date _____	Date _____

Rework or Repair Instructions (as applicable):

Inspection after completion of Rework or Repair for Approval:

☐ IFS Quality Representative	☐ IFS Management	☐ Third Party Inspector
Signature _____	Signature _____	Signature _____
Date _____	Date _____	Date _____

Group Responsible for Re-Work:

Engineering	Materials	Shop	☐ QC	☐ Sales	☐ Vendor
☐ PM ☐ EE ☐ PE ☐ ED ☐ ME ☐ IE ☐ MD ☐ DC	☐ Receiving ☐ Purchasing	☐ Fabrication ☐ Blast/Painting ☐ Assembly ☐ Electrical			Name _____ P.O. No. _____

Estimate Hrs./Cost for Re-Work (reserved for Management):
Engineering: _____ Hrs. Production: _____ Hrs. Material: $ _____ Total Cost: $ _____

Corrective Action (reserved for Management):
Corrective Action Required ☐ Yes ☐ No
Corrective Action Number Issued: _____

EXHIBIT 13.7 MATERIAL COLOR & STAMP CODING CHART

MATERIAL COLOR & STAMP CODING CHART

The following color coding and stamping may be used on all miscellaneous parts that are pressure retaining or non-pressure retaining. When used such materials will then be identified as follows:

Miscellaneous Parts Color Code

Color	No Color	Yellow	Blue	Gray	Orange	Green	Purple
P No.	P1	P1 (LT)	P3	P4	P5A	P5B (5Cr)	P5B (9Cr)
Nom. Chem.	CS	CS (Low Temp)	C-1/2Mo	1 1/4Cr-1/2Mo	2 1/4Cr-1/2Mo	5Cr-1/2Mo	9Cr-1Mo
Material	SA105	SA333 Gr 6	SA204 A	SA182 F11	SA182 F22	SA182 F5	SA182 F9
	SA36	SA350 LF2	SA234 WP1	SA335 P11	SA335 P22	SA335 P5	SA335 P9
	SA106 B/C	SA420 WPL6	SA335 P1	SA381 11	SA387 22	SA387 5	
	SA234 WPB						
	SA516						

Note:
Stainless steel and nickel materials shall not be painted. They shall have their material information transferred using a marker having low chlorides (< 50ppm).

Couplings and Similar Parts Stamping

Identification stamping when manufacturer's material information markings will be or is obliterated by grinding or welding:

Rating	P No.	Material Spec	Stamp
3000#	P1	SA105	A
6000#	P1	SA105	B
3000#	P1 (LT)	SA350 LF2	C
6000#	P1 (LT)	SA350 LF2	D
3000#	P3	SA234 WP1	E
6000#	P3	SA234 WP1	F
3000#	P4	SA182 F11	G
6000#	P4	SA182 F11	H
3000#	P5A	SA182 F22	I
6000#	P5A	SA182 F22	J
3000#	P5B (5Cr)	SA182 F5	K
6000#	P5B (5Cr)	SA182 F5	L
3000#	P5B (9Cr)	SA182 F9	M
6000#	P5B (9Cr)	SA182 F9	N

Note:
The above system may be used in addition to the specification already stamped on the materials.

EXHIBIT 13.8 VESSEL NAMEPLATE (TYPICAL NAMEPLATE)

