**\*Please note: This page is to be deleted prior to the issuance of the manual\***

This sample manual is intended to assist new and existing organizations applying for TSSA Certificate(s) of Authorization. Please ensure that the titles of personnel are updated as needed to reflect the organizational requirements.

This sample manual includes all the requirements for the following ***(\*Appendixes not applicable to the organization are to be removed)***:

* ASME B31.1 Power Piping
* ASME B31.3 Process Piping
* ASME B31.5 Refrigeration Piping and Heat Transfer Components
* CSA Z7396.1 Medical Gas Pipeline Systems
* NBIC NB-23 Part 3 Repairs and Alterations
* Welding
* Brazing
* Bonding
* Non-Destructive Examination
* Post Weld Heat Treatment
* ASME Section I & ASME B31.1 Boiler External Piping
* Manufacturing of Fittings
* Hot Tapping & Line Stopping
* Trades Organization BPV Members
* Alternate Piping Process

**ABC Company name and/or logo**

***1234 ABC Street***

***ABCTown, Ontario***

***N0G 1Y0***

This Quality Program Manual is for the shop fabrication, field installation, assembly, erection, and repair of piping systems in accordance with:

* CSA-B51 Boiler Pressure Vessel & Pressure Piping Code
* CSA B52 Mechanical Refrigeration Code
* ASME B31.1 Power Piping Code
* ASME B31.3 Process Piping Code
* ASME B31.5 Refrigeration Piping Code
* CSA Z7396.1 Medical Gas Pipeline Systems
* ASME Section I Rules for Construction of Power Boilers (for Boiler External Piping)

&

For shop and field metallic repairs and alterations of boilers, pressure vessels, piping, and category A, B, C, D, E, F & H Type Fittings in accordance with:

* CSA-B51 Boiler Pressure Vessel & Pressure Piping Code
* The National Board Inspection Code NB-23 Part 3 Repairs & Alterations
* Original Code of Construction

&

For the shop fabrication of welded/brazed and non-welded/non-brazed category A, B, C, D, E, F, & H type fittings in accordance with:

* CSA-B51 Boiler Pressure Vessel & Pressure Piping Code
* Applicable Code of Construction

&

For hot tap and line stopping of pressure retaining equipment in accordance with:

* CSA-B51 Boiler Pressure Vessel & Pressure Piping Code
* API-2201 Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries
* Original Code of Construction

&

For the Alternate Piping Process for Pressure Piping Inspection in Ontario in accordance with:

* TSSA Safety Advisory BPV-001-23
* Ontario Regulation 220/01 Section 9(4)

Manual Issue#: \_\_\_\_\_

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| --- | --- | --- |
| Section | Title | Revision |
| i | Cover Page | 0 |
| ii | Table of Contents | 0 |
| iii | Statement of Authority | 0 |
| iv | Revision Control Record | 0 |
| 1 | Manual Control | 0 |
| 2 | Organization Chart | 0 |
| 3 | Material Control | 0 |
| 4 | Fabrication, Installation, and Repairs | 0 |
| 5 | Non-Conformances | 0 |
| 6 | Calibration | 0 |
| 7 | The Inspector | 0 |
| 8 | Records Retention | 0 |
| 9 | Exhibits | 0 |
| 10 | Appendixes | 0 |

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| Authorized By (Company Representative): | Date: |
| Accepted By (TSSA Representative): | Date: |

Company Logo and/or Company Name

This Quality Program Manual contains the requirements deemed necessary by this Company in accordance with the following Appendixes:

* ASME B31.1 Power Piping
* ASME B31.3 Process Piping
* ASME B31.5 Refrigeration Piping and Heat Transfer Components
* CSA Z7396.1 Medical Gas Pipeline Systems
* NBIC NB-23 Part 3 Repairs and Alterations
* Welding
* Brazing
* Bonding
* Non-Destructive Examination
* Post Weld Heat Treatment
* ASME Section I & ASME B31.1 Boiler External Piping
* Manufacturing of Fittings
* Hot Tapping & Line Stopping
* Trades Organization BPV Members
* Alternate Piping Process

The ***Project Manager*** has the authority and responsibility for enforcing the quality control system described, and the organizational freedom to identify quality control problems and to initiate, recommend and provide solutions, including the authority to stop work when necessary.

In the event of conflict between the ***Project Manager*** or other personnel, problems shall be brought to the ***President*** for final resolution in accordance with the applicable Code and the requirements in this quality control manual.

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| Print Name: |  |
| Sign: |  |
| Title: |  |
| Date: |  |

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| Rev | Section | Paragraph | Description | Company  Initial & Date | TSSA  Initial & Date |
| 0 | ALL | ALL | ISSUE #1 |  |  |
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* 1. The ***Project Manager*** is responsible for the control, preparation, approval, revision, distribution, and implementation of this Quality Program Manual and Appendixes.
  2. The ***Project Manager*** is responsible for having access to the latest edition of the TSSA Code Adoption Document and the applicable Code books specified in the applicable Appendixes.
  3. The ***Project Manager*** is responsible for:

1. Reviewing the current Code Adoption Document available on the TSSA website ([www.tssa.org](http://www.tssa.org)) and documenting the review by signature and date on the cover page or documented by other means.
2. Reviewing the applicable CSA Standard and documenting the review by signature and date on the cover page, “Preface”, or documented by other means.
3. Reviewing the applicable ASME/NBIC Code and documenting the review by signature and date on the “Summary of Changes” page or documented by other means.
4. Ensuring any changes to the Codes that affect the contents of this manual and/or appendixes shall be addressed within 6 months of the issue date, and the manual and/or appendix revised per this section.
   1. Revisions of this manual and appendixes shall be carried out by changing the affected sections, advancing the revision number on each page of the affected section(s), the Table of Contents (Section ii), and highlighting all revised text. All revisions shall be recorded on the Revision Control Record (Section iv).
   2. The ***Project Manager*** shall indicate acceptance of the revisions by signing and dating the Table of Contents and initialling and dating the Revision Control Record. All proposed revisions shall be submitted to the TSSA Representative for acceptance prior to inclusion and implementation. This acceptance shall be indicated by signature and date on the Table of Contents and initial and date on the Revision Control Record.
   3. All revised sections will revert to zero and the issue number advanced by one at each tri annual TSSA audit.
   4. After acceptance by the ***Project Manager*** and the TSSA Representative, a copy of this manual or revised sections will be re-distributed to all controlled manual holders. A “Read Only” copy of this manual may be uploaded to the company intranet or provided to field staff, as required.

**Notes:**

* Due to the structure of the company, one person could complete more than one of these functions.
* Any reference to the ***Project Manager, Foreman, Installer/Fabricator*** throughout this manual includes shop and field (as applicable).
* A delegate may be appointed to complete a task on behalf of the responsible person.
* Inspector: TSSA Inspector / Authorized Inspector / Insurance Inspector / Owner-User Inspector (as applicable).

**PURCHASING:**

* 1. The ***Project Manager*** shall ensure that all material is ordered based upon the information provided on the registered design.
  2. The ***Project Manager*** shall ensure that all material is ordered to the correct ASME or ASTM specification as shown in the registered design. No substitution of material shall be permitted without the approval of an engineer, the ***Project Manager,*** and the concurrence of the Inspector.
  3. All Purchase Orders (Exhibit #1) are prepared by the ***Project Manager*** using the information provided on the registered design, and shall include the following as a minimum:

1. Purchase Order Number/Job reference number and date.
2. Material description, identification, and specifications.
3. Requirements for copies of mill test reports or certificates of compliance when specified by the Code.
4. Requirements for statutory declarations for fittings, including flexible hoses.
5. Partial Data Reports for parts manufactured by others.
6. Any other supplementary Code and/or quality requirements.
   1. Distribution of Purchase Orders are as follows: Supplier, ***Project Manager***, job file.

**RECEIVING INSPECTION:**

* 1. The ***Foreman*** is responsible for conducting a visual and dimensional inspection of all incoming material to ensure compliance with the Purchase Order requirements and will sign and date the packing slip as proof of the inspection operation. The ***Foreman*** shall ensure that the material is identified, and the proper documentation has been obtained. If material is rejected, it shall be recorded on the packing slip.
  2. The ***Foreman*** shall ensure that the markings on all material is identified and traceable to ASME/ASTM specifications, or statutory declarations.
  3. When material is cut into pieces for or during fabrication, the ***Foreman*** shall ensure that the material specification is transferred to each cut piece to maintain traceability, or a Coded marking system may be used when described below and acceptable to the Inspector. Traceability shall be in accordance with one or more of the following methods:

1. Transfer of the original identification markings to a location where the markings will be visible on the completed item (i.e., SA-106 Grade B Sch 40, ASTM B280 Type L, etc.).
2. Transfer of heat numbers may be used when Mill Test Reports are received from the supplier and obtained in the job file.
3. Transfer of markings using methods such as material tabulations or as-built drawings.
4. Transfer of markings on a box or bundle for small items.
   1. The ***Project Manager*** shall ensure that all Code material is clearly identified and suitably stored.
   2. If material is found non-conforming it shall be identified with a Hold Tag (Exhibit #2) and returned to the supplier or handled in accordance with Section 5 of this Manual. All material with illegible markings shall be returned to the supplier.

**CUSTOMER SUPPLIED MATERIAL**

* 1. Material for Code work supplied by the customer will be subject to the same incoming inspection requirements as material ordered by the company and must be accepted in the same way before being released for fabrication. Proof of material inspection and acceptance will be by initial and date on the applicable Inspection and Test Checklist for Customer Supplied Material.
  2. The ***Project Manager*** shall ensure the fabrication, assembly, erection, field installation, repairs, or alterations is in strict accordance with the applicable appendix, the latest revision of the accepted drawings, jurisdiction, and customer requirements.
  3. The ***Foreman*** will prepare an Inspection and Test Checklist (Exhibit #3) which will list all the important stages of fabrication that require inspection and will provide columns for initial and date of inspections performed by the ***Foreman*** and the Inspector. No work shall proceed past these inspection points until they have been signed off by the ***Foreman*** and the Inspector.
  4. The ***Foreman*** shall notify the Inspector prior to the start of work and make available the Inspection and Test Checklist, latest drawings, specifications, and all other job-related documentation for initial review and designation of hold points on the Inspection and Test Checklist.
  5. The ***Foreman*** shall be a liaison with the Inspector and provide at least 48 hours’ notice of any upcoming hold point to permit the required inspection to be carried out. The Inspector has the right to designate additional hold points at any time and shall be provided with the opportunity to ensure all Code required inspections have been performed.
  6. The ***Foreman*** shall be responsible for the examination and testing of parts before, during and after fabrication, ensuring that all required inspection points are signed off and accepted before the next step of fabrication proceeds. Parts and/or workmanship that fail to meet any of the requirements will be identified as non-conforming per Section 5.
  7. The ***Installer/Fabricator*** will only acquire materials which have been released for fabrication.
  8. In addition to the inspection functions detailed on the Inspection and Test Checklist, the ***Foreman*** shall ensure that all fittings have CRN’s and are of the correct pressure/temperature rating and type for the service.

