PROCESS INDUSTRY PRACTICES

COMPLETE REVISION
September 2017

Vessel

PIP VECV1001
Design Criteria and Purchasing Requirements for Vessels ASME *Code* Section VIII, Divisions 1 and 2

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.

© Process Industry Practices (PIP), Construction Industry Institute, The University of Texas at Austin, 3925 West Braker Lane (R4500), Austin, Texas 78759. PIP Member Companies and Subscribers may copy this Practice for their internal use. Changes or modifications of any kind are not permitted within any PIP Practice without the express written authorization of PIP. Authorized Users may attach addenda or overlays to clearly indicate modifications or exceptions to specific sections of PIP Practices. Authorized Users may provide their clients, suppliers and contractors with copies of the Practice solely for Authorized Users' purposes. These purposes include but are not limited to the procurement process (e.g., as attachments to requests for quotation/ purchase orders or requests for proposals/contracts) and preparation and issue of design engineering deliverables for use on a specific project by Authorized User's client. PIP's copyright notices must be clearly indicated and unequivocally incorporated in documents where an Authorized User desires to provide any third party with copies of the Practice.

PUBLISHING HISTORY

September 1997	*Issued*	*February 2007*	*Complete Revision*	*September 2017*	*Complete Revision*
February 1999	*Complete Revision*	*May 2009*	*Editorial Revision*		
August 2000	*Complete Revision*	*March 2012*	*Complete Revision*		

Not printed with State funds

PIP VECV1001
Design Criteria and Purchasing Requirements for Vessels ASME *Code* Section VIII, Divisions 1 and 2

Table of Contents

1. Scope

This Practice provides requirements for use by a Purchaser for determining the design criteria for pressure vessels constructed in accordance with ASME *Boiler and Pressure Vessel Code*, Section VIII, Division 1 or Division 2, henceforth referred to as the *Code*. Requirements that are specific to *Code,* Section VIII, Division 2 are shown in braces { }.

This Practice describes the requirements for the design, materials of construction, inspection and testing of pressure vessels constructed in accordance with *Code*, Section VIII, Division 1 {or 2}. Guidance is also provided for the development of purchase specifications for the construction of new pressure vessels which meet the philosophy and requirements of *Code,* Section VIII, Division 1 {or 2}.

This Practice also applies to shell-and-tube exchangers. See *PIP VECST001* and *PIP VESST002* for the additional requirements specific to exchangers only.

This Practice is intended to be used for the purchase of vessels where the Manufacturer is also responsible for performing detailed design for the vessels in accordance with the *Code*. If Purchaser also performs a detailed design, the design shall also be in accordance with *PIP VESV1002*.

The following are not covered by this Practice:

a. Standardized pre-designed (i.e., off-the-shelf) vessels (see *PIP VESSM001*)

b. Vessels with layered construction

c. Small vessels and low-pressure vessels (see *PIP VESSM001* and *PIP VESLP001*)

d. Process design of trays and other removable internals

2. References

Applicable parts of the following Practices, industry codes and standards, government regulations, and references 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 VEDV1003 - *Documentation Requirements for Vessels, ASME* Code *Section VIII, Divisions 1 and 2*

– PIP VEFV1100 - *Vessel/Heat Exchanger Standard Details*

PIP VEFV1116 - *Vessel Manway Hinges*

PIP VEFV1117 - *Vessel Vertical Manway Davits*

PIP VEFV1118 - *Vessel Horizontal Manway Davits*

PIP VEFV1124 - *Vessel Vortex Breakers*

PIP VEFV1125 - *Vessel Internal Ladders*

PIP VEFV1128 - *Skirt Attachments*

- PIP VESSM001 - *Specification for Small Pressure Vessels and Heat Exchangers with Limited Design Conditions*
- PIP VESLP001 - *Low Pressure, Welded Vessel Specification*
- PIP VECST001 - Supplemental *Design Criteria and Purchasing Requirements for Shell and Tube Heat Exchangers, ASME Code Section VIII, Divisions 1 and 2*
- PIP VESST002 - Supplemental *Design and Fabrication Specification for Shell and Tube Heat Exchangers, ASME Code Section VIII, Divisions 1 and 2*
- PIP VESV1002 - *Design and Fabrication Specification for Vessels, ASME C*ode *Section VIII, Divisions 1 and 2*

2.2 Industry Codes and Standards

For each of the following reference documents, if *Code*, Table U-3 {1.1} lists an edition or addenda different than the edition listed in the reference, the edition listed in *Code*, Table U-3 {1.1} shall be used.

- American Petroleum Institute (API)
  - API 650 - *Welded Steel Tanks for Oil Storage*
  - API RP 571 - *Damage Mechanisms Affecting Fixed Equipment in the Refining Industry*
- American Society of Civil Engineers (ASCE)
  - ASCE 7 - *Minimum Design Loads for Buildings and Other Structures*
- American Society of Mechanical Engineers (ASME)
  - *ASME Boiler and Pressure Vessel Code*

    Section I - *Power Boilers*

    Section II - *Materials, Parts A, B, C, D*

    Section VIII - *Pressure Vessels, Divisions 1 and 2*

    Section IX - *Welding and Brazing Qualifications*

    Code Case 2055 - *Pneumatic Testing of Pressure Vessels, UG-20, Section VIII, Division 1*

    Code Case 2203 - *Omission of Lifting Device Requirements for Pressure Relief Valves on Air, Water over 140°F (60°C), or Steam Service, Section VIII, Divisions 1 and 2*
  - ASME B1.1 - *Unified Inch Screw Threads (UN and UNR Thread Form)*
  - ASME B16.5 - *Pipe Flanges and Flanged Fittings, NPS 1/2 through NPS 24*
  - ASME B16.9 - *Factory-Made Wrought Buttwelding Fittings*
  - ASME B16.11 - *Forged Fittings, Socket-Welding and Threaded*
  - ASME B16.47 - *Large Diameter Steel Flanges, NPS 26 through NPS 60*
  - ASME PCC-1 - *Guidelines for Pressure Boundary Bolted Flange Joint Assembly*
  - ASME PCC-2 - *Repair of Pressure Equipment and Piping*