

## Watering Facility (No.) 614

### DEFINITION

A device (tank, trough, or other watertight container) for providing animal access to water.

### PURPOSES

To provide watering facilities for livestock and/or wildlife at selected locations in order to:

- Protect and enhance vegetative cover through proper distribution of grazing; or
- Provide erosion control through better pasture management; or
- Protect streams, ponds, and water supplies from contamination by providing alternative access to water.

### CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where there is a need for new or improved watering facilities to permit the desired level of pasture management, to reduce health hazards for livestock, or to reduce livestock waste in streams.

### CRITERIA

**General.** This practice shall facilitate proper pastureland use by improving distribution of grazing over all parts of the pasture, meeting the water requirements of livestock with adequately distributed water supplies.

**Capacity.** The trough or tank shall have adequate capacity to meet the water requirements of the livestock and/or wildlife. This will include the storage volume necessary to carry over between periods of replenishment. The facility shall have a capacity to provide at least the gallons per head per day listed in Table 1.

Within a pasture, water storage capacity or other water sources shall be provided to meet water requirements for a minimum of 3 days where water supply, pipeline, power, or pump failure could cause loss of pipeline supplied water. However, where water supplies are dependable and livestock are checked daily, troughs with little water storage capacity may be used.

Troughs or tanks must provide the daily water requirement of the livestock and provide access for the entire herd within a short period of time. This time frame is based on the herd size and incorporated within the design process.

Automatic water level control and/or overflow facilities shall be provided as appropriate.

Overflow facilities shall be installed on all watering facilities where inflow is not controlled by automatic flow control switches or valves or where malfunction of automatic flow controls may cause saturated soil conditions or erosion.

All materials shall have a life expectancy that meets or exceeds the planned useful life of the facility installation. The minimum planned life for this system shall be designed for 10-years.

**Tank Protection.** The trough and outlet pipes shall be protected from freezing and ice damage. Freeze-proof troughs or electric heaters may be used.

System valves or pipes shall be protected by shields or covers to prevent damage by livestock.

Overflows shall be piped to a stable or suitable point of release to prevent erosion or hazardous conditions at the overflow outlet. The overflow outlets shall be protected from damage with rock, steel pipe, concrete, or other durable material. The overflow shall extend a minimum of 20 feet (6.1m) beyond the tank.

The overflow pipe shall be a minimum of 1/2 inch (12.7mm) larger than the inflow pipe or 2 inches (50.8mm), whichever is larger.

All storage tanks shall be designed to withstand all anticipated internal and external loadings.

Roofs can be placed over the trough to provide shade and reduce loss of water by evaporation.

**TABLE 1 - Minimum Daily Livestock Water Requirements**

Livestock	Drinking Water Quantity * gals/day (liters/day)		Maximum Water Spacing miles (kilometers)	
	Conventional Grazing System	Prescribed Grazing System	Rough Relief **  (strongly sloping, rolling, moderately steep, and hilly; generally > 15% slope)	Gentle Relief **  (nearly level, gently sloping, and undulating)
Beef Cow	20 (76)	15 (57)	0.5 (0.8)	1 (1.6)
Cow & Small Calf	20 (76)	15 (57)	0.5 (0.8)	1 (1.6)
Horses & Mules	20 (76)	15 (57)	0.5 (0.8)	1 (1.6)
Sheep & Goats	4 (15)	2 (8)	0.5 (0.8)	1 (1.6)
Dairy Cow	25 (95)	20 (76)	0.5 (0.8)	1 (1.6)
Hog	2 (8)			

\* Daily water consumption for livestock classes not listed may be calculated at one gallon per day per 100 lbs. of body weight.

\*\* In a prescribed grazing system, less distance should be used.

When a roof is placed over the trough to provide shade, the roof shall be designed for snow and wind loads as specified in ASAE S288 (Designing Buildings to Resist Snow and Wind Loads) and shall be durable to withstand anticipated livestock and wildlife activities.

Common construction materials are reinforced concrete, steel, fiberglass, plastic, and wood. All designs shall meet the industry standards for the material being used. Generally, applicable design requirements and procedures can be found in the documents referenced at the end of this standard.

**Drinking Watering Facilities.** All components of the watering facility system shall have appropriate protective structures installed that will protect them from damage by livestock, vandals, farm operations, or other site-specific hazards.

Tank or trough bottoms shall be placed on rock, fine gravel, or sand. Where these materials are not present, the bottom shall be placed on a minimum 4-inch (101.6mm) layer of fine gravel or sand.

The site shall be well drained, or drainage measures shall be provided. Areas adjacent to the trough or tank that will be used by livestock shall be graveled, paved, or otherwise treated to provide firm footing and reduce erosion. Design of the protective surface around the trough shall be in accordance with Michigan NRCS Standard Heavy Use Area

Protection (561). This practice shall be extended to a minimum of 6 feet (1.8m) beyond the trough or tank.

**Lightweight Tanks.** Lightweight troughs or tanks made of fiberglass, plastic, wood, or steel may be moveable or permanent installations.

**Concrete Tanks or Troughs.** Concrete structures shall be constructed from a concrete mix producing a minimum compressive strength of 3,000 psi (20,685 kPa) at 28 days. Concrete construction shall be in accordance with NRCS Construction Specification MI-158 Concrete Construction.

