

# **Pressure Vessel Inspection Code: In-service Inspection, Rating, Repair, and Alteration**

API 510  
ELEVENTH EDITION, OCTOBER 2022

ERRATA 1, MARCH 2023



American  
Petroleum  
Institute

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# Pressure Vessel Inspection Code: In-service Inspection, Rating, Repair, and Alteration

## 1 Scope

### 1.1 General Application

#### 1.1.1 Coverage

This inspection code covers the in-service inspection, repair, alteration, and rerating activities for pressure vessels and the pressure-relieving devices (PRDs) protecting these vessels. This inspection code applies to all hydrocarbon and chemical process vessels that have been placed in service unless specifically excluded per [1.2.2](#); however, it could also be applied to process vessels in other industries at owner-operator discretion. This includes:

- a) vessels constructed in accordance with an applicable construction code [e.g., ASME *Boiler and Pressure Vessel Code (BPVC)*]; where a pressure vessel has been constructed to the American Society of Mechanical Engineers (ASME) *Section VIII Code*, API 510 is intended to apply to Divisions 1 and 2 and not Division 3;
- b) vessels constructed without a construction code (noncode vessels);
- c) vessels constructed and approved as jurisdictional-special based upon jurisdiction acceptance of particular design, fabrication, inspection, testing, and installation;
- d) nonstandard vessels.

However, vessels that have been officially decommissioned (i.e. no longer are an asset of record from a financial/accounting standpoint) are no longer covered by this “in-service inspection” code. Abandoned-in-place vessels may still need some amount of inspection and/or risk mitigation to assure they do not become a hazard because of continuing deterioration. Pressure vessels temporarily out of service and preserved for potential future use are still covered by this code.

The ASME *BPVC* and other recognized construction codes are written for new construction; however, most of the technical requirements for design, welding, nondestructive examination (NDE), and materials can be applied to the inspection, rerating, repair, and alteration of in-service pressure vessels. If for some reason an item that has been placed in service cannot follow the construction code because of its new construction orientation, the requirements for design, material, fabrication, and inspection shall conform to API 510 rather than to the construction code. If in-service vessels are covered by requirements in the construction code and API 510 or if there is a conflict between the two codes, the requirements of API 510 shall take precedence. As an example of the intent of API 510, the phrase “applicable requirements of the construction code” has been used in API 510 instead of the phrase “in accordance with the construction code.”

#### 1.1.2 Intent

The application of this inspection code is restricted to owner-operators that employ or have access to the following technically qualified individuals and organizations:

- a) an authorized inspection agency;
- b) a repair organization;
- c) an engineer;
- d) an inspector;

e) examiners.

Inspectors are to be certified as stated in this inspection code (see Annex B). Since other codes covering specific industries and general service applications already exist (e.g., NB-23), the refining and petrochemical industry has developed this inspection code to fulfill their own specific requirements for vessels and PRDs that fit within the restrictions listed in the scope.

The intent of this code is to specify the in-service inspection and condition-monitoring program needed to determine the integrity of pressure vessels and PRDs. The program should provide reasonably accurate and timely assessments to determine if any changes in the condition of pressure equipment could compromise continued safe operation. The owner-operators shall respond to any inspection results that require corrective actions to assure the continued safe operation of pressure vessels and PRDs.

This code does not cover source inspection of newly fabricated pressure vessels. Refer to API RP 588 *Recommended Practice for Source Inspection and Quality Surveillance of Fixed Equipment* for guidance on the surveillance of supplier vendors fabricating and/or repairing pressure vessels that will be installed on site. Owner-operators may engage the services of individuals qualified and certified in accordance with API RP 588 or this code.

### 1.1.3 Limitations

Adoption and use of this inspection code does not permit its use in conflict with any prevailing regulatory requirements. However, if the requirements of this code are more stringent than the requirements of the regulation, then the requirements of this code shall govern.

## 1.2 Specific Applications

### 1.2.1 Exploration and Production (E&P) Vessels

All pressure vessels used for E&P service [e.g., drilling, producing, gathering, transporting, lease processing, and treating liquid petroleum, natural gas, and associated salt water (brine)] may be inspected under the alternative rules set forth in [Section 9](#). Except for [Section 6](#), all of the sections in this inspection code are applicable to pressure vessels in E&P service. The alternative rules in [Section 9](#) are intended for services that may be regulated under safety, spill, emission, or transportation controls by the U.S. Coast Guard; the Office of Hazardous Materials Transportation of the U.S. Department of Transportation (DOT), and other units of DOT; the Bureau of Ocean Energy Management, Regulation, and Enforcement, formerly the Minerals Management Service of the U.S. Department of the Interior; state and local oil and gas agencies; or any other regulatory commission.

### 1.2.2 Excluded and Optional Services

Vessels excluded from the specific requirements of this inspection code are listed in Annex A. However, each owner-operator has the option of including any excluded pressure vessel in their inspection program as outlined in this code.

Some vessels exempted in accordance with the criteria in ASME *BPVC, Section VIII, Division 1* should be considered for inclusion based on risk (probability and consequence of failure) as determined by the owner-operator. An example of such vessels might be vacuum flashers in refining service or other large vessels operating in vacuum service.

### 1.2.3 Recognized Technical Concepts

For inspection planning and engineering assessment of in-service pressure vessels, this inspection code recognizes the applicability of fitness-for-service (FFS) assessment and risk-based inspection (RBI) methodologies. API 579-1/ ASME FFS-1 provides detailed assessment procedures for specific types of damage referenced in this code. API RP 580 provides guidelines for conducting a risk-based assessment program. API RP 581 provides a method of conducting RBI in accordance with the principles in API RP 580.