Practice Specification
Watering Facility (Code 614)

1. SCOPE

The work shall consist of furnishing and installing the materials necessary to construct a tank, trough, or other watertight container.

2. SITE PREPARATION

Site preparation shall be in accordance with Construction Specification 587, Structure for Water Control.

3. FOUNDATION WORK

Foundation work shall be in accordance with Construction Specification 587, Structure for Water Control.

The area immediately surrounding the tank or trough shall be smoothed and graded to permit free drainage of the surface water without erosion. The foundation shall be leveled, scarified, and compacted, before any material is placed.

4. EARTHWORK

Earthwork (common excavation and earth fill) shall be in accordance with Construction Specification 587, Structure for Water Control.

If a tank or trough is to be constructed on a relatively impermeable soil, at least 4 inches of sand, gravel, or other porous material shall be placed on the foundation. When on-site materials exist or can be reworked to provide a well-drained base, imported drain materials will not be required. The surface of the base material shall be smooth and without sharp protruding rocks to prevent damage to the bottom of the tank or trough.

The base material shall surround the outside of trough for a minimum of 4 feet. The bottom of the trough or tank shall be at least 2 inches above the surrounding ground surface.

5. MATERIALS AND INSTALLATION

Approved construction materials for water facilities are: reinforced concrete, rubble masonry, galvanized and black sheet metal steel, fiberglass, polyethylene, used heavy equipment tires, and plastic. Polyethylene and plastic shall be used for storage only, not for troughs and drinkers. All piping for inlet, outlet and overflow fittings of the tank shall be new.

Troughs and tanks shall be evaluated for external stability, overturning and sliding, and adequately anchored in accordance with details shown in the drawing. The Above Ground Tank, Anchor Design Data spreadsheet may be used as guidance. Anchoring may be done by, but is not limited to, the following:

- Concrete ballast at least 4 inches thick placed inside the tank or trough,
- Three or more equally spaced posts welded or bolted to facility and anchored in concrete or buried at least 30 inches into soil,
- Three or more equally spaced 3/8 inch diameter guy wires secured to the facility with bolts or welded and anchored,
- Anchor per manufacturer’s recommendations,
    - Four members of 1-1/2 inch diameter steel post pipes placed around top perimeter of trough and bolted to four equally spaced posts. Posts shall be standard steel posts. Members should not be crossed as to leave as much free water surface area as possible.
    - In areas where elk are present, storage tanks may be buried 1/3 total height and must be approved by the area engineer prior to installation.

Escape ramps will be of corrosion resistant materials. Escape ramps will be installed flush to the trough or tank wall in a manner that prevents animals from passing between the wall and the ramp and will extend to the bottom of the trough.

Polyethylene and fiberglass tanks that are to be installed underground shall be installed according to manufacturer's installation guidelines and shall be specifically manufactured for underground use. In the absence of guidelines, excavation and backfill shall be completed as follows:

- Excavate to a depth that will provide a minimum of 18" and a maximum of 30" of cover over the top of the tank. This will avoid collapse and over-expansion of the tank and possible leakage.
- Allow 18" to 24" clearance around entire tank.
- Bed the tank a minimum of 8" with well packed sand.
- After installing all appurtenances, fill the tank as you backfill, maintaining the water and backfill level to each other. Backfill material shall be free of silt and clay, sharp or protruding objects. Maximum gravel size shall be 1/2in.
- Backfill with no more than 12" lifts. Backfill the ends of the tank first.
- Tamp and compact backfill under all pipes and fittings.
- The top foot of back fill may be native material. Mound soil over the top to provide positive drainage away from tank. Maximum cover shall be 30".

a. Reinforced Concrete

Reinforced concrete shall be in accordance with Construction Specification 587C. The minimum class of concrete to be used shall be 3000. The cement shall be Portland cement, Type II, or Type I/II or as shown on drawings. An air-entraining agent shall be added to the mixing water in the amount needed to produce an air content of 5% to 7%.

