

## CHAPTER 17 NONPOTABLE RAINWATER CATCHMENT SYSTEMS

### 1701.0 General.

**1701.1 Applicability.** The provisions of this chapter shall apply to the installation, construction, alteration, and repair of nonpotable rainwater catchment systems. *In addition, applicable provisions in Chapter 16, Sections 1601.0 through 1601.9 for "Alternate Water Sources for Nonpotable Applications" shall apply to rainwater catchment systems.*

### 1702.0 Nonpotable Rainwater Catchment Systems.

**1702.1 General.** The installation, construction, alteration, and repair of rainwater catchments systems intended to supply uses such as water closets, urinals, trap primers for floor drains and floor sinks, irrigation, industrial processes, water features, cooling tower makeup and other uses shall be approved by the Authority Having Jurisdiction.

**1702.2 Plumbing Plan Submission.** No permit for a rainwater catchment system shall be issued until complete plumbing plans, with data satisfactory to the Authority Having Jurisdiction, have been submitted and approved.

**1702.2.1 Permit.** *It shall be unlawful for a person to construct, install, alter, or cause to be constructed, installed, or altered, a nonpotable rainwater catchment system in a building or on a premise without first obtaining a permit to do such work from the Authority Having Jurisdiction.*

#### Exceptions:

- (1) *A permit is not required for exterior rainwater catchment systems used for outdoor non-spray irrigation with a maximum storage capacity of 5000 gallons (18 927 L) where the tank is supported directly upon grade and the ratio of height to diameter or width does not exceed 2 to 1 and it does not require electrical power or a makeup water supply connection.*
- (2) *[HCD 1 & HCD 2] A permit is not required for exterior rainwater catchment systems used for spray irrigation with a maximum storage capacity of 360 gallons (1363 L).*

**1702.3 System Changes.** No changes or connections shall be made to either the rainwater catchment system or the potable water system within a site containing a rainwater catchment system requiring a permit without approval by the Authority Having Jurisdiction.

**1702.4 Connections to Potable or Reclaimed (Recycled) Water Systems.** Rainwater catchment systems shall have no unprotected connection to a potable water supply or alternate water source system. Potable or reclaimed (recycled) water is permitted to be used as makeup water for a rainwater catchment system provided the potable or reclaimed (recycled) water supply connection is protected by an air gap or reduced-pressure principle backflow preventer in accordance with this code.

**1702.5 Initial Cross-Connection Test.** Where a portion of a rainwater catchment system is installed within a building, a cross-connection test is required in accordance with Section

1702.11.2. Before the building is occupied or the system is activated, the installer shall perform the initial cross-connection test in the presence of the Authority Having Jurisdiction and other Authorities Having Jurisdiction. The test shall be ruled successful by the Authority Having Jurisdiction before final approval is granted.

**1702.6 Sizing.** Rainwater catchment system distribution piping for indoor applications shall be sized as outlined in this code for sizing potable water piping. The design and size of rainwater drains, gutters, conductors, and leaders shall comply with Chapter 11 of this code.

**1702.7 Rainwater Catchment System Materials.** Rainwater catchment system materials shall comply with Section 1702.7.1 through Section 1702.7.3.

**1702.7.1 Water Supply and Distribution Materials.** Rainwater catchment water supply and distribution materials shall comply with the requirements of this code for potable water supply and distribution systems, unless otherwise provided for in this section.

**1702.7.2 Rainwater Catchment System Drainage Materials.** Materials used in rainwater catchment drainage systems, including gutters, downspouts, conductors, and leaders shall be in accordance with the requirements of this code for storm drainage.

**1702.7.3 Storage Tanks.** Rainwater storage tanks shall comply with Section 1702.9.5.

**1702.8 Rainwater Catchment System Color and Marking Information.** Rainwater catchment systems shall have a colored background in accordance with Section 601.2. Rainwater catchment systems shall be marked, in lettering in accordance with Section 601.2, with the words: "CAUTION: NONPOTABLE RAINWATER WATER, DO NOT DRINK."

### 1702.9 Design and Installation.

**1702.9.1 Outside Hose Bibbs.** Outside hose bibbs shall be allowed on rainwater piping systems. Hose bibbs supplying rainwater shall be marked with the words: "CAUTION: NONPOTABLE WATER, DO NOT DRINK" and Figure 1702.9.



