

Operating Guideline # 603

Water Tanks for Private Fire Protection Recognition

May 11, 2021



PURPOSE:

The Purpose of this Operating Guideline (OG) is to provide the minimum requirements for the design, construction, installation, and maintenance of tanks and accessory equipment that supply firefighting water.

GUIDELINE:

- 1 The water used for firefighting should be clean potable water with due allowance for its reliability in the future.
- 2 The location of tanks shall be such that the tank and structure are protected from fire exposure.
- 3 Materials of tanks shall be limited to steel, concrete, and fiberglass reinforced plastic tanks.
- 4 Complete information regarding the tank piping shall be submitted to the Fire Chief for approval. Including the following:
 - a) Size of pipes and arrangement
 - b) Size, location, and type of all valves, tank heater, & accessories
 - c) Details of any frostproofing
 - d) Structural drawings
 - e) Seismic bracing details and calculations
 - f) Operational settings and sequence of operation
 - g) Compaction and backfill details
 - h) Buoyancy calculations
- 5 Upon completion of the tank, and after the contractor has tested the tank and made it watertight, the tank contractor shall notify the Fire Chief so that the tank can be inspected and approved.
- 6 If tank structures are used to support signs, flagpoles, steel stacks or similar objects, they shall be specifically designed for the purpose.
- 7 To prevent lightning damage to tanks, protection shall be installed in accordance with NFPA 780.
- 8 Tank structures shall comply with the local building code for seismic requirements.
- 9 All welding shall be completed in accordance with AWWA D100, NFPA 241, and ASME *Boiler and Pressure Vessel Code*, Section IX.
- 10 Concrete tanks shall be made impermeable by means of an impervious membrane or coating that is applied to the interior surface of the tank to prevent visible leakage or seepage through the tank wall.
- 11 Tanks shall be designed to resist the pressure of the earth against them when buried.
- 12 Bedding and backfill shall be non corrosive inert material, of a type recommended by the tank manufacturer, such as crushed stone or pea gravel that is properly compacted.
- 13 Tanks shall be located completely below the frost line to protect against freezing.
- 14 Where tanks are not subjected to traffic, tanks shall be covered with not less than 12 in. (305 mm) of compacted backfill and topped with up to 18 in. (457 mm) of compacted backfill or with not less than 12 in. (305 mm) of compacted backfill, on top of which shall be placed a slab of reinforced concrete not less than 4 in. (100 mm) thick.

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15 Where tanks are, or are likely to be, subjected to traffic, they shall be protected from vehicles passing over them by at least 36 in. (914 mm) of backfill, or 18 in. (457 mm) of compacted backfill, plus either 6 in. (152 mm) of reinforced concrete or 9 in. (229 mm) of asphaltic concrete or greater where specified by the tank manufacturer.

16 The tanks shall be safeguarded against movement when exposed to high groundwater or floodwater by anchoring with non metallic straps to deadman anchors or by securing using other recognized engineering standards.

17 The depth of cover shall be measured from the top of the tank to the finished grade, and due consideration shall be given to future or final grade and the nature of the soil.

18 Maximum burial depths, measured from the top of the tank, are established by the tank manufacturers and independent testing laboratories. Maximum burial depth shall be specified by the tank manufacturer and marked on the tank.

19 Tanks shall have a vent that extends above the ground to prevent against pressurization of the tank during filling and creation of a vacuum during use. Tank venting systems shall be provided with a minimum 2 in. (50 mm) nominal inside diameter.

20 Water level monitoring shall be capable of being read above ground.

21 Tanks must have an accessible method of filling the tank above ground.

22 Tanks used as cisterns for providing fire flow shall have a working dry hydrant assembly with threads acceptable to the Fire Chief.

23 Tanks shall be located such that the lowest water in the tank used for fire protection is not more than 15 ft (4.6 m) below grade where the fire department apparatus will site to extract water from the tank.

24 Connections for other than fire protection shall be allowed only when approved by the Fire Chief. All fire protection pipe shall be separate from any other use piping.

25 A water level gauge of suitable design shall be provided. It shall be carefully installed, adjusted and properly maintained.

26 The gauge shall be located to prevent it from freezing.

27 A listed, close-circuit, high-water and low-water level electric alarm shall be permitted to be used in place of the gauge.

28 Water-level monitoring shall be capable of being supervised and read above ground.

29 The frost proof casing shall be maintained in good repair and shall be weather tight through-out.

30 Tanks that are subject to freezing shall be heated.

31 The heating system shall be of such capacity that the temperature of the coldest water in the tank or tank riser, or both, is maintained at or above 42°F (5.6°C) during the coldest weather.

32 The coldest weather temperature that is used to determine the need for heating shall be based on the lowest mean temperature for one day, obtained from Environment Canada.

33 A low water temperature alarm, set at 40°F (4.4°C), shall be provided.

34 The method of heating shall be based on the type of tank.

35 The method of heating shall be based on calculating the heat loss of the water in water tanks due to ambient temperature.

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36 The heater shall be plainly marked with a plate or cast lettering that indicates the kilowatt (BTU) per hour input, type of heater, and the manufacturer's name.

37 Tanks shall be permitted to be equipped with solar heating to reduce the consumption of other forms of heating energy.

38 Valves on the tank shall be inspected weekly.

39 An annual inspection shall be made of tanks for fire protection, tank supporting structures and water supply systems, including piping, control valves, check valves, heating systems, mercury gauges and expansion joints, to ensure that they are in operating condition.

40 A daily check of the temperature of the water contained in tanks shall be carried out during freezing weather to ensure that it does not fall below the freezing temperature.

41 Water supply systems used for fire protection shall be kept free of ice accumulations that may interfere with flow.

42 Private and public water supplies for fire protection installations shall be maintained to provide the required flow under fire conditions.

43 Dry Hydrants shall be maintained free of snow and ice accumulations.

44 Dry Hydrants shall be readily available, maintained in operating condition and unobstructed for use at all times.

45 Dry Hydrants shall be inspected annually and after each use.

46 Dry hydrants shall be equipped with port caps that are secured wrench-tight.

47 Dry Hydrant water flow shall be inspected annually to ensure that it meets the 3,800 L/min flow.

RESPONSIBILITY:

It is the responsibility of all fire department staff to ensure compliance with the provisions of this Operating Guideline, unless approved by the Fire Chief.

REFERENCES:

- NFPA 22 Water Tank