The Technical Standards and Safety Authority
Boilers and Pressure Vessels Safety Program
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GUIDE FOR MANUFACTURERS, FABRICATORS, INSTALLERS, REPAIRERS, ALTERERS AND AUDIT TEAMS

FOR THE

ACCREDITATION OF HOT TAP ORGANIZATIONS PROVIDING THE FOLLOWING SERVICES:

- Hot Tap Welding
- Hot Tap Machine Operation
- Turnkey Operations

IN ACCORDANCE WITH:

- **CSA B51 – Boiler, pressure vessel and pressure piping code**
- **NBIC NB-23 Part 3 – Repairs and Alterations**
- **API 2201 – Safe Hot Tapping Practices in the Petroleum and Petrochemical Industries**
- **TSSA Safety Bulletin SB05-02 – Hot Tap and Line Stopping for Pressure Equipment**

INTRODUCTION

This guide is prepared for the use of audit team leaders, members, and applicants for TSSA Certificates of Authorization (C of A). This guide is to be used in conjunction with the TSSA Accreditation of Boiler and Pressure Vessel Repair or Alteration Organizations Program & Checklist.

The scope of this checklist is for hot taps on in-service pressure piping using welded construction and ferritic and austenitic materials. This checklist does not address all situations nor answer all potential questions, nor is it a substitute for specific job planning.

It is the responsibility of the owner to ensure that all the necessary engineering, installation and safety requirements are addressed for any given hot tap operations. When more than one organization is involved in the various activities required for the hot tap, the owner shall ensure that all organizations involved are coordinated and advised of their responsibilities.

For turnkey hot tap operations, the organization proving the total turnkey service shall be responsible to the owner/user for the complete hot tap operations and compliance to all applicable Codes and Regulations.

It is not intended to replace or interpret the requirements of the CSA, NBIC or API Codes. This guide does not list all the detailed requirements of the CSA, NBIC or API Codes referenced, but rather lists the highlights that the applicant is required to include in the written Quality Control (QC) Manual.

In addition, to assist the TSSA audit team, this guide is provided to applicants for their use in identifying and verifying the paragraph(s) where their QC Manual addresses all applicable control requirements of the CSA, NBIC or API Codes. The QC Manual must contain the description of the controls necessary for implementing the QC Program, but it is not required to contain all the programmatic requirements which will be found in the QC Program, such as written procedures.

The guide is based upon CSA B51, NBIC NB-23 Part 3, API 2201 and the TSSA Safety Bulletin SB05-02 requirements. The guide is subject to revision by TSSA based on changes made to the CSA, NBIC and API Codes, from time to time, or based on feedback received from users.

An audit must cover a QC Manual and its implementation. It is recognized that the scope of work, QC Manual and Manual implementation will vary from one applicant to another, therefore, only those activities to be performed under the scope of an applicant's TSSA Certificate of Authorization are required to be addressed in the QC Manual. TSSA audit teams are advised that this guide may not outline all possible aspects of each audit. The QC Manual need not follow the format of this guide but shall described applicable requirements.

Questions of possible need for interpretation raised by the audit team members or the applicant shall be submitted to the TSSA Boiler and Pressure Vessel Chief Inspector for a resolution.

HOW TO USE THIS GUIDE

Review each item in the checklist against the QC Manual and:

1) Check the applicable column, “Yes”, “No” or “N/A” (Not Applicable)
2) Note the paragraph number in the QC Program Manual which covers the subject addressed in the column labelled “Quality Program Reference”.
3) Submit one copy of the completed checklist with one uncontrolled copy of the current QC Manual to TSSA Head Office for review, at least one month prior to the scheduled implementation audit date.

DEMONSTRATION OF THE QUALITY SYSTEM

The purpose of the demonstration item is to evaluate the applicant’s Quality Control System (QCS) and implementation. For evaluation of the QCS, the applicant must demonstrate to the current Regulatory & Code rules sufficient administrative controls and implementation of the QCS to show that they have the knowledge and ability to provide hot tap services as those covered by the QCS.