FIGURE 1702.9

**1702.9.2 Deactivation and Drainage for Cross-Connection Test.** The rainwater catchment system and the potable water system within the building shall be provided with the required appurtenances (e.g., valves, air or vacuum relief valves, etc.) to allow for deactivation or drainage as required for a cross-connection test in accordance with Section 1702.11.2.

**1702.9.3 Collection Surfaces.** Rainwater shall be collected from roof surfaces, or other manmade, above-ground impervious collection surfaces. Rainwater collected from surface water runoff, vehicular parking surfaces or manmade surfaces at or below grade shall comply with the water quality requirements for on-site treated nonpotable gray water in Section 1604.0.

**Exception:** Collected rainwater or storm water used exclusively for subsurface landscape irrigation.

**1702.9.3.1 Prohibited Discharges.** Overflows and bleed-off pipes from roof-mounted equipment and appliances shall not discharge onto roof surfaces that are intended to collect rainwater.

**1702.9.4 Minimum Water Quality.** The minimum water quality for harvested rainwater shall meet the applicable water quality requirements for the intended applications as determined by the Authority Having Jurisdiction. In the absence of water quality requirements for harvested rainwater, Table 1702.9.4 shall apply.

**Exception:** [BSC] No treatment is required for rainwater used for non-spray irrigation where the maximum storage volume is less than 5000 gallons (18 927 L) where the tank is supported directly upon grade and the ratio of height to diameter or width does not exceed 2 to 1.

**1702.9.4.1 Disinfection.** Where the initial quality of the collected rainwater requires disinfection or other treatment or both, the collected rainwater shall be treated as necessary to ensure the required water quality is delivered at the point of use. Where chlorine is used for disinfection or treatment, water shall be tested for residual chlorine in accordance with ASTM D 1253. The levels of residual chlorine shall not exceed the levels allowed for the intended use in accordance with the requirements of the local Enforcing Agency.

**1702.9.5 Rainwater Storage Tanks.** Rainwater storage tanks shall be constructed and installed in accordance with Section 1702.9.5.1 through Section 1702.9.5.8.

**1702.9.5.1 Construction.** Rainwater storage shall be constructed of solid, durable materials not subject to excessive corrosion or decay and shall be watertight. Storage tanks shall be approved by the Authority Having Jurisdiction, provided such tanks are in accordance with approved applicable standards.

**1702.9.5.2 Location.** Rainwater storage tanks shall be permitted to be installed above or below grade.

**1702.9.5.3 Above Grade.** Above grade storage tanks shall be of an opaque material, approved for

aboveground use in direct sunlight or shall be shielded from direct sunlight. Tanks shall be installed in an accessible location to allow for inspection and cleaning. The tank shall be installed on a foundation or platform that is constructed to accommodate loads in accordance with the building code.

**1702.9.5.4 Below Grade.** Rainwater storage tanks installed below grade shall be structurally designed to withstand anticipated earth or other loads. Holding tank covers shall be capable of supporting an earth load of not less than 300 pounds per square foot (lb/ft<sup>2</sup>) (1465 kg/m<sup>2</sup>) where the tank is designed for underground installation. Below grade rainwater tanks installed underground shall be provided with manholes. Below grade storage tanks, located outside of the building, shall be provided with either a manhole not less than 24 inches (610 mm) square or a manhole with an inside diameter of not less than 24 inches (610 mm). Service ports in manhole covers shall be not less than 8 inches (203 mm) in diameter. The manhole opening shall be located not less than 4 inches (102 mm) above the surrounding grade. The surrounding grade shall be sloped away from the manhole. Underground tanks shall be ballasted, anchored, or otherwise secured, to prevent the tank from floating out of the ground when empty. The combined weight of the tank and hold down system shall meet or exceed the buoyancy force of the tank.

**1702.9.5.5 Drainage and Overflow.** Rainwater storage tanks shall be provided with a means of draining and cleaning. The overflow drain shall not be equipped with a shutoff valve. The overflow outlet shall discharge in accordance with this code for storm drainage systems. Where discharging to the storm drainage system, the overflow drain and tank drain shall be protected from backflow of the storm drainage system by a backwater valve or other approved method. Backwater valves shall be installed so that access is provided to the working parts for service and repair.

