

Standard for Actuators and Mounting Kits for Valves

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Introduction

It is necessary that users of this document be aware that further or differing requirements can be needed for individual applications. This document is not intended to inhibit a vendor from offering, or the purchaser from accepting, alternative equipment or engineering solutions for the individual application. This can be particularly applicable where there is innovative or developing technology. Where an alternative is offered, it is the responsibility of the vendor to identify any variations from this document and provide details.

Units of measurement

In this specification, data are expressed in both U.S. customary (USC) and metric (SI) units. For a specific order item, unless otherwise stated, only one system of units shall be used, without

Rounding

Except as otherwise required by this specification, to determine conformance with the specified requirements, observed or calculated values are rounded to the nearest unit in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding method of ASTM E29 or ISO 80000-1, [Annex B](#), Rule A.

Conformance with this International Standard

A quality system applied to assist compliance with the requirements of this International Standard is typically implemented by the manufacturer. The manufacturer is responsible for conforming with all the applicable requirements of this standard. It is permissible for the purchaser to make any investigation necessary to be assured of conformance

Standard for Actuators and Mounting Kits for Valves

1 Scope

This standard defines the requirements for design, mechanical integrity, and sizing of actuators and related components, and is applicable to all types of electric, pneumatic, and hydraulic actuators, inclusive of mounting kit, installed on valves that conform to API Specification 6D.

This standard is not applicable to actuators installed on control valves, valves being used for regulation, valves in subsea service, handheld powered devices, manually operated gearboxes, instrument tubing and associated fittings, and actuator control equipment.

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 Specification 6D,¹ *Specification for Valves*

ASME Boiler and Pressure Vessel Code,² Section VIII, Division 1, *Rules for Construction of Pressure Vessels*

ASME Boiler and Pressure Vessel Code, Section VIII, Division 2, Alternative Rules, *Rules for Construction of Pressure Vessels*

ASME Boiler and Pressure Vessel Code, Section IX, *Welding and Brazing Qualifications*

ASNT SNT-TC-1A, *Non-Destructive Testing*

ASTM A370,³ *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*

ASTM B733, *Standard Specification for Autocatalytic (Electroless) Nickel-Phosphorus Coatings on Metal*

ASTM E29, *Standard Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

AWS D1.1/D1.1M,⁴ *Structural Welding Code — Steel*

AWS QC1, *Standard for AWS Certification of Welding Inspectors*

EN 10204,⁵ *Metallic products — Types of inspection documents*

ISO 148-1,⁶ *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 4406:1999, *Hydraulic fluid power — Method for coding the level of contamination by solid particles*

ISO 5210, *Industrial valves — Multi-turn valve actuator attachments*

¹ American Petroleum Institute, 200 Massachusetts Ave, NW, Washington, DC 20001, USA.

² American Society of Mechanical Engineers International, 345 East 47th Street, New York, NY 10017-2392, USA.

³ American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA.

⁴ American Welding Society, 8669 NW 36 Street, #130, Miami, Florida 33166-6672, www.aws.org.

⁵ CEN, European Committee for Standardization, Central Secretariat, Rue de Stassart 36, B-1050 Brussels, Belgium.

⁶ International Organization for Standardization, Chemin de Blandonnet 8, CP 401, 1214 Vernier, Geneva, Switzerland, www.iso.org.

ISO 5211, *Industrial valves — Part-turn actuator attachments*

ISO 8573-1, *Contaminants and purity classes*

ISO 9606-1, *Qualification testing of welders — Fusion welding — Part 1: Steels*

ISO 9712, *Non-destructive testing — Qualification and certification of NDT personnel — General principles*

ISO 12944-2, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 2: Classification of environments*

ISO 80000-1:2009, *Qualities and units — Part 1: General*

IEC 60529,⁷ *Degrees of protection provided by enclosures (IP Code)*

MSS SP-101, *Part-Turn Valve Actuator Attachment — FA Flange and Driving Component Dimensions and Performance Characteristics*

MSS SP-102, *Multi-Turn Valve Actuator Attachment — Flange and Driving Component Dimensions and Performance Characteristics*

NACE MR0175/ISO15156⁸ (all parts), *Petroleum and natural gas industries — Materials for use in H₂S-containing environments in oil and gas production*

3 Terms, Definitions, Abbreviations, and Symbols

3.1 Terms and Definitions

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

3.1.1

actuator

Electrically, pneumatically, or hydraulically powered device bolted or otherwise attached to the valve for applying torque or thrust to open and close a valve.