**PRESSURE TESTING**

* 1. The ***Foreman*** will be responsible for performing the final inspection and monitoring of the final pressure test, which shall also be witnessed by the Inspector. If the Inspector is unable to witness the pressure test, a representative of the client may witness the test on behalf of the Inspector if specifically agreed upon between the Inspector and the ***Foreman***. The “Client Pressure Test Witness” portion of the Inspection and Test Checklist shall be completed.
  2. For hydrostatic testing, a calibrated pressure gauge shall be attached to the highest point on the item being tested. For pressure testing, analog pressure gauges shall be graduated to not less than 1-1/2 times, and approximately twice but not more than 4 times the test pressure. Digital pressure gauges are not subject to the same range restrictions as analog gauges.
  3. Pressure testing procedures and requirements shall comply with the applicable Code and contractual requirements. All repairs must be completed before testing.
  4. Should a pneumatic test be permitted, special precautions must be taken to ensure personnel safety and the provisions of the applicable Code adhered to.

**FINAL INSPECTION**

* 1. The ***Foreman*** shall verify that all required inspections and tests have been completed and signed off by the Company representative and the Inspector on the Inspection and Test Checklist. The ***Foreman*** shall verify that all job file documentation, such as material certification, partial data reports, etc., have been accepted and signed off as applicable, and made available to the Inspector for review.
  2. The ***Foreman*** shall review for correctness and certify the TSSA Piping Systems Installation and Test Data Report and present it to the Inspector for signature and date. Distribution of the Data Report shall be per Section 8.

**PIPING REPAIRS**

* 1. Mechanically assembled like for like replacements per TSSA Safety Bulletin SB 05-01 may be completed as required.
  2. For welded and/or brazed like for like replacements (if applicable), or for welded repairs to pressure retaining material, the ***Project Manager*** shall be responsible for the preparation of the repair procedure and the selection of techniques to be used (i.e., selection of proper welding/brazing procedure specification, materials required, NDE methods, etc.)
  3. The repair procedure, method, and Inspection and Test Checklist shall be presented to the Inspector by the ***Project Manager*** for acceptance and insertion of hold points prior to commencing the repair work.
  4. The pressure testing and final inspection shall be performed as stated above.
  5. A non-conformance is any condition that fails to meet the applicable rules of the Code, Regulation, or this Manual. Non-conformances that require special consideration and the Inspector involvement shall be documented using the Non-Conformance Report (Exhibit #4). Examples of this may include but are not limited to:

1. Different materials used other than indicated on the registered design (when requested to remain in the system),
2. Fittings installed without CRN Registration,
3. Inadequate design.
   1. When a non-conforming condition is discovered, it shall be identified as non-conforming by the ***Foreman.*** The ***Project Manager*** shall be informed of all non-conforming conditions and shall be responsible for identifying and controlling further processing of the non-conforming items until final disposition.
   2. The ***Project Manager*** shall be responsible for preparing a Non-Conformance Report. This shall be done by entering the description of the non-conformance in Section 1 of the Non-Conformance Report.
   3. The ***Project Manager*** shall be responsible for entering, reviewing, and approving the recommended disposition in Section 2 of the Non-Conformance Report by signature and date. The disposition of the non-conformance shall be described as: Use-as-is, Repair, Reject, or Other. The Non-Conformance Report shall then be presented to the Inspector for acceptance of the disposition by signing and dating Section 2 of the Non-Conformance Report.
   4. Items dispositioned as “Use-As-Is” may require an evaluation by an ***Engineer***. When required, the ***Engineer*** shall also sign and date Section 2 of the Non-Conformance Report.
   5. The non-conformance shall be addressed on the Inspection and Test Checklist with a hold point added. No work shall proceed on the item until the disposition has been reviewed and accepted by the ***Project Manager***, the Inspector, and the ***Engineer*** (if required).
   6. When the disposition has been completed, the ***Project Manager*** is responsible to record any significate notes and sign and date Section 3 of the Non-Conformance Report. The Non-Conformance Report shall then be presented to the Inspector and ***Engineer*** (if required) for final acceptance by signature and date in Section 3.
   7. When completed, the ***Project Manager*** shall remove items off hold and all Non-Conformance Reports shall be placed in the applicable job file. Items dispositioned as “Rejected” may be disposed of without further input from the Inspector or ***Engineer***.
   8. Examination, measuring and test equipment, including pressure gauges, requiring calibration shall be under the control of the ***Project Manager*** who shall be responsible for:
4. Ensuring that all items are maintained in good condition and checked for signs of damage before use.
5. Any equipment found to be defective or suspected to be so shall be immediately removed from service.
6. Ensuring only currently calibrated equipment is used.
7. Performing, or arranging for, calibration of measuring and test equipment, the results of which shall be traceable to National Standards (NIST).
8. Establishing and maintaining a calibration frequency schedule for the equipment and its corresponding amount of use.
   1. Examination, measuring and test equipment not required to be calibrated, such as linear scales, steel tapes, rules, squares, levels, etc. used for non-precision measurement or layout, will be examined at regular intervals by the ***Project Manager*** who will be responsible for ensuring that they are kept in good condition. Any such equipment found worn or damaged shall be replaced.
   2. The ***Project Manager*** will maintain a record of calibration for each piece of measuring and test equipment showing:
9. Type of equipment,
10. Identification and serial numbers,
11. Calibration frequency,
12. Check method and tolerance,
13. Date of calibration and next due date,
14. Result of calibration and person or organization performing the calibration
    1. All calibrated items shall be permanently identified with a serial number and shall have a label or sticker affixed, showing the serial number, date calibrated and calibration due date.
    2. When calibrations are not completed in house, pressure gauges shall be sent to a calibration facility for calibration or purchased new with a calibration certification. All calibration records shall be traceable to National Standards. All calibration records shall be maintained by the ***Project Manager*** and made available to the Inspector for review.
    3. Parts checked since the previous calibration with equipment found to be in error, or out of calibration, shall be considered unacceptable until it can be determined that all requirements have been met.
    4. Examination, measuring, and testing equipment found defective will be immediately withdrawn from service by the ***Project Manager*** and tagged as such, until it has been repaired or replaced in accordance with this section.
    5. All measuring and test equipment records will be kept on file and maintained by the ***Project Manager*** who will make these records available for review by the Inspector.
    6. The Inspector is a representative of the Authorized Inspection Agency and carries out inspections on all Code items built by the Company. The Authorized Inspection Agency in Ontario is The Technical Standards and Safety Authority, Boilers and Pressure Vessels Safety Program.
    7. The Inspector shall have been qualified by written examination under the rules of Ontario Regulation 220-01.
    8. A controlled copy of this Quality Control Manual shall be provided to the Inspector for use at the shop and/or field site.
    9. The Inspector and Inspector’s Supervisor shall be permitted access to all parts of the shop and/or field where Code work is being performed.
    10. The ***Project Manager*** shall ensure the Inspector has access to all drawings, calculations, specification, procedures, process sheets, repair procedures, records, test results, and other documentation necessary for the Inspector to perform their duties.
    11. The ***Project Manager*** shall ensure that all inspections required by the Code have been performed by the Inspector.
    12. The ***Project Manager*** will provide assistance to the Inspector during any required inspection surveillance monitoring of the quality program, and to the Inspector, Inspector’s Supervisor, or TSSA Representative during audits.
    13. All records and documentation accumulated during the course of a job will be the responsibility of the ***Project Manager*** and will be maintained for all items as required by the applicable Code and customer contract. These records will be made available to the Inspector for review prior to the certification of the Data Report.
    14. Distribution of Data Reports shall be as follows:

* Original to TSSA
* Copy to Owner/Client
* Copy to Job File
  1. The following documentation shall be maintained for a minimum of 3 years or as required by the applicable Code of Construction, and made available for each tri annual TSSA audit (as applicable):

1. The applicable Data Report
2. Manufacturer’s Partial Data Reports
3. Repair Reports
4. Inspection and Test Checklist
5. Registered Design Drawings and specifications
6. Design calculations
7. Welding/Brazing/Bonding Procedure Specification
8. Procedure Qualification Record
9. Welder/Brazer/Bonder Qualification Records and Welder/Brazer/Bonder Continuity Records
10. Material Test Reports/Material Certification
11. Statutory Declarations/Proof of CRN Registered Fittings
12. Purchase Orders
13. Proof of material receiving & inspection
14. Record of Calibration
15. NDE Reports
16. Heat Treatment Reports
17. Non-Conformance Reports
18. Copy or photograph of nameplate

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| No. | Exhibit | Revision |
| 1 | Purchase Order | 0 |
| 2 | Hold Tag | 0 |
| 3 | Inspection and Test Checklist | 0 |
| 4 | Non-Conformance Report | 0 |

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| Company Logo / Company Name | | |
| Job #: | | PO#: |
|  | | |
| Qty: | Material Description: | |
|  | | |
| 20 feet | 2” Sch.40, SA-53 Grade B ERW Pipe | |
| 10 pcs | 2” Coupling, SA-105N | |
| 20 feet | 1” B819 Medical gas tubing, Type L | |
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| Notes:   * Proof of CRN Registration required for all fittings. * Material Test Reports required with all steel pipe. * All Code Markings shall be legible. | | |

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| HOLD | **Reason for Hold:** |
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| *Company Name* |

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| Company Logo / Company Name | | | | | | |
| Job Number: | | CRN P#: | | | | |
|  | | | | | | |
| * ASME B31.1 | * ASME B31.3 Cat \_\_\_ | | * ASME B31.5 | | * CSA Z7396.1 | |
|  | | | | | | |
| H = Hold Point  V = Verification Point  W = Witness Point | | Company Initial and Date | | H, V or W | | Inspector Initial and Date |
|  | | | | | | |
| Drawing registered, reviewed, and accepted prior to production | |  | |  | |  |
|  | | | | | | |
| Materials inspected and accepted | |  | |  | |  |
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| Fitting CRN registrations verified | |  | |  | |  |
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| Customer supplied material inspected and accepted | |  | |  | |  |
|  | | | | | | |
| Welding Procedure Specification/ Brazing Procedure Specification verified | |  | |  | |  |
|  | | | | | | |
| Welder/Brazer qualifications and applicable logs verified | |  | |  | |  |
|  | | | | | | |
| Non-Destructive Examination completed and reports accepted | |  | |  | |  |
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| Post Weld Heat Treatment completed and reports accepted | |  | |  | |  |
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| Supports visually inspected and accepted | |  | |  | |  |
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| Visual welding examination completed and accepted | |  | |  | |  |
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| Gauge(s) calibrated, range(s) acceptable, and report(s) accepted | |  | |  | |  |
|  | | | | | | |
| Preliminary test completed and accepted prior to full test pressure (for pneumatic tests) | |  | |  | |  |
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| Pressure test and leak testing completed and accepted | |  | |  | |  |
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| Non-Conformances accepted and closed | |  | |  | |  |
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| Piping Systems Installation and Test Data Report certified | |  | |  | |  |
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To be completed when acceptable to the Inspector:

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| Client Pressure Test Witness | | | |
| Name: |  | Organization: |  |
| Title: |  | Date: |  |
| Signature: |  |  | |

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| Company Logo / Company Name | | | | | |
| Report #: | | Date: | | Item #: | |
| Section 1 - Description of Non-Conformance: | | | | | |
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| Section 2 - Recommended Disposition: | | | | | |
| * Use-As-Is | * Repair | | * Reject | | * Other |
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| Disposition Approved By: | | | | | |
| ***Project Manager:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| ***Inspector:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| ***Other:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| Section 3 - Disposition Completed: | | | | | |
|  | | | | | |
| Final Acceptance: | | | | | |
| ***Project Manager:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| ***Inspector:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
| ***Other:*** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (Signature) | | | Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | | |
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| Appendix | Revision |
| ASME B31.1 Power Piping | 0 |
| ASME B31.3 Process Piping | 0 |
| ASME B31.5 Refrigeration Piping and Heat Transfer Components | 0 |
| CSA Z7396.1 Medical Gas Pipeline Systems | 0 |
| NBIC NB-23 Part 3 Repairs and Alterations | 0 |
| Welding | 0 |
| Brazing | 0 |
| Bonding | 0 |
| Non-Destructive Examination | 0 |
| Post Weld Heat Treatment | 0 |
| ASME Section I & ASME B31.1 Boiler External Piping | 0 |
| Manufacturing of Fittings | 0 |
| Hot Tapping & Line Stopping | 0 |
| Trades Organization BPV Members | 0 |
| Alternate Piping Process | 0 |

