Fitness-For-Service

API 579-1/ASME FFS-1, June, 2016

The American Society of Mechanical Engineers

AMERICAN PETROLEUM INSTITUTE

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Foreword

In contrast to the straightforward and conservative calculations that are typically found in design codes, more sophisticated assessment of metallurgical conditions and analyses of local stresses and strains can more precisely indicate whether operating equipment is fit for its intended service or whether particular fabrication defects or in-service deterioration threaten its integrity. Such analyses offer a sound basis for decisions to continue to run as is or to alter, repair, monitor, retire or replace the equipment.

The publication of the American Petroleum Institute's Recommended Practice 579, Fitness-For-Service, in January 2000 provided the refining and petrochemical industry with a compendium of consensus methods for reliable assessment of the structural integrity of equipment containing identified flaws or damage. API RP 579 was written to be used in conjunction with the refining and petrochemical industry's existing codes for pressure vessels, piping and aboveground storage tanks (API 510, API 570 and API 653). The standardized Fitness-For-Service assessment procedures presented in API RP 579 provide technically sound consensus approaches that ensure the safety of plant personnel and the public while aging equipment continues to operate, and can be used to optimize maintenance and operation practices, maintain availability and enhance the long-term economic performance of plant equipment.

Recommended Practice 579 was prepared by a committee of the American Petroleum Institute with representatives of the Chemical Manufacturers Association, as well as some individuals associated with related industries. It grew out of a resource document developed by a Joint Industry Program on Fitness-For-Service administered by The Materials Properties Council. Although it incorporated the best practices known to the committee members, it was written as a Recommended Practice rather than as a mandatory standard or code.

While API was developing Fitness-For-Service methodology for the refining and petrochemical industry, the American Society of Mechanical Engineers (ASME) also began to address post-construction integrity issues. Realizing the possibility of overlap, duplication and conflict in parallel standards, ASME and API formed the Fitness-For-Service Joint Committee in 2001 to develop and maintain a Fitness-For-Service standard for equipment operated in a wide range of process, manufacturing and power generation industries. It was intended that this collaboration would promote the widespread adoption of these practices by regulatory bodies. The Joint Committee included the original members of the API Committee that wrote Recommended Practice 579, complemented by a similar number of ASME members representing similar areas of expertise in other industries such as chemicals, power generation and pulp and paper. In addition to owner representatives, it included substantial international participation and subject matter experts from universities and consulting firms.

In June 2007, the Fitness-For-Service Joint Committee published the first edition of API 579-1/ASME FFS-1 Fitness-For-Service.

The 2016 publication of API 579-1/ASME FFS-1 includes a number of modifications and technical improvements. Some of the more significant changes are the following:

- Reorganized the standard to facilitate use and updates.
- Expanded equipment design code coverage.
- Added Annex for establishing an allowable Remaining Strength Factor (RSF).
- Simplified Level 1 criterion for the circumferential extent of a Local Thin Area (LTA) through the modification of the Type A Component definition and subdivision of Type B Components into Class 1 or Class 2.
- Updated crack-like flaw interaction rules.
- Re-wrote weld residual stress solution Annex for use in the assessment of crack-like flaws.

- Updated guidance on material toughness predictions for use in the assessment of crack-like flaws.
- Updated evaluation procedures for the assessment of creep damage.
- Added Annex covering metallurgical investigation and evaluation of mechanical properties in a fire damage assessment.
- Developed new Part 14 covering the assessment of fatigue damage.

This publication is written as a standard. Its words shall and must indicate explicit requirements that are essential for an assessment procedure to be correct. The word should indicates recommendations that are good practice but not essential. The word may indicate recommendations that are optional.

Most of the technology that underlies this standard was developed by the Joint Industry Program on Fitness-For-Service, administered by The Materials Properties Council. The sponsorship of the member companies of this research consortium and the voluntary efforts of their company representatives are acknowledged with gratitude.

The committee encourages the broad use of the state-of-the-art methods presented here for evaluating all types of pressure vessels, boiler components, piping and tanks. The committee intends to continuously improve this standard as improved methodology is developed and as user feedback is received. All users are encouraged to inform the committee if they discover areas in which these procedures should be corrected, revised or expanded. Suggestions should be submitted to the Secretary, API/ASME Fitness-For-Service Joint Committee, The American Society of Mechanical Engineers, Two Park Avenue, New York, NY 10016, or SecretaryFFS@asme.org.

There is an option available to receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the Committee Web at http://go.asme.org/ffscommittee after selecting “errata” in the “Publication Information” section.

This standard is under the jurisdiction of the ASME Board on Pressure Technology Codes and Standards and the API CRE Committee and is the direct responsibility of the API/ASME Fitness-For-Service Joint Committee. The American National Standards Institute approved API 579-1/ASME FFS-1 2016 in June, 2016.

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Special Notes

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