

# Pressure Management

*ASME publishes a roadmap for maintaining the integrity of pressure equipment at all stages of its life.* By Steven J. Rossi

Pressure equipment keeps our civilization running, and a vast wealth of information, codes, and standards has accumulated concerning the best way to manage pressure vessels, piping, and related products from beginning to end of their service lives. There are standards and best practices for constructing them, for operating and monitoring them, and for repairing and replacing them.

Pressure equipment manufacturers, owners, users, regulatory personnel, and other stakeholders have often raised questions regarding what fixed equipment standards and guidelines are applicable to design, fabrication, examination, purchase, installation, operation, in-service inspection, repair, continued service, and replacement. The life cycle of pressure equipment from new construction to decommissioning requires that the management system flow in a consistent, organized, logical sequence without gaps or, at least, with known gaps identified. However, it can be a daunting task for anyone to be aware of all the standards and guidelines that are applicable.

Keeping track of all this information is the purpose of a new ASME publication, PTB-2-2009 *Guide to Life Cycle Management of Pressure Equipment Integrity* prepared by J. R. Sims, Jr., a senior engineering fellow at Becht Engineering Co. and vice chair of the ASME Pressure Technology Post Construction Committee.

## *Need for a Roadmap*

The book grew out of a workshop held by ASME in March 2009 that considered the need for an integrated approach to the standards for managing the life cycle of pressure equipment. The transition from new construction to post construction was an essential part of this discussion. New construction standards address issues of inspectability and pressure relief, and provide a baseline critical to any post-construction assessment.

ASME also has issued a number of post-construction engineering standards for the inspection and maintenance of pressure equipment after it has been placed in service. The work began in 1993, when the ASME Post Construction Committee 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.

As a result, ASME PCC-1 *Guidelines for Pressure Boundary Bolted Flange Joint Assembly* was published in 2000; ASME 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 addition, the Joint API/ASME Committee on Fitness for Ser-

**A-94 BPVC Section V Nondestructive Examination**

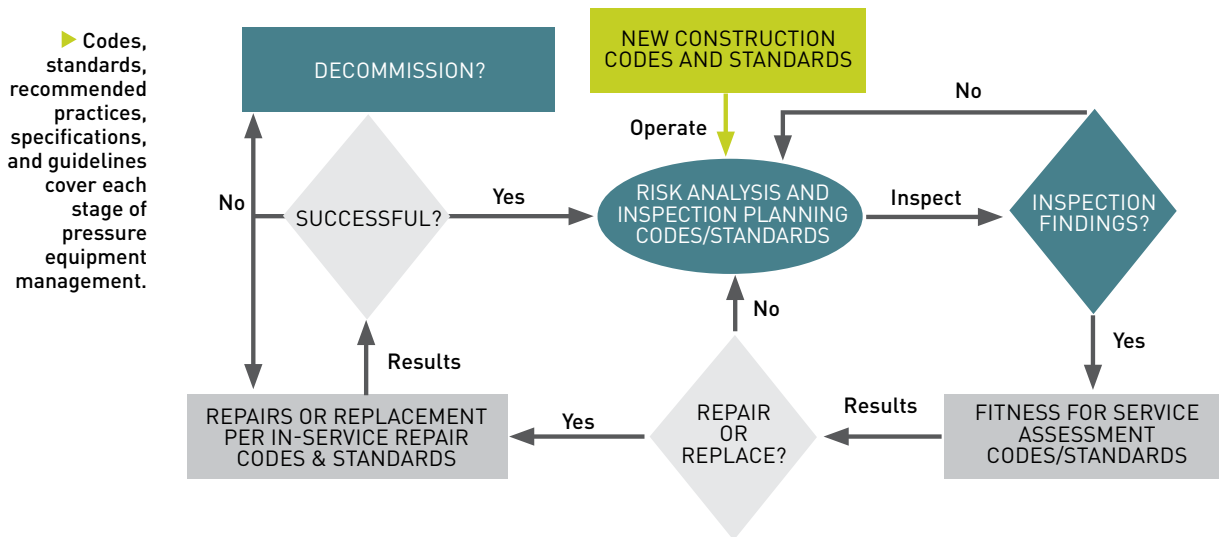
Current Edition:	2007 (631 pages)				
Alt. Number:	None				
ANSI Approved?	Yes				
Scope:	This section of the code contains requirements and methods for nondestructive examination (NDE), which are code requirements to the extent they are specifically referenced and required by other code sections or referencing document. These NDE methods are intended to detect surface and internal imperfections in materials, welds, fabricated parts and components. They include radiographic examination, ultrasonic examination, liquid radiographic examination, magnetic particle examination, liquid penetrant examination, magnetic particle examination, eddy current examination, visual examination, leak testing and acoustic emission examination. Appendix A of Subsection A presents a listing of common imperfections and damage mechanisms and the NDE methods that are generally capable of detecting them.				
Application:	This document can be used by owners, manufacturers and inspection service companies as an aid in selecting an NDE method(s) and performing the test for inspecting new and existing equipment. It also presents guidance for the evaluation of the test results.				
Comments:	This is a comprehensive guidance document intended for use by persons knowledgeable in inspection methods and procedures and in the types of defects and damage mechanisms.				
User:	Consultant	Manufacturer	Owner	Inspector	Regulator
	S	P	P	P	P
	P – Primary User S – Secondary User				