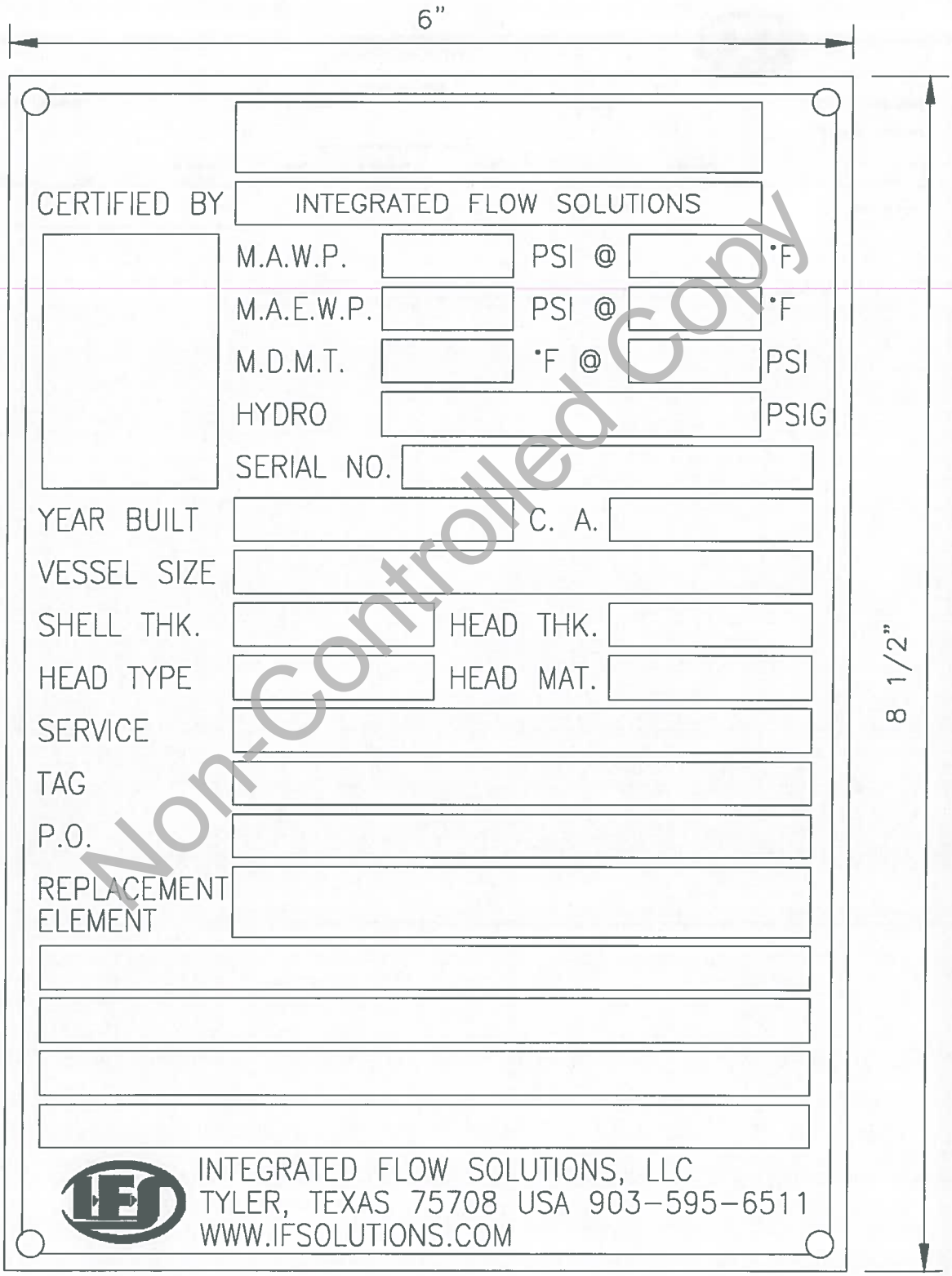


EXHIBIT 13.9 BULK CONTINUITY REPORT

INTEGRATEDFLOWSOLUTIONS
6461 REYNOLDS RD.
TYLER, TEXAS 75708

Bulk Continuity

Report Date: Discipline: Location: Sorted By: **Welder Name**

Generated: 12/13/2017 Page 1 of 1

A struck out date indicates an expired process.

Process	Expiration Date(s)	Weld Date	Inspection Type	Inches Inspected	Inches of Defect	Job	Witnessed By
Welder Name:	Stamp Number:						

Certified by: _____ _____ Quality Assurance
Date

EXHIBIT 13.10 NDE WORK ORDER

INTEGRATED FLOW SOLUTIONS

NDE WORK ORDER

DATE:_____ ORDERED BY:_____

CUSTOMER: IFS
CODE: ASME Section IX
SERVICE: Welder Qualification
(normal fluid, severe cyclic etc.)

REV.	SPOOL NO.	WELD	WELD STAMP	DIA.	SCH	REP RS NW	RT%	RT	MT	PT	BN	NOTES
ex.	Welders Name GTAW 2.5" 6G	WQ	O	2.5"	.625"	NW	-	X				Welder Qual.