**1702.9.5.5(A) Overflow Outlet Size.** The overflow outlet shall be sized to accommodate the flow of the rainwater entering the tank and not less than the aggregate cross-sectional area of inflow pipes.

**1702.9.5.6 Opening and Access Protection.**

**1702.9.5.6(A) Animals and Insects.** Rainwater tank openings shall be protected to prevent the entrance of insects, birds, or rodents into the tank and piping systems. Screens installed on vent pipes, inlets, and overflow pipes shall have an aperture of not greater than  $\frac{1}{16}$  of an inch (1.6 mm) and shall be close fitting.

**1702.9.5.6(B) Human Access.** A minimum of one access opening shall be provided to allow

**TABLE 1702.9.4  
MINIMUM TREATMENT AND WATER QUALITY FOR RAINWATER**

APPLICATION	MINIMUM TREATMENT	MINIMUM WATER QUALITY
Car washing	Debris excluder or other approved means in compliance with Section 1702.9.10	N/A
	100 Micron (100 µm) in compliance with Section 1702.9.11 for drip irrigation	
Surface, subsurface and drip irrigation	Debris excluder or other approved means in compliance with Section 1702.9.10	N/A
	100 Micron (100 µm) in compliance with Section 1702.9.11 for drip irrigation	
Spray irrigation where the maximum storage volume is less than 360 gallons (1363 L)	Debris excluder or other approved means in compliance with Section 1702.9.10	N/A
Spray irrigation where the maximum storage volume is equal to or greater than 360 gallons (1363 L)	Debris excluder or other approved means in compliance with Section 1702.9.10	Escherichia coli: < 100 CFU/100 ml Turbidity: < 10 NTU
Urinal and water closet flushing, clothes washing, and trap priming	Debris excluder or other approved means in compliance with Section 1702.9.10	Escherichia coli: < 100 CFU/100 ml
	100 Micron (100 µm) in compliance with Section 1702.9.11	Turbidity: < 10 NTU
Ornamental fountains and other water features	Debris excluder or other approved means in compliance with Section 1702.9.10	Escherichia coli: < 100 CFU/100 ml Turbidity: < 10 NTU
Cooling tower make up water	Debris excluder or other approved means in compliance with Section 1702.9.10	Escherichia coli: < 100 CFU/100 ml
	100 Micron (100 µm) in compliance with Section 1702.9.11	Turbidity: < 10 NTU

inspection and cleaning. Rainwater tank man-holes and access openings shall be secured by either a lockable device or other approved method to prevent unauthorized access.

**1702.9.5.7 Venting.** Rainwater tanks shall be provided with a vent sized in accordance with this code, and based on the size of the tank influent pipe. Tank vent pipes shall not be connected to the sanitary drainage system vents.

**1702.9.5.8 Marking.** Rainwater tanks shall be permanently marked with the capacity and the language: "NONPOTABLE RAINWATER." Where openings are provided to allow a person to enter the tank, the opening shall be marked with the following language: "DANGER-CONFINED SPACE."

**1702.9.6 Pumps.** Pumps serving rainwater catchment systems shall be listed. Pumps supplying water to water closets, urinals, and trap primers shall be capable of delivering not less than 15 pounds-force per square inch (psi) (103 kPa) residual pressure at the highest and most remote outlet served. Where the water pressure in the rainwater supply system within the building exceeds 80 psi (552 kPa), a pressure reducing valve reducing the pressure to 80 psi (552 kPa) or less to water outlets in the building shall be installed in accordance with this code.

**1702.9.7 Roof Drains.** Primary and secondary roof drains, conductors, leaders, and gutters shall be designed and installed in accordance with this code.

**1702.9.8 Water Quality Devices and Equipment.** Devices and equipment used to treat rainwater to maintain the minimum water quality requirements determined by the Authority Having Jurisdiction shall be listed or labeled (third-party certified) by a listing agency (accredited conformity assessment body) and approved for the intended application.

**1702.9.9 Freeze Protection.** Tanks and piping installed in locations subject to freezing shall be provided with an approved means of freeze protection.

**1702.9.10 Debris Removal.** The rainwater catchment conveyance system shall be equipped with a debris excluder or other approved means to prevent the accumulation of leaves, needles, other debris and sediment from entering the storage tank. Devices or methods used to remove debris or sediment shall be accessible and sized and installed in accordance with manufacturer's installation instructions.