Refer to Steel Rim Storage Tank for Reinforcement design reference or as shown on the drawings. The concrete for the entire floor and foundation shall be placed continuously and as one unit. A construction joint shall be formed between the floor and the wall as shown on the drawings. Construction joint between wall and floor shall also be water tight.

b. Rubble Masonry

Rubble masonry shall be in accordance with Construction Specification 587R. Walls with a water depth greater than 2 feet shall be supported with adjustable coupling bands uniformly spaced at intervals not to exceed 18 inches. Each band shall have a minimum cross-section of 0.3 square inches, be made of steel, and must extend around the perimeter of circular tanks. For square or rectangular tanks, bands must have one coupling for each wall and the band must be bent square at the corners. All construction shall be water tight.

c. Steel

Steel shall be in accordance with Construction Specification 587MF including:

The metalwork shall be fabricated with the material identified on the drawings and in accordance with the following:

Structural Steel

Structural steel shall conform to the requirements of ASTM A 36. High-strength low-alloy structural steel shall conform to ASTM A 242 or A 588. Carbon steel plates of structural quality to be bent, formed, or shaped cold shall conform the ASTM A 283, Grade C. Carbon steel sheets of structural quality shall conform to ASTM Standard A 1011, Grade 40 or A 1008, Grade 40. Carbon steel strip of structural quality shall conform to ASTM Standard A 1011, Grade 36.

Commercial or Merchant Quality Steel

Commercial or merchant quality steel shall conform to the requirements of the applicable ASTM listed below:

Product	ASTM Standards
Carbon steel bars	A 575, Grade M 1015 to Grade M 1031

Product	ASTM Standards
Carbon steel sheets	A 1011 or A 1008
Carbon steel strips	A 1011
Zin-coated carbon steel sheets	A 653 or A 924

Aluminum Alloy

Aluminum alloy products shall conform to the requirements of the applicable ASTM Standard listed below. Unless otherwise specified, alloy 6061-T6 shall be used.

Product	ASTM Standard
Standard Structural Shape	B 308
Extruded structural pipe and tube	B 429
Extruded bars, rods, shapes and tubes	B 221
Drawn seamless tubes	B 210
Rolled or cold-finished bars, rods and wire	B 221
Sheet and plate	B209

Bolts

Steel bolts shall conform to the requirements of ASTM Standard A 307. If high-strength bolts are specified, they shall conform to the requirements of ASTM A 325.

When galvanized or zinc-coated bolts are specified, the zinc coating shall conform to the requirements of ASTM Standard A 153; except that bolts 1/2 inch or less in diameter may be coated with electro-deposited zinc or cadmium coating conforming to the requirements of ASTM Standard B 633, Service Condition SC 3 or ASTM A 766, unless otherwise specified.

Rivets

Unless otherwise specified, steel rivets shall conform to the requirements of ASTM Specification A 31, Grade B. Unless otherwise specified, aluminum alloy rivets shall be Alloy 6061 conforming to the requirements of ASTM Standard B 316.

Seams and joints may be bolted, riveted, or butt-welded. The ends of the steel may also be lapped 2 inches and welded with a fillet weld on both sides. All joints must be of good quality and be watertight. Joints that are crimped or soldered are not acceptable.

For field fabricated tanks, bolted or riveted joints shall be lapped at least 2.0 inches. Holes shall be drilled or punched for ⅜-inch diameter bolts or rivets spaced at 1½ inch on center, or holes may be drilled or punched for ½-inch diameter bolts or rivets spaced at 2 inches on center. Corrugated steel shall be bolted or riveted per the manufacturer or commercial fabricating plant.

All welded joints shall be continuously welded in accordance with good welding procedures.

For steel structures with a concrete floor: prior to placement of concrete, the bottom 8.0 inches of the steel wall may be painted with asphalt. Prior to concrete placement, the assembled steel rim shall be leveled and temporarily held at the designed elevation with blocking. The walls shall be embedded a minimum of 4 inches into the reinforced concrete footing.

PAINT MATERIAL

Unless otherwise specified or shown on the drawings, the following shall be used:

Type 4 – Epoxy polyamide primer. Epoxy polyamide primer shall be lead and chromate free. It shall have a minimum of 56 percent solids by volume. Epoxy primer shall be able to be applied satisfactorily at 4 to 6 mils dry-film thickness in one coat. Color availability shall be red, gray, and white. Epoxy primer shall conform to AWWA Standard C 2109 and AWWA Standard D 102.

Type 5 – Epoxy polyamide (intermediate or finish). Epoxy polyamide shall be lead free. It shall have a minimum of 56 percent solids by volume. Epoxy polyamide shall be able to be applied satisfactorily at 4 to 6 mils dry-film thickness in one coat. Finish shall be semi-gloss. Epoxy finish shall conform to AWWA C 210 and AWWA D 102.

Metal Priming

Items specified to be galvanized shall be completely fabricated for field assembly before the application of the zinc coatings. Zinc coating shall conform to the requirements of ASTM Standard A123.

FABRICATION

The metalwork shall be fabricated to the dimensions shown on the drawings. Galvanized items shall not be cut, welded, or drilled after the zinc coating is applied.

