Edition	Revision	August 19, 2019
1	0	

Pressure Welder Mobility System

Policy and Procedures Manual

Performance Qualification Testing and Maintenance of Qualifications

Section 1

Program Description

The Pressure Welder Mobility System (PWMS) is an online database that facilitates the mobility of pressure welders between participating jurisdictions. Membership is voluntary and is open to eligible pressure welders, pressure welding and brazing contractors, pressure welding and brazing test centres, jurisdictions or other organizations engaged in pressure welding of boilers, pressure vessels and pressure piping. The technical details contained in the program meet the minimum requirements of Section IX of the ASME Boiler and Pressure Vessel Code. Additional essential variables and administrative provisions have been incorporated. These are necessary to allow for the mutual recognition of performance qualification records between jurisdictions and to enable the continuity of individuals to be updated by different pressure welding and brazing contractors located in any participating jurisdiction.

Individual pressure welders that elect to participate will be validated by the jurisdiction where they reside and will receive a Mobility Identification Symbol (MIS). Once the MIS has been issued, a welder will be eligible to challenge one or more Uniform Performance Qualification tests. If successful, a record of the test will be uploaded to the database, and it will be available for the welder, contractors, and jurisdictions to view. Through the PWMS a pressure welder may have their qualification(s) updated by participating contractors and validated by a participating jurisdiction.

Pressure Welding Contractors, Brazing Contractors, and Authorized Welding Test Centres that participate in the pressure welder mobility system may review the database to determine the availability and status of pressure welders. This will enable pre-authorization of individuals, by the jurisdiction, before mobilization of pressure welders to a job site. Participating contractors will play a role in the ongoing maintenance of records for each pressure welder employed by the contractor.

Section 2

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Section 3

Participating Jurisdictions

Juridiction	Chief Boiler Inspector *Print*	Chief Boiler Inspector *Signature*	Date
New Brunswick	Eben Creaser	***Original Signed Document on File***	August 19, 2019
Newfoundland and Labrador	Dennis Eastman	***Original Signed Document on File***	August 19, 2019
Nova Scotia	Donald Ehler	***Original Signed Document on File***	August 19, 2019
Northwest Territories	Matthias Mailman	***Original Signed Document on File***	August 19, 2019
Nunavut	Muhammad Wani	***Original Signed Document on File***	August 19, 2019
Prince Edward Island	Steven Townsend	***Original Signed Document on File***	August 19, 2019

Section 4

Manual Control and Revisions

The Policy and Procedures Manual shall be kept as a password-protected, read-only file. The Chair of the Board of Directors of ACI Central Inc. (The Chair) shall be assigned the responsibility for control of the Policy and Procedures Manual, as well as facilitating any requested revisions to the Policy and Procedures Manual. Copies of the manual shall be available to all participants as a downloadable .pdf document.

Any participant may request a change or revision to the Policy and Procedures Manual. Such requests shall be made in writing to the Chief Inspector in the jurisdiction where the participant resides. The Chief Inspector will review and assess the requests submitted and determine the merit and benefit to the jurisdiction and the mobility system. The Chief Inspector will forward requests deemed appropriate to all other participating jurisdictions for consideration. Any proposed revision to the Policy and Procedures Manual shall be accepted by the unanimous agreement of the Chief Inspectors before being incorporated.

The Chair will make accepted revisions to the Policy and Procedure Manual by the revision of a complete section. Changes to wording within a revised section shall be indicated by using bold text until a new edition is issued. The implementation date of revisions shall be agreed upon by all participating jurisdiction Chief Inspectors. The Chair shall circulate the revised section(s) along with a revised Section 2 and Section 3. The signatures of all Chief Inspectors shall be required before making the revised copy of the manual available.

Section 5

Definitions

Authorized Test Centre - A facility that is authorized by the jurisdiction to facilitate pressure welder performance qualification tests.

Continuity Update Test - A welder performance qualification test administered by an Authorized Test Centre, in accordance with a defined set of requirements, which will document satisfactory use of a process, and renew the expiry date of the mobility qualification.