EXHIBIT 13.11 CALIBRATION SCHEDULE

Calibration Schedule

QF-06-01

Reviewed by: Virgimar Soto | Approved by: Carrie Hopkins

Today's Date 8/9/2016

Calibration Due Date: due within 45 days | Calibration Due Date: Expired | Location: Out for Calibration

ID NUMBER	DESCRIPTION	RANGE	BRAND	MODEL[1]	SERIAL[2]	CALIBRATION INTERVAL[3]	LAST CALIBRATION DATE	LAST CALIBRATION BY	CALIBRATION DUE DATE	LOCATION	COMMENTS
example	*Pressure Gauge*	*0-15 PSIG*	*Wika*	*NMN*	*NSN*	*Annualy*	*8/1/2016*	*IFS*	*8/1/2017*	*QC*	*Removed from Service*

Notes:
1. NMN denotes no model number
2. NSN denotes no serial number
3. Indicate Time Based (6 months, Annualy, etc.), Prior to Use, or Reference Only

QF-06-01 Calibration Schedule | Rev.: 2 | Issue Date: 08/05/2016 | Page 1 of 1

EXHIBIT 13.12 REPAIR/ALTERATION PLAN

REPAIR/ALTERATION PLAN

Plan No.: _____ Date: _____ ☐ Repair ☐ Alteration

NBIC _____ Edition _____ Addenda

Original Mfr.: _____ Serial No.: _____ NB No.: _____ Yr. Built: _____

Description of work to be performed:

Jurisdictional approval required: ☐ Yes ☐ No Verified by: _____ Date: _____

Acceptance of Plan:

	Quality Representative	Customer Representative	Authorized Inspector
Signature			
Date			

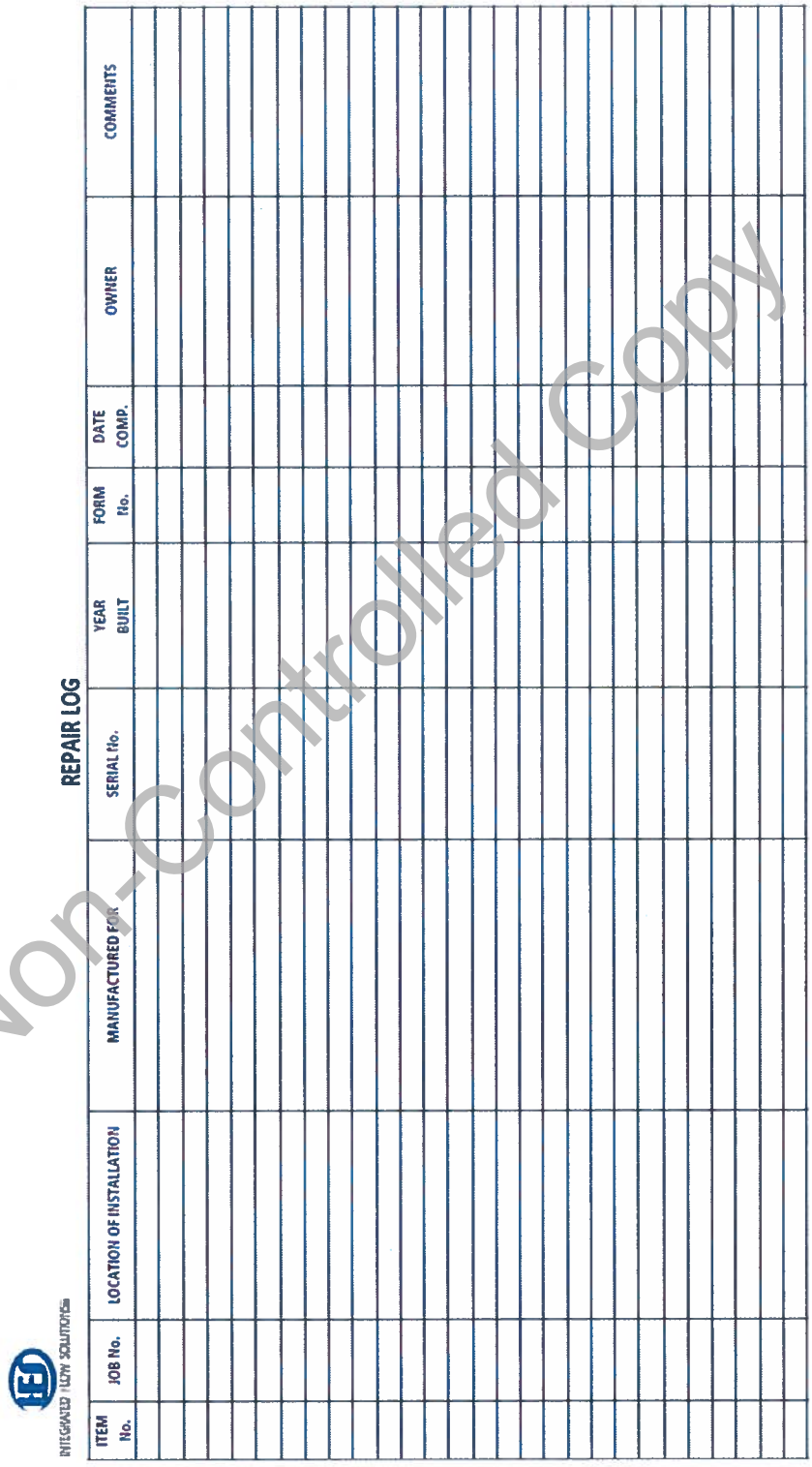
IN-PROCESS & FINAL	QC / DATE	INSP / DATE
B. WPS No.(s):		
1. Welder's Identification:		
2. Welder's Qualifications		
C. Engineering		
1. Original Data Report reviewed		
2. Stamping checked to verify applicable Code		
3. Drawings & Calculations accepted		
D. New Material Issuance		
E. Fabrication: fit-up, prep, etc.		
1. Shell:		
2. Head(s):		
3. Nozzles:		
4. Patch:		
5. Tubes:		
6. Other:		
F. Internal		
G. NDE: ☐ RT1 ☐ RT2 ☐ RT3 ☐ RT4		
☐ PT ☐ MT ☐ UT ☐ Other -		
H. Heat Treatment:		
I. Pressure Test:		
J. Final		
K. Stamping Checked		
L. ☐R-1 ☐R-2 ☐R-3 ☐R-4 Report reviewed and signed		