It is expected that the hot tap functions be demonstrated using typical Code work. However, they may be demonstrated using current work, a mock-up, or a combination of the two. Any current Code work ongoing at the time of the audit is subject to the audit team’s review. While that applicant must address each element of the QCS in the Code, the applicant need only demonstrate those elements within the intended scope of activities that apply to their program.

QUALITY CONTROL SYSTEM CHECKLIST
HOT TAPS

Company Name: _____

Completed by: _____ Date: _____

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
1	**GENERAL QUALITY CONTROL SYSTEM REQUIREMENTS**				
	(a) The QCS is documented in detail in a QC Manual that addresses all requirements of the applicable Code Section and includes: (i) a cover sheet that contains the company name, physical address, and a brief description of the program scope(s) as it will appear on the requested Certificate(s) of Authorization. (NOTE: The cover sheet may also contain the effective date of the QC Manual, mailing address, phone number or other information desired by the certificate holder or applicant.)	☐	☐	☐	
	(ii) a brief description of the scope of work being accomplished under the Program including, Hot Tap welding, machine operation, design, or a combination thereof.	☐	☐	☐	
	(iii) a Table of Contents page which includes each section by subject, number, and revision number (as applicable).	☐	☐	☐	
2	**STATEMENT OF AUTHORITY AND RESPONSIBILITY**				
	(a) The Statement of Authority and Responsibility shall include the following:	☐	☐	☐	
	(i) A statement that all work carried out by the applicant meets all applicable Code and Jurisdictional requirements.	☐	☐	☐	
	(ii) The authority and responsibility of those in charge of the QCS are clearly established and documented.	☐	☐	☐	
	(iii) Persons performing QC functions have sufficient and well-defined responsibility, the authority and the organizational freedom to identify QC problems and to initiate, recommend, and provide solutions, including stop work orders if further processing would result in a non-conformance with the applicable Code section.	☐	☐	☐	
	(iv) A statement that all disagreements in the implementation of the QCS is referred for resolution to a higher authority in the company.	☐	☐	☐	
	(v) The Statement of Authority and Responsibility is signed and dated by a senior company official responsible for Code activities (i.e. President, Vice President, Plant Manager, etc.)	☐	☐	☐	
3	**MANUAL CONTROL**				
	(a) Manual revision control system (i.e. is the QC Manual revised by page or by section, are the controls clearly described?)	☐	☐	☐	
	(b) The title of the individual responsible for revising the QC Manual.	☐	☐	☐	
	(c) The title of the individual responsible for reviewing new CSA/NBIC/API Code Editions and making any required changes to the QC Manual within six months from the new Edition issue date.	☐	☐	☐	
	(d) Provision for review and approval of the QC Manual to maintain it is current.	☐	☐	☐	
	(e) Provision for submittal of the QC Manual revisions to the TSSA Inspector or Quality Assessment Specialist for acceptance prior to implementation including timely update of all copies to reflect approved revisions.	☐	☐	☐	
	(f) In the case where the QC Manual exists in more than one language, at lease one version is in English and identified as the authoritative version. In the case where the QC Manual exists in languages other than English, a statement by the C of A holder that the translation is correct shall be provided. (NOTE: A glossary of terms is desirable from the standpoint of clarity and if abbreviated titles of personnel and control documents are used throughout the QC Manual.)	☐	☐	☐	
	(g) Provision for distribution of the revised QC Manual (controlled or uncontrolled), including hard copy and/or electronic controls.	☐	☐	☐	