**1702.9.11 Required Filters.** A filter permitting the passage of particulates not larger than 100 microns (100 µm) shall be provided for rainwater supplied to water closets, urinals, trap primers, and drip irrigation systems.

**1702.9.12 Roof Gutters.** Gutters shall maintain a minimum slope and be sized in accordance with Section 1106.3.

**1702.10 Signs.** Signs in buildings using rainwater water shall be in accordance with Section 1702.10.1, Section 1702.10.2, and applicable requirements of the California Building Code.

**1702.10.1 Commercial, Industrial, Institutional, and Residential Restroom Signs.** A sign shall be installed in restrooms in commercial, industrial, and institutional occupancies, and shall also be installed in residential common use area restrooms using nonpotable rainwater for water closets, urinals, or both. Each sign shall contain the following text:

TO CONSERVE WATER, THIS BUILDING USES RAINWATER TO FLUSH TOILETS AND URINALS.

**1702.10.2 Equipment Room Signs.** Each equipment room containing nonpotable rainwater equipment shall have a sign posted with the following wording in 1 inch (25.4 mm) letters:

CAUTION NONPOTABLE WATER, DO NOT DRINK. DO NOT CONNECT TO DRINKING WATER SYSTEM. NOTICE: CONTACT BUILDING MANAGEMENT BEFORE PERFORMING ANY WORK ON THIS WATER SYSTEM.

This sign shall be posted in a location that is visible to anyone working on or near rainwater water equipment.

**1702.11 Inspection and Testing.** Rainwater catchment systems shall be inspected and tested in accordance with Section 1702.11.1 and Section 1702.11.2.

**1702.11.1 Supply System Inspection and Test.** Rainwater catchment systems shall be inspected and tested in accordance with the applicable provisions of this code for testing of potable water and storm drainage systems.

**1702.11.2 Cross-Connection Inspection and Testing.** An initial inspection and test in accordance with Section 1702.5 shall be performed on both the potable and rainwater catchment water systems. The potable and rainwater catchment water systems shall be isolated from each other and independently inspected and tested to ensure there is no cross-connection in accordance with Section 1702.11.2.1 through Section 1702.11.2.3.

**1702.11.2.1 Visual System Inspection.** Prior to commencing the cross-connection testing, a dual system inspection shall be conducted by the Authority Having Jurisdiction and other authorities having jurisdiction as follows:

- (1) Pumps, equipment, equipment room signs, and exposed piping in an equipment room shall be checked.

**1702.11.2.2 Cross-Connection Test.** The procedure for determining cross-connection shall be followed by the applicant in the presence of the Authority Having Jurisdiction and other authorities having jurisdiction to determine whether a cross-connection has occurred as follows:

- (1) The potable water system shall be activated and pressurized. The rainwater catchment water system shall be shut down and completely drained.
- (2) The potable water system shall remain pressurized for a minimum period of time specified by the Authority Having Jurisdiction while the rainwater catchment water system is empty. The minimum period the rainwater catchment water system is to remain depressurized shall be determined on a case-by-case basis, taking into account the size and complexity of the potable and rainwater catchment water distribution systems, but in no case shall that period be less than 1 hour.
- (3) Fixtures, potable and rainwater, shall be tested and inspected for flow. Flow from a rainwater catchment water system outlet shall indicate a cross-connection. No flow from a potable water outlet shall indicate that it is connected to the rainwater water system.
- (4) The drain on the rainwater catchment water system shall be checked for flow during the test and at the end of the period.
- (5) The potable water system shall then be completely drained.
- (6) The rainwater catchment water system shall then be activated and pressurized.
- (7) The rainwater catchment water system shall remain pressurized for a minimum period of time specified by the Authority Having Jurisdiction while the potable water system is empty. The minimum period the potable water system is to remain depressurized shall be determined on a case-by-case basis, but in no case shall that period be less than 1 hour.
- (8) Fixtures, potable and rainwater catchment, shall be tested and inspected for flow. Flow from a potable water system outlet shall indicate a cross-connection. No flow from a rainwater catchment water outlet shall indicate that it is connected to the potable water system.
- (9) The drain on the potable water system shall be checked for flow during the test and at the end of the period.
- (10) Where there is no flow detected in the fixtures which would indicate a cross-connection, the potable water system shall be repressurized.

**1702.11.2