Fire Test for Quarter-turn Valves and Valves Equipped with Nonmetallic Seats

API STANDARD 607
SEVENTH EDITION, JUNE 2016

AMERICAN PETROLEUM INSTITUTE

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Introduction

This standard covers the requirements and method for evaluating the performance of valves when they are exposed to defined fire conditions. The performance requirements establish limits of acceptability of a valve, regardless of size or pressure rating. The burn period has been established to represent the maximum time required to extinguish most fires. Fires of longer duration are considered to be of major magnitude with consequences greater than those anticipated in the test. The test pressure during the burn is set at 0.2 MPa (30 psig) for nonmetallic seated valves rated Class 150 and Class 300 to better simulate the conditions that would be expected in a process plant when a fire is detected and pumps are shut down. In this case, the source of pressure in the system is the hydrostatic head resulting from liquid levels in towers and vessels. This situation is approximated by this lower test pressure.

In production facilities, valves are typically of a higher rating and the pressure source is not easily reduced when a fire is detected. Therefore, for all other valves, the test pressure during the burn is set at a higher value to better simulate the expected service conditions in these facilities. Use of this standard assumes that the execution of its provisions is entrusted to appropriately qualified and experienced personnel because it calls for procedures that may be injurious to health if adequate precautions are not taken. This standard refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage of the procedure.

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1 Scope

This standard specifies fire type-testing requirements and a fire type-test method for confirming the pressure-containing capability of quarter-turn valves and other valves with nonmetallic seating under pressure during and after the fire test. It does not cover the testing requirements for valve actuators other than manually operated gear boxes or similar mechanisms when these form part of the normal valve assembly. Other types of valve actuators (e.g. electrical, pneumatic, or hydraulic) may need special protection to operate in the environment considered in this valve test, and the fire testing of such actuators is outside the scope of this standard.

NOTE For the purposes of this standard, the terms “fire type-test” and “fire test” are synonymous.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

API Standard 598, *Valve Inspection and Testing*

IEC 60584-2, *Thermocouples: Tolerance Values of the Thermoelectric Voltages*

3 Terms and Definitions

For the purposes of this document, the following terms and definitions apply.

3.1
asymmetric seated valve
Valve with an internal construction that has no plane of symmetry perpendicular to the axis of the body ends.

NOTE This is a valve with a single seat offset from the shaft centerline.

3.2
Class
An alphanumeric designation that is used for reference purposes related to valve pressure-temperature capability, taking into account valve material mechanical properties and valve dimensional characteristics. It comprises the letters Class followed by a dimensionless whole number. The number following the letters Class does not represent a measurable value and is not used for calculation purposes except where specified in this standard. The allowable pressure for a valve having a Class number depends on the valve material and its application temperature and is to be found in tables of pressure-temperature ratings.

3.3
DN
An alphanumeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters DN followed by a dimensionless number indirectly related to the physical size of the bore or outside diameter of the end connection, as appropriate. The dimensionless number following DN does not represent a measurable value and is not used for calculation purposes except where specified in this standard.

3.4
NPS
An alphanumeric designation of size that is common for components used in a piping system, used for reference purposes, comprising the letters NPS followed by a dimensionless number indirectly related to the physical size