UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2021
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USACE / NAVFAC / AFCEC / NASA	**UFGS-33 16 13.16 (April 2006)**

Preparing Activity: NAVFAC	**Replacing without change UFGS-13208 (August 2004)**

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SECTION 33 16 13.16

WIRE-WOUND CIRCULAR PRESTRESSED-CONCRETE WATER TANK
04/06

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NOTE: This guide specification covers the requirements for precast, wire wound prestressed concrete water tanks for potable water storage.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable item(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

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NOTE: This covers tanks specified by the American Water Works Association in Standard D110.

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NOTE: The drawings should include:

1. Site plan with existing topography and approximate tank centerline location. Include underground utility locations.

2. Tank overflow elevation, freeboard, approximate height and diameter of tank.

3. Soil information.

4. Loading conditions, such as snow, seismic, and other live loads.

5. Height of backfill, or earthcover, if any.

6. Size, material, location, and limits for all pipe connections.

7. Size, material, arrangement, and location for overflow pipe.

8. Subdrainage and overflow collection system.

9. Earth cover required of inlet, outlet, and drain piping.

10. Size, material, and location of vents and access hatches if manufacturer's standard will not be acceptable.

11. Special exterior architectural treatment, if any.

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PART 1 GENERAL

1.1 REFERENCES

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NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a Reference Identifier (RID) outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 301	(2016) Specifications for Structural Concrete

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA D110	(2013) Wire- and Strand Wound, Circular, Prestressed Concrete Water Tanks

ASTM INTERNATIONAL (ASTM)

ASTM A227/A227M	(2017) Standard Specification for Steel Wire, Cold-Drawn for Mechanical Springs
ASTM A416/A416M	(2018) Standard Specification for Low-Relaxation, Seven-Wire for Prestressed Concrete
ASTM A475	(2003; R 2020) Standard Specification for Zinc-Coated Steel Wire Strand
ASTM A586	(2018) Standard Specification for Metallic-Coated Parallel and Helical Steel Wire Structural Strand
ASTM A603	(2019) Standard Specification for Zinc-Coated Steel Structural Wire Rope
ASTM A648	(2018) Standard Specification for Steel Wire, Hard Drawn for Prestressed Concrete Pipe
ASTM A653/A653M	(2020) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A821/A821M	(2015) Standard Specification for Steel Wire, Hard Drawn for Prestressing Concrete Tanks

1.2 SYSTEM DESCRIPTION

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NOTE: AWWA D110 covers design and construction of wire- and strand-wound circular prestressed-concrete water-containing structures with the following three types of core walls:

Type I -- cast-in-place concrete with vertical prestressing;

Type II -- shotcrete with a steel diaphragm;

Type III -- precast concrete with a steel diaphragm

The type available varies in different parts of the country. Check with local contractors.

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Construct concrete water tank AWWA D110, Type [I] [II] [III]. Provide tank, reinforced concrete floor slab, and roof.

a. Roof live load [_____] kg per square meter psf.

b. Allowable soil bearing pressure [_____] kPa psf, and equivalent lateral earth pressure [_____] kPa pcf.

c. Wind load [_____], importance factor [_____].

[d. Seismic Zone [_____], importance factor [_____], and soil profile coefficient [_____].]

1.3 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified those items that require Government approval, due to their complexity or criticality, with a "G". Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item if the submittal is sufficiently important or complex in context of the project.

For Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

Choose the first bracketed item for Navy, Air Force, and NASA projects, or choose the second bracketed item for Army projects.
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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are [for Contractor Quality Control approval.][for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Concrete water tank

AWWA D110, design-construct requirements, stamped by a professional engineer.

SD-05 Design Data

Design calculations

SD-06 Test Reports

Prestressing process records

Leakage testing

SD-10 Operation and Maintenance Data

Concrete water tank, Data Package 1

Submit in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

1.4 QUALITY ASSURANCE

1.4.1 Design Calculations

AWWA D110, stamped by a professional engineer.

PART 2 PRODUCTS

2.1 CONCRETE

Section 03 30 00 CAST-IN-PLACE CONCRETE.

2.1.1 Floor and Footings

Minimum 20 MPa 3000 psi 28 day strength.

2.1.2 Wall and Dome Roof

Minimum 29 MPa 4000 psi 28 day strength.

2.2 SHOTCRETE

Section 03 37 13 SHOTCRETE. Minimum 31 MPa 4500 psi 28 day strength or wall strength if greater.

2.2.1 Wire Coat

Provide shotcrete consisting of not more than three parts sand to one part portland cement by volume.

2.2.2 Additional Coats

Provide shotcrete consisting of not more than four parts sand to one part Portland cement by volume.

2.3 CEMENT MORTAR

ACI 301. In cases where mortar is to be used to encase the waterstop, mortar shall consist of not more than three parts sand to one part portland cement by weight.

2.4 REINFORCING

Galvanize all steel reinforcing.

2.4.1 Nonprestressed Reinforcement

ACI 301.

2.4.1.1 [Earthquake Cables

ASTM A416/A416M, GRADE 250 OR 270, ASTM A586, ASTM A603. Provide zinc coating ASTM A475, Table 4, class A, or ASTM A603, Table 2, class A.

]2.4.1.2 Steel Sheet Diaphragms

AWWA D110, galvanized ASTM A653/A653M, Z275 G90.

2.4.2 Prestressed Reinforcement

AWWA D110 and ACI 301. In addition, ASTM A648, ASTM A227/A227M, or ASTM A821/A821M.

2.5 ELASTOMERIC MATERIAL

AWWA D110 for waterstops, bearing pads, sealer, [sponge filler] and seal coat.

2.6 [DUCT MATERIAL

AWWA D110.

]PART 3 EXECUTION

3.1 INSPECTION

Ensure elevations of floor and footing excavation are within one-tenth foot of the indicated elevations and that excavation slopes are uniform and free of loose debris. Follow inspection procedures in accordance with AWWA D110.

3.2 INSTALLATION

Follow construction procedures in accordance with AWWA D110, with restrictions specified herein.

a. Do not use curing compound except in conjunction with water curing.

[b. AWWA D110, provide additional protection for reinforcing and prestressing strands for aggressive water conditions. [_____]].

3.3 FIELD QUALITY CONTROL

a. Keep prestressing process records in accordance with AWWA D110.

b. Perform leakage testing in accordance with AWWA D110.

3.4 REPAIRS

3.4.1 Leakage Cracks

Make repairs by pressure epoxy grouting in accordance with AWWA D110. Retest.

3.4.2 Honeycombed Concrete

If allowed by QC Representative, remove defective concrete and replace with nonshrinking aggregate grout from Section 03 30 00 CAST-IN-PLACE CONCRETE.

3.5 BACKFILL

Section 31 00 00 EARTHWORK for backfill requirements. Backfill after tank testing is successfully completed. Avoid unbalanced backfill placement.

-- End of Section --