ANSI/AWWA C542-16
(Revision of ANSI/AWWA C542-09)

American Water Works Association

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AWWA Standard

Electric Motor Actuators for Valves and Slide Gates

Effective date: Sept. 1, 2016.
First edition approved by AWWA Board of Directors Jan. 25, 2009.
This edition approved Jan. 16, 2016.
Approved by American National Standards Institute Apr. 7, 2016.

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AWWA Standard

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ISBN-13, print: 978-1-62576-177-4 eISBN-13, electronic: 978-1-61300-388-6

DOI: http://dx.doi.org/10.12999/AWWA.C542.16

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Appendix

A Electric Actuator Data Form 19

Table

A.1 ANSI/AWWA C542 Electric Actuator Data Form 19

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Foreword

This foreword is for information only and is not a part of ANSI/AWWA C542.*

I. Introduction.

I.A. *Background.* This standard covers electric motor actuators that are externally mounted on gate, ball, plug, cone, globe, and butterfly valves, and on slide gates suitable for use in water, wastewater, and reclaimed water utilities. This standard does not cover pilot and control apparatus used to actuate the operating device.

I.B. *History.* The first edition of the ANSI/AWWA C540 standard, published in 1987, was the result of 12 years of effort by the AWWA Standards Committee on Power-Actuating Devices for Valves and Sluice Gates. The committee was formed by AWWA in 1974 and charged with the development of standards on prime movers for valves and sluice gates, including electric motors and cylinders employing air, water, and oil. The second edition of the ANSI/AWWA C540 standard was approved by the AWWA Board of Directors on June 6, 1993, and added quarter-turn actuators. The third edition was approved on June 16, 2002. It added vane-type actuators and digital controls. In 2006, the original single standard was split into two separate standards, one for electric motor actuators (ANSI/AWWA C542) and one for hydraulic and pneumatic cylinder and vane-type actuators (ANSI/AWWA C541). Both of these standards replace the ANSI/AWWA C540 standard. The first edition of ANSI/AWWA C542 was approved by the AWWA Board of Directors on Jan. 25, 2009. This edition was approved on Jan. 16, 2016.

II. Special Issues.

II.A. *Discussion.* At the time this standard was approved, numerous AWWA standards define valves or slide gates that may be operated by electric actuators. The standards listed here refer to this standard for electric actuators and do not include separate electric actuator sections. These standards are ANSI/AWWA C500, Metal-Seated Gate Valves for Water Supply Services; ANSI/AWWA C504, Rubber-Seated Butterfly Valves; ANSI/AWWA C507, Ball Valves, 6 In. Through 60 In. (150 mm Through 1,500 mm); ANSI/AWWA C509, Resilient-Seated Gate Valves for Water Supply Service; ANSI/AWWA C516 Large-Diameter Rubber-Seated Butterfly Valves, Sizes 78 In. (2,000 mm) and Larger; ANSI/AWWA C517, Resilient-Seated Cast-Iron Eccentric Plug Valves; ANSI/AWWA C560, Cast-Iron Slide Gates; ANSI/AWWA C561,

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Fabricated Stainless-Steel Slide Gates; ANSI/AWWA C562, Fabricated Aluminum Slide Gates; and ANSI/ AWWA C563, Fabricated Composite Slide Gates.

ANSI/AWWA C542 describes only the design and performance of those actuating devices applied to systems with operating pressures normally encountered in water utilities. Purchasers of electric motor actuators should carefully review the requirements of this standard, evaluate the information to be provided to the manufacturer, and review the data to be supplied by the manufacturer. Such evaluations are essential to allow proper application of the electric motor actuator for the intended use.

ANSI/AWWA C542 references the National Electrical Manufacturers Association (NEMA),* which publishes standards and application guides for electrical equipment, enclosures, and components for various hazardous and nonhazardous service. Users of ANSI/AWWA C542 are cautioned to clearly specify the application requirements for the service. Such service may include depth and duration for submerged application, explosion-proof, and outdoor application.

Specific requirements for controls and accessories and other items not covered by this standard shall be included in the purchase documents.

Users of this standard should consult the National Electrical Code and local codes for circuit breakers/disconnect switch requirements.

III. Use of This Standard. It is the responsibility of the user of an AWWA standard to determine that the products described in that standard are suitable for use in the particular application being considered. There are numerous lists throughout this standard describing various features of electric motor actuators. These lists are intended to be nonlimiting in nature and may not include all features necessary for a particular application or that a particular purchaser may desire.

This standard includes certain options that shall be selected and specified by the purchaser to completely describe and obtain the actuator desired. In addition to the factors in Sec. III.A, Purchaser Options and Alternatives, other factors to be considered when sizing an actuator are described in Sec. 4.3, Actuator Sizing. The following summarizes the options that shall be selected and the data that shall be covered in the purchase documents covering actuators manufactured in accordance with this standard.

III.A. *Purchaser Options and Alternatives.* The following information should be provided or requested by the purchaser:

* National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1752, Rosslyn, VA 22209.

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1. Standard used—that is ANSI/AWWA C542, Electric Motor Actuators for Valves and Slide Gates, of latest revision.

2. The purchaser should note that corrosion-resistant metals shall be carefully selected and required to be compatible with the environmental conditions to which they are exposed in a given application (Section 3, item 3).