QUALITY CONTROL SYSTEM CHECKLIST
HOT TAPS

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
4	**ORGANIZATION**				
	(a) An organization chart showing the relationship between management, engineering, purchasing, manufacturing, production, field assembly, field construction, inspection, and quality control (as applicable) exists and reflects the actual organization. (NOTE: The purpose of this chart is to identify and associate the various organizational groups with the function for which they are responsible. The Code does not intend to encroach on the right to establish or alter whatever form of organization considered to be appropriate for Code work.)	☐	☐	☐	
5	**DRAWINGS, DESIGN CALCULATIONS AND SPECIFICATION CONTROL**				
	(a) Procedures exist which assure that the owner, user or a designated agent of the owner or user has submitted drawings and design calculations for hot tapping to TSSA for registration.	☐	☐	☐	
	(b) The title of the individual responsible for reviewing and approving drawings and design calculations provided by the owner or user to ensure the following information is included:	☐	☐	☐	
	• Code of Construction (including fluid service category for work to be performed under ASME B31.3).	☐	☐	☐	
	• Pipeline or pressure component service.	☐	☐	☐	
	• Design and operating conditions (pressure, temperature, etc.).	☐	☐	☐	
	• Pressure test of branch connection (method, pressure, temperature, etc.).	☐	☐	☐	
	• Material specifications (pipeline, hot tap fitting, repads, etc.).	☐	☐	☐	
	• Hot tap fitting attachment weld detail (weld joint configuration, weld sizes, etc.)	☐	☐	☐	
	• Hot tap fitting and valve details (type, material, thickness, etc.).	☐	☐	☐	
	• Minimum base metal thickness required.	☐	☐	☐	
	• NDE requirements, PWHT requirements, hardness testing requirements, etc.	☐	☐	☐	
6	**MATERIAL CONTROL**				
	(a) Procedures for material control exist to assure that the materials used are of known weldable quality, shall conform to the Code of Construction, and shall be compatible with the original material.	☐	☐	☐	
7	**EXAMINATION AND INSPECTION PROGRAM**				
	(a) The title of the individual responsible for developing a hot tap procedure. The procedure shall include:	☐	☐	☐	
	(i) The responsibilities of the owner/user or designated agent who shall ensure: • 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. • All necessary engineering, installation and safety requirements are addressed. • A job analysis has been completed that 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. • 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.	☐	☐	☐	

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
	• 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. • The base metal of the pressure retaining item is free of laminations, hydrogen attach or stress corrosion cracking. • Imperfections are evaluated which may prevent a sound weld from being made at the location of the hot tap. • The minimum base metal thickness requirements have been documented. • The proper hot tap fitting has been selected (i.e. welded outlet, split tees, nozzles, etc.)				
	(ii) The title of the individual responsible for documenting and designating competent and qualified personnel who are experienced, skilled, and knowledgeable to perform the work.	☐	☐	☐	
	(iii) The title of the individual responsible for developing a checklist with all requirements for the work to be done.	☐	☐	☐	
	(iv) The title of the individual responsible for presenting the checklist to the owner/user or designated agent and to the TSSA Inspector for review and insertion of inspection points.	☐	☐	☐	
	(b) **(Machine Operation)** Measures have been established to ensure	☐	☐	☐	
	(i) The hot tap machine is designed and constructed to withstand the pressure, temperature, and mechanical stress, which may be imposed during operation.	☐	☐	☐	
	(ii) The hot tap machine cutter and pilot bit have been carefully inspected to ensure satisfactory condition prior to use.	☐	☐	☐	
	(iii) The hot tap machine is capable of being left in service in the event of mechanical problems or valve leakage.	☐	☐	☐	
	(iv) Operational upsets have been considered during the operation of the hot tap machine.	☐	☐	☐	
	(v) The operator is competent and has been qualified by formal training or on the job training to assemble, use, and install the hot tap machine.	☐	☐	☐	
	(vi) A competent person is present during the hot tap operation.	☐	☐	☐	
	(vii) The owner/user or designated agent has physically marked the location of the hot tap.	☐	☐	☐	
	(viii) The owner/user or designated agent has evaluated the pipe wall thickness within 28 days of the hot tap operation, as well as ensuring the documented hot tap plan and contingency plan is in place.	☐	☐	☐	
	(c) **(Machine Operation)** Prior to the operation of the hot tap machine, the following measures shall be checked and documented	☐	☐	☐	
	(i) 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.	☐	☐	☐	
	(ii) The pressure test of the hot tap fitting has been completed.	☐	☐	☐	
	(iii) The manufacturer's instructions for the installation of the hot tap machine has been followed.	☐	☐	☐	
	(iv) The hot tap valve has been tested for seat leakage prior to installation.	☐	☐	☐	
	(v) The hot tap machine bleed-off valve is not plugged and will hold pressure.	☐	☐	☐	
	(vi) The hot tap machine bolts and packing has been checked for tightness.	☐	☐	☐	

