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AMERICAN NATIONAL STANDARD

**STANDARD FOR QUALIFICATION OF  
CONTROL VALVE STEM SEALS**

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Fluid Controls Institute, Inc.

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Sponsor:



*Fluid Controls Institute, Inc.*  
1300 Sumner Ave  
Cleveland, Ohio 44115-2851

ANSI/FCI 91-1-2010

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**Standard for Qualification of Control  
Valve Stem Seals**

Sponsor

**Fluid Controls Institute, Inc.**

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**Foreword** (This foreword is included for information only and is not part of ANSI/FCI 91-1, *Standard for Qualification of Control Valve Stem Seals*).

This voluntary standard has been developed through the cooperative efforts of the members of the Control Valve Section of the Fluid Controls Institute, Inc. (FCI). Its purpose is to assist users and specifiers of control valves in their efforts to comply with federal and state equipment leak regulations as they relate to leak detection and repair.

The purpose of this standard is to provide a means of evaluating the sealing properties of a stem seal design under a standard set of test conditions in a laboratory environment. Compliance with this standard does not provide proof of actual performance in a process plant due to the variance in actual process service conditions. Compliance by the manufacturer with this standard does not waive any federal or state leak detection and repair requirements on the part of the end user. Stem seals meeting this standard are believed to enhance the end user's capability in meeting the equipment leak requirements.

This standard was originally adopted as an FCI standard January 29, 1991. The standard has been periodically revised and the latest revision was approved in August, 2010.

The existence of an FCI standard does not in any respect preclude any member or non-member from manufacturing or selling products not conforming to the standard. It should be clearly understood that this is a voluntary standard and the FCI is not responsible for its use.

FCI recognizes the need to periodically review and update this standard. Suggestions for improvement should be forwarded to the Fluid Controls Institute, Inc., 1300 Sumner Avenue, Cleveland, Ohio, 44115-2851. All constructive suggestions for expansion and revision of this standard are welcome.

# ANSI/FCI 91-1-2010

## AMERICAN NATIONAL STANDARD

### Standard for Qualification of Control Valve Stem Seals

#### 1. PURPOSE

This standard classifies control valve stem seals by their ability to withstand mechanical and thermal cycles at a specified set of temperature and pressure conditions. Bellows, diaphragms, and tubular seals are not covered by this standard.

#### 2. DEFINITIONS

2.1 Control Valve - A valve with a power positioning actuator for moving a closure member to any position relative to a valve port or ports in response to an external signal. The power for a control valve actuator is derived from an independent source.

2.2 Fugitive Emissions - Those emitted from process equipment. Any unwanted leak to atmosphere.

2.3 Mechanical Cycle - Moving the valve stem or shaft from the fully closed position to the fully open position and back to the fully closed position.

2.4 Proof of Design - A test to qualify stem seal design to meet the requirements for a class shown in Table 1.

2.5 Rated Travel - The valve travel at which the manufacturer's rating is established.

2.6 Stem Seal - The means of preventing leakage of process fluid to the atmosphere where the stem protrudes from the valve body assembly. The stem seal also includes any loading or retaining mechanism.

2.7 Stem Seal Leakage - The concentration of process fluid being emitted past the stem seal under the defined test conditions. For this standard methane

will be used exclusively as the process fluid, except at elevated temperatures.

2.8 Stem Seal Cross Section -  $1/2$  (Bore Diameter - Stem Diameter). This definition is consistent with commonly used terminology in the packing industry and is equivalent to gland width, packing cross section, or packing size.

2.9 Stem Seal Adjustment - The use of a wrench or other tool to move any mechanism which retains or applies stress to the stem seal components.

#### 3. SCOPE AND LIMITATIONS

3.1 This standard shall apply to rotary and linear motion control valves. Bellows, diaphragms and tubular stem seals are not covered by this standard.

3.2 This standard shall not apply to valves that are governed by conflicting national or international standards.

3.3 Municipal, state and federal regulations may require additional qualifications testing that is beyond the scope of this standard.

3.4 The test results from this standard shall only be used to predict leakage at conditions within the qualified pressure and temperature rating.

3.5 The laboratory proof of the design as described may not guarantee similar results when the control valve is exposed to different field process conditions.

#### 4. CLASSIFICATIONS

4.1 To qualify to this test standard the valve stem seal shall be tested to one of the classes shown in Table 1 to either a 100 ppm or 500 ppm maximum stem seal leakage criteria as specified.