CLEANING

Surfaces to be painted shall be thoroughly cleaned prior to the application of the paint. All grease and oil shall be removed from the metal surface by steam cleaning or by solvent cleaning. All dirt, surface rust, and loose scale shall be removed by wire brushing, flame cleaning, use of rotary abrading tools, or light sand blasting.

PAINTING

Paint shall not be applied when the temperature of the item to be painted or of the surrounding air is less than 50 degrees Fahrenheit. Painting shall be done only when the humidity and temperature of the surrounding air and the temperature of the metal surfaces are such that evaporating rather than condensation will result.

Surfaces shall be painted immediately after cleaning.,

One priming coat is required and may be applied by brush or spray.

A minimum of two finish coats is required. Additional finish coats may be necessary to attain a total dry-film thickness of 6 mils.

The drying time between coats shall be as prescribed by the paint manufacturer, but not less than that required for the paint film to thoroughly dry. The elapsed time between coats shall not exceed 60 hours.

The finished surface of each coat shall be free from runs, drops, ridges, laps, or excessive brush marks, and shall present no variation in color, texture, and finish.

d. Refurbished Steel Tanks

Refurbished steel tanks shall meet the minimum requirements as new steel tanks and as described in Conservation Standard 614, Watering Facility. Tanks shall be refurbished at a commercial tank refurbishing facility. They shall be cleaned to bare metal and coated with a material that meets NSF/ANSI Standard 61 for potable water. Certification by refurbishing company stating these requirements have met is required.

e. Fiberglass

All surfaces shall be free of cracks, crazes, dry spots, air bubbles, pinholes, pimples, and de-lamination. The exterior surface shall be smooth with no exposed fibers. The top edge of tanks or troughs shall be reinforced with a steel flange or other acceptable reinforcement.

Prefabricated fiberglass storage tanks and troughs shall meet one of the following standards: AWWA Standard D120-09 (Thermosetting Fiberglass-reinforced Plastic Tanks), ASTM Standard D3299-10 (Standard Specification for Filament-Wound Glass-fiber-reinforced Thermoset Resin Corrosion Resistant Tanks), or ASTM Standard 4097-10 (Standard Specification for Contact-Molded Glass-fiber- reinforced Thermoset Resin Corrosion Resistant Tanks). Structure shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight. Tank must also be dark enough to prevent growth of algae inside the tank.

The spray gun or pneumatically applied method shall be used for all reconstructed tank applications.

Used steel tanks, prior to reconstructing with fiberglass, shall be thoroughly sandblasted to remove all loose rust, concrete, paint, tar, or other foreign material. All joints, seams, corners, and pipe fittings shall be reinforced with adequate fiberglass impregnated polyester resins. The top edge of open tanks or troughs shall be reinforced with a steel flange or other acceptable reinforcement. On reconstructed tanks, the fiberglass coating shall roll over the top edge of the existing tank at least 4 inches.

f. Plastic Liners for Tanks

Plastic liners for tanks shall have a life expectancy that meets or exceeds the planned useful life of the practice. The liner manufacturer must certify that the material used meets NSF/ANSI Standard 61 for potable water. The liner shall have a minimum thickness of 20 mils (0.5mm). Tanks with plastic liners shall have a roof or top cover.

The support shell for the liner if constructed of galvanized steel, shall be at least 30 mils thick (0.8mm or at least 23 Gage), no higher than 7 feet 6 inches, and no more than 40 feet in diameter.

g. Polyethylene Tanks

Prefabricated polyethylene tanks shall meet standards and regulations ASTM D1998, Standard Specification for Polyethylene Upright Storage Tanks; NSF/ANSI Standard 61; and FDA Regulation 21 CFR 177.152. The tank must also be designed to prevent UV damage and algae growth.

All repairs and modifications to the tank must be welded and performed by a qualified plastic welder.

h. Large Rubber Tire

Large clean, used tires may be used as troughs. Tires shall be cleaned and free of chemicals and free of any aftermarket chemical puncture sealer.

6. CERTIFICATION

The manufacturer or installing contractor of the watering facility shall furnish a written guarantee that protects the owner against defective workmanship and materials for not less than one year. Written guarantee shall also state that the installation and/or materials meet NRCS Practice Standards and Specifications.

7. MEASUREMENT

The measurement of completed work shall be by one of the following options:

- The completed job for each facility, or
- The quantities of the key materials used to complete facility.

8. ITEMS OF WORK AND CONSTRUCTION DETAILS

Items of work to be prepared in conformance with this specification and the construction details are:

9. Specific Site Requirements

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