



**American Water Works
Association**

Errata to
ANSI/AWWA A100-06
Standard
for

Water Wells

(December 2007)

1. On page xii, the following text shall be inserted as item III.A.3: “Details of other federal, state, local, and provincial requirements (Sec. 4).” The current items III.A.3 through III.A.17 shall be renumbered III.A.4 through III.A.18 to reflect this insertion.
2. Section 4.3.2, page 9, shall read: “*Casing materials.* All casing material shall be new and shall conform to one of the manufacturing standards listed in Table 2. It shall be the responsibility of the constructor to ensure that the purchaser is provided with documented mill certifications by the manufacturer of the casing.”
3. Figure D.6, page 45 shall have the following corrections made:
 - a. The label of the radius line set at 45 degrees to the Constructed Pump Centerline shall read: “0.157 ft (1.88 in.)”
 - b. The paragraph under Misalignment Radius = 1.88 in. shall read: “This value is the maximum horizontal distance between well centerline and a straight line representing the pump centerline. This line being constructed so as to minimize the horizontal distance between the two centerlines. This value can be considered a measurement of the maximum dogleg of the well.”
 - c. The paragraph for Misalignment Diameter = 3.76 in. shall read: “This value, which is twice the misalignment radius, represents the difference between well ID and the largest pump OD that can be inserted into the well without bending. This value can be considered a measurement of the loss in effective diameter of the well.”

4. Appendix L, Section L.3 DESIGN EXAMPLES, page 83, first paragraph, shall read: “As can be seen in the previous examples, the design length of well screen may vary widely, depending on the percentage of open area of the screen slots and the selected design screen entrance velocity. Selection of the appropriate screen length and position would undoubtedly need to consider aquifer thickness and stratigraphic layering, in conjunction with the calculations. However, two of the calculated screen lengths, 3 ft and 630 ft (in Examples 2 and 3), are relatively extreme and would likely not be used in common practice.”



**American Water Works
Association**

ANSI/AWWA A100-06
(Revision of ANSI/AWWA A100-97)

The Authoritative Resource on Safe WaterSM

AWWA Standard

Water Wells



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Sections

AWWA Standard

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Foreword

This Foreword is for information only and is not a part of ANSI/AWWA A100.

I. Introduction.

I.A. *Background.* This standard was originally used more as a specification than as a standard. Subsequent changes have been directed at developing a true standard as opposed to a specification.

This standard is designed primarily for vertical wells for municipal and industrial water supply.

I.B. *History.* The first edition of this standard was approved by the AWWA Board of Directors on May 10, 1946, and was titled "Standard Specifications for Deep Wells," with the designation 4A1-1946. Amendments to Sec. 1-1.1, Sec. 1-3.2, and Sec. 1-3.3 of that standard were approved by the board on Oct. 1, 1946, and the standard was redesignated AWWA A100-46. Subsequently, a number of minor editorial changes were made; a recommended procedure for sealing abandoned wells was added as appendix Sec. A1-13; and the standard was published on June 18, 1952, titled "Standard for Deep Wells." The standard was revised on Jan. 26, 1958, and was adopted jointly by AWWA and the National Water Well Association (NWWA). The standard was revised again in 1966. In 1984, the standard was reorganized substantially and revised to be a standard for well construction, rather than a specification, and republished under the title "Standard for Water Wells." The standard was again revised in 1990 and 1997. This ninth edition was approved by the AWWA Board of Directors on Feb. 12, 2006.

I.C. *Acceptance.* In May 1985, the US Environmental Protection Agency (USEPA) entered into a cooperative agreement with a consortium led by NSF International (NSF) to develop voluntary third-party consensus standards and a certification program for direct and indirect drinking water additives. Other members of the original consortium included the American Water Works Association Research Foundation (AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). The American Water Works Association (AWWA) and the Association of State Drinking Water Administrators (ASDWA) joined later.

In the United States, authority to regulate products for use in, or in contact with, drinking water rests with individual states.* Local agencies may choose to impose

*Persons outside the United States should contact the appropriate authority having jurisdiction.

requirements more stringent than those required by the state. To evaluate the health effects of products and drinking water additives from such products, state and local agencies may use various references, including

1. An advisory program formerly administered by USEPA, Office of Drinking Water, discontinued on Apr. 7, 1990.
2. Specific policies of the state or local agency.
3. Two standards developed under the direction of NSF, NSF*/ANSI[†] 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI 61, Drinking Water System Components—Health Effects.
4. Other references, including AWWA standards, *Food Chemicals Codex*, *Water Chemicals Codex*,[‡] and other standards considered appropriate by the state or local agency.

Various certification organizations may be involved in certifying products in accordance with NSF/ANSI 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdiction. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI 61 does not stipulate a maximum allowable level (MAL) of a contaminant for substances not regulated by a USEPA final maximum contaminant level (MCL). The MALs of an unspecified list of "unregulated contaminants" are based on toxicity testing guidelines (noncarcinogens) and risk characterization methodology (carcinogens). Use of Annex A procedures may not always be identical, depending on the certifier.

ANSI/AWWA A100 does not address additives requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

1. Determine additives requirements, including applicable standards.
2. Determine the status of certifications by all parties offering to certify products for contact with, or treatment of, drinking water.
3. Determine current information on product certification.

* NSF International, 789 N. Dixboro Road, Ann Arbor, MI 48105.