This Quality Program Manual applies in its entirety with the following exceptions for ASME B31.1 Power Piping Systems:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. ASME B31.1 Power Piping

**DRAWINGS AND SPECIFICATIONS:**

1. It is the responsibility of the ***Project Manager*** to ensure that all drawings and specifications are prepared to the latest edition of ASME B31.1. The ***Project Manager*** shall review and approve all documents required to be submitted to TSSA for registration. Approval shall be by signature and date on all the applicable documents.
2. The drawing and/or specifications shall contain the following information as a minimum (as applicable):

* Code of construction (ASME B31.1)
* Design pressure and temperature
* Safety valve or safety device setting and location
* Service fluid
* Test pressure, type of test (i.e., hydrostatic, pneumatic, etc.) and duration
* Statement describing only CRN registered fittings to be used
* Pipe/tube size and schedule (i.e., 1” Sch.40, etc.)
* Pipe/tube material specifications (i.e., SA-53B, ASTM B280, etc.)
* Fitting material specifications (i.e., SA-234, etc.)
* Pipe joining methods (welded, brazed, threaded, etc.)
* Non-destructive examination
* Post Weld Heat Treatment
* Statement describing maximum support spacing, type and anchor location

1. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings and specifications to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
2. The ***Project Manager*** is responsible for the distribution of drawings and specifications, and the removal of all obsolete drawings and specifications.
3. When calculations are required, the ***Engineer*** shall be responsible for:

* Reviewing and approving calculations and specifications to the latest Code Edition. Approval shall be by signature and date on the applicable documents.
* Ensuring the correct computer aided design calculations output has been obtained.
* Verifying that all computer program revisions have been made within 6 months of the new Code Edition issue, and the revised program is producing the correct output.

1. Fabrication of a pressure piping system may commence prior to the P-Number registration from TSSA provided that the company assumes all risks related to the fabrication. The Inspector shall be notified prior to the job start.

**FABRICATION, INSTALLATION, AND REPAIRS:**

1. The ***Foreman*** shall ensure that adequate supports are provided, properly installed, fastened, and checked prior to pressure testing. Spacing of supports shall be per ASME B31.1.

This Quality Program Manual applies in its entirety with the following exceptions for ASME B31.3 Process Piping Systems:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. ASME B31.3 Process Piping

**DRAWINGS AND SPECIFICATIONS:**

1. It is the responsibility of the ***Project Manager*** to ensure that all drawings and specifications are prepared to the latest edition of ASME B31.3. The ***Project Manager*** shall review and approve all documents required to be submitted to TSSA for registration. Approval shall be by signature and date on all the applicable documents.
2. The drawing and/or specifications shall contain the following information as a minimum (as applicable):

* Code of construction (ASME B31.3)
* Design pressure and temperature
* Safety valve or safety device setting and location
* Service fluid
* Test pressure, type of test (i.e., hydrostatic, pneumatic, etc.) and duration
* Statement describing only CRN registered fittings to be used
* Pipe/tube size and schedule (i.e., 1” Sch.40, etc.)
* Pipe/tube material specifications (i.e., SA-53B, ASTM B280, etc.)
* Fitting material specifications (i.e., SA-234, etc.)
* Pipe joining methods (welded, brazed, threaded, etc.)
* Non-destructive examination
* Post Weld Heat Treatment
* Statement describing maximum support spacing, type and anchor location
* Fluid service category for ASME B31.3 (NOTE: is the owner’s responsibility to specify the category of piping system as required by the ASME B31.3 Process Piping Code).

1. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings and specifications to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
2. The ***Project Manager*** is responsible for the distribution of drawings and specifications, and the removal of all obsolete drawings and specifications.
3. When calculations are required, the ***Engineer*** shall be responsible for:

* Reviewing and approving calculations and specifications to the latest Code Edition. Approval shall be by signature and date on the applicable documents.
* Ensuring the correct computer aided design calculations output has been obtained.
* Verifying that all computer program revisions have been made within 6 months of the new Code Edition issue, and the revised program is producing the correct output.

1. Fabrication of a pressure piping system may commence prior to the P-Number registration from TSSA provided that the company assumes all risks related to the fabrication. The Inspector shall be notified prior to the job start.

**CALIBRATION:**

1. Gauges shall be calibrated against a standard dead weight tester or a calibrated master gauge. The gauge shall have been calibrated within 12 months prior to each test, or any time there is reason to believe the gauge is in error. Calibration may exceed 12 months with owner’s approval.

This Quality Program Manual applies in its entirety with the following exceptions for ASME B31.5 Refrigeration Piping and Heat Transfer Components:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B52 Mechanical Refrigeration Code
   2. B31.5 Refrigeration Piping and Heat Transfer Components

**DRAWINGS AND SPECIFICATIONS:**

1. It is the responsibility of the ***Project Manager*** to ensure that all drawings and specifications are prepared to the latest edition of ASME B31.5. The ***Project Manager*** shall review and approve all documents required to be submitted to TSSA for registration. Approval shall be by signature and date on all the applicable documents.
2. The drawing and/or specifications shall contain the following information as a minimum (as applicable):

* Code of construction (ASME B31.5)
* Design pressure and temperature
* Safety valve or safety device setting and location
* Service fluid
* Refrigerant name, group number and total weight of charge
* Refrigeration system capacity (i.e., tons, etc.)
* Test pressure, type of test (i.e., hydrostatic, pneumatic, etc.) and duration
* Statement describing only CRN registered fittings to be used
* Pipe/tube size and schedule (i.e., 1” Sch.40, etc.)
* Pipe/tube material specifications (i.e., SA-53B, ASTM B280, etc.)
* Fitting material specifications (i.e., SA-234, etc.)
* Pipe joining methods (welded, brazed, threaded, etc.)
* Non-destructive examination
* Post Weld Heat Treatment
* Statement describing maximum support spacing, type and anchor location

1. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings and specifications to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
2. The ***Project Manager*** is responsible for the distribution of drawings and specifications, and the removal of all obsolete drawings and specifications.
3. When calculations are required, the ***Engineer*** shall be responsible for:

* Reviewing and approving calculations and specifications to the latest Code Edition. Approval shall be by signature and date on the applicable documents.
* Ensuring the correct computer aided design calculations output has been obtained.
* Verifying that all computer program revisions have been made within 6 months of the new Code Edition issue, and the revised program is producing the correct output.

1. Fabrication of a pressure piping system may commence prior to the P-Number registration from TSSA provided that the company assumes all risks related to the fabrication. The Inspector shall be notified prior to the job start.

**FABRICATION, INSTALLATION, AND REPAIRS:**

1. A pressure test and leak test of refrigerant pressure piping shall be conducted as follows:
   1. Piping shall be examined before the pressure is applied to ensure that it is tightly connected. All items not subject to the pressure test shall be disconnected or isolated by valves, blanks, or other suitable means.
   2. A preliminary test at a pressure of up to 25 psi may be applied, prior to other testing, as a means of locating major leaks.
   3. The temperature of the piping systems during testing shall be above the ductile-brittle transition temperature.
   4. The company shall take measures to protect personnel from the potential rupture of piping components during pneumatic testing of systems.
   5. The means used to build up the test pressure shall have either a pressure limiting device or a pressure reducing device and a pressure relief device and gauge on the outlet side. The pressure relief device shall be set above the test pressure but low enough to prevent permanent deformation of any of the system components.
   6. Testing of refrigeration pressure piping shall be performed with dry nitrogen or another non-flammable gas.
   7. The high and low sides of each system shall be tested and proven tight at not less than the pressure specified on the registered drawing.
   8. For large systems that are not completely visible to the testing operator, the pressure in the system should be gradually increased to one-half of the test pressure, after which the pressure shall be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached.
   9. The pressure test shall be continuously maintained for at least two (2) hours.
2. After the pressure test is completed, a leak test shall be performed as follows:
   1. The test pressure for the leak test shall be the lesser of the design pressure or the safety valve set pressure for the leak test.
   2. Examination for leaks shall be by the soap suds test or electronic leak detection or by other methods of equal sensitivity.
   3. Examination shall be made of all joints and connections.
   4. The piping system shall show no evidence of leaking.
   5. Refrigerant vapour detection methods shall be used when refrigerant is used as the testing medium. Environmental regulations shall be complied with when testing with refrigerants.
3. The ***Project Manager*** is responsible to ensure that all requirements of this manual are followed by the company when carrying out repairs to refrigeration pressure piping systems. The company shall also comply with all other legislated requirements, including trade qualifications for the province of Ontario when performing repairs to refrigeration piping.
4. Repairs to refrigeration piping shall be done in accordance with the following:
   1. The original code of construction,
   2. The original standard, or
   3. To a code, standard or specification most applicable to the work being completed.
5. Companies performing repairs to refrigeration piping systems with a capacity over 3 tons (11 kW) refrigeration capacity or 5 tons Air Conditioning are required to have a TSSA Certificate of Authorization.
6. The company may perform self-inspection of brazed repairs to refrigeration pressure piping systems provided all of the following requirements are complied with:
   1. The company shall be in possession of a valid TSSA Certificate of Authorization.
   2. The company shall follow the requirements of this manual.
   3. The company shall document the repair on a Refrigeration Piping Repair Report (Appendix Exhibit #1) for each repair which shall include the following information:
      1. Date,
      2. Equipment owner name and address,
      3. Type of refrigeration system & capacity,
      4. Brazer ID (for brazed repairs),
      5. Repair details,
      6. Leak test pressure and results,
      7. Refrigeration Technicians signature and date.
7. Each repair performed to a refrigeration pressure piping system regulated by TSSA that does not comply with all of the above requirements shall be subject to inspection and acceptance by an Inspector.
8. The company shall ensure that repair records are kept on file for at least three (3) years minimum and shall be made available to the TSSA Representative upon request.
9. A leak test shall be performed after each repair of a refrigeration pressure piping system and shall include, but not be limited to the following:
   1. All leaks shall be repaired, and the system shall be re-tested after all repairs are completed.
   2. The test pressure used for the leak test shall be one the following:
      1. The safety valve set pressure,
      2. The manufacturers recommended test pressure, or
      3. As per a Code, standard or specification most applicable to the work.
   3. Ozone depleting substances shall not be used as trace gases.
   4. Environmental regulations shall be complied with when testing with refrigerants.
   5. If a leak is found, the system should be evacuated and repaired prior to topping up the refrigerant charge.
   6. Leak detection methods include, but are not limited to:
      1. Bubble testing with soap suds solution,
      2. Electronic leak detection, or
      3. Fluorescent dye

**BRAZING:**

1. A Brazers Log (Appendix Exhibit #2) shall be used to maintain the brazers qualification in the following manner:
   1. The ***Project Manager*** is responsible to confirm that each Brazer has used the brazing process at least once every 6 months.
   2. If a brazer has used the brazing process within each 6-month period, the ***Project Manager*** shall document this by initialling and dating the Brazers Log in the appropriate column.
   3. Renewal of a brazer performance qualification for refrigeration pressure piping is required when one of the following conditions occurs:
      1. When there is a specific reason to question the brazers ability to make brazed joints that meet the specification, or
      2. When the Brazer has not used the brazing process within a 6-month period.
2. The surfaces to be brazed shall be clean and free of grease, oxides, paint, scale, and dirt of any kind. Any suitable chemical or mechanical method of cleaning may be used to provide a clean wettable surface for brazing.
3. All leaking joints shall be repaired. Brazed joints may be repaired by cleaning the exposed area, re-fluxing, and re-brazing.
4. Soldered joints are not permitted for new fabrication or repairs of refrigeration pressure piping systems regulated by TSSA.