3. Details of federal, state or provincial, and local requirements (Sec. 4.1).

4. Modifications to manufacturer delivery requirements (Sec. 4.2).

5. Valve and slide gate physical characteristics (Sec. 4.3).

   a. Size and type of valve or slide gate to be operated by the actuator.

   b. Stem or shaft diameter at point of attachment.

   c. Rising stem, nonrising stem, or quarter turn.

   d. Pitch, lead, hand of thread, or keyway dimensions.

   e. Weight of gate and stem for slide gate.

   f. Actuator orientation in relation to valve or slide gate.

   g. Actuator mounting: directly mounted or remotely mounted on a floor stand and coupled with extension shafting.

   h. Seating/unseating torque in foot-pounds (newton-meters), maximum dynamic torque in foot-pounds (newton-meters), and when applicable, thrust in pounds (newtons) (Sec. 4.3.1.2).

   i. Maximum torque/thrust capability of the valve or slide gate (Sec. 4.3.2).

6. Lost-motion device requirement (Sec. 4.4.3).

7. Lubricant requirements (Sec. 4.4.5).

8. Direction of rotation of actuator handwheel to open valve or slide gate if other than counterclockwise (Sec. 4.4.6).

9. Supply voltage with maximum and minimum variation, phase, and frequency (Sec. 4.4.7).

10. Required type of service (Sec. 4.4.7).

   a. Open–close. Frequency of operation and travel time duty cycle.

   b. Throttling/modulating. Operating conditions, input signal to actuator, and starts per hour.

      Class 1—60 starts per hour, maximum.

      Class 2—100 starts per hour, maximum.

      Class 3—600 starts per hour, maximum.

      Class 4—1,200 starts per hour, maximum.

11. Ambient temperature and humidity ranges.

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12. Installation location: outdoors, indoors in a pit, in a vault, or in any hazardous location if applicable, as defined by the National Electrical Code. If submergence is expected, give depth and length of time of submergence.

13. Operating-cycle requirements. Travel time or speed, in seconds or inches per minute (centimeters per minute), from fully open to fully closed positions, or the reverse under all operating conditions. State acceptable plus/minus variation limits or an acceptable range of operating limits.

14. The number of limit-switch contacts used for interlocking and position indication in the open, closed, and intermediate positions shall be defined (Sec. 4.4.8).

15. Controls enclosure requirements (Sec. 4.4.10).

16. Number of heaters, their locations, and their supply voltages if required (Sec. 4.4.10).

17. Position-indication requirements (Sec. 4.4.12).

18. Need for stem protector (Sec. 4.4.13).

19. Control feature requirements (Sec. 4.4.14). The purchaser shall coordinate the selection of the actuator control system with the overall project or site control system to establish their compatibility.

20. Digitally controlled communication requirements (Sec. 4.4.14). The purchaser shall coordinate the selection of the digital control system with the overall project or site digital control system to establish their compatibility.

21. Whether or not the controls are to be integral to the actuator, remotely mounted, or supplied by others (Sec. 4.4.14.1).

22. Process-control signal (Sec. 4.4.14.1 and 4.4.14.2).

    a. For analog input, indicate signal (e.g., 4–20 mA).

    b. For contact closure, indicate voltage and source/dry contact.

    c. For digital serial communication, indicate digital communications protocol (e.g., Device Net, Profibus, Modbus, etc.).

23. Seal-in latching contact requirements (Sec. 4.4.14.3.1).

24. If required, extra reversing-starter auxiliary contacts (Sec. 4.4.14.3.1).

25. A standard reversing contactor is controlled through the use of an integral transformer that provides 120 V. If a transformer is not required, its replacement shall meet the requirements of Sec. 4.4.14.3.2.

26. If push buttons are to be remote mounted (Sec. 4.4.14.3.3).

27. Remote enclosure requirements (Sec. 4.4.14.3.3).

28. Open–close light indication requirements (Sec. 4.4.14.3.4).

29. Process-control signal requirements (Sec. 4.4.14.4.4).

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30. Number of feedback and auxiliary devices as required (Sec. 4.4.14.5).

31. Special service coating requirements (Sec. 4.5.1).

32. Request for certification of tests and copies of proof of design and performance tests (Sec. 5.4).

33. Plant inspection and testing requirements (Sec. 5.5).

34. Shipping and storage requirements (Sec. 6.2).

35. Affidavit of compliance (Sec. 6.3).

III.B. *Modification to Standard.* Any modification to the provisions, definitions, or terminology in this standard shall be provided in the purchase documents.

IV. Major Revisions. Major changes made to the standard in this revision include the following:

1. Added handwheel, rim pull and stem protection requirements for slide gates (Sec. 4.4.6.1, 4.4.6.2, 4.4.13.1).

2. Optional delivery requirement of affidavit of compliance changed from supplier to manufacturer (Sec. 6.3).

3. Table A.1, Electric Actuator Data Form, was added as appendix A.

V. Comments. If you have any comments or questions about this standard, please call AWWA Engineering and Technical Services at 303.794.7711, FAX at 303.795.7603; write to the department at 6666 West Quincy Avenue, Denver, CO 80235-3098; or email at standards@awwa.org.

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AWWA Standard

Electric Motor Actuators for Valves and Slide Gates

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes electric motor actuators for valves and slide gates in water, wastewater, and reclaimed water utility systems. Electric motor actuators are designed to produce a multiturn rotary motion output to actuate a multiturn valve or gate or to actuate an external gearhead for quarter-turn valves. Electric motor actuators not requiring external gearheads for quarter-turn valves are defined in Sec. 4.4.1.2.

1.1.1 *Actuator function.* Actuators shall produce a rotary or linear motion to activate a valve or slide gate in open–close, throttling, or modulating service.

1.1.2 *Excluded actuators.* The following types of actuators are not included in this standard: Motor actuators using water, oil, or a gas as the driver medium.

1.1.3 *Other exclusions.* This standard does not include the following:

1. Electric/electronic controls for electric motor actuators contained within separate enclosures at a location remote from the actuator or actuator floor stand.

2. Intermediate gearhead or mechanism (nonintegral to actuator) between electric actuator output and valve/gate stem or shaft is defined in Sec. 4.4.1.2, style (1).

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