

OAR CHAPTER 333
DIVISION 061
PUBLIC WATER SYSTEMS
Effective 10-21-04

333-061-0050 Construction Standards

(1) General:

- (a) These standards shall apply to the construction of new public water systems and to major additions or modifications to existing public water systems and are intended to assure that the system facilities, when constructed, will be free of public health hazards and will be capable of producing water which consistently complies with the maximum contaminant levels;
- (b) Public water systems which may not comply fully with these construction standards, shall be allowed to continue in operation and shall not be required to undertake alterations to existing facilities, unless the standard is listed as a significant deficiency as prescribed in OAR 333-061-0076(3) or maximum contaminant levels are being exceeded. Existing facilities are:
 - (A) Facilities at public water systems constructed or installed prior to August 21, 1981; and
 - (B) Facilities at public water systems which have been in continual use in or as a public water system and not inoperative for more than 1 year.
- (c) Non-public water systems that are converted to public water systems shall be modified as necessary to conform to the requirements of this rule.
- (d) Facilities at public water systems shall be designed and constructed in a manner such that contamination will be effectively excluded, and the structures and piping will be capable of safely withstanding external and internal forces acting upon them;
- (e) Only materials designed for potable water service and meeting National Sanitation Foundation Standard 61, Section 9 - Drinking Water System Components - Health Effects (Revised September, 1994) or equivalent shall be used in those elements of the water system which are in contact with potable water;
- (f) New tanks, pumps, equipment, pipe valves and fittings shall be used in the construction of new public water systems, major additions or major modifications to existing water systems. The Department may permit the use of used items when it can be demonstrated that they have been renovated and are suitable for use in public water systems;
- (g) Prior to construction of new facilities, the water supplier shall submit plans to the Department for approval as specified in OAR 333-061-0060(1)(a).

certification process, a rigorous engineering design review of the point-of-entry devices.

- (ii) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contractor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.
 - (iii) The point-of-entry device must be evaluated to assure that the device will not cause increased corrosion of lead and copper bearing materials located between the device and the tap that could increase contaminant levels of lead and copper at the tap.
- (E) All consumers shall be protected. Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The Department must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.
- (5) Facilities for continuous disinfection:
- (a) Water obtained from surface sources or groundwater sources under the direct influence of surface water shall, as a minimum, be provided with continuous disinfection before such water may be used as a source of supply for a public water system. Water obtained from wells constructed in conformance with the requirements of these rules and which is found not to exceed microbiological maximum contaminant levels, may be used without treatment at public water systems;
 - (b) Water obtained from wells or springs shall be considered groundwater unless determined otherwise by the Department. Wells and springs may be utilized without continuous disinfection if the construction requirements of section (2) of this rule are met and analyses indicate that the water consistently meets microbiological standards. A well or spring that is inadequately constructed and shows a history of microbiological contamination shall first be upgraded to meet current construction standards, and if microbiological contamination still persists, then continuous disinfection shall be provided prior to use in public water systems.
 - (c) In public water systems where continuous disinfection is required as the sole form of treatment, or as one component of more extensive treatment to meet the requirements prescribed in OAR 333-061-0032(1), the facilities shall be designed so that:
 - (A) The disinfectant applied shall be capable of effectively destroying pathogenic organisms; and

- (B) The disinfectant is applied in proportion to flow; and
 - (C) Disinfectants, other than ultraviolet light disinfection treatment, shall be capable of leaving a residual in the water which can be readily measured and which continues to serve as an active disinfectant; and
 - (D) Sufficient contact time shall be provided to achieve “CT” values capable of the inactivations required by OAR 333-061-0032(1) For ultraviolet light disinfection treatment, sufficient irradiance expressed in milliWatts per square centimeter (mW/cm^2) and exposure time expressed in seconds (s) shall be provided to achieve UV dose levels expressed as (mW/cm^2) or milli-Joules per square centimeter (mJ/cm^2) capable of the inactivations required by OAR 333-061-0032(1).
- (d) When continuous disinfection, other than ultraviolet light disinfection, is required for reasons other than the treatment of surface water sources or groundwater sources under the direct influence of surface water, in addition to the requirements of paragraphs (5)(c)(A) through (C) of this rule, the facilities shall be designed so that:
- (A) The primary disinfection treatment is sufficient to ensure at least 99.99 percent (4-log) inactivation and/or removal of viruses as determined by the Department, or;
 - (B) There is sufficient contact time provided to achieve disinfection under all flow conditions between the point of disinfectant application and the point of first water use:
 - (i) When chlorine is used as the primary disinfectant, the system shall be constructed to achieve a free chlorine residual of 0.2 mg/l after 30 minutes contact time under all flow conditions before first water use;
 - (ii) When ammonia is added to the water with the chlorine to form a chloramine as the disinfectant, the system shall be constructed to achieve a combined chlorine residual of at least 2.0 mg/l after 3 hours contact time under all flow conditions before first water use;
- (e) Provisions shall be made to alert the water supplier before the chlorine supply is exhausted.
- (f) Provisions shall be made for sampling the water before and after chlorination;
- (g) Testing equipment shall be provided to determine the chlorine residual;
- (h) Chlorinator piping shall be designed to prevent the contamination of the potable water system by backflow of untreated water or water having excessive concentrations of chlorine;
- (i) [Chlorine gas feeders and chlorine gas storage areas shall:](#)
- (A) Be enclosed and separated from other operating areas;