Asterisk (*) indicates Inspector's Hold Points

Acceptance of Work Performed:

	Quality Representative	Customer Representative	Authorized Inspector
Signature			
Date			

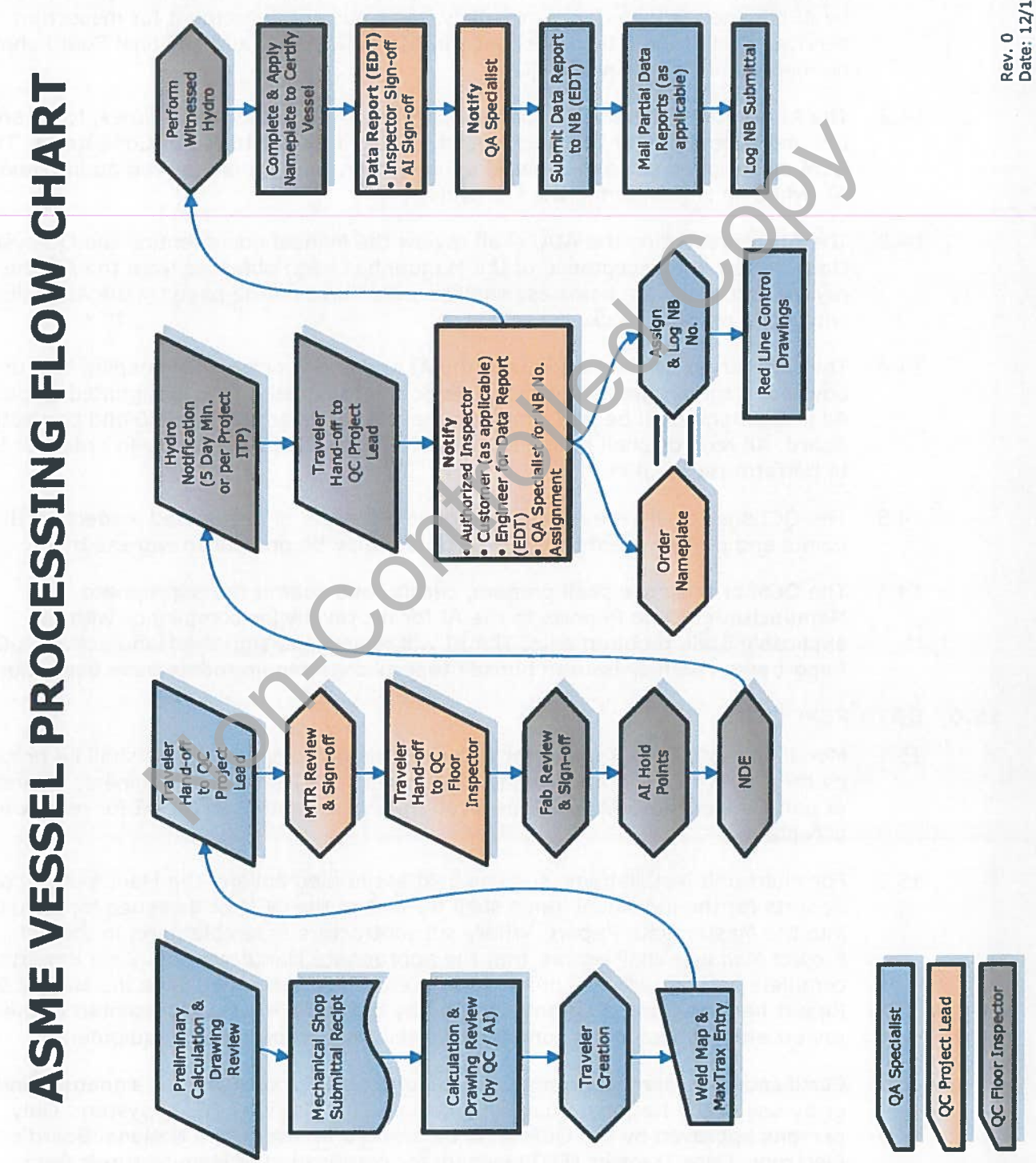
EXHIBIT 13.13 REPAIR LOG



REPAIR LOG

ITEM No.	JOB No.	LOCATION OF INSTALLATION	MANUFACTURED FOR	SERIAL No.	YEAR BUILT	FORM No.	DATE COMP.	OWNER	COMMENTS

EXHIBIT 13.14 ASME VESSEL PROCESS FLOW MAP



14.0 AUTHORIZED INSPECTOR

14.1 The AI, as defined in the Code, shall have been qualified by a written examination under the rules of any State of the United States or Province of Canada which has adopted the Code. He or she will be employed by an ASME accredited AIA as defined by ASME and with which the company has a current agreement for inspection service. Should there be any change in AIA's the ASME and National Board shall be notified immediately by the QCM.

14.2 The AI and their Supervisor shall be provided free access, at all times, to all areas of IFS and subcontractor facilities involved in the manufacturing of Code items. The QCM or designee will assist the AI's Supervisor, during his required audits, and the AI, while he is monitoring the QC System.

14.3 The AI, representing the AIA, shall review the Manual documenting the QC system. Once review and acceptance of the Manual has been obtained from the AI, the review and acceptance process shall be noted on the title page by the AI's initials within the revision block.

14.4 The QCI serves as the liaison with the AI and is responsible for keeping him or her advised of the progress of work so he or she may make their designated inspection. All inspections shall be performed by the AIA on record with ASME and the National Board. All records shall be made available to the AI, as necessary in order for the AI to perform their duties.

14.5 The QCI shall notify the AI, sufficiently in advance, of designated inspection HOLD points and pressure tests so that he or she may be present to witness them.

14.6 The QCM or designee shall prepare, certify, and submit the appropriate Manufacturer's Data Reports to the AI for his review for compliance with the applicable Code requirements. The AI will review and sign the Manufacturer's Data Report when he has assured himself that all code requirements have been met.

