PROCESS INDUSTRY PRACTICES

TECHNICAL REVISION
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Vessel

PIP VECQ1001
Pressure Vessel Shop Qualification Procedure

PURPOSE AND USE OF PROCESS INDUSTRY PRACTICES

In an effort to minimize the cost of process industry facilities, this Practice has been prepared from the technical requirements in the existing standards of major industrial users, contractors, or standards organizations. By harmonizing these technical requirements into a single set of Practices, administrative, application, and engineering costs to both the purchaser and the manufacturer should be reduced. While this Practice is expected to incorporate the majority of requirements of most users, individual applications may involve requirements that will be appended to and take precedence over this Practice. Determinations concerning fitness for purpose and particular matters or application of the Practice to particular project or engineering situations should not be made solely on information contained in these materials. The use of trade names from time to time should not be viewed as an expression of preference but rather recognized as normal usage in the trade. Other brands having the same specifications are equally correct and may be substituted for those named. All Practices or guidelines are intended to be consistent with applicable laws and regulations including OSHA requirements. To the extent these Practices or guidelines should conflict with OSHA or other applicable laws or regulations, such laws or regulations must be followed. Consult an appropriate professional before applying or acting on any material contained in or suggested by the Practice.

This Practice is subject to revision at any time.

PUBLISHING HISTORY

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Table of Contents

Data Forms

1. Scope

This Practice describes procedures for shop qualification of manufacturers of shop built pressure vessels, tanks and heat exchangers in general accordance with the *ASME Boiler and Pressure Vessel Code*, Section VIII. This Practice may be used to qualify manufacturers of equipment to be provided in accordance with *PIP VESV1002*, *VESST001*, *VESSM001*, *VESLP001* and *VESHP001*. This Practice may also be used to qualify shops in accordance with foreign or other US codes but the references given in this Practice are intended for *ASME Code* construction. This Practice does not include qualification of field erected tank manufacturers.

2. References

Applicable parts of the following Practices and industry codes and standards shall be considered an integral part of this Practice. The edition in effect on the date of contract award shall be used, except as otherwise noted. Short titles are used herein where appropriate.

2.1 Process Industry Practices (PIP)

- PIP VESAC001 - *Air-Cooled Heat Exchanger Specification* (Supplement to *API STD 661*)
- PIP VESST002 - *Supplemental Design and Fabrication Specification for Shell and Tube Exchangers ASME Code Section VIII, Divisions 1 and 2*
- PIP VESV1002 - *Vessel Fabrication Specification, ASME Code Section VIII, Divisions 1 and 2*
- PIP VESSM001 - *Specification for Small Pressure Vessels and Heat Exchangers with Limited Design Conditions*
- PIP VESLP001 - *Specification for Low-Pressure, Welded, Shop-Fabricated Vessels*
- PIP VESHP001 - *Horizontal Heat Exchanger Specification*

2.2 Industry Codes and Standards

- American Society of Mechanical Engineers (ASME)
  - ASME Boiler and Pressure Vessel Code
    Section II – *Materials, Parts A, B, C & D*
    Section V – *Nondestructive Examination*
    Section VIII – *Pressure Vessels, Division 1 and 2*
    Section IX – *Welding and Brazing Qualifications*

3. Definitions

Code: ASME *Boiler and Pressure Vessel Code* Section VIII, Division 1 or 2, and any *Code* Cases approved by the User

Manufacturer: The party entering into a contract with the Purchaser to construct a vessel in accordance with the contract documents. In accordance with the *Code* definition, the

Manufacturer is the party that possesses a valid Certificate of Authorization to manufacturer pressure vessels with the *ASME* Mark.

National Board: The National Board of Boiler and Pressure Vessel Inspectors, an organization comprised of chief inspectors of various governmental jurisdictions in the US and Canada

Purchaser: The party actually placing the order for the vessel or vessel components. This may be the User or the User's authorized agent.

User: The party responsible for establishing construction criteria consistent with the *Code* philosophy and service hazards. User refers to the operator of the equipment. The User is responsible for performing the procedures specified in this Practice.

4. Requirements

4.1 General

4.1.1 The procedure for qualification of a vessel, tank or heat exchanger manufacturing shop shall consist of the following sequential steps.

a. Initial Commercial Prescreening – After selecting a Manufacturer for evaluation, an initial commercial prescreening procedure shall be performed to determine if the shop is a suitable candidate for future work. See Section 4.2 for the activities to be performed.

b. Request for Information – When the initial commercial information has been received, reviewed and a determination made that the Manufacturer is commercially stable enough to be considered for performance of contract work, a formal request for information shall be sent to the Manufacturer. See Section 4.3 for the minimum contents of the request for information.

c. On-Site Technical Evaluation – When the information requested in accordance with Section 4.3 has been received the information shall be evaluated by an audit team comprised of personnel in accordance with Section 4.4.1. The audit team shall decide whether to make an on-site technical evaluation of the Manufacturer's facility. In advance of an on-site technical evaluation meeting, the Manufacturer shall be given a list of the personnel, facilities and documentation that is to be reviewed by the audit team during the technical evaluation meeting (see Section 4.4.2), and a suggested evaluation meeting agenda (see Section 4.4.3).

d. Post Evaluation Activities – After the on-site technical evaluation has been completed, the Manufacturer shop shall be classified (see Section 4.5.1) and informed of the results of the evaluation (see Section 4.5.2). Post audit follow-ups shall be performed in accordance with Section 4.5.3.