**CALIBRATION:**

1. For brazed refrigeration piping only, two gauges mounted on a common manifold may be used for the pressure test. Prior to the application of the full test pressure, the accuracy of the gauges shall be tested at approximately one-half of the specified test pressure to ensure that the gauges are indicating properly, and the readings are within 5% (full scale) of each other. If the two gauges do not give readings within these tolerances, they shall be replaced with other gauges and the accuracy checked again until a properly indicating pair of gauges are in place.

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| Company Logo / Company Name | | | |
| TSSA C of A Number: **QA-00000** | Date: | | |
| Location of Installation: | Equipment Type, Capacity, & Refrigerant: | | |
|  | | | |
| Description of Repair: | | | |
|  | | | |
| Leak Test Pressure:  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ psi kPa | Leak Test Results:  Acceptable Unacceptable | | |
|  | | | |
| Technician Name (print & sign): | | Brazer ID: | Date: |
|  | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| Company Logo / Company Name | | | | | | | |
| Brazers Name | ID# | Date Qualified | Process | Jan. 2024 | Apr. 2024 | Jul. 2024 | Oct. 2024 |
|  |  |  | Manual Torch Brazing | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: |
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|  |  |  | Manual Torch Brazing | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: |
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|  |  |  | Manual Torch Brazing | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: |
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|  |  |  | Manual Torch Brazing | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: |

This Quality Program Manual applies in its entirety with the following exceptions for CSA Z7396.1 Medical Gas Pipeline Systems:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. CSA Z7396.1 Medical Gas Pipeline Systems

**DRAWINGS AND SPECIFICATIONS:**

1. It is the responsibility of the ***Project Manager*** to ensure that all drawings and specifications are prepared to the latest edition of CSA Z7396.1. The ***Project Manager*** shall review and approve all documents required to be submitted to TSSA for registration. Approval shall be by signature and date on the applicable documents.
2. The drawing and/or specifications shall contain the following information as a minimum (as applicable):

* Code of construction (CSA Z7396.1)
* Design pressure and temperature
* Safety valve or safety device setting and location
* Service fluid
* Test pressure, type of test (i.e., hydrostatic, pneumatic, etc.) and duration
* Statement describing only CRN registered fittings to be used
* Pipe/tube size and schedule (i.e., 1” Sch.40, etc.)
* Pipe/tube material specifications (i.e., SA-53B, ASTM B280, etc.)
* Fitting material specifications (i.e., SA-234, etc.)
* Pipe joining methods (welded, brazed, threaded, etc.)
* Statement describing maximum support spacing, type and anchor location

1. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings and specifications to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
2. The ***Project Manager*** is responsible for the distribution of drawings and specifications, and the removal of all obsolete drawings and specifications.
3. When calculations are required, the ***Engineer*** shall be responsible for:

* Reviewing and approving calculations and specifications to the latest Code Edition. Approval shall be by signature and date on the applicable documents.
* Ensuring the correct computer aided design calculations output has been obtained.
* Verifying that all computer program revisions have been made within 6 months of the new Code Edition issue, and the revised program is producing the correct output.

1. Fabrication of a pressure piping system may commence prior to the P-Number registration from TSSA provided that the company assumes all risks related to the fabrication. The Inspector shall be notified prior to the job start.

**MATERIALS:**

1. The ***Project Manager*** shall ensure that only BCuP-3 or BCuP-5 filler is used in medical gas piping installations per CSA Z7396.1.

This Quality Program Manual applies in its entirety with the following exceptions for Repairs and Alterations of pressure retaining item:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. NBIC NB-23 Part 3 Repairs and Alterations

**DRAWINGS AND SPECIFICATIONS:**

1. It is the responsibility of the ***Project Manager*** to ensure that all drawings and specifications are prepared to describe the repair or alteration to the latest edition of NBIC NB-23 Part 3. The drawings shall include sufficient information to satisfactorily perform the repair or alteration.
2. For alterations to pressure retaining items, calculations by a professional engineer shall be provided to support the change as required by the TSSA Boilers and Pressure Vessel regulation. The ***Project Manager*** shall obtain and approve all required drawings, specifications, calculations and submit to TSSA for registration of the alteration.
3. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings, specifications, and calculations to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
4. The ***Project Manager*** is responsible for the distribution of drawings, specifications, and calculations, and the removal of all obsolete drawings, specifications, and calculations.
5. When calculations are required, the ***Engineer*** shall ensure the correct computer aided design output has been obtained. All computer program revisions must be made within 6 months of the new Code Edition issue and shall be verified by the ***Engineer***.

**MATERIALS:**

1. The materials used in making repairs or alterations shall conform insofar as possible to the original Code of Construction. Carbon or alloy steel having a carbon content of more than 0.35% shall not be welded unless permitted by the original Code of Construction. The ***Project Manager*** is responsible for verifying identification of existing materials from the original Manufacturer’s Data Report. Consideration shall be given to the condition of the existing material, especially in the weld preparation area. If the existing material cannot be verified (unknown), the ***Project Manager*** shall perform a chemical analysis and hardness testing, as a minimum, of the unknown material to verify its weldability and strength or may elect to qualify a weld procedure. If there is a question with regard to the weldability characteristics of the material, then competent technical advice should be obtained.
2. When purchasing materials for shells, heads or other pressure boundary parts formed from plate used for the repair or alteration of pressure retaining item, the ***Project Manager*** shall ensure that the Purchase Order includes the request for documentation to satisfy ASME Section VIII-1, Division 1 – UG and UCS 79.
3. For plate, or heads made from plate used for the repair or alteration of pressure retaining item, the mill test reports and/or Partial Data Reports shall be obtained and reviewed, and the physical and mechanical properties shall be verified to ASME Section II. The mill test report shall be initialled and dated by the ***Project Manager*** to indicate acceptance.
4. When material has been received, the ***Foreman*** shall ensure that the identification marking is traceable to the ASME or ASTM specifications.

**EXAMINATION AND INSPECTION:**

1. When repair or alteration work is scheduled for production, the ***Project Manager*** shall be responsible for ensuring that it is in strict accordance with the NBIC, the original Code of Construction, and the latest revision of the accepted drawings, jurisdiction, and customer requirements.
2. The ***Project Manager*** shall prepare a repair or alteration procedure and present to the Inspector for acceptance prior to commencing the work. The repair or alteration procedure shall specify the following:
   1. Proper welding procedure specification to be used,
   2. Appropriate materials required,
   3. Non-Destructive Examination to be completed,
   4. Preheat requirements,
   5. Post Weld Heat Treat requirements
3. The ***Project Manager*** shall obtain a copy of the original Manufacturer’s Data Report (if available) for use in the design of the repair or alteration. When the original Manufacturer’s Data Report is not available, agreement of the method of the repair or alteration shall be obtained by the Inspector.
4. The ***Foreman*** shall prepare an Inspection and Test Checklist (Appendix Exhibit #1) which will list all the important stages that require inspection and will provide columns for initial and date of inspections performed by the ***Foreman*** and the Inspector. No work shall proceed past these inspection points until they have been signed off by the Foreman and the Inspector.
5. The ***Foreman*** shall notify the Inspector prior to the start of work and make available the Inspection and Test Checklist, latest revised drawings, calculations, and specifications, and all other job-related documentation for initial review and designation of hold points on the Inspection and Test Checklist.
6. Pressure tests will be carried out in accordance with the NBIC NB-23 Part 3. Should a pneumatic test be permitted (pressure vessels only), special precautions must be taken to ensure personnel safety and the provisions of the applicable Code section/s adhered to. Pneumatic tests are not permitted on boilers.
7. Welded and non-welded boiler tube replacements are considered repairs and require inspections. Inspections of welded boiler tube replacements shall be performed by an inspector. Non-welded boiler tube replacement inspections shall be performed by an inspector or may be witnessed by a certified chief operating engineer for the plant, only if a record is kept and made available to the inspector at the next periodic inspection.
8. The applicable nameplate (Appendix Exhibit #2) shall be permanently attached to the pressure retaining item as close as possible to the original nameplate, or at a location agreed up by the ***Project Manager*** and the Inspector.
9. Upon completion of a repair or alteration, the ***Project Manager*** shall prepare and certify the TSSA Report of Repair or Alteration and submit it to the Inspector for review and signature.

**THE INSPECTOR:**

1. For repairs of boilers and pressure vessels that are insured, the inspection may be performed by an Inspector from the Insurance Company who holds a Certificate of Competency or by a TSSA Inspector.

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| Company Logo / Company Name | | | | | | |
| Job Number: | CRN #: | | | 5AN #: | | |
|  | | | | | | |
| * Repair | | * Alteration | | | | |
|  | | | | | | |
| * ASME Section VIII-1 | * ASME Section I | | | * ASME Section IV | | |
|  | | | | | | |
| H = Hold Point  V = Verification Point  W = Witness Point | | | Company Initial and Date | | H, V or W | Inspector Initial and Date |
|  | | | | | | |
| Drawings registered, reviewed, and accepted prior to production | | |  | |  |  |
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| Materials inspected and accepted | | |  | |  |  |
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| Fitting CRN registrations verified | | |  | |  |  |
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| Customer supplied material inspected and accepted | | |  | |  |  |
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| Welding Procedure Specification/ Brazing Procedure Specification verified | | |  | |  |  |
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| Welder/Brazer qualifications and applicable logs verified | | |  | |  |  |
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| Non-Destructive Examination completed and reports accepted | | |  | |  |  |
|  | | | | | | |
| Post Weld Heat Treatment completed and reports accepted | | |  | |  |  |
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| Gauge(s) calibrated, range(s) acceptable, and report(s) accepted | | |  | |  |  |
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| Pressure test and leak testing completed and accepted | | |  | |  |  |
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| Non-Conformance Reports accepted and closed | | |  | |  |  |
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| Nameplate stamping and attachment verified and accepted | | |  | |  |  |
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| Report of Repair or Alteration certified | | |  | |  |  |
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Note: All nameplate lettering to be a minimum of 5/32” in height

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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Altered By  MAWP \_\_\_\_\_\_\_\_ psi at \_\_\_\_\_\_\_\_ ˚F  MDMT \_\_\_\_\_\_\_\_ ˚F at \_\_\_\_\_\_\_\_ psi  CRN No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date: \_\_\_\_\_\_\_\_\_\_\_ TSSA QA# \_\_\_\_\_\_\_\_\_\_\_\_ |

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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Repaired By  Date: \_\_\_\_\_\_\_\_\_\_\_ TSSA QA# \_\_\_\_\_\_\_\_\_\_\_\_ |

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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Re-Rated By  MAWP \_\_\_\_\_\_\_\_ psi at \_\_\_\_\_\_\_\_ ˚F  MDMT \_\_\_\_\_\_\_\_ ˚F at \_\_\_\_\_\_\_\_ psi  CRN No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date: \_\_\_\_\_\_\_\_\_\_\_ TSSA QA# \_\_\_\_\_\_\_\_\_\_\_\_ |

**WELDING MATERIAL:**

1. The ***Project Manager*** is responsible for ordering welding material in accordance with the Welding Procedure Specification (WPS). This shall include the AWS Specification & Classification number.
2. The ***Project Manager*** is responsible for checking and accepting the incoming welding material and verify its compliance with the purchase order and ASME requirements.
3. Any damaged or nonconforming welding material will be rejected and returned to the supplier.
4. The ***Foreman*** is responsible for systematically checking welding material in storage and in use for proper handling, application, protection, and distribution. Welding material will be stored in designated clean, dry areas and stainless-steel material will be separated from carbon steel material. Bare rods and welding wire will be kept in individual containers according to size and type and these containers will be properly marked for identification. Flux material will be stored in individually identified bins in a clean dry storage area.
5. Low hydrogen electrodes will be purchased, received, and stored in hermetically sealed containers. When the containers are opened the electrodes will immediately be placed in a heated holding oven. This oven will be maintained at a temperature recommended by the electrode manufacturer. The ***Foreman*** will control the issue and return of low hydrogen electrodes. Low hydrogen electrodes will be issued only in sufficient quantity to complete a weld or for a four-hour period, whichever is less, after which unconsumed electrodes will be examined by the ***Foreman*** for condition, cleanliness, and identification prior to returning them to the heated holding oven. Damaged electrodes will be scrapped, and a bin will be provided in the weld area for rod end disposal.
6. Welding gases will be subjected to the same control as other materials and the ***Foreman*** will ensure that gas cylinders are properly identified before use.