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
	(vii) The hot tap fitting, valve and hot tap machine has been pressure tested.	☐	☐	☐	
	(d) **(Machine Operation)** During the operation of the hot tap machine, the following measures shall be checked and documented	☐	☐	☐	
	(i) When the hot tap machine starts cutting, it should proceed without interruption until the hot tap has been completed and the valve closed.	☐	☐	☐	
	(ii) The manufacturer's instructions have been followed when retracting the bore and closing the valve.	☐	☐	☐	
	(iii) A contingency plan has been established and utilized if the coupon is lost during retrieval.	☐	☐	☐	
	(iv) Adequate containment is available to control liquids and vapors trapped within the hot tap machine.	☐	☐	☐	
8	**NON-CONFORMANCES**				
	(NOTE: A non-conformance is any condition which does not comply with the applicable rules of the Code, QC Manual, or other specified requirements. Non-conformances must be corrected before the completed item can be considered acceptable to Code.) (a) A procedure exists for the correction of non-conformances. The procedure shall include:	☐	☐	☐	
	(i) The title of the individual responsible for reviewing the non-conforming condition.	☐	☐	☐	
	(ii) Identifying and controlling further processing of non-conforming items until final disposition.	☐	☐	☐	
	(iii) Documenting the non-conformance, the disposition, and informing the TSSA Inspector of the non-conforming condition.	☐	☐	☐	
	(iv) Addressing the non-conformance on the checklist with a hold point added.	☐	☐	☐	
	(v) The final inspection and disposition shall be accepted by the QC and TSSA Inspector.	☐	☐	☐	
	(vi) When the disposition is "Use-As-Is", the disposition may require an engineer to ensure an engineering evaluation has been carried out.	☐	☐	☐	
9	**WELDING CONTROL** *(if welding is in program)*				
	(a) Welding shall conform to the requirements of ASME Section IX, API, and the Code of Construction, as applicable to the scope of work.	☐	☐	☐	
	(b) The title of the individual responsible for certifying Welding Procedure Specifications (WPS), Procedure Qualification Records (PQR), and Welder/Welding Operator Certificates. The individual responsible shall:	☐	☐	☐	
	(i) Be appointed by letter.	☐	☐	☐	
	(ii) Have a satisfactory level of competence in accordance with the QCS, and as a minimum be qualified by education, experience, or training.	☐	☐	☐	
	(iii) Have a record maintained by the applicant containing objective evidence of all qualifications, training, or experience.	☐	☐	☐	
	(c) The title of the individual responsible for ensuring the WPS and the welder assigned to each weldment is qualified and appropriate for the work to be completed, with consideration of the following: (i) The use of special welding procedures for high tensile strength steels to avoid weld cracking. (ii) The use of low hydrogen electrodes to minimize weld cracking. (iii) The need for preheat and post weld heat treatment. (iv) The WPS selected is to be based upon past experience performing welding operations on similar piping or based on heat transfer analysis.	☐	☐	☐	

