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Guide to Life Cycle Management of Pressure Equipment Integrity

ASME
SETTING THE STANDARD

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GUIDE TO LIFE CYCLE MANAGEMENT OF PRESSURE EQUIPMENT INTEGRITY

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FOREWORD

In 1993, ASME initiated activity to address the development of post construction standards in response to an identified need for recognized and generally accepted engineering standards for the inspection and maintenance of pressure equipment after it has been placed in service. In 1995, the Post Construction Committee (PCC) was appointed to develop and maintain standards addressing common issues and technologies related to post-construction activities, and to work with other consensus committees in the development of separate, product-specific codes and standards addressing issues encountered after initial construction of non-nuclear pressure equipment such as boilers, pressure vessels (including heat exchangers), piping and piping components, pipelines, and storage tanks. Subcommittees were formed on bolted flange joint assembly, repair and testing, and inspection planning. The subcommittees were charged with preparing standards dealing with several aspects of the in-service inspection and maintenance of pressure equipment. As a result, *ASME PCC-1 Guidelines for Pressure Boundary Bolted Flange Joint Assembly* was published in 2000; A*SME PCC-2 Repair of Pressure Equipment and Piping* was published in 2006 and *ASME PCC-3 Inspection Planning Using Risk-Based Methods* was published in 2007.

In the course of preparing the documents described above, the Post Construction Committee recognized the need to provide a guideline or "roadmap" to help users of pressure equipment and their designated agents, as well as manufacturers, owners, regulators and other stakeholders, identify the codes, standards, recommended practices, specifications and guidelines that apply to the life cycle management of pressure equipment integrity. Accordingly, ASME held a workshop in March 2009 to review a proposal for guidance that provides an integrated approach to the understanding and application of technologies in these standards in engineering programs for management of the life cycle of pressure equipment, including inspection, fitness for continued service and repair. The transition from new construction to post construction was an essential part of this study, as new construction standards address inspectability and provide a baseline critical to any post-construction assessment. The post construction standards presented and reviewed included:

PCC-1	Guidelines for Pressure Boundary Bolted Flange Joint Assembly
PCC-2	Repair of Pressure Equipment and Piping Standard
PCC-3	Inspection Planning Using Risk-Based Methods API 579-1/ASME FFS-1 Fitness-For-Service

This Guide is intended to fill that need. It is not intended to be an industry standard, but rather to provide general guidance. Also note that this document is not intended to be a complete listing of all of the publications related to pressure equipment integrity, which would fill many bookshelves, but rather lists the most pertinent references in the opinion of the author and the reviewers.

The first edition of ASME PTB-2, prepared by J. R. Sims, Jr., was published in 2009. This edition reflects updates to documents previously included in the first edition, as well as new documents that have been published since then. Also included is Appendix C, which includes international documents that are relevant to the life cycle management of pressure equipment integrity.

Established in 1880, ASME is a professional not-for-profit organization with more than 100,000 members promoting the art, science, and practice of mechanical and multidisciplinary engineering and allied sciences. ASME develops codes and standards that enhance public safety, and ASME provides lifelong learning and technical exchange opportunities benefiting the engineering and technology community. Visit www.asme.org for more information.

STLLC is a not-for-profit limited liability company, with ASME as the sole member, formed in 2004 to carry out work related to new and developing technologies. STLLC's mission includes meeting the needs of industry and government by providing new standards-related products and services, which advance the application of emerging and newly commercialized science and technology and provides the research and technology development needed to establish and maintain the technical relevance of codes and standards. Visit http://asmestllc.org/ for more information.

ABBREVIATIONS AND ACRONYMS

API	American Petroleum Institute
ANSI	American National Standards Institute
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASME BPVC	ASME Boiler and Pressure Vessel Code
ASNT	American Society for Non-Destructive Testing
BPVC	Boiler and Pressure Vessel Code (ASME)
CFR	Code of Federal Regulations
MTI	Materials Technology Institute of the Chemical Process Industries
NB	National Board of Boiler and Pressure Vessel Inspectors
NBBPVI	National Board of Boiler and Pressure Vessel Inspectors
RP	Recommended Practice
SDO	Standards Developing Organization that, for the purpose of this Guide, is accredited by ANSI
SEI	Structural Engineering Institute
TEMA	Tubular Exchanger Manufacturers Association

1 SCOPE

This Guide provides a summary of some of the more commonly used codes, standards, recommended practices (RPs), publications, specifications and guidelines produced by organizations based in the United States that assist manufacturers, owners, users and their designated agents, regulators and other stakeholders in maintaining the integrity of fixed pressure equipment in process plants and in general industrial use. For the convenience of the user of this Guide, the term "documents" will be used throughout to refer collectively to "codes, standards, recommended practices, specifications and guidelines." This Guide is not all-inclusive.

There are many documents that are useful for specific applications of pressure equipment that have not been described or included as references in this Guide. This does not imply that these documents should not be used or that they have any deficiencies. Note also that engineering knowledge and experience is necessary for the proper application of most of the documents listed.

The following applications for pressure equipment are not specifically included in the scope. However, the owner of these categories of equipment may use those portions of this Guide that are applicable:

(a) Upstream "non-process" equipment in the oil and gas industry (e.g., pressure equipment used in oil and gas exploration and production such as Christmas trees, wellhead equipment, flow lines, subsea equipment).

(b) Equipment in commercial nuclear power plants.

(c) Domestic plumbing and other domestic pressure equipment, such as hot water heaters. Portable air receivers (air tanks) used by homeowners and contractors are excluded from the scope, but air receivers in industrial facilities are included.

(d) Liquefied natural gas (LNG) and liquefied petroleum gas (LPG) transport and storage (API and ship classification societies).

(e) Pipelines.

(f) Pressure equipment used in transport service.

(g) Fired tubular process heaters. However, some documents relevant to that application are included to the extent they might be used by equipment types that are covered in this Guide. Some of these documents include API Std 530, API Std 560 and API RP 573. They are mentioned here for users seeking additional information.

This Guide includes only documents that are pertinent to maintaining equipment integrity (e.g., pressure containment) through appropriate design, construction, inspection, maintenance, alteration and repair. Standards related to areas such as identification schemes, plant or pipeline operator qualification are outside of its scope.

When this Guide was originally published, it included only those documents that were developed and published within the United States. This edition includes an appendix to list documents from selected countries outside the United States that are relevant to the management of pressure equipment integrity.

The inclusion of a document in this Guide does not imply that the document is endorsed by ASME. This listing is provided only for the convenience of manufacturers, users and their designated agents, regulators and other stakeholders to help identify documents that are potentially applicable.