**WELDING SUPERVISION:**

1. All personnel performing supervisory activities per ASME Section IX, QG-106 shall be designated by the ***President***. All designated personnel shall have a satisfactory level of competence in accordance with ASME Section IX; QG-106, and have a record maintained, containing objective evidence of the designated personnel’s qualifications, training, or experience.
2. All welding (including tack welding) shall be performed by welders/welding operators qualified to Welding Procedure Specifications (WPS) that have been written and subsequently qualified to ASME Section IX, plus any additional requirements of the applicable Code Sections to which the work is being performed. It is the responsibility of the ***Project Manager*** to review the welding requirements in the applicable Code to ensure that the construction Codes do not take exception to what is permitted by ASME Section IX.
3. All documentation and records of qualified procedures and personnel shall be maintained by the ***Project Manager*** and kept on file.

**WELDING PROCEDURES AND PERSONNEL QUALIFICATIONS:**

1. The ***Project Manager*** is responsible for developing welding parameters required by the ASME Code and customer contract and will liaise with the ***Foreman*** in preparation of the procedure to be used for production.
2. The procedure will consider the process to be used, type of material, qualification limits etc., required by the applicable specifications. They will be documented on the WPS which will list the essential, non-essential and where necessary, supplementary essential variables within the process to be used.
3. Any revisions and disposal of voided procedures is the responsibility of the ***Project Manager***.
4. The ***Project Manager*** will conduct qualification tests for each procedure to be utilized, which may also be witnessed by the Inspector. The specimen to be tested for procedure qualifications shall be welded either by direct employees or by individuals engaged by contract for their services under the full supervision and control of the Company.
5. All variables, if recorded, shall be the actual variables (including ranges) used during the welding of the test coupon. If variables are not monitored during welding, they shall not be recorded.
6. It is permissible to subcontract the preparation of the test specimens, performance of Non-Destructive Examination, and other mechanical tests, provided that the Company accepts full responsibility for any such work.
7. When the specimen has been accepted in accordance with the ASME Code requirements, the results will be documented on a Procedure Qualification Record (PQR) by the ***Project Manager*** who will date and certify the document on behalf of the Company.
8. Copies of the WPS and PQR will be submitted to the jurisdiction for registration by the ***Project Manager***. The ***Project Manager*** will liaise with the subcontracted test facility and keep all the test results on file.
9. The ***Project Manager*** will conduct and/or supervise the performance qualification tests in accordance with the qualified procedures. These tests may also be witnessed by the Inspector. The welders/welding operators used to produce the test coupons shall be under full control and supervision of the Company during the production of the test coupons.
10. The ***Project Manager*** will be responsible for documenting and certifying the Welder/Welding Operator Certificate on behalf of the company. The Certificate and test coupons or documents shall be presented to the Inspector for acceptance, signature, and date.
11. A welder/welding operator must be requalified when there is a specific reason to question their ability to make welds that meet the specification, the qualifications which support the welding they are doing shall be revoked. All other qualifications not questioned remain in effect.
12. All welders/welding operators shall be requalified every 12 months by the TSSA for each Welder/Welding Operator Certificate they are working with. Welder/Welding Operator Certificates expire 12 months from the date the coupon was welded.

**PRODUCTION WELDING:**

1. In addition to the inspection functions detailed on the Inspection and Test Checklist, the ***Foreman*** shall ensure:
   1. All welders/welding operators are provided with and are qualified to the applicable WPS required for the job and that correct instructions are given in the use of the WPS.
   2. Copies of the WPS to be used in fabrication are specified on the shop drawings and are available to the welders/welding operators in the work area.
   3. Control is maintained for the issuance and return of welding material to assure the proper welding material is used.
   4. Welds are ground as required, nozzles radiused and a full dimensional check made on weld reinforcements, fillet welds, etc., to ensure design and Code conformity.
   5. Damaged electrodes or electrode stubs have been discarded in a disposal bin in the weld area.
2. All qualified welders/welding operators will be issued with an identification number to be used for marking adjacent to any joint made by them at intervals of not greater than three feet. When this marking is not feasible, the ***Foreman*** shall keep a map which will record the welders/welding operators used on each joint.
3. A log of the welder numbers will be maintained by the ***Project Manager***. Should a welder/welding operator’s employment be terminated, their identification number will not be re-used for a period of twelve months minimum.
4. Tack welding will only be performed by qualified welders to qualified welding procedures. Tack welds shall be removed or properly prepared for inclusion in the final weld. They will be visually inspected for defects by the welder/welding operator prior to welding and if found defective, will be completely removed.

**CLEANING OF SURFACES TO BE WELDED:**

1. The surfaces to be welded shall be clean and free of scale, rust, oil, grease, slag, detrimental oxides, and other deleterious foreign material. The method and extent of cleaning should be determined based on the material and the contaminant to be removed.
2. When weld metal is to be deposited over a previously welded surface, all slag shall be removed by a roughing tool, chisel, chipping hammer or other suitable means to prevent inclusion of impurities in the weld metal.
3. Cast surfaces to be welded shall be machined, chipped, or ground to remove foundry scale and to expose sound metal.

**REPAIR OF WELD DEFECTS:**

1. Defects such as cracks, pinholes, and incomplete fusion, detected visually, during the pressure test, or by the examinations required by the Code of construction, shall be removed by mechanical means or by thermal gouging processes, after which the joint shall be rewelded.

**WELDING SUB-CONTRACTORS:**

1. When welding is subcontracted, the ***Project Manager*** shall ensure that the sub-contracted company holds the applicable TSSA Certificate of Authorization to provide the welding service. The welding sub-contracted company shall complete the following:
   1. Contact the Inspector, informing them of the portion of the job they will be completing.
   2. Review drawings, specifications, and verifies materials.
   3. Completes the job package as required by their quality program.
   4. Forwards a copy of the following documentation to the ***Project Manager***:
      1. Inspection and Test Checklist
      2. Copy of the Welding Procedure Specification
      3. Copy of the registered Procedure Qualification Record
      4. Copy of Welder/Welding Operator Certificates
      5. Copy of the Non-Destructive Examination Reports
      6. Copy of the Post Weld Heat Treatment Reports
      7. The applicable certified Data Report
2. Welded parts that are shop fabricated by the sub-contractor and shipped to the field site require the applicable marking and certified Partial Data Reports signed by the manufacturing shop Inspector. The marking and Partial Data Reports will be used as the basis for acceptance of the sub-contracted welded parts by the field site Inspector.

**VISUAL WELD EXAMINATION (applicable to ASME B31.1 or ASME B31.3 Only):**

1. All visual weld examinations required by the applicable ASME Code shall be by a member of the Company, appointed by the ***Project Manager***.
2. The ***Project Manager*** shall be responsible for preparing and certifying a Visual Examination Procedure that meets the requirements of the applicable construction Code and ASME Section V as a minimum.
3. The ***Project Manager*** shall be responsible to appoint visual examiners and review their qualifications on an annual basis. This review shall be recorded, and records made available to the Inspector upon request.
4. Visual weld examination interpretation shall be in accordance with the applicable Code of Construction and results recorded on the Inspection and Test Checklist or on a visual examination report (as applicable).
5. Visual weld examination may be sub-contracted to a qualified NDE company. Results of visual weld examination shall be documented on a visual examination report by the sub-contractor. This report shall be reviewed and accepted by the ***Project Manager*** and included in the job file.

**BRAZING MATERIAL:**

1. The ***Project Manager*** is responsible for ordering brazing material in accordance with the Brazing Procedure Specification (BPS). This shall include the AWS Specification & Classification number.
2. The ***Project Manager*** is responsible for checking and accepting the incoming brazing material and verify its compliance with the purchase order and ASME requirements.
3. Any damaged or nonconforming brazing material will be rejected and returned to the supplier.
4. The ***Foreman*** is responsible for systematically checking brazing material in storage and in use for proper handling, application, protection, and distribution. Brazing rods will be kept in individual containers according to size and type and these containers will be properly marked for identification.
5. Brazing gases will be subjected to the same control as other materials and the ***Foreman*** will ensure that gas cylinders are properly identified before use.

**BRAZING SUPERVISION:**

1. All personnel performing supervisory activities per ASME Section IX, QG-106 shall be designated by the ***President***. All designated personnel shall have a satisfactory level of competence in accordance with ASME Section IX; QG-106, and have a record maintained, containing objective evidence of the designated personnel’s qualifications, training, or experience.
2. All brazing shall be performed by brazers/brazing operators qualified to Brazing Procedure Specifications (BPS) that have been written and subsequently qualified to ASME Section IX, plus any additional requirements of the applicable Code Sections to which the work is being performed. It is the responsibility of the ***Project Manager*** to review the brazing requirements in the applicable Code to ensure that the construction Codes do not take exception to what is permitted by ASME Section IX.
3. All documentation and records of qualified procedures and personnel shall be maintained by the ***Project Manager*** and kept on file.

**BRAZING PROCEDURES AND PERSONNEL QUALIFICATIONS:**

1. The ***Project Manager*** is responsible for developing brazing parameters required by the ASME Code and customer contract and will liaise with the ***Foreman*** in preparation of the procedure to be used for production.
2. The procedure will consider the process to be used, type of material, qualification limits etc., required by the applicable specifications. They will be documented on the BPS which will list the essential, non-essential and where necessary, supplementary essential variables within the process to be used.
3. Any revisions and disposal of voided procedures is the responsibility of the ***Project Manager***.
4. The ***Project Manager*** will conduct qualification tests for each procedure to be utilized, which may also be witnessed by the Inspector. The specimen to be tested for procedure qualifications shall be brazed either by direct employees or by individuals engaged by contract for their services under the full supervision and control of the Company.
5. All variables, if recorded, shall be the actual variables (including ranges) used during the brazing of the test coupon. If variables are not monitored during brazing, they shall not be recorded.
6. It is permissible to subcontract the preparation of the test specimens, and other mechanical tests, provided that the Company accepts full responsibility for any such work.
7. When the specimen has been accepted in accordance with the ASME Code requirements, the results will be documented on a Procedure Qualification Record (PQR) by the ***Project Manager*** who will date and certify the document on behalf of the Company.
8. Copies of the BPS and PQR will be submitted to the jurisdiction for registration by the ***Project Manager***. The ***Project Manager*** will liaise with the subcontracted test facility and keep all the test results on file.
9. The ***Project Manager*** will conduct and/or supervise the performance qualification tests in accordance with the qualified procedures. These tests may also be witnessed by the Inspector. The brazers/brazing operators used to produce the test coupons shall be under full control and supervision of the Company during the production of the test coupons.
10. The ***Project Manager*** will be responsible for documenting and certifying the Brazer/Brazing Operator Certificate on behalf of the company. The Certificate and test coupons or documents shall be presented to the Inspector for acceptance, signature, and date.
11. A brazer/brazing operator must be requalified when there is a specific reason to question their ability to make brazes that meet the specification, the qualifications which support the brazing they are doing shall be revoked. All other qualifications not questioned remain in effect.
12. All brazers/brazing operators shall be requalified every 12 months by the TSSA for each Brazer/Brazing Operator Certificate they are working with. Brazer/Brazing Operator Certificates expire 12 months from the date the coupon was brazed.

