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USACE / NAVFAC / AFCESA | **UFGS-13208 (August 2004)**

Preparing Activity: NAVFAC | **Superseding UFGS-13208N (September 1999)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated 23 June 2005
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SECTION TABLE OF CONTENTS

DIVISION 13 - SPECIAL CONSTRUCTION

SECTION 13208

WIRE-WOUND CIRCULAR PRESTRESSED-CONCRETE WATER TANK

08/04

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Design Calculations

PART 2 PRODUCTS

2.1 CONCRETE
2.1.1 Floor and Footings
2.1.2 Wall and Dome Roof
2.2 SHOTCRETE
2.2.1 Wire Coat
2.2.2 Additional Coats
2.3 CEMENT MORTAR
2.4 REINFORCING
2.4.1 Nonprestressed Reinforcement
2.4.1.1 Earthquake Cables
2.4.1.2 Steel Sheet Diaphragms
2.4.2 Prestressed Reinforcement
2.5 ELASTOMERIC MATERIAL
2.6 DUCT MATERIAL

PART 3 EXECUTION

3.1 INSPECTION
3.2 INSTALLATION
3.3 FIELD QUALITY CONTROL
3.4 REPAIRS
3.4.1 Leakage Cracks
3.4.2 Honeycombed Concrete
3.5 BACKFILL

-- End of Section Table of Contents --

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SECTION 13208

WIRE-WOUND CIRCULAR PRESTRESSED-CONCRETE WATER TANK
08/04

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

Comments and suggestions on this guide specification are welcome and should be directed to the technical proponent of the specification. A listing of technical proponents, including their organization designation and telephone number, is on the Internet.

Recommended changes to a UFGS should be submitted as a Criteria Change Request (CCR).

Use of electronic communication is encouraged.

Brackets are used in the text to indicate designer choices or locations where text must be supplied by the designer.
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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: Issue (date) of references included in project specifications need not be more current than provided by the latest guide specification. Use of SpecsIntact automated reference checking is recommended for projects based on older guide specifications.
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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.

ACI INTERNATIONAL (ACI)

ACI 301	(1999) Specifications for Structural Concrete for Buildings

AMERICAN WATER WORKS ASSOCIATION(AWWA)

AWWA D110	(1995; A D110a-96) Wire- and Strand Wound, Circular, Prestressed Concrete Water Tanks

ASTM INTERNATIONAL (ASTM)

ASTM A 227/A 227M	(1999) Steel Wire, Cold-Drawn for Mechanical Springs
ASTM A 416/A 416M	(2002) Steel Strand, Uncoated Seven-Wire for Prestressed Concrete
ASTM A 475	(2003) Zinc-Coated Steel Wire Strand
ASTM A 586	(2004) Zinc-Coated Parallel and Helical Steel Wire Structural Strand and Zinc-Coated Wire for Spun-In-Place

	Structural Strand
ASTM A 603	(1998; R 2003) Zinc-Coated Steel Structural Wire Rope
ASTM A 648	(2004a) Steel Wire, Hard Drawn for Prestressing Concrete Pipe
ASTM A 653/A 653M	(2004a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 821	(1999) 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: Submittals must be limited to those necessary for adequate quality control. The importance of an item in the project should be one of the primary factors in determining if a submittal for the item should be required.

A "G" following a submittal item indicates that the submittal requires Government approval. Some submittals are already marked with a "G". Only

delete an existing "G" if the submittal item is not complex and can be reviewed through the Contractor's Quality Control system. Only add a "G" if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation 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 projects.

Submittal items not designated with a "G" are considered as being for information only for Army projects and for Contractor Quality Control approval for Navy projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] The following shall be submitted in accordance with Section 01330 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 01781 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 03300N 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 03371 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 A 416/A 416M, GRADE 250 OR 270, ASTM A 586, ASTM A 603. Provide zinc coating ASTM A 475, Table 4, class A, or ASTM A 603, Table 2, class A.

]2.4.1.2 Steel Sheet Diaphragms

AWWA D110, galvanized ASTM A 653/A 653M, Z275 G90.

2.4.2 Prestressed Reinforcement

AWWA D110 and ACI 301. In addition, ASTM A 648, ASTM A 227/A 227M, or ASTM A 821.

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 03300N CAST-IN-PLACE CONCRETE.

3.5 BACKFILL

Section 02300 EARTHWORK for backfill requirements. Backfill after tank testing is successfully completed. Avoid unbalanced backfill placement.

-- End of Section --