† American National Standards Institute, 25 West 43rd Street, Fourth Floor, New York, NY 10036.

‡ Both publications available from National Academy of Sciences, 500 Fifth Street, N.W., Washington, DC 20001.

II. Special Issues.

II.A. *Screen Capacity.* The physical conditions of aquifers, as well as the experience and practice related to their utilization as groundwater resources, vary between well sites and geographic regions. Historically, a common practice for sizing well-screen length and diameter was based on screen open area and inlet velocity (entrance velocity). However, the recommended upper limit for this screen inlet velocity has varied greatly among designers and remains a subject of considerable technical debate. Many designers have, for various technical reasons, limited well-screen entrance velocities to not exceed 0.1 ft/sec (0.03 m/sec). Others have used and demonstrated successful well designs and installations with velocities substantially exceeding 0.1 ft/sec (0.03 m/sec), and the previous edition of this standard proposed an upper limit of entrance velocity of 1.5 ft/sec (0.46 m/sec).

Based on a significant body of ongoing research within the groundwater industry, the Committee recognizes as part of this current standard that there is no singular, uniquely defined criterion for permissible velocity through the screen slot openings that is solely suitable for designing a well screen without consideration of the aquifer characteristics and the manner of well construction. In particular, the aspects of flow surrounding the well screen, in the filter, and at the filter–aquifer interface are known to play a prominent role in the well’s performance, and are, in fact, more influential than screen entrance velocity in determining screen dimensions. Similarly, the sizing of screen length and diameter are greatly influenced by the aquifer thickness, stratigraphic layering, and pump size. Accordingly, the applicable design approach must be regarded as a multifaceted and dynamic problem. Within this context, the current edition of the standard no longer recommends screen design solely on the basis of screen entrance velocity criterion (Sec. 4.5.3).

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.

III.A. *Purchaser Options and Alternatives.* The following items should be specified by the purchaser:

1. Standard used—that is, ANSI/AWWA A100, Standard for Water Wells, of latest revision.
2. Whether compliance with NSF/ANSI 61, Drinking Water System Components—Health Effects, is required, in addition to the requirements of the Safe Drinking Water Act.

3. Scope of the exploratory investigation (Sec. 4.2.1).
4. Whether additional formation samples are needed (Sec. 4.2.2.2).
5. Time, place, and mode of sample delivery (Sec. 4.2.2.5).
6. Type of geophysical log desired, if any (Sec. 4.2.3).
7. Details of other federal, state, local, and provincial requirements (Sec. 4.3).
8. Options for type of casing material (Sec. 4.3.2).
9. Whether the purchaser wants to specify temporary casings (Sec. 4.4.1).
10. If minimum casing thickness tables can be used safely for the conditions encountered (Sec. 4.4.5).
11. Determination of the capacity of the well screen by careful evaluation of the composition of the aquifer. (The well-screen selection should be made by a qualified professional engineer, hydrogeologist, or well-drilling constructor.) (See Sec. 4.5 and Sec. II.A, Screen Capacity, of the Foreword.)
12. Maximum rate of flow from well (Sec. 4.5.2 and 4.5.3).
13. Available options for screen construction (Sec. 4.5.7).
14. Alternate alignment tolerance (Sec. 4.7.9.4 and appendix D).
15. The depth of the completed well, which defines the lower limit to which construction tolerances are to be applied (Sec. 4.7.9.5).
16. Accuracy of water-level measurements (Sec. E.2.2 in appendix E).
17. Flow rate for performance testing (Sec. E.4.2 in appendix E).

III.B. *Modification to Standard.* Any modifications to the provisions, definitions, or terminology in this standard must be provided by the purchaser.

IV. Major Revisions. Major revisions made to the standard in this edition include the following:

1. The format has been changed to AWWA standard style.
2. The definitions of parties have been revised to approved wording.
3. The standard no longer endorses the use of screen entrance velocity as the sole criterion for determining the minimum length of well screen. This issue is addressed by changes in Section II of the Foreword and Sec. 4.5.3, 4.5.4, and 4.5.5.3 of the standard. In addition, appendix L has been added to provide illustrative examples of calculations of well-screen length versus entrance velocity, using different screen open areas and design velocities.
4. Table K.4 in appendix K has been updated to reflect current industry properties for PVC well casing.

5. Two tables in appendix K of the previous standard have been removed from this revision of the standard. Former Tables K.5 for ABS well casing and K.6 for SR well casing have been discontinued, as these products are no longer widely used for water well construction.

V. Comments. If you have any comments or questions about this standard, please call the AWWA Volunteer & Technical Support Group at 303.794.7711, FAX 303.795.7603, write to the group at 6666 West Quincy Avenue, Denver, CO 80235-3098, or e-mail at standards@awwa.org.

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American Water Works
Association

ANSI/A WWA A100-06
(Revision of ANSI/A WWA A100-97)

AWWA Standard

Water Wells

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes the minimum requirements for vertical water supply wells.

Sec. 1.2 Purpose

The purpose of this standard is to provide the minimum requirements for water wells, including consideration of the influences of geologic and hydrologic conditions and water quality and well construction.

Sec. 1.3 Application

This standard can be referenced in specifications for constructing water wells and can be used as a guide for vertical water supply wells. The stipulations of this standard apply when this document has been referenced and only to water wells used in water supply service applications.