**PRODUCTION BRAZING:**

1. The ***Foreman*** shall have control over production brazing and will be responsible for:
   1. Ensuring that all brazers/brazing operators are provided with and are qualified to the applicable BPS required for the job and that correct instructions are given in the use of the BPS.
   2. Verifying that the copies of the BPS to be used in fabrication are specified on the shop drawings and are available to the brazers/brazing operators in the work area.
   3. Control is maintained for the issuance and return of brazing material to assure the proper brazing material is used.
2. All qualified brazers/brazing operators will be issued with an identification number to be used for marking adjacent to any joint made by them at intervals of not greater than three feet. When this marking is not feasible, the ***Foreman*** shall keep a map which will record the brazers/brazing operators used on each joint.
3. A log of the brazer numbers will be maintained by the ***Project Manager***. Should a brazers/brazing operator’s employment be terminated, their identification number will not be re-used for a period of twelve months minimum.

**CLEANING OF SURFACES TO BE BRAZED:**

1. The surfaces to be brazed shall be clean and free of scale, rust, oil, grease, slag, detrimental oxides, and other deleterious foreign material. The method and extent of cleaning should be determined based on the material and the contaminant to be removed.

**BRAZING SUB-CONTRACTORS:**

1. When brazing is subcontracted, the ***Project Manager*** shall ensure that the sub-contracted company holds the applicable TSSA Certificate of Authorization to provide the brazing service. The brazing sub-contracted company shall complete the following:
   1. Contact the Inspector, informing them of the portion of the job they will be completing.
   2. Review drawings, specifications, and verifies materials.
   3. Completes the job package as required by their quality program.
   4. Forwards a copy of the following documentation to the ***Project Manager***:
      1. Inspection and Test Checklist
      2. Copy of the Brazing Procedure Specification
      3. Copy of the registered Procedure Qualification Record
      4. Copy of Brazer/Brazing Operator Certificates
      5. The applicable certified Data Report
2. Brazed parts that are shop fabricated by the sub-contractor and shipped to the field site require the applicable marking and certified Partial Data Reports signed by the manufacturing shop Inspector. The marking and Partial Data Reports will be used as the basis for acceptance of the sub-contracted brazed parts by the field site Inspector.
3. The ***Project Manager*** is responsible for the creation, control, and revision of all bonding procedures. The ***Project Manager*** shall ensure that all bonding procedures are documented and meet the requirements of ASME B31.3. Bonding procedures and personnel are not required to be registered with the TSSA.
4. The ***Project Manager*** shall be responsible for the training and continuity of all bonding personnel per ASME B31.3. The ***Project Manager*** shall document proof of the bonder qualification and continuity on the Bonder Record Log (Exhibit #1).
5. Bonders shall be re-qualified when:
   1. They have not bonded with a process within 6 months or more.
   2. There is specific reason to question the bonder’s ability to make bonds that meet the bonding procedure.
6. Procedure qualification by others per ASME B31.3 is acceptable, provided all the requirements of the Code are met. The ***Project Manager*** shall accept these bonding procedures on behalf of the Company as their own.
7. Performance qualifications by others is acceptable provided ASME B31.3 have been followed and is acceptable to the Inspector.
8. The ***Project Manager*** shall make all applicable bonding procedures available to the Inspector for approval prior to completing any bonding work. The Inspector may request requalification of bonding personnel if the work is deemed inadequate.

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| Company Logo / Company Name | | | | | | | |
| Bonders Name | ID# | Date Qualified | Process | Jan. 2024 | Apr. 2024 | Jul. 2024 | Oct. 2024 |
|  |  |  |  | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: | Job#:  Sign: |
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1. All Non-Destructive Examination (NDE) shall be completed by a sub-contracted company approved by the ***Project Manager***. The ***Project Manager*** shall ensure that:
   1. The Level III Examiner and personnel supervised by him are properly qualified and certified in accordance with CAN/CGSB-48.9712, SNT-TC-1A, or ISO 9712 requirements.
   2. All NDE procedures are made and qualified in accordance with ASME Section V and the requirements of the applicable Code section to which the work is being performed.
2. The sub-contractor’s Level III Examiner shall be responsible for:
   1. The preparation of any required written NDE procedures.
   2. Maintaining a documented record of qualifications, training, examination, and past experience of all the NDE personnel and providing records when requested by the ***Project Manager*** or the Inspector.
   3. Providing calibration records of NDE equipment when requested by the ***Project Manager*** or the Inspector.
   4. Ensuring all NDE procedures are demonstrated and accepted by the Inspector and available upon request.
3. The responsibility for determining NDE requirements rests with the ***Project Manager***.
4. All radiographs shall be interpreted by a Level II or III Examiner before presenting the film and report to the ***Project Manager***, who will review and accept these reports and any other NDE reports (Ultrasonic, Liquid Penetrant, Magnetic Particle, or Visual Inspection), on behalf of the Company.
5. All NDE reports shall be signed and dated by the ***Project Manager*** prior to presenting them to the Inspector for review and acceptance. All NDE Reports shall be retained in accordance with the applicable Code.
6. All Post Weld Heat Treatment (PWHT) shall be completed by a sub-contracted company approved by the ***Project Manager***. The ***Project Manager*** shall ensure that:
   1. The PWHT is completed as required by the Code and engineering design,
   2. Welding procedures for PWHT are registered with TSSA,
   3. PWHT procedures and charts are reviewed and accepted, including proper placement of thermocouples,
   4. Traceability of the item is maintaining traceability when sent to the sub-contracted facility,
   5. The calibration records from the PWHT facility are reviewed and accepted by the ***Project Manager*** prior to the pressure test.
7. The sub-contracted PWHT facility shall be responsible for providing time/temperature charts or chronological temperature lists to the ***Project Manager***. These documents shall be reviewed and accepted by the ***Project Manager*** to ensure conformance to written procedures and applicable ASME Code section requirements.
8. All PWHT documentation shall be made available to the Inspector for review and acceptance.

This Quality Program Manual applies in its entirety with the following exceptions for ASME Section I & ASME B31.1 Boiler External Piping:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. ASME B31.1 Power Piping
   3. ASME Section I Rules for Construction of Power Boilers

**DRAWINGS AND SPECIFICATIONS:**

1. The design of the Boiler External Piping (BEP) shall be the responsibility of the ASME Section I boiler manufacturer. If the BEP does not come as part of the design, the ***Project Manager*** shall be responsible for the design and registration with TSSA. Approval shall be by signature and date on the applicable documents.
2. When this Company is responsible for the design of the BEP, the drawing and/or specifications shall contain the following information as a minimum (as applicable):
   1. Code of construction (ASME B31.1)
   2. Design pressure and temperature
   3. Safety valve or safety device setting and location
   4. Service fluid
   5. Test pressure, type of test (i.e., hydrostatic, pneumatic, etc.) and duration
   6. Statement describing only CRN registered fittings to be used
   7. Pipe/tube size and schedule (i.e., 1” Sch.40, etc.)
   8. Pipe/tube material specifications (i.e., SA-53B, ASTM B280, etc.)
   9. Fitting material specifications (i.e., SA-234, etc.)
   10. Pipe joining methods (welded, brazed, threaded, etc.)
   11. Non-destructive examination
   12. Post Weld Heat Treatment
3. If customer designs and specifications are to be utilized, the ***Project Manager*** shall review and approve drawings and specifications to ensure Code compliance. Approval shall be by signature and date on the calculations, specifications, and/or drawings (as applicable).
4. The ***Project Manager*** is responsible for the distribution of drawings and specifications, and the removal of all obsolete drawings and specifications.
5. When calculations are required, the ***Engineer*** shall be responsible for:

* Reviewing and approving calculations and specifications to the latest Code Edition. Approval shall be by signature and date on the applicable documents.
* Ensuring the correct computer aided design calculations output has been obtained.
* Verifying that all computer program revisions have been made within 6 months of the new Code Edition issue, and the revised program is producing the correct output.

1. Fabrication of a pressure piping system may commence prior to the P-Number registration from TSSA provided that the company assumes all risks related to the fabrication. The Authorized Inspector shall be notified prior to the job start.

**MATERIALS:**

1. The ***Project Manager*** shall ensure that materials are ordered to ASME SA, SB, or SFA specifications. Materials ordered to ASTM may be used considering the ASTM material is identical or more stringent than the ASME material.
2. The ***Project Manager*** shall ensure that the materials are reviewed to the requirements of ASME Section II for compliance. The Mill Test Report(s) shall be signed and dated by the ***Project Manager*** as proof of meeting the material requirements of ASME Section II.

**FABRICATION, INSTALLATION, AND REPAIRS:**

1. The BEP shall be hydrostatically tested per ASME Section I.
2. The Authorized Inspector shall witness the pressure test and verify materials as minimum mandatory hold points.
3. All BEP piping shall be stamped per the following:
   1. Welded BEP over 2” shall be stamped with the company name and serial number. Such stamping shall be on the pipe, valve, or fitting, adjacent to the welded joint furthest from the boiler. For temperatures above 800⁰F, stamping may be on a nameplate as per ASME Section I.
   2. Welded piping under 2” shall be marked with identification acceptable to the Authorized Inspector and traceable to the Boiler External Piping Systems Installation and Test Data Report.
   3. Mechanically assembled BEP which contains no pressure boundary welds does not require stamping.
4. The ***Project Manager*** shall be review for correctness and certifying the Boiler External Piping Systems Installation and Test Data Report prior to presenting to the Authorized Inspector for acceptance.

This Quality Program Manual applies in its entirety with the following exceptions for the manufacturing of welded or brazed and non-welded or non-brazed Category A, B, C, D, E, F, & H Type Fittings:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. Applicable Code of Construction

**DRAWINGS AND SPECIFICATIONS:**

1. The ***Project Manager*** shall ensure the completed Statutory Declaration form has been submitted with the application to TSSA for the registration of the fitting.
2. The ***Project Manager*** shall ensure that fitting drawings are submitted to TSSA for registration and shall contain the following information:
   1. Code of Construction
   2. Material Specification (If the material specification is other than ASME or ASTM, the Company is required to submit the material specification details including mechanical properties and a statement indicating the nearest ASME or ASTM equivalent)
   3. Maximum Allowable Working Pressure and Temperature
   4. Overall dimensions and detailed dimensions of all pressure parts
   5. Detailed calculations or a copy of the proof test report witnessed and signed by the Inspector

**FABRICATION, INSTALLATION, AND REPAIRS:**

1. The ***Project Manager*** is responsible for preparing an Inspection and Test Checklist (Appendix Exhibit #1) which shall list all required inspection points, drawings, materials, procedures, or any other special requirements.
2. The ***Project Manager*** is responsible for preparing a Nameplate (Appendix Exhibit #2), or stamping, as applicable.
3. The Inspector and Data Report requirements are excluded from the manufacture of fittings unless proof testing is required. The Inspector shall witness proof testing for design verification.