3.1.2

actuator, linear

Actuator that transmits thrust to the valve for a defined linear stroke.

3.1.3

actuator, multi-turn

Actuator that transmits torque to the valve by a rotation of more than one revolution.

3.1.4

actuator, part-turn

Actuator that transmits torque to the valve by a rotation of one revolution or less.

3.1.5

breakaway thrust

breakaway torque

Maximum thrust or torque required to operate a valve at maximum pressure differential.

⁷ IEC, International Electrotechnical Commission, Central Office, 3, rue de Varembé, CH-1211 Geneva 20, Switzerland

⁸ National Association of Corrosion Engineers, NACE International, 15835 Park Ten Place, Houston, Texas 77084, www.nace.org.

3.1.6**cycle**

Operation from the fully closed to fully open and return to the closed position, or fully open to fully closed and return to the open position.

3.1.7**drive shaft**

Driven component of the mounting kit (drive adapter, drive tube) that allows transmission of torque and/or thrust from an actuator to the valve shaft/stem.

3.1.8**drive train**

Parts in the actuator and mounting kit designed to provide the transmission of torque/thrust, not including the valve stem.

3.1.9**maximum allowable stem torque/thrust****MAST**

Maximum torque/thrust that is permissible to apply to the valve drive train without risk of damage, as defined by the valve manufacturer/supplier.

3.1.10**maximum pressure differential**

maximum difference between the upstream and downstream pressure across the valve closure member at which the closure member may be operated (see API 6D).

3.1.11**mechanically loaded parts**

Actuator and mounting kit parts that transmit torque/thrust or other structural loads, or any combination thereof.

3.1.12**mounting kit**

Components that may be comprised of combinations of the following: mounting spool, drive shaft, drive key, dowel pin, and bolting.

3.1.13**mounting spool**

Structural component (e.g. bracket, pipe, adapter flange) that connects the actuator to the valve.

3.1.14**no visible leakage**

As applied to air or gas testing, a leak that produces no visible formation of bubbles in a water immersion test or after the application of leak detection fluid at the test pressure and for the duration of the test.

3.1.15**operating time**

Duration expressed in seconds of the complete stroke at the drive train output for multi-turn and linear actuators, or the complete angular stroke at the drive train output for partial-turn actuators.

3.1.16**pressure-containing parts**

Parts whose failure to function as intended results in a release of contained fluid into the environment.

3.1.17**pressure, design**

Pressure defined for the design of the actuator pressure-containing and mechanically loaded parts, as defined by the actuator manufacturer.

3.1.18**pressure, maximum operating**

Maximum allowable pressure to supply at the actuator pressure port, as defined by the actuator manufacturer/supplier.

3.1.19**pressure, maximum rated**

Maximum pressure permissible into the actuator for pressure-containing or mechanically loaded parts, as defined by the actuator manufacturer.

3.1.20**pressure, maximum supply**

Maximum available pressure to be supplied at the actuator, as defined by the purchaser.

3.1.21**pressure, minimum operating/working**

Minimum pressure at which the actuator provides the torque/thrust to operate the valve, inclusive of safety factor, as defined by the actuator manufacturer.

3.1.22**pressure, minimum supply**

Minimum available pressure to be supplied at the actuator, as defined by the purchaser.

3.1.23**purchaser**

An organization or individual that buys equipment from the manufacturer.

Example Valve manufacturer, distributor/stockist, value-add-center, end-user.

3.1.24**stall torque**

Maximum torque that an electric actuator develops when the motor is energized and the output drive is locked.

3.1.25**stem/shaft**

Valve part that connects the closure member to the actuator.

3.1.26**stroke**

Movement of the valve closure member from the fully closed position to the fully open position, or vice versa.

3.1.27**supplier**

Manufacturer or third-party provider of the actuator or the actuated valve assembly.

3.1.28**temperature, maximum design**

Maximum temperature at which the actuator is capable of operating.

3.1.29**temperature, maximum operating**

Maximum temperature at which the actuator is required to operate.

3.1.30**temperature, minimum design**

Minimum temperature at which the actuator is capable of operating.