4.1.2 Qualification of manufacturing shops to foreign codes and standards can require additional documents which shall be determined by the User.

4.2 Initial Commercial Prescreening

4.2.1 The financial stability, solvency, and commercial turnover of the Manufacturer shall be checked by using the following sources if available:

a. Internet tools

b. Commercial financial reference services (e.g., Dun and Bradstreet)

c. Data provided in advance by the Manufacturer

Comment: For some privately held Manufacturers and state-owned Manufacturers (e.g., those in China), financial information can be difficult to obtain and local resources should be employed to obtain the information.

4.2.2 The history of the Manufacturer regarding ability to meet schedules, meet quality standards, and provide competitive pricing shall be reviewed.

Comment: References from known contacts in user companies are the preferred source of this information.

4.2.3 The Manufacturer shall be contacted to determine the following:

a. Interest in becoming qualified

b. Willingness and eagerness to participate in the qualification process

c. Present shop capacity

d. Work backlog

e. Verification of commercial terms of sale

4.3 Request for Information

4.3.1 Shop Information Form

4.3.1.1 *PIP VECQ1001-F1* through *PIP VECQ1001-F4*, Shop Information Forms shall be furnished to the Manufacturer.

4.3.1.2 The Manufacturer shall provide the requested information and return the completed form to the User.

4.3.1.3 The completed form shall be evaluated to determine if an on-site technical evaluation is warranted.

4.3.1.4 The completed form shall be used as a reference during the on-site technical evaluation.

4.3.2 Commercial Terms

4.3.2.1 The User's contract commercial terms including a description of future bidding procedures (i.e., paper sealed bid, electronic bid, reverse auction, etc.) shall be furnished to the Manufacturer.

4.3.2.2 The Manufacturer shall provide comments regarding any disagreements with the terms and conditions which may hinder a future contract.

4.3.2.3 The Manufacturer's comments shall be returned to the User with the completed *PIP VECQ1001-F1* through *PIP VECQ1001-F4*, Shop Information Forms.

4.4 On-Site Technical Evaluation

4.4.1 Audit Team Members

4.4.1.1 An audit team consisting of at least the following members shall be assembled to conduct the on-site technical evaluation:

a. Procurement department representative

b. Pressure vessel design engineer

c. Materials engineer, welding engineer or an experienced inspector knowledgeable regarding welding, nondestructive examinations (NDE), and fabrication procedures.

4.4.1.2 If a more thorough evaluation of shops with advanced fabrication and NDE capabilities is required, both a materials/welding engineer and an experienced inspector should be included on the audit team.

4.4.1.3 If a User employee is not available to participate in one or more of the minimum positions on the team, qualified outside consultants and inspectors shall be included as team members.

4.4.1.4 Although one person may be capable of filling more than one position on the team, an on-site audit shall not be performed solely by a purchasing agent or a project engineer.

4.4.1.5 If the Manufacturer is located in a country where the native language is different from that of the members of the audit team, at a minimum one qualified local technical interpreter shall be included as a team member.

Comment: Preferably, dual language technical members of the audit team should provide interpreting services.

4.4.2 Manufacturer Information Review

4.4.2.1 General

1. In addition to the information requested on Forms *PIP VECQ1001-F1* through *-F4*, the Manufacturer shall be requested to collect the information specified in this Section in advance of the on-site technical evaluation, and provide the information for review by the audit team at the on-site evaluation meeting.

2. A *PIP VECQ1001-F5*, On-Site Technical Qualification Audit Form, shall be used by the audit team to record the Manufacturer's capabilities as determined during the on-site evaluation.

4.4.2.2 Engineering and Design

The following information shall be reviewed by the pressure vessel design engineer:

a. Numbers of staff engineers and draftsman and their qualifications and experience

b. List of engineering software used for vessel and heat exchanger calculations and drawings

c. List of any other engineering software used

d. Typical drawings and calculations for vessels and heat exchangers, reactors, columns, preferably to *ASME* standards

e. Certificates of Authorization - *ASME*, Chinese, EU, India, Malaysia, Indonesia, Korea, etc.

f. *Code* books including Section VIII, Div 1, Section II, Section V, Section IX and Section VIII, Div 2, (if shop has Div 2 Stamp). *Code* books and Stamps shall be checked for current editions.

g. Documents confirming experience fabricating *Code* vessels

4.4.2.3 Welding and Fabrication

The following information and procedures shall be reviewed by the materials/welding engineer and/or quality assurance inspector:

a. Welding qualification sheets including welding procedure specification / procedure qualification record (WPS/PQR) documents

b. Procedures for keeping each welder current on *Code* qualifications

c. Procedures for storage and handling of welding consumables

d. Plate rolling procedures

e. Heat treatment procedures

f. Procedures for segregation, storage and handling of materials and tooling

g. *Code* Section IX book

h. Fabrication control procedures

i. Shop cleanliness and tidiness

j. Other records and documents that provide evidence of certification of the shop by local jurisdictional authorities as required

4.4.2.4 Non-Destructive Examination

1. The following information and procedures shall be reviewed by the NDE specialist and/or quality assurance inspector:

   a. Written practice for personnel certification

   b. Certification files for one Level III individual and another Level II individual

   c. Procedures for radiography, ultrasonic testing, dye penetrant testing, and magnetic particle testing

   d. Procedures for visual, leak testing, and/or other testing methods

   e. Quality Control Manual

   f. *Code* Section V book