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
	(d) Measures are taken to ensure:	☐	☐	☐	
	(i) WPS's are available to the welder in the work area.	☐	☐	☐	
	(ii) Welder qualifications are maintained in accordance with Section IX, the TSSA Code Adoption Document and the Code of Construction.	☐	☐	☐	
	(iii) A system is established for identifying the welds completed by each welder.	☐	☐	☐	
	(iv) Removing or inspecting tack welds is completed per Code.	☐	☐	☐	
	(v) Storage and conditioning of low-hydrogen electrodes is established (as required).	☐	☐	☐	
	(vi) The control, issuance, and return of welding material to assure the proper welding material is used.	☐	☐	☐	
	(vii) The TSSA Inspector is provided with the right to require and witness the requalification of a welder or procedure for just cause.	☐	☐	☐	
	(e) For hot tap welding, the following measures shall be checked and documented:	☐	☐	☐	
	(i) The owner/user or designated agent has conducted a review of the pressure retaining equipment metallurgy and line contents to ensure: • The hot tap fitting and welding electrodes are compatible. • 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. • If it is necessary to purge or flood the line to prevent the formation of flammable mixtures during in-service welding. • welding pre-test samples are completed on similar materials and thicknesses if applicable are completed	☐	☐	☐	
10	**NON-DESTRUCTIVE EXAMINATION** *(If in program)*				
	(a) Provisions exist for identifying the appropriate NDE procedures applicable to the scope of work. These provisions assure that:	☐	☐	☐	
	(i) NDE personnel are qualified in accordance with the applicable Code section requirements.	☐	☐	☐	
	(ii) NDE (UT, MT, PT, RT and VT) examinations are performed in accordance with a written procedure when required.	☐	☐	☐	
	(iii) RT film and all NDE reports are retained in accordance with the applicable Code.	☐	☐	☐	
	(iv) All NDE equipment is calibrated.	☐	☐	☐	
	(v) The AI is provided with the right to require and witness the demonstration by NDE personnel of an NDE examination or NDE procedure for just cause.	☐	☐	☐	
11	**HEAT TREATMENT** *(if in program)*				
	(a) Provisions exist for determining the method and extent of post weld heat treatment applicable to the scope of work.	☐	☐	☐	
	(b) Controls are in place to assure that heat treatment is completed as required by the applicable Code and the owner or user has identified any potential ignition sources and provide the post weld heat treatment procedure to be used.	☐	☐	☐	
	(c) Measures are established to assure the proper placement of thermocouples and the use of charts.	☐	☐	☐	
	(d) When heat treatment is subcontracted, measures are established to assure that the procedures are followed and that heat treatment charts are provided.	☐	☐	☐	

No.	Quality Element and Sub-Elements	Yes	No	N/A	Quality Program Reference
	(e) Documentation is provided to the AI for assurance that all heat treatment requirements have been met.	☐	☐	☐	
12	**CALIBRATION OF MEASURING AND TEST EQUIPMENT**				
	(a) A procedure exists for the calibration of examination, measuring, and test equipment used in fulfillment of applicable Code requirements.	☐	☐	☐	
	(b) Measures are established to ensure that:	☐	☐	☐	
	(i) Calibration records are maintained and that status indicators are used to indicate the current calibration status of the equipment.	☐	☐	☐	
	(ii) Calibration equipment is maintained in good condition, checked for signs of damage, and removed from service if found defective.	☐	☐	☐	
	(iii) A calibration frequency is established and maintained, and results are traceable to National Standards.	☐	☐	☐	
	(iv) When calibrations are performed in-house, the title of the individual responsible is identified and procedures are established.	☐	☐	☐	
13	**RECORDS RETENTION**				
	(a) The hot tap organization shall maintain the documents outlined below for a period as required by the Code of Construction but a minimum of 3 years: (i) Applicable Data Reports (ii) Hot Tap alteration drawings and design calculations (iii) Fitting CRN registrations (iv) Checklists, process sheets, travelers, etc., (v) Material test reports and/or material certifications (vi) Pressure parts documentation and certifications (vii) Welding Procedure Specifications and Procedure Qualification Records (viii) Welder Qualification Records (ix) Non-Destructive Examination reports (x) Alteration procedures and records (xi) Heat treatment records and test results (xii) Non-conformances and dispositions (xiii) Pressure test records (xiv) Any other applicable documentation	☐	☐	☐	
14	**THE TSSA INSPECTOR**				
	(a) The Inspector shall be employed by the TSSA	☐	☐	☐	
	(b) A controlled copy of the QC Manual is available to the TSSA Inspector at the site where Hot Tap activities are being carried out.	☐	☐	☐	
	(c) The TSSA Inspector has access to all drawings, calculations, specifications, procedures, process sheets, alteration procedures, records, test results, and any other documents necessary for the TSSA Inspector to perform their duties.	☐	☐	☐	
	(d) Provisions exist for providing a liaison between the TSSA Inspector, owner/user or designated agent.	☐	☐	☐	
	(e) Provisions exist for access for the TSSA Inspector and the TSSA Inspector Supervisor to all areas involving Code activities.	☐	☐	☐	
	(f) Provisions exist to assure that all Code and required alteration inspections by the TSSA Inspector are performed.	☐	☐	☐	
15	**SAMPLE FORMS**				
	(a) Forms used to control functions relative to quality are included within the QC Manual and their use explained in the text of the QC Manual.	☐	☐	☐	