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| Company Logo / Company Name | | | |
| Job Number: | CRN #: | | |
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| Code of Construction: | | | |
|  | | | |
| H = Hold Point  V = Verification Point  W = Witness Point | | H, V or W | Company Initial and Date |
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| Drawing registered, reviewed, and accepted prior to production | |  |  |
|  | | | |
| Materials inspected and accepted | |  |  |
|  | | | |
| Welding Procedure Specification/ Brazing Procedure Specification verified | |  |  |
|  | | | |
| Welder/Brazer qualifications and applicable logs verified | |  |  |
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| Non-Destructive Examination completed and reports accepted | |  |  |
|  | | | |
| Post Weld Heat Treatment completed and reports accepted | |  |  |
|  | | | |
| Gauge(s) calibrated, range(s) acceptable, and report(s) accepted | |  |  |
|  | | | |
| Pressure test and leak testing completed and accepted | |  |  |
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| Non-Conformances accepted and closed | |  |  |
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| Nameplate stamping and attachment verified and accepted | |  |  |
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Note: All nameplate lettering to be a minimum of 5/32” in height

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| \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Manufactured By  MAWP \_\_\_\_\_\_\_\_ psi at \_\_\_\_\_\_\_\_ ˚F  MDMT \_\_\_\_\_\_\_\_ ˚F at \_\_\_\_\_\_\_\_ psi  CRN No: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Date: \_\_\_\_\_\_\_\_\_\_\_ TSSA QA# \_\_\_\_\_\_\_\_\_\_\_\_ |

This Quality Program Manual applies in its entirety with the following exceptions for the hot tapping and line stopping of pressure retaining items:

1. The ***Project Manager*** shall have access to the latest edition of the following:
   1. CSA B51 Boiler and Pressure Vessel & Pressure Piping Code
   2. API-2201 Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries
   3. Original Code of Construction

**DRAWINGS AND SPECIFICATIONS:**

1. The attachment of branch connections to an existing pressure retaining item constitutes an alteration defined in the Boilers and Pressure Vessels Regulation O. Reg. 220/01. The ***Project Manager*** or owner (or owner’s representative) of the pressure retaining item is responsible for submitting the drawings and design calculations for the hot tap or line stop to TSSA for registration.
2. The ***Project Manager*** is responsible for reviewing and approving the drawings and design calculations provided by the owner, or their representative, to ensure the following information is included:
   1. Code of Construction (including fluid service category for work to be performed under ASME B31.3).
   2. Pipeline or pressure component service.
   3. Design and operating conditions (pressure, temperature, etc.)
   4. Pressure test of branch connection (method, pressure, temperature, etc.)
   5. Material specifications (pipeline, hot tap fitting, repads, etc.)
   6. Hot tap fitting attachment weld detail (weld joint configuration, weld sizes, etc.)
   7. Hot tap fitting and valve details (type, material, thickness, etc.)
   8. Minimum base metal thickness required.
   9. NDE requirements, PWHT requirements, hardness testing requirements, etc.

**MATERIALS**

1. The ***Project Manager*** is responsible for ensuring that all materials are of known weldable quality and conforms to the Code of Construction and compatible with the original material.

**EXAMINATION AND INSPECTION:**

1. The ***Project Manager*** is responsible for preparing and approving a hot tap/line stop procedure and hot tap checklist before commencing any hot tap or line stopping operation. The hot tap procedure shall ensure:
   1. An initial site safety meeting takes place which includes all organizations involved in the hot tap, including the TSSA Inspector, to ensure that all organizations and personnel involved are familiar with their responsibilities and safety procedures.
   2. All necessary engineering, installation, and safety requirements are addressed.
   3. A job analysis has been completed which states a hot tap is appropriate after all other alternatives have been explored. The job analysis shall also include what work is to be accomplished and how the work is to be done.
   4. The hot tap procedure and checklists from each organization have been reviewed to ensure appropriate measures are addressed and the procedure and checklists have been authorized.
   5. The existing base metal thickness of the pressure retaining item will provide adequate support for the new construction and the hot tapping machine or the use of reinforcement pads or other means of support are adequate for the new construction and hot tapping machine.
   6. The base metal of the pressure retaining item is free of laminations, hydrogen attach or stress corrosion cracking.
   7. Imperfections are evaluated which may prevent a sound weld from being made at the location of the hot tap.
   8. The minimum base metal thickness requirements have been documented.
   9. The proper hot tap fitting has been selected (i.e., welded outlet, split tees, nozzles, etc.)
2. The ***Project Manager*** is responsible for documenting and designating competent and qualified personnel who are experienced, skilled, and knowledgeable to perform the work.
3. The ***Project Manager*** shall prepare and approve a hot tap Inspection and Test Checklist (Exhibit #1), which shall list all the important stages required to perform the hot tap that requires examination and testing and shall provide columns for sign off and dating of inspections performed by the ***Project Manager*** when each function is complete. No work shall proceed past these inspection points until the ***Project Manager*** has signed them off.
4. Before starting the hot tap, the ***Project Manager*** shall notify the Inspector and make available the Inspection and Test Checklist, the latest revised drawings, design calculations, and all job-related documents required by the Inspector for initial review and designation of mandatory hold points on the Inspection and Test Checklist.

**MACHINE OPERATION**

1. The ***Project Manager*** shall ensure the hot tap machine to be used shall be designed and constructed to withstand the pressure, temperature, and mechanical stress, which may be imposed during operation. The hot tap machine cutter and pilot bit shall be carefully inspected to ensure satisfactory condition prior to use. The hot tap machine shall be capable of being left in service in the event of mechanical problems or valve leakage. Operational upsets shall have been considered during the operation of the hot tap machine.
2. The ***Project Manager*** shall ensure the hot tap machine operator is competent and qualified by formal training or on the job training to assemble, use, and install the hot tap machine. The ***Project Manager*** shall be present during the hot tap operation.
3. The owner or their representative shall physically mark the location of the hot tap, verified by the ***Project Manager***. The owner or their representative must evaluate the pipe wall thickness within 28 days of the hot tap operation, as well as ensure the documented hot tap plan and contingency plan is in place.
4. Prior to the operation of the hot tap machine, the ***Project Manager*** shall ensure the following measures have been checked and documented:
   1. The visual weld inspection of the hot tap fitting attachment weld has been completed by a certified visual weld examiner per the original Code of construction.
   2. The pressure test of the hot tap fitting has been completed.
   3. The manufacturer’s instructions for the installation of the hot tap machine have been followed.
   4. The hot tap valve has been tested for seat leakage prior to installation.
   5. The hot tap machine bleed-off valve is not plugged and can hold pressure.
   6. The hot tap machine bolts and packing has been checked for tightness.
   7. The hot tap machine has been pressure tested.
5. During the operation of the hot tap machine, the ***Project Manager*** shall ensure the following measures have been checked and documented:
   1. When the hot tap machine starts cutting, it can proceed without interruption until the hot tap has been completed and the valve is closed.
   2. The manufacturer’s instructions have been followed when retracting the bore and closing the valve.
   3. A contingency plan has been established and utilized if the coupon is lost during retrieval.
   4. Adequate containment is available to control liquids and vapours trapped within the hot tap machine.

**WELDING**

1. In addition to the Welding Appendix, the Project Manager shall check and document the following measures, and the owner or their representative shall conduct a review of the pressure retaining equipment metallurgy and line contents to ensure:
   1. The hot tap fitting and welding electrodes are compatible
   2. The heat transfer during welding has been evaluated to determine the heat input and related welding variables to prevent overheating and burn through during welding.
   3. If it is necessary to purge or flood the line to prevent the formation of flammable mixtures during in-service welding.
   4. Welding pre-test samples are completed on similar materials and thicknesses (if applicable) are completed.

This Quality Program Manual applies in its entirety with the following exceptions for Trades Organization BPV Members:

For members of HRAI or ORAC:

**DRAWINGS AND SPECIFICATIONS**

1. This company may utilize HRAI/ORAC registered P-Standard Drawings following HRAI/ORAC requirements.

**BRAZING**

1. In addition to the Brazing Appendix, this company may utilize HRAI/ORAC Brazing Procedures following HRAI/ORAC requirements.
2. Qualified testing locations will be responsible for personnel performing supervisory activities in accordance with ASME Section IX, QG-106.

For members of MCAO:

**WELDING AND/OR BRAZING:**

1. In addition to the Welding and/or Brazing Appendix, this company may utilize MCAO Welding and/or Brazing Procedures following MCAO requirements.
2. Qualified testing locations will be responsible for personnel performing supervisory activities in accordance with ASME Section IX, QG-106.

This Quality Program Manual applies in its entirety with the following exceptions for the Alternate Piping Process:

**STATEMENT OF AUTHORITY:**

1. This Quality Program Manual Appendix contains the requirements deemed necessary by this Company for the self-inspection of piping systems per TSSA Safety Advisory BPV-001-23.
2. The ***Company Qualified Personnel*** will provide inspections based on the Quality Program, registered design, and jurisdictional requirements.
3. The ***Company Qualified Personnel*** have been given the authority and responsibility for enforcing the inspection requirements per this Appendix and has the organizational freedom to identify inspection issues that include the authority to stop work when necessary, until these issues are resolved.
4. The ***Company Qualified Personnel*** will provide unbiased inspections when carrying out duties and shall work with the Company in resolving inspection issues.
5. In the event of conflict between the ***Company Qualified Personnel*** and other personnel on matters associated with providing inspections in accordance with the regulatory requirements, they shall be brought to the TSSA for resolution in accordance with the Quality Program Manual, Codes, or Regulatory requirements.

**SCOPE:**

1. This Appendix may be used with the Certificate Holders Quality Programs, including:
   1. ASME B31.1 Power Piping (Non-Boiler External Piping)
   2. ASME B31.3 Process Piping
   3. ASME B31.5 Brazed or Mechanical Joints for Refrigeration ONLY (Limited to A1 and A2L Refrigerants)
   4. CSA Z7396.1 Medical Gas Pipeline Systems

**DEFINITIONS:**

**A1 Refrigerant** - isrefrigerant that has no flame propagation.

**A2L Refrigerant -** A2L is lower flammability refrigerant with a maximum burning velocity of 10 cm/s (3.9 in/s).



NOTE: For a list of A1 Refrigerants see ASHRAE -34

**\*Boiler External Piping** - Boiler external piping shall be considered as piping attached to an ASME *Section I Power Boiler* that begins where the boiler proper terminates at:

1. the first circumferential joint for welding end connections; or
2. the face of the first flange in bolted flanged connections; or
3. the first threaded joint in that type of connection, and that extends up to and including the valve or valves required by ASME B31.1 para. 122.1.

\* For more details on Boiler External Piping see ASME B31.1 Power Piping Code Figures 100.1.2 (1-7)

**Boiler Proper Piping** – Boiler Proper Piping is piping that is part of the actual boiler (ASME *Section I Power Boiler)* that is fabricated and installed by the boiler manufacturer. (ASME B31.1 Code does not apply to this piping).

