ANSI/AWWA **D115-20**

(Revision of ANSI/AWWA D115-17)

AWWA Standard

Tendon-Prestressed Concrete Water Tanks

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American Water Works Association

AWWA Standard

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Committee Personnel

The AWWA Standards Committee on Concrete Water Tanks, Tendon-Type Prestressed, which reviewed and approved this standard, had the following personnel at the time of approval:

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Contents

All AWWA standards follow the general format indicated subsequently. Some variations from this format may be found in a particular standard.

Foreword

This foreword is for information only and is not part of ANSI/AWWA D115.*

I. Introduction.

I.A. *Background.* The New England Water Works Association (NEWWA) established a committee in 1958 to prepare a standard for the design and construction of circular prestressed-concrete water storage tanks. The committee submitted a suggested specification covering wire-wound prestressed-concrete tanks to NEWWA in October 1962 as a guide to those water utilities that wished to consider the use of these tanks.

The American Concrete Institute (ACI†) Committee 344 concluded eight years of committee work with a report titled "Design and Construction of Circular Prestressed Concrete Structures," published in the *ACI Journal* in September 1970. This report referred to both wire-wound and tendon tanks. After publication of its first report in 1970, ACI Committee 344 could not reach a consensus on a combined report covering both wire-wound and tendon tanks. In 1985, the ACI Committee was divided into two subcommittees, and "interim" reports were completed in 1988 for both types of tanks. ACI did not publish these interim reports but made copies available until a consensus could be reached on a recombined report. However, a consensus could not be reached, and in the spring of 1994, ACI Committee 344 was divided into two separate committees: ACI 372 and ACI 373. ACI Committee 373 was disbanded in 2012.

I.B. *History.* In the December 1972 issue of *Journal AWWA,* circular prestressed-concrete water containment structures were discussed in four articles. As a result of these articles and continued discussion on the subject, a standards committee was authorized by the AWWA Standards Council on June 20, 1974, to develop an AWWA standard on circular prestressed-concrete water tanks. The AWWA Standards Committee on Circular Prestressed-Concrete Water Tanks held its first meeting on June 19, 1974.

After many meetings and the presentation of many differing viewpoints, this committee decided to defer work on a standard for tendon tanks and to concentrate only on a standard for wire-wound tanks. ANSI/AWWA D110-86, Standard for Wire-Wound Prestressed Concrete Tanks, was published in 1986.

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

† American Concrete Institute, 38800 Country Club Drive, Farmington Hills, MI 48331.

In 1988, the AWWA Standards Council authorized the formation of a new standards committee to develop a standard for tendon-type prestressed-concrete tanks, with the assigned task of developing a standard for the safe, efficient use of tendon-stressing techniques for design and construction of tanks. Subsequently, this new AWWA standards committee was formed and held its first meeting on June 21, 1989, under its first chair, Ib Falk Jorgensen.

The first edition of this standard was published in 1996 and incorporated applicable work of ACI and the AWWA standards committee that had developed ANSI/AWWA D110-86. It contained requirements and recommendations, specifically for circular tendon-prestressed potable water tanks.

The second edition was expanded to include tendon-prestressed tanks of rectangular and other shapes, as well as circular. It was approved by the AWWA Board of Directors on Feb. 12, 2006.

The third edition of ANSI/AWWA D115 was approved on Jan. 14, 2017, and this fourth edition was approved on Jan. 23, 2020.

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 consortium included the Water Research Foundation (formerly AwwaRF) and the Conference of State Health and Environmental Managers (COSHEM). 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 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. Specific policies of the state or local agency.
2. Two standards developed under the direction of NSF†: NSF/ANSI/CAN‡ 60, Drinking Water Treatment Chemicals—Health Effects, and NSF/ANSI/CAN 61, Drinking Water System Components—Health Effects.

* Persons outside the United States should contact the appropriate authority having jurisdiction.
† NSF International, 789 North Dixboro Road, Ann Arbor, MI 48105.
‡ Standards Council of Canada, 55 Metcalfe Street, Suite 600, Ottawa, ON K1P 6L5 Canada.

3. 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/CAN 61. Individual states or local agencies have authority to accept or accredit certification organizations within their jurisdictions. Accreditation of certification organizations may vary from jurisdiction to jurisdiction.

Annex A, "Toxicology Review and Evaluation Procedures," to NSF/ANSI/CAN 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 D115 does not address all material requirements. Users of this standard should consult the appropriate state or local agency having jurisdiction in order to

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

II. Special Issues.

II.A. *General.* This standard reflects a committee consensus of industry practice concerning the design, detailing, and construction of prestressed-concrete water tanks that employ horizontal prestressing tendons in walls. This standard also addresses the use of prestressing tendons in floors, vertically in the walls, and in roofs. Recommended criteria and guidelines are presented to assist engineers in design and construction of both cast-in-place and precast concrete tanks using tendon prestressing, based on the specific detailed experience of the committee members. Engineering principles are tied to existing codes where applicable. Design and construction of prestressed-concrete water tanks are complex, requiring a wide range of special knowledge and experience. This standard represents a sharing of information on the unique aspects of analysis and construction that are encountered in these types of structures.

* Both publications available from National Academy of Sciences, 500 Fifth Street, NW, Washington, DC 20001.

II.B. *Site-Specific Conditions*. Because of the wide range of site-specific environments, foundation conditions, loadings, and construction conditions throughout North America, this standard should not be expected to apply universally or to produce a cost-effective and maintenance-free structure in every situation. In adapting this standard to obtain the structure's expected service life for the actual conditions that are anticipated, the purchaser and the designer of the tank are advised to carefully study factors affecting the structure.

II.C. *Tendons*. There are three types of tendons used in the floors, walls, and roofs of tendon-prestressed concrete tanks: bonded, unbonded, and precast-pretensioned. Triple corrosion protection is provided for both bonded and unbonded tendons: (1) two-way prestressed-concrete cover, (2) waterproof plastic ducts or sheathing, and (3) rich cement grout or post-tensioning coating material with corrosion-inhibiting additives. The purchaser should rely on their purchaser's engineer to determine the appropriate type of tendon, taking into account the design requirements and local conditions.

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*. It is not the purpose of this standard either to define or recommend contractual relationships or to stipulate contractual obligations, which are the responsibility of the purchaser. Generally, purchasers may solicit competitive bids for tendon-prestressed concrete tanks by one of two alternative methods.

Under the first method, a qualified engineer is retained by the purchaser to design the structure and prepare construction drawings, specifications, and other contract documents. Competitive bids are then solicited from constructors and suppliers for construction of the tank. In this standard, these are referred to as *purchaser-furnished designs*.

Under the second method, the purchaser prepares performance specifications that require bidding constructors to prepare detailed project designs and specifications and construct the tank according to the approved design. In this standard, these are referred to as *design–construct projects.*

Although the division of information that must be covered in the purchaser's specifications for execution of each project type differs substantially, depending on who is responsible for the tank design, the information that must be supplied by the purchaser to successfully apply this standard is essentially the same for both methods.