Mobility Qualification - The record that documents the eligibility to perform pressure welding and brazing and records the successful completion of uniform performance qualification test(s) and indicates the date of expiry.

Participating Jurisdiction - Jurisdictions that fully accept and implement the requirements of this Policy and Procedures Manual as indicated by the signatures in Section 3.

Mobility Identification Symbol – The unique identifier assigned to a pressure welder.

Pressure Welder/Brazer - An individual who possesses valid qualifications to perform pressure welding in a participating jurisdiction.

Pressure Welding and Brazing Contractor - A contractor who possesses current participating jurisdiction authorization to engage in pressure welding and brazing.

Uniform Performance Qualification Test - A welding performance qualification test administered in accordance with a defined set of requirements which will result in a pre-determined range of qualification.

Validated - The review and acceptance of information by a participating jurisdiction.

Section 6

Membership

Pressure welder mobility system membership is available to pressure welders, pressure welding and brazing contractors, pressure welding and brazing test centres, and jurisdictions. The system offers membership in different groups, as described herein:

Eligibility

Pressure Welder/Brazer: An individual who possesses the valid qualifications to perform pressure welding or brazing in a participating jurisdiction. The qualification must be current at the time of validation and be maintained to process the annual renewal of membership in the program.

Pressure Welding and Brazing Contractor: A contractor who possesses current participating jurisdiction authorization to engage in pressure welding and brazing. Validation of pressure welding and brazing contractors shall be performed by the jurisdiction in which the pressure welding and brazing contractor is headquartered. In the case where a contractor is not from a participating jurisdiction, membership shall be validated by the participating jurisdiction where the contractor first receives authorization to perform pressure welding and brazing. Contractors that have authorizations in multiple jurisdictions need only apply once. Contractors will be permitted to utilize the system in all other participating jurisdictions where they hold pressure welding and brazing authorization.

Authorized Test Centre: A participating jurisdiction shall confirm through an audit that the test centre employs competent persons to organize, administer, and document welder performance qualification tests. Authorized test centres shall have written procedures in place that describe performance qualification testing that is satisfactory to the jurisdiction addressing the requirements of the Performance Qualification Test Protocol in Section 7.

Participating Jurisdiction: Any Province or Territory of Canada whose Chief Inspector is a signatory to Section 3.

Application Process

Applications for all categories of membership are submitted electronically through the online database. Applicants must have a valid email address and will create a profile providing the information requested by the online application form(s). Initial applications require individuals to select the category of membership they are applying for. The fee for application (see Section 12) is payable online by credit card only and is a non-refundable application fee. Applications once submitted will be reviewed by a participating jurisdiction. The jurisdiction shall validate applications that satisfy requirements. Once validated, an email confirmation will be sent to the applicant at the email address provided. The email will provide the member with a username and temporary password they will use to gain access to the database. Members will have the ability to change the temporary password and make edits to their profile information as needed.

Section 7

Welder/Brazer Performance Qualification

Welders/Brazers that have been validated to participate in the mobility system are eligible to challenge uniform performance qualification tests. The testing protocol to be used is described in Section 8. Available qualifications are listed in Table 1 below. Testing shall, in all cases, be performed in an authorized test centre. Production welds and or job-site field testing will not be eligible for inclusion. Every welder/brazer performance qualification test posted on the pressure welder mobility system shall be conducted in the presence of an inspector employed by the jurisdiction, or an inspector who is authorized by the Board.

Completed test coupons will be evaluated for acceptance following ASME Section IX and requirements specified in this document. The test organization will file qualification records for the tests taken and submitted with detailed documentation to the inspector who witnessed the test for validation. Once validated, the record will be stored on the pressure welder mobility online database and be available to the welder and contractors and jurisdictions.

Qualification records for each test taken remain valid for six (6) months. Extension of a welder's expiry date may be done through the validated acceptable performance of production welding filed by a contractor, or through the performance of a continuity test as described in Section 8 of this manual.