15.0 DATA REPORTS

15.1 Manufacturer's Data Reports for Code vessels, boilers, and piping shall be prepared, by the QCM or QCI, if not already prepared by the Mechanical Engineer, for vessels or parts under the control of this location, and submitted to the AI for review and acceptance.

15.2 For multi-unit installations, such as field assembled boilers, the Manufacturer's Data Reports for the individual items shall be sent to the QCM or designee for inclusion into the Master Data Report. Where subcontractors assemble parts in the field, the Project Manager shall ensure that the appropriate Manufacturer's Data Reports, complete and correct, are provided to the QCM or designee. Once the Master Data Report has been prepared and certified by the QCM, it will be presented to the AI for review and acceptance to complete the certification process of equipment.

15.3 Certification of Manufacturer's Data Reports shall be with written signature and date or by use of the National Board's Electronic Data Transfer (EDT) system. Only persons approved by the QCM shall be granted access to the National Board's Electronic Data Transfer (EDT) system for certification of Manufacture's Data Reports.

15.4 Certified Manufacturer's Data Reports will be submitted to the National Board for registration within 30 days of certification. This submittal will be by physically mailing the data report to the National Board registration office, or by the use of the National Board's Electronic Data Transfer (EDT) system.

16.0 REPAIRS AND ALTERATIONS

16.1 Additional terms and definitions used in this section:

Alteration
Any Change in the item described on the original Manufacturer's Data Report which affects the pressure containing capability of the PRI. Non-physical changes such as an increase in the MAWP (internal or external), or design temperature of a pressure retaining item shall be considered an alteration. A reduction of the MDMT shall be considered an alteration.

Jurisdiction or Jurisdictional Authority
A Governmental Entity which administers and enforces one or more sections of the ASME Code, one of which shall be Section I (power boilers). All references to jurisdiction in these sections are applicable only when involvement is required by jurisdictional policy.