◀ An excerpt from Appendix A in the new *Guide*: The appendix summarizes all documents referenced in the text.

vice developed the API 579-1/ASME FFS-1 *Fitness-For-Service* standard in 2007.

Navigation through all the various standards is difficult at best for even the most experienced ASME code engineer. The Post Construction Committee recognized the need to provide a guideline or “roadmap” to help all stakeholders involved with pressure equipment identify the codes, standards, recommended practices, specifications, and guidelines that apply to managing and maintaining the integrity of pressure equipment throughout its complete life cycle. Most pressure equipment requires inspection during its useful life, and inspection access should be designed into the product.

Original manufacturing data required for life-cycle



analysis must be collected during manufacturing. Thus, the direct connection between new construction and post construction is vital, and a document making that connection was needed.

PTB-2-2009 is intended to bridge the transition between new construction and post construction practices, and to reference necessary standards and documents in one volume.

In specifying and purchasing pressure equipment, the buyer of the equipment will specify the requirements for construction, including the construction codes to be used. In other cases, the buyer may provide performance requirements, or may purchase a stock item. In both cases, however, the owner and user should understand the tasks needed to properly maintain the equipment. Before acquiring new pressure equipment, it is important for the equipment owner to consider the requirements for in-service inspection, testing, maintenance, and repair that may be necessary during the lifetime of the equipment, so that the design and construction can be optimized to provide appropriate access for these activities, as well as to provide ways for minimizing the impact of possible repairs. Some of the steps in this consideration and the documents that should be considered for each step are listed under each equipment type.

PTB-2 is organized by type of equipment—various types of boilers, pressure vessels, storage tanks, piping systems, components, fittings, and other devices. A section is devoted to each equipment type and identifies all applicable documents. The types of boilers included, for instance, are power (steam) boilers, heat recovery steam generators, heating boilers, and unfired steam boilers.

There is also a section for documents relating to specific tasks, such as welding and non-destructive examination, that are routinely performed as a part of new or post construction operations. An appendix contains a summary of each referenced document. These are limited to documents published by North American based standards developing organizations.

PTB-2 also provides a summary of some of the more commonly used codes, standards, recommended practices, specifications, and guidelines 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. The guideline is intended to provide the general or potential user of codes and standards with a coherent path for maintaining equipment integrity.

PTB-2-2009 offers strategies for addressing issues encountered when navigating between new construction and post-construction standards. These include a simplified approach for those interested in purchasing and operating pressure equipment in a purely prescriptive manner, as well as avenues for those who may choose to invest in advanced technology in seeking safe but competitive advantages in a global market.

ASME plans to update PTB-2 periodically to include new and modified documents. In particular, consideration for future editions is being given to including documents published by other worldwide standards-developing organizations. ■

Steven J. Rossi is project engineering advisor and secretary to the ASME Pressure Technology Post Construction Committee.