All valid test records shall be recognized as transferable between participating jurisdictions for jurisdictional authorization and licensing. Valid test records document a pre-defined range of qualification, as described in Section 8, which will be used to issue jurisdictional approval or to license in the form specified by the participating jurisdiction without any further testing or other requirements.

Table 1

Eligible Qualification Tests
SMAW - F3/F4
SMAW - F3/F4 HW
GTAW/SMAW - F6/F4 Carbon Steel
GTAW/SMAW - F6/F4 HW Carbon Steel
GTAW/SMAW - F6/F5 Stainless Steel
GTAW/SMAW - F6/F5 HW Stainless Steel
OFW - F101 (Torch)
OFW - F103 (Torch)

Section 8

Performance Qualification Test Protocol

Welders:

- Every welder performance test conducted shall be carried out in the presence of a jurisdictional inspector, or when requested by a member jurisdiction, an inspector acceptable to the Board.
- Testing shall be performed at Authorized Test Centres only.
- Production welding and or onsite job tests are ineligible for inclusion.
- All initial tests for F3\F4 will be conducted using a 2 NPS Sch 80 pipe. F3/F4 shall be one root pass only F3-E6011, remainder F4-E7018
- All initial tests for F6/F4 and F6/F5 will be performed on 2 NPS Sch 160 pipe. GTAW F6 portion shall be two (2) passes ER70S-2 or ER 309 as applicable.
- Testing for the limited thickness heavy wall (HW) qualification for the mobility system, if requested, will be conducted on 2 NPS XXS. A welder must hold a current non-HW qualification test record for the same filler metals.
- The welder shall tack test coupons in three locations only. Maximum tack length 3/8". Tack welds shall be the same process and filler material as the root pass. Tack welds may be performed in any position, and the coupon moved between tacks.
- Tack welds may be tapered by grinding to allow for proper weld fusion during root pass welding.
- Welding coupon shall be secured to a test bench or post connected to a test bench in the 6G position. The Test Administrator and Inspector shall inspect to confirm the proper position, the coupon preparation, and tack weld size before authorizing the welder to proceed.
- The coupon once secured and inspected is not permitted to be moved in any direction after the authorization to proceed.

- Upon completion of the root pass, the welder shall inform the test administrator and inspector. The test administrator, monitored by the inspector shall visually inspect both internal and external surfaces of the root pass with the aid of a flashlight and mirror. The root pass shall be evaluated in accordance with the **Root Pass Visual Acceptance Criteria** provided in this section before the welder is authorized to continue the welding test.
- Failure to meet acceptance criteria will constitute a failure; repairs will not be permitted
- If the root pass is acceptable, the welder will be instructed to fill and cap the coupon. Weld cap shall be stringers only. Upon completion of welding, the welder will inform the administrator and inspector who shall both inspect the coupon before it being removed from the test position.
- The completed weld shall be evaluated in accordance with the **Completed Weld Visual Acceptance Criteria** provided in this section.
- Performance testing may be terminated at any stage of review if it becomes apparent that the candidate does not have the required skill to produce satisfactory results, or is taking an excessive length of time to complete any phase of the test.
- Completed test coupons that meet visual acceptance criteria shall be subjected to either a Guided Bend Test following ASME Section IX QW-161 or Radiographic Examination following QW-191.
- Welder's test coupons that have passed all inspections and tests shall have their record of testing posted by the test administrator for validation by the jurisdiction.
- The test record, once validated, will show an expiry date six (6) months from the date of the test.
- Expiry dates may be extended when continuity is maintained by following Section 9 of the Policy and Procedures Manual.

An individual who fail a PWMS qualification test will require additional training and will not be permitted to retest on a failed procedure for 14 days.

