Study Guide

for

API Standard 1104 Welding of Pipelines and Related Facilities

TWENTIETH EDITION

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Abstract

This study guide contains information on the use of API Standard 1104, Twentieth Edition, which will assist the student in preparing for using the standard as well as preparing for code-related examinations. Material is provided for each of the 13 sections of the standard and both appendices. Exercise questions and answers are provided for each topic.

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Study Guide for API Standard 1104, Twentieth Edition

Foreword

AWS Education Services has published this AWS Study Guide to assist quality professionals—inspectors and supervisors—and quality-conscious engineers and managers in reading, understanding, and learning to apply the American Petroleum Institute's API Standard 1104, *Welding of Pipelines and Related Facilities,* Twentieth Edition.

API 1104 applies to welding of piping used in the compression, pumping, and transmission of petroleum products, fuel gases, carbon dioxide, and nitrogen. The standard's purpose is to present methods for the production and inspection of high-quality welds through the use of qualified personnel using approved procedures, materials, and equipment. It applies to new construction and in-service welding, and is voluntary.

This API 1104 Study Guide consists of an introduction and 15 sections, each covering a specific code section or appendix.

For each section exercise questions and answers are provided at the end of this document. Answering them provides a valuable review of the section contents. These questions also illustrate the types of questions you're likely to encounter in practice.

The authors of this book want you to write in this book and in *API Standard 1104* to clarify your understanding of the figures, tables, and text in both volumes.

The book provides a commentary on the code; it does not repeat the contents of the code.

As you read this book, open the code to the corresponding page.

Remembering excerpts from the code is neither necessary nor desirable. You need not memorize the code; just learn how to use it.

The American Welding Society appreciates feedback from participants in its education programs. Please send comments or questions to:

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or contact AWS Education Services by email: education@aws.org. Additional information on AWS products and services may be found on our website: www.aws.org.

Table of Contents

List of Tables

List of Figures

INTRODUCTION: HOW TO USE API 1104

Definitions of Documents

All codes, standards, specifications, and guides are conceptually similar, but each has a specific application and purpose. API 1104 is a good example of the concept, so learning to use this standard will help you learn to use others as well.

A **CODE** is a body of laws arranged systematically for easy reference and use. Because a code has a legal status, it is by definition mandatory, and uses words such as shall, will, and must to express certain conditions and requirements, and to verify that those requirements are being met. Examples of codes include AWS D1.1, *Structural Welding Code—Steel*, AASHTO/AWS D1.5, *Bridge Welding Code*, and ASME B31.1, *Power Piping Code*.

A **STANDARD** is established for use as a rule or basis of comparison in measuring quality, quantity, content, relative value, etc. API 1104, *Welding of Pipelines and Related Facilities*, is an example. So are AWS A3.0, *Standard Welding Terms and Definitions*, and AWS QC1, *Standard for AWS Certification of Welding Inspectors*.

A **SPECIFICATION** is a detailed description of the parts of a whole; a statement or enumeration of particulars, as to actual or required size, quality, performance, terms, etc. Thus, a specification describes all pertinent technical information for a material, product, system, or service, and indicates how to determine that the requirements have been met. Examples include AWS Filler Metal Specifications A5.1 through A5.34.

A **RECOMMENDED PRACTICE** is a nonmandatory description of generally accepted industrial methods and techniques. One of the most common examples is *Recommended Practice No. SNT-TC-1A*, ASNT's guideline to personnel qualification and certification in nondestructive examination.

A **GUIDE** provides information on proven methods to accomplish certain tasks. It is not mandatory but should reflect best practices. An example is AWS B1.11, *Guide for the Visual Examination of Welds*.

Less Than or Greater Than?

In many codes and standards, including API 1104, the rules vary depending on the size of a part, intended service and manufacturing requirements. Often these rules are differentiated symbolically. Most people know that = means "equal to" but the symbols for "less than" and "greater than" can cause confusion. Here's an easy way to keep them straight:

- < The symbol for **l**ess than points to the **l**eft. Example: 5 < 9 means five is less than nine.
- > The symbol for g**r**eater than points to the **r**ight. Example: 9 > 5 means nine is greater than 5.
- ≤ is the symbol for less than or equal to.
- ≥ is the symbol for greater than or equal to.