Inspector
An Individual who holds a valid and current National Board Commission.

Original Code of Construction (OCC)
Documents published by recognized national standards writing bodies that contain technical requirements for construction of pressure retaining items or equivalent to which the pressure retaining item was certified by the original manufacturer.

Repair
The work necessary to restore pressure retaining items to a safe and satisfactory operation condition.

Re-Rating
See Alteration

Non-Code Item
A pressure retaining item which was not designed or constructed to any code of construction or an item which was designed in accordance with the ASME Code but not inspected, certified and stamped with the Code symbol.

Routine Repairs
Repairs listed and defined in NBIC Part 3 for which the requirements for in-process involvement by the Inspector and stamping by the "R" Certificate Holder may be waived as determined appropriate by the Jurisdiction and the Inspector.

NBIC
National Board Inspection Code

Pressure Retaining Item (PRI)
Any Boiler, pressure vessel, piping or material used for the containment of pressure, either internal or external.

16.2 General

16.2.1 Shop and field repairs and alterations to metallic PRI's are made in accordance with the requirements of the NBIC, Jurisdiction, Code and this Manual. In this section the AI is referred to as the "Inspector" as noted in NBIC.

16.2.2 The controls addressed through this entire Manual will also be used in this section for repairs and alterations, unless specifically addressed in the section.

16.2.3 All material used in making repairs and alterations shall conform to the requirements of the original Code section used for construction and Section II. Material of a different nominal composition, equal to or greater allowable stress than the original, may be used, if approved by the responsible Engineer and accepted by the Inspector.

16.2.4 When Existing material cannot be identified, the QCM shall be responsible for any testing required to identify the material. The method used and the results shall be available to the Inspector. For material that cannot be identified, a chemical analysis and hardness test as a minimum shall be performed.

16.2.5 If the company provides the materials, procurement, inspection, and the handling of material shall be in accordance with the applicable sections of this Manual.

16.2.6 If the materials are provided by others, sufficient documentation and material identification shall be provided for the acceptance of the material by the company and the inspector. Receiving inspection and handling of these materials shall be in accordance with the applicable sections of this Manual.

16.2.7 All examinations, NDE, heat treatment, and other tests, required by the Code for the original construction of the PRI, will be required for the repair or alteration unless impossible or impractical. If examinations, NDE, heat treatment, or other tests, originally required, are impossible or impractical, alternate methods acceptable to the Inspector and the Jurisdiction, if applicable, may be used.

16.3 Codes and Standards

16.3.1 When the standard governing the original construction is ASME Code, repairs and alterations shall conform, insofar as possible, to the ASME Code section and edition most applicable to the work planned.

16.3.2 When the standard governing the original construction is other than ASME Code, repairs and alterations shall conform, insofar as possible, to the edition of the construction code, standard or specification most applicable to the work planned. Where this is not possible, it is permissible to use other codes, standards, or specifications, including the ASME Code, provided IFS has the concurrence of the Inspector and the Jurisdiction where the PRI is installed.

16.4 Responsibility

16.4.1 The QCM or designee is responsible for compliance with the NBIC for repairs and alterations to PRI's and for preparation of all documents required to complete a repair or alteration.

16.4.2 The QCI is responsible for keeping the Inspector informed of the progress of work being performed and any upcoming inspection HOLD points designated.

16.5 Procedure

16.5.1 General

16.5.1.1 For all repairs and alterations the QCM or designee shall prepare a proposed Repair/Alteration Plan (Exhibit 13.12) for the method and extent of repairs or alterations.

16.5.1.2 The Repair/Alteration Plan shall be presented to the Inspector, for review and acceptance, prior to the start of work. If applicable, WPSs, drawings, and/or calculations shall also be made available at the time of his or her review. If the scope or work changes, the Inspector shall be notified of the change. Under no circumstances shall work be started or continued, when the scope of work changes, without authorization of the Inspector.

16.5.2 Repairs

16.5.2.1 All repairs shall be carried out in accordance with the requirements of NBIC Part 3, this Manual, and any Jurisdictional requirements.

16.5.2.2 For routine repairs the requirement for in-process involvement of the Inspector and application of stamping may be waived at the discretion of the Inspector, provided all of the following conditions are met:

- The QCM shall verify, to the satisfaction of the Inspector, that routine repairs are acceptable to the Jurisdiction.
- Prior approval for routine repairs shall be obtained from the Inspector,
- Routine repairs shall be documented on an R-1 Form with the statement "Routine Repair" in the remarks section,
- Routine Repairs shall be only the ones listed in NBIC Part 3 (paragraph 3.3.2 d).
- The QCM shall be responsible for identifying, controlling and implementing routine repairs.
- Alternative welding methods without PWHT, as described in the NBIC, shall not be used for routine repairs.