Root Pass Visual Acceptance Criteria:

The surface of the root pass on the interior of the pipe coupon shall be cleaned, de-slagged where applicable and wire brushed by the welder before the examination. Acceptance criteria for the visual inspection of the root pass shall be:

- uniform in width;
- complete fusion;
- penetration, at any point along the weld, not to be less than flush (concave) or exceed 2.5 mm (3/32") in height;
- free from undercut;
- free from cracks or other fusion related defects;
- free from porosity;
- free from heavy oxidation when completed by the GTAW process

Completed Weld Visual Acceptance Criteria:

The surface of the completed weld shall be de-slagged and cleaned by wire brush before the examination. Dressing or blending of the weld may be done by light grinding or filing at the stop/starts only. Dressing the toes of the weld by filing is not permitted. Acceptance criteria for the visual examination of the completed weld shall be:

- uniform in width, smooth rippling, and smooth transition between stinger beads and weld metal to base metal interface;
- weld reinforcement, at any point along the weld, is not to be less than flush (concave) or exceed 2.5 mm (3/32") in height;
- free from grapes/icicles, craters or overlap;
- free from arc strikes on either the inside or outside of the weld zone;
- free from cracks or other fusion related defects;
- free from porosity;
- undercut along either toe of the weld shall not be greater than 0.08 mm (1/16") in-depth and shall not exceed a total length of 19 mm (0.75");
- no evidence of burn through on the root pass.

Guided Bend Test Acceptance Criteria:

The guided bend tests shall have no open defects in the weld or heat affected zone exceeding 3.2 mm (1/8") measured in any direction on the convex surface of the specimen. Open defects occurring on the corners of the specimen during bending shall not be considered unless there is evidence, they result from slag inclusions, lack of fusion, or other internal defects. The failure of any bend specimen shall be regarded as a complete failure of the test.

Radiographic Testing Acceptance Criteria:

Acceptance criteria for welded coupons subject to evaluation by Radiographic Testing (RT) will be as specified in QW-191.1.2 of ASME Boiler and Pressure Vessel Code Section IX. Evaluation of the test results shall be carried out by a technician with a minimum Level II qualification through the Canadian Government Standards Board CAN-CGSB 48.9712/ISO 9712. Evaluations using other non-destructive testing methods will not be accepted. Test coupon welds that are evaluated by RT, which resulted in fail will not be accepted for further testing by a guided bend test. RT film of the test coupon shall be made available to the participating jurisdiction's inspector when requested.

Brazers:

The qualification test requirements and acceptance criteria for a brazing qualification shall be as follows:

Coupons:

- The material shall be P-107 per ASME Section IX.
- The coupon pieces shall be Type K Tubing, 1 ½" diameter (1 5/8" ACR), four pieces not less than 102 mm (4") long, and two 1 ½" straight couplings.
- Both ends of all tubing shall be deburred and one end, where the braze is to occur, shall be thoroughly cleaned using emery cloth. The bore of the couplings, to the depth of the overlap for the tubing, shall also be thoroughly cleaned using emery cloth.
- Flux paste shall be used, and after applying to the tubing and coupling surfaces to be brazed, each coupling shall have the tubing inserted at both ends to the maximum lap depth of the coupling (27.7 mm, 1.09").

Brazing test:

- The process to be used is manual face feed Torch Braze using oxygen-acetylene gases with a neutral or slightly carburizing flame. Tip size shall be either number 2 or number 3.
- The filler metal used shall be solid bare wire or rod, 3/32" or 1/8" diameter, and comply with ASME SFA 5.8, and may be either F-101 or F-103. (Note; qualification will apply to whichever F-number is used. To qualify for both F-numbers, two separate tests are required.
- One of the two coupons shall be fixed in the horizontal position.
- Both joints, on each end of the coupling, shall be 100% brazed while the coupon remains in the horizontal position.
- Once completed, the coupon may be cooled using a wet cloth or immersing in cool water, then positively identified as the horizontal coupon. The identification shall be shown on two places on the coupon, 180°apart.
- The second coupon shall be brazed on the vertical up-flow position. The coupon shall be fixed in the vertical position.
- The joint on the bottom side of the coupling shall be 100% brazed.

- When the first joint is completed, the coupon shall then be rotated 180° and re-fixed in the vertical position such that the second joint is in the vertical up-flow position.
- The second joint shall be 100% brazed.
- Once completed, the coupon may be cooled using a wet cloth or immersing in cool water, then positively identified as the vertical coupon. The identification shall be shown on two places on the coupon, 180°apart.