**Lethal substances** - poisonous gases or liquids of such a nature that a very small amount of the gas or of the liquid’s vapour mixed or unmixed with air is dangerous to life when inhaled.

Note: *Attention should be given to liquids that may be absorbed through the Body.*

**B31.3 Category M Fluid Service** - a fluid service in which both of the following apply:

1. the fluid is so highly toxic that a single exposure to a very small quantity of the fluid, caused by leakage, can produce serious irreversible harm to persons on breathing or bodily contact, even when prompt restorative measures are taken
2. after consideration of piping design, experience, service conditions, and location, the owner determines that the requirements for Normal Fluid Service do not sufficiently provide the leak tightness required to protect personnel from exposure

**New Fabrication or Installation** – New Piping System installations where one did not exist before, also *includes* new pipe spools fabricated and additions of piping to existing systems

**Superheated Steam** - issteam at a temperature higher than its boiling point at the absolute pressure where the temperature is measured.

**ELIGIBLE PIPING SYSTEMS**

1. Most piping systems are eligible to apply for the alternate piping process, however: **New fabrications or installations longer than 1,000 ft will require TSSA to be consulted prior to fabrication or installation to ensure the piping system will qualify for this process.**
2. The following types of piping systems will **NOT** be eligible for this alternate piping process:
3. Refrigeration piping systems where refrigerant is A2, A3, B1, B2, B2L, B3
4. Refrigeration piping systems where refrigerant is A1 or A2L and the design pressure is above 700 psi
5. Boiler proper piping
6. Boiler external piping or non-boiler external piping with

* superheated steam; or
* steam design pressure over 250 psi

1. Piping systems designed to ASME B31.3 Normal Fluid Service and other piping systems designed per ASME B31.1 where any of the following conditions apply:

* design pressure is above 375 psi or design temperature is above 800⁰F or
* non-buried gaseous systems with Nominal Pipe Size over 12”

1. Piping systems designed for ASME B31.3 Category M, Elevated temperature, Severe Cyclic or High-Pressure Service as defined in ASME B31.3
2. Lethal service systems as per owner’s classification
3. Hot Tapping on piping systems

**TRAINING/QUALIFICATION REQUIREMENTS QUALIFIED PERSONNEL**

***Also see qualified personnel Section 5.0***

1. This Company is responsible to have qualified personnel that provide oversight and inspection for the alternate piping process responsibilities.
2. Qualified Person(s) shall be appointed by the President based on education, experience, training, or a combination thereof.
3. This Company shall have documented evidence of proficiency for each person assigned to provide oversite and inspection in their respective duties.
4. The TSSA may require additional training requirements for personnel providing inspections as deemed necessary depending on work scope.
5. Qualified Person(s) are required to be acceptable to the TSSA Boiler & Pressure Vessel Program, prior to performing alternate piping process inspections.
6. This Company shall maintain a documented list of each Qualified Person. The ***President***has the responsibility for maintaining this list and making it available to TSSA personnel upon request. The ***President***is responsible to report to the TSSA when a Qualified person (s) has changed employment, no longer works for this Company, or is no longer appointed by this Company.
7. Qualified Person(s) accepted by the TSSA will be given a unique identification number specific to their Company identifying them as a Qualified Person. Qualified Persons can only provide Inspection for this Company.

**QUALIFIED PERSONNEL**

1. The Candidate(s) for performing inspections and completing the “Alternate Piping Data Form”must meet the following requirements:

NOTE: The Candidate(s) meeting one or more of the requirements listed below are subject to review of the TSSA based on the scope and complexity of the Quality Program.

1. Be an employee of the Certificate of Authorization holder.
2. Depending on the scope of the Quality Program, satisfy at least one of the following qualifications or certifications:
   * + API 510 and/or 570 Certification
     + CWB Weld Supervisors or CWB Level 1, 2 or 3 Weld Inspectors
     + CGSB Level II Examiner
     + Ontario Certified Refrigeration Technician (Refrigeration ONLY)
     + Pass a National Board In-Service Course (IS), (A) or Repair Course (R)
     + Hold a National Board "Certified Individual" [NB-383] Certification
     + Hold a National Board "Pressure Equipment Inspector" [NB-438] Certification
     + A degree in Engineering with at least 3 years of documented experience in the design, fabrication, or examination of industrial pressure piping
     + A diploma in Engineering Technology with 5 years documented experience in the design, fabrication, or examination of industrial pressure piping
     + Documented evidence of 10 years of work experience in the fabrication, installation, and inspection of code piping systems.
3. Candidates(s) meeting the requirements in 5.2 are required to participate in the TSSA Regulatory Training Module (1) and receive a passing grade.
4. Certificate of Authorization Holders that do not have any employees that meet any of the requirements in 4.2 will be required to complete as follows:
   * 1. Participate in the TSSA Piping Inspection Training Course (Module 2) and receive a passing grade and;
     2. Participate in the TSSA Regulatory Training Module (1) and receive a passing grade.

**QUALIFIED PERSONNEL REPORTING STRUCTURE**

1. The Qualified Person(s) shall have direct report to senior management when performing Alternate Piping Duties.

**ALTERNATE PIPING INSPECTIONS**

1. All inspections are the responsibility of this Company and are to be performed by Company Qualified Personnel and acceptable to the TSSA. Inspections include but are not limited to:
2. Review of design documents *(including piping registrations)*
3. Review of Inspection and Test Plans/Checklists
4. Review of Welding/Brazing Procedures
5. Review of Welder/Brazer Qualifications
6. Review & Acceptance of NDE Procedures such as RT, MT, PT, UT, and associated reports
7. Review of materials (*including proof of CRN for fittings)*
8. Review, accept, and verify closure of Non-Conformances
9. Verify examination for leakage has been completed by competent personnel
10. Witnessing the pressure test(s)
11. Review and signing of the TSSA Alternate Piping Data Form(Appendix Exhibit #3)
12. The company Qualified Person(s) shall complete, sign & indicate their Identification Number# on the Alternate Inspection & Test Checklist (Appendix Exhibit #2a or #2b as applicable). Multiple Qualified Persons may complete the Alternate Inspection & Test Checklist as required.

**DOCUMENTATION**

1. The documentation as required by the Quality Program Manual shall be maintained on file for a minimum of 5 years by the company. Files are required to be available upon request by the TSSA for review.
2. Documentation related to the qualification of Qualified Person(s) shall be retained for a period of 5 years after the last Alternate Piping Data Formwas signed.
3. The Company shall maintain a log of all Ontario regulated piping installations and fabrications on the Alternate Piping Process Log Sheet (Appendix Exhibit #1).
4. Documentation shall be complete, legible, and easily retrievable.

**ALTERNATE PIPING DATA FORM**

1. The Alternate Piping Data Form is to be completed by the Company.
2. **Certificate of Compliance:** The Certificate of Compliance portion of the Data Form shall be completed by the Company’s Qualified Person. The Company shall then forward the Alternate Piping Data Form to the TSSA for technical review.

NOTE: The “Certificate of Authorization Number” is the new QA Number for the Alternate Piping Process.

1. **Certificate of Inspection (TSSA):** After TSSA Completes the Certificate of Inspection, the Alternate Piping Data Form shall be distributed and maintained per z)iii below.
2. **Distribution of Alternate Process Piping Form:** The TSSA will send all completed and accepted Alternate Piping Data Forms back to the Company for distribution and filing. The Company shall maintain & distribute as follows:

* 1 Copy for Company job file
* 1 Copy to Client

**TSSA TECHNICAL REVIEW**

1. Data Reports are to be sent into the TSSA for technical review. Any deficiencies identified during the review shall be addressed by the Companyand documented per the Quality Program Manual.
2. The TSSA may request additional documentation as deemed necessary to provide clarification as required.

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| **Date:** | **Location of Installation** | **Work Order** | **Qualified Person Identification #:** |
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NOTE: This log may be maintained electronically.

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| *Company Logo and/or Company Name* | | | | | | |
| TSSA Work Order Number: | |  | | | | |
| Piping Registration Number: | | P# or P-STD#: | | | | |
|  | | | | | | |
| * ASME B31.1 | * ASME B31.3 Cat \_\_\_ | | | * ASME B31.5 | * CSA Z7396.1 | |
|  | | | | | | |
| **Description of Inspections** | | | **Company Qualified Person Initial and Date** | | | **Qualified Person Identification #** |
|  | | | | | | |
| Design documents and drawings reviewed prior to production | | |  | | |  |
|  | | | | | | |
| Materials received, accepted, and inspected per the Quality Program | | |  | | |  |
|  | | | | | | |
| Customer supplied material inspected and accepted | | |  | | |  |
|  | | | | | | |
| Fitting CRN registrations verified | | |  | | |  |
|  | | | | | | |
| Welding Procedure Specification (WPS)/Brazing Procedure Specification (BPS) verified | | |  | | |  |
|  | | | | | | |
| Welder/Brazer qualifications verified | | |  | | |  |
|  | | | | | | |
| NDE completed and reports accepted | | |  | | |  |
|  | | | | | | |
| PWHT completed and reports accepted | | |  | | |  |
|  | | | | | | |
| Brazing examination completed and accepted | | |  | | |  |
|  | | | | | | |
| Supports visually inspected and accepted | | |  | | |  |
|  | | | | | | |
| Visual welding examination completed and accepted | | |  | | |  |
|  | | | | | | |
| For Pneumatic tests: Preliminary low-pressure test completed, and all mechanical joints checked for tightness prior to full test pressure being applied | | |  | | |  |
|  | | | | | | |
| Pressure test witnessed and accepted | | |  | | |  |
|  | | | | | | |
| Leak test witnessed and accepted | | |  | | |  |
|  | | | | | | |
| Non-Conformances completed and accepted per the Quality Manual (as applicable) | | |  | | |  |
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| Alternate Piping Data Form completed and accepted | | |  | | |  |
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| Alternate Piping Data Form sent to TSSA for technical review | | |  | | |  |
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| --- | --- | --- | --- | --- | --- | --- |
| *Company Logo and/or Company Name* | | | | | | |
| TSSA Work Order Number: | |  | | | | |
| Piping Registration Number: | | P# or P-STD#: | | | | |
|  | | | | | | |
| * ASME B31.1 | * ASME B31.3 Cat \_\_\_ | | | * ASME B31.5 | * CSA Z7396.1 | |
|  | | | | | | |
| **Description of Inspections** | | | **Company Qualified Person Initial and Date** | | | **Qualified Person Identification #** |
|  | | | | | | |
| Design documents and drawings reviewed prior to production | | |  | | |  |
|  | | | | | | |
| Materials received, accepted, and inspected per the Quality Program | | |  | | |  |
|  | | | | | | |
| Customer supplied material inspected and accepted | | |  | | |  |
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| Fitting CRN registrations verified | | |  | | |  |
|  | | | | | | |
| Supports visually inspected and accepted | | |  | | |  |
|  | | | | | | |
| Visual examination of threaded, expanded, and compression fittings completed and accepted | | |  | | |  |
|  | | | | | | |
| For Pneumatic tests: Preliminary low-pressure test completed, and all mechanical joints checked for tightness prior to full test pressure being applied | | |  | | |  |
|  | | | | | | |
| Pressure test witnessed and accepted | | |  | | |  |
|  | | | | | | |
| Leak test witnessed and accepted | | |  | | |  |
|  | | | | | | |
| Non-Conformances completed and accepted per the Quality Manual (as applicable) | | |  | | |  |
|  | | | | | | |
| Alternate Piping Data Form completed and accepted | | |  | | |  |
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| Alternate Piping Data Form sent to TSSA for technical review | | |  | | |  |
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