16.5.3 Alterations

16.5.3.1 Alterations shall be carried out in accordance with the requirements of NBIC Part 3, this Manual, and any Jurisdictional requirements.

16.5.3.2 The QCM or designee will provide the Inspector with the following for alterations to PRIs:

- Design calculations prepared in accordance with this Manual
- Applicable drawings
- For physical changes, Manufacturer's Partial Data Report for Code symbol stamped parts
- Repair/Alteration Plan
- A copy of the original Manufacturer's Data Report
- Any other documents necessary for the Inspector to accept the alteration and designate his or her required inspection HOLD points

16.5.3.3 When the original Manufacturer's Data Report cannot be obtained, agreements on the method of establishing design basis for the alteration shall be obtained from the Inspector and the Jurisdiction, if applicable.

16.5.4 Re-Rating

16.5.4.1 Re-rating a PRI by increasing the maximum allowable working pressure (internal or external) or temperature, or decreasing the minimum temperature, shall be considered an alteration and shall be done only after the following requirements have been met to the satisfaction of the Jurisdiction, if applicable, at the location of the installations.

- Revised calculations prepared in accordance with this Manual
- Re-rating shall be established in accordance with the requirements of the Code
- The PRI is in satisfactory condition for the proposed service
- The PRI has been pressure tested, as required for the new service conditions

16.6 Replacement Parts

16.6.1 Replacement parts which will be subject to internal or external pressure that consist of new materials which may be formed to the required shape by casting, spinning, forging, die forming and on which no fabrication welding is performed, shall be supplied as material. Such parts shall be marked with the material and part identification and the name or brand of the part manufacturer. In lieu of full identification marking on the material or part, the part manufacturer may use a coded marking system traceable to the original marking. Such markings shall be considered as the parts manufacturer's certification that the part complies with the original code of construction.

16.6.2 Replacement parts which will be subject to internal or external pressure that are preassembled by attachment welds shall have the welding performed in accordance with the original code of construction. The supplier or manufacturer shall certify that the material and fabrication are in accordance with the original code of construction.

16.6.3 When ASME is the author of the original code of construction, replacement parts subject to internal or external pressure and fabricated by welding, which require shop inspection by the Inspector, shall be fabricated, inspected, stamped and certified by the ASME Certificate Holder and the Inspector, and shall be supplied with the appropriate Manufacturer's Partial Data Report.

16.6.4 When the author of the original code of construction is not ASME, replacement parts subject to internal or external pressure and fabricated by welding, shall be manufactured, inspected, stamped and certified as required by the original code of construction. Where this is not possible or practical, it is permissible to use other codes, standards, or specifications, including the ASME Code.

16.6.5 Replacement parts manufactured, per 16.6.4 above, shall be documented on the appropriate NBIC form and the "R" symbol stamp applied as required by the NBIC.

16.7 Pressure Testing

16.7.1 The QCM is responsible for all activities related to pressure testing. Pressure tests shall conform to the requirements of the NBIC and will be witnessed by the Inspector.

16.7.2 All pressure test gauges used shall be calibrated annually. However, gauges shall be recalibrated at any time there is reason to believe they are in error. Gauges shall be calibrated with a standard dead weight tester or calibrated master gauge.

16.7.3 The test pressure shall be the minimum required to verity the leak tightness integrity of the repair or alteration, but not more than 1.5 times the maximum allowable working pressure (MAWP) stamped on the PRI, as adjusted for temperature. When the original test pressure included consideration of corrosion allowance, the test pressure may be further adjusted based on the remaining corrosion allowance.

16.7.4 Replacement parts used in a repair or alteration shall be tested at the MAWP stamped on the PRI being repaired or altered.

16.7.5 The metal temperature at the time of pressure test shall be in accordance with the original Code, but not less than 60°F, unless the owner provides information on the toughness characteristics of the material to indicate the acceptability of a lower test temperature.

16.7.6 The hold time for the pressure test shall be 10 minutes prior to examination by the Inspector unless a longer hold time as been mandated by the Owner.