Specimen Preparation:

- Each coupon or specimen shall be evaluated visually and by sectioning as per ASME Section IX, QB-181
- Once the two coupons have been visually accepted by the jurisdiction inspector, per the criteria below, the coupons shall be cut in two by sawing or grinding (zip-cut only) along their longitudinal axis. The cut lines shall be such that the cut will not obstruct the position identification and will produce two relatively equal size specimens from each coupon.
- The edges of each specimen shall be deburred by filing for the entire length of each edge. The edge surface at the coupling shall be further prepared by slightly sanding using sandpaper or emery cloth.
- Each specimen shall then be handed over for evaluation.

Evaluation:

- Before evaluation of the coupon or specimens by the jurisdiction inspector, the supervisor representing the contractor/test centre shall accept the coupons or specimens before presenting them to the inspector. Should the supervisor reject the coupons or specimen for any reason, the test shall be ended immediately with a status of fail.
- When the coupons have been brazed, cooled and identified, the Brazer shall present them for visual examination. The supervisor and the jurisdiction inspector shall conduct the examination.
- If visually accepted, the Brazer shall then proceed to prepare the specimens as per the Specimen Preparation section above.

Acceptance Criteria:

- **Visual criteria:**
  - Each joint shall be brazed for 100% of its circumference with continuity of the brazing filler metal;
  - Have a smooth and consistent contour of filler metal in the joint area;
  - No evidence of brazing filler metal outside of the joint area;
  - No sags, grapes or icicles in the brazing filler metal;
  - No evidence of damage or deformation to the base metal caused by overheating.

- **Sectioning Criteria:**
  - Each specimen will contain four brazed areas to be evaluated. These areas are represented on each side of the coupling (two joints), with two areas on one joint;
  - The tube shall show full insertion into the coupling, up to 27.7 mm (1.09") with a tolerance of +0/-1.6 mm (0.0625").
  - The edge surfaces of each brazed area shall show filler metal with no un-brazed areas exceeding 20% of the length of the required overlap. Un-brazed portions found in one area under evaluation may be a single missed area or the sum of two or more missed areas. If multiple areas are observed, their lengths shall be added together, and the sum shall not exceed 20% of the required overlap (5.5 mm or 0.22");
  - In cases where the overlap is not 100% inserted but within tolerance, that dimension of the un-inserted tube will be included in the 20% allowance.

The range of qualification for a successful candidate is P107 base material pressure piping using socket/lap joints with overlap not exceeding 34.6 mm (1.363") and using a filler rod with the same F Number used during the qualification test ie (F-101 or F-103).

Section 9

Maintenance of Qualification

Pressure welders with validated and current test records may have the expiry date for their existing test records extended if they are performing pressure welding and brazing utilizing an eligible welding process, and they are working for a Pressure Welding and Brazing Contractor under the following requirements:

- The welder has performed open root butt welding on a registered boiler, pressure vessel, or pressure piping system. The brazer has performed socket joint brazing on a registered boiler, pressure vessel, or pressure piping system.
- The welding/brazing is performed and is authorized by the jurisdiction through a permit or another acceptable jurisdictional method (ITP) and will be inspected by the Pressure Welding and Brazing Contractor's Quality Control Inspector and the Jurisdiction.
- Records shall be created by the Pressure Welding, and Brazing Contractor that will include the weld procedure used, the welder identification, the date welding was performed, the unique weld identification and NDE records documenting acceptable weld quality.
- The Pressure Welding and Brazing Contractor representative will update the database and submit the records for validation. Each record shall contain sufficient information to allow the Jurisdiction to confirm the validity of the database entry by reviewing the Pressure Welding and Brazing Contractors records.
- F3/F4 test records shall be updated by F3/F4 open root, butt welding that has been radiographed. Documented In-Process weld examination as per ASME B31.3 Paragraph 344.7 may be used as an acceptable alternative when a radiograph has not been performed.
- For the other test records, each process may be updated individually with the limitation that the F6 portion of F6/F4 shall be limited to carbon steel welding and similarly, the F6 portion of F6/F5 will be limited to the welding of 300 series stainless steel.