Acceptance of pre-cast components shall be based on an engineering analysis provided by the supplier. If placement requirements are an integral part of the design, then placement specifications shall be required.

Interior walls of troughs or tanks subject to freezing shall have a minimum taper of 1 inch (25.4mm) horizontal to 12 inches (305mm) vertical.

**Steel Tanks.** All steel tank material shall be galvanized, stainless steel, or factory coated with plastic or epoxy in a manner suitable for use in high exposure conditions.

Top edges of tanks shall be reinforced with rolled pipe, galvanized tube angle iron, or other suitable reinforcement. Top edge reinforcement is not required for corrugated steel, 12 gauge or heavier.

Tanks with steel bottoms shall be minimum 24 gauge for less than 6 feet (1.8m) diameter, and 20 gauge for larger diameters.

The bottom shall be joined in such a manner as to provide a locked and water tight seam. The underside bottom shall be thoroughly coated with asphaltic compound or other suitable permanent waterproof coating prior to final placement.

Where the trough or tank steel rim and concrete floor join, a heavy coating of a non-conductor of electricity such as asphalt or similar coating shall protect the metal rim.

Steel walls for concrete, bentonite, or membrane bottom tanks shall be constructed of galvanized steel not less than 16 gauge.

**Fiberglass.** Fiberglass tanks or troughs shall have a nominal minimum thickness of 3/16 inch (4.8mm).

Fiberglass structures shall be made of ultraviolet resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight.

Fiberglass for use in tanks with concrete bottoms shall have a minimum nominal thickness of 1/4 inch (6.4mm).

The tank top edge shall be flanged reinforced by a 2 inch (51mm) straight flange, minimum of 3/8 inch (9.5mm) thick or 2 inch (51mm) curled or rolled flange, minimum of 1/4 inch (6.4mm) thick.

**Plastic.** Plastic tank or troughs shall be made of HDPE or equivalent materials.

Where a plastic tank or trough is planned to be used during winter weather, a deicer mechanism shall be installed to prevent freezing conditions within the tank or trough.

Plastic structures shall be made of ultraviolet-resistant materials or shall have a durable coating to protect the structure from deterioration due to sunlight.

## CONSIDERATIONS

Potential effects of installation and operation of the well on cultural, historical, archeological, or scientific resources at or near the site need to be considered in planning.

Topography should be evaluated to minimize trail erosion and flooding erosion from tank overflow.

Watering facilities should be accessible to small animals. Escape ramps for birds and small animals should be installed.

If deep tanks are installed, it is important to place an animal barrier over or around the tank to prevent animals from falling in.

Above-ground tanks should be protected from animals entering them or equipment accidentally striking them. In some locations, welded pipe barriers are placed around tanks to protect them.

When the watering pipeline system enters through the bottom of the tank, an animal barrier should be installed to protect the pipeline appurtenances from damage.

When watering tanks are located on fence lines, wooden post and planking fence should be considered.

## PLANS AND SPECIFICATIONS

Plans and specifications for installing troughs and tanks shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose. If the trough and/or tank are a component of a system that includes additional conservation practices, the information necessary to construct these additional practices will also be conveyed on the plans.

Development of plans will be guided by Engineering Field Handbook, Chapter 5, and shall be in accordance with National Engineering Manual, Parts 541 and 542.

Support data documentation requirements are as follows:

- Inventory and evaluation records
  - CONS-6 notes or special report
- Survey notes, where applicable
  - Design survey
  - Construction layout survey
  - Construction check survey
- Design records
  - Physical data, functional requirements, and site constraints, where applicable
  - Soils/subsurface investigation report, where applicable
- Design and quantity calculations

- Construction drawings/specifications with:
  - Location map
  - “Designed by” and “Checked by” names or initials
  - Approval signature
  - Job class designation
  - Initials from pre-construction conference
  - As-built notes
- Construction inspection records
  - CONS-6 notes or separate inspection records
  - Construction approval signature
- Record of any variances approved, where applicable
- Record of approvals of in-field changes affecting function and/or job class, where applicable

#### **OPERATION AND MAINTENANCE**

An Operation and Maintenance plan specific to the type of installed trough or tank shall be provided to the landowner. The plan shall provide specific instructions for operating and maintaining trough and tanks to ensure that they function properly. It shall also provide for periodic inspections and prompt repair or replacement of damaged components or erosion. The plan shall include, but not be limited to, the following provisions:

- Check for debris, algae, sludge, or other materials in the trough which may restrict the inflow or outflow system;
- Check for leaks and repair immediately, if any leaks are found;
- Check the automatic water level device to ensure proper operation;
- Check to ensure that adjacent areas are well protected against erosion;
- Check to ensure the outlet pipe is freely operating and not causing erosion problems; and
- Prepare guidance for winter weather, such as adding material in the storage area to allow for ice expansion without damage.

Algae and iron sludge accumulation should be addressed in areas with water quality that is known to cause problems. Chemicals such as copper sulfate and chlorine can be recommended as needed, as long as local rules and regulations are followed.

#### **REFERENCES**

- NRCS - National Range and Pasture Handbook.
- Manual of Steel Construction, American Institute of Steel Construction.
- Timber, National Design Specification for Wood, American Forest and Paper Association.