16.7.7 When operation of the PRI does not allow pressure testing using liquids or when a pressure test is not practical, other methods shall be used to verify integrity the of the repair or alteration and are as follows:

- Pneumatic test with the concurrence to the Inspector, the Owner, and when required, the Jurisdiction. Precautionary requirements of the applicable section of the original Code shall be followed, or
- NDE examination, methods used shall be suitable for providing meaningful results to verify the integrity of the repair or alteration. Concurrence of the Owner shall be obtained in addition to the Inspector, and when required, the Jurisdiction.

16.8 Acceptance, Stamping and Documentation

16.8.1 The QCM is responsible for the administrative control of the "R" stamp. The stamp is only to be used by authorized QC personnel and shall be maintained in secure storage when not in use.

16.8.2 The QCM or QCI shall stamp or attach a nameplate adjacent to the original stamping or nameplate in accordance with the NBIC. This can only be done with the knowledge and authorization of the Inspector.

16.8.3 If, during the repair or alteration of a PRI, it is necessary to remove the original manufacturer's Code nameplate or stamping, the Inspector shall, subject to approval of the Jurisdiction, witness the following:

- The making of a rubbing or taking a photo of the old and new stamping
- The transfer of the nameplate or stamping to a new location on the PRI and the obliteration or removal of the original stamping. The ASME Certification Mark shall not be re-stamped. Any relocation shall be described on the appropriate NBIC form.

16.8.4 When the repair or alteration activity is completed, the QCI shall review all documentation for compliance to the NBIC and the original code of construction. When satisfied that all requirements have been met, he or she shall certify by signing and dating the appropriate NBIC form.

- Form R-1 Report of Repair
- Form R-2 Report of Alteration
- Form R-3 Report of Parts Fabricated by Welding
- Form R-4 Report Supplementary Sheet

16.8.5 The final records and appropriate NBIC form, certified by the QCM or QCI, are presented to the Inspector for review and acceptance. When the Inspector is satisfied that all NBIC and code of construction requirements have been met, he or she will certify the PRI by signing and dating the form.

16.8.6 A log (Exhibit 13.13) of repairs and alterations shall be maintained. The log will document the job number, location of installation, who the PRI was manufactured for, PRI serial number, year PRI was built, NBIC form number, date repair or alteration was completed, and the PRI Owner.

Repairs and alterations will be sequentially numbered for the purpose of registration with the National Board.

16.8.7 The QCM or designee shall distribute legible copies of the certified NBIC form, together with any attachments, to the Owner or User, the Inspector, the Jurisdiction, if required, and the AIA responsible for the in-service inspection of the PRI. A copy is to be placed in the job file for retention.

16.8.8 Form R-1 may be registered with the Nation Board.

16.8.9 The original NBIC form, for alterations made on items registered with the National Board, shall be submitted to the National Board within 30 days of certification date.

16.8.10 If the repair is not to be registered or the alteration was performed on a PRI not originally registered with the National Board, the associated NBIC form shall be retained for a minimum of five years in the job file.

16.8.11 A copy of R forms for Boilers in the State of Texas shall be sent to the Chief Inspector with 90 days.

16.8.12 The QCM is responsible for retaining all required records referenced in this section for a period of three years. Record retention is to follow the instructions identified in NBIC Part3, Figure 1.6.5.1.

17.0 ASSEMBLY AT FIELD SITES

17.1 Assembly of Code items at field sites will be controlled by the requirements of this Manual as referenced on the organizational chart with the following modifications.

17.2 Material for the field may be purchased and received at the shop location, in accordance with section 5.0 of this Manual, and shipped to the field site along with any required documentation. At the field site, the QCI will verify the correct materials and their quantities have been received and inspect them for any shipping damage.

17.3 Purchasing of material in the field may be performed by the Foreman in accordance with the requirements of section 5.0 of this Manual. Material receiving inspection of materials purchased in the field will be performed in accordance with section 5.0 of this Manual.

17.4 Welding consumables will be stored, issued, and controlled by the Foreman in accordance with section 8.0 of this Manual. Also, during inclement weather, a protective blind or shield shall be used while welding is in progress. Low hydrogen rods will be issued in portable heated rod containers or sealed containers.

17.5 All field documentation will be controlled by the QCI in the field and returned to the shop facility for review by the QCM. Retention of records shall be in accordance with section 12.0 of this Manual.

17.6 If a particular field assembly should require any modification to this Manual, the changes will be presented to the AI for his or her review and acceptance. When accepted, an On-Site Addenda shall be prepared and will be included and controlled in all Manuals at the site. Upon completion of that job, a copy of any Addenda shall

be retained in the job file until the Manufacturer's Data Report has been certified by the QCM and AI.