Section 10

Duties and Responsibilities

This section lists the duties and responsibilities for Members and Participating Jurisdictions concerning the Pressure Welder Mobility System. These duties and responsibilities are mandatory requirements needed to maintain the functionality and integrity if the Pressure Welder Mobility System

Welder/Brazer

- Achieve and maintain qualifications to permit membership in the system.
- Make initial membership application
- Renew membership annually
- Apply for performance qualification testing at authorized test centres
- Follow PWMS performance testing protocol

Authorized Test Centre

- Achieve and maintain qualifications to permit membership in the system.
- Make initial membership application
- Renew membership annually
- Employ a qualified test administrator(s).
- Provide and maintain appropriate test facility including equipment, tools, materials, and consumables.
- Coordinate and conduct performance testing.
- Generate and maintain test records.
- Enter records of successful testing on the database for validation.
- Pay fee related to jurisdictional witnessing of the test.

Pressure Welding and Brazing Contractor

- Achieve and maintain qualifications to permit membership in the system.
- Make initial membership application
- Renew membership annually
- Generate and maintain records of production welding.
- Enter details of eligible production welding on to the database.
- Make records of production welding available to the jurisdictional inspector to support validation.

Participating Jurisdictions

- Confirm compliance with the requirements of this manual.
- Witness all of welder performance tests.
- Review contractor weld records supporting continuity.
- Validate membership, test records, continuity records.
- Report violations to all other participating jurisdictions.

Section 11

Inquiries and Dispute Resolution

The PWMS has been developed with a strict set of governing rules and protocol described in this manual. The purpose of this manual is to enable these rules to be clearly understood and followed. By working collaboratively members can ensure that the rules are adhered to so that all stakeholders may utilize and enjoy the benefits of the system.

From time to time, there may arise instances where a member believes that there is a problem with some aspect of the system. This section will set the protocol that shall be followed to address any perceived problem or other dispute.

Pressure welders that have any question or concern related to their test records as appear on the database shall contact the authorized test centre for clarification. In the case where a pressure welder has any question or concern related to the updating of expiry dates utilizing continuity (documented production welding), they shall contact the employer that was responsible for tracking and posting the production welding. The welder if dispatched through a trade organization, may authorize a representative of the trade organization to contact the employer for clarification on their behalf.

The program will limit the need for Jurisdictional representatives to interact directly with pressure welders and to enter and maintaining records related to the testing and continuity of pressure welders. Most issues that may arise related to an individual pressure welder will first need to be addressed by the pressure welding and brazing contractor or an authorized test centre representative.

If a contractor/test centre cannot resolve the issue, it is the responsibility of the contractor/test centre to arrange for dispute resolution with the jurisdictional representative. The contractor/test centre shall send written correspondence/email to the jurisdictional representative with copies sent to all concerned parties describing the dispute or concern. The Jurisdictional representative shall review the specifics of the issue and reference this manual for guidance on the resolution.

Correspondence and resolutions may be shared with all other member jurisdictional representatives so that consistent application of the policies and procedures can be maintained. In cases where a gap, error, or omission in the manual is the cause of an issue or dispute a revision or addition to this manual may be required for clarification.

Section 12

Fees

The Pressure Welder Mobility System will be operated on cost recovery, not for profit basis. Membership fees are not associated with any additional fees for administration or licensing charged by authorized test centres or jurisdictions. The membership fee will be utilized to fund the cost of maintaining the program, which includes maintenance, revision and annual fees associated with the website and servers for the database. The cost of the program will be evaluated on a yearly. Based on the annual evaluation, membership fees may need to be adjusted. Membership fees will be due annually with all memberships expiring December 31st each year. The fee for membership is based on assumptions and the best guess of the number of members that will apply and maintain a yearly membership.

Pressure Welder Membership Fee - $ 50.00
Pressure Welding and Brazing Contractor Fee - $ 200.00
Authorized Welding Test Centre Fee - $ 200.00