- (B) Chlorine cylinders shall be restrained in position to prevent upset by chaining 100 and 150 pound cylinders two-thirds of their height up from the floor and by double chocking one ton cylinders;
 - (C) The room housing the feeders and cylinders shall be above ground surface, shall have doors which open outward and to the outside and shall be ventilated by mechanical means at floor level and shall have an air intake located higher than the exhaust ventilation;
 - (D) Be located so that chlorine gas, if released, will not flow into the building ventilation systems;
 - (E) Have corrosion resistant lighting and ventilation switches located outside the enclosure, adjacent to the door;
 - (F) Be provided with a platform or hydraulic scale for measuring the weight of the chlorine cylinders;
 - (G) Be provided with a gas mask or self contained breathing apparatus approved by the **National Institute of Occupational Safety and Health (NIOSH)** for protection against chlorine gas and kept in good working condition. Storage of such equipment shall be in an area adjoining the chlorine room and shall be readily available. (Also see the Oregon Occupational Health and Safety regulations contained in OAR Chapter 437.)
- (j) When continuous disinfection treatment is provided through ultraviolet light disinfection, the facilities shall be designed to meet the requirements of this subsection:
- (A) Ultraviolet light may be used as the sole disinfectant for non-community systems serving groundwater with minimal distribution systems, as determined by the Department;
 - (B) Ultraviolet systems must meet the specifications of a Class A UV system under the National Sanitation Foundation (NSF) Standard 55;
 - (C) The ultraviolet light failsafe dosage set point shall be equivalent to 38 mWs/cm² (38 mJ/cm²) with a wavelength between 200 and 300 nanometers;
 - (D) Ultraviolet lamps are insulated from direct contact with the influent water and are removable from the lamp housing;
 - (E) The treatment unit must have a fixed flow rate control that prevents flows exceeding the manufacturer's maximum rated flow rate, an ultraviolet light sensor that monitors light intensity through the water during operation, and a visual and audible alarm with an

- automatic water flow shut-off if the ultraviolet light intensity drops below the failsafe set point;
- (F) There must be a visual means to verify operation of all ultraviolet lamps;
 - (G) The lamps, lamp sleeves, housings and other equipment must be able to withstand a working pressure of at least 100 psig (689 kPa);
 - (H) The treatment facility must be sheltered from the weather and accessible for routine maintenance as well as routine cleaning and replacement of the lamp sleeves and cleaning of the sensor windows/lenses;
 - (I) The lamps must be changed as per the manufacturer's recommendation, or at least annually; and
 - (J) The treatment unit must be connected into the main water line at the source with the shut-off valves at both the inlet side and the outlet side of the treatment unit. There shall be no bypass piping around the treatment unit.
- (6) Finished water storage:
- (a) Distribution reservoirs and treatment plant storage facilities for finished water shall be constructed to meet the following requirements:
 - (A) They shall be constructed of concrete, steel, wood or other durable material capable of withstanding external and internal forces which may act upon the structure;
 - (B) Ground-level reservoirs shall be constructed on undisturbed soil, bedrock or other stable foundation material capable of supporting the structure when full;
 - (C) Steel reservoirs, standpipes and elevated tanks shall be constructed in conformance with the **AWWA Standards D100 and D103**;
 - (D) Concrete reservoirs shall be provided with sufficient reinforcing to prevent the formation of cracks, and waterstops and dowels shall be placed at construction joints. Poured-in-place wall castings shall be provided where pipes pass through the concrete;
 - (E) Wooden reservoirs shall be redwood or other equally durable wood and shall be installed on a reinforced concrete base. Where redwood reservoirs are used, separate inlet and outlet pipes are required and the water entering the reservoir must be continuously disinfected so as to result in a residual in the water leaving the reservoir in accordance with paragraph (5)(c)(D)(i) of this rule;
 - (F) Start-up procedures for new redwood tanks shall consist of filling the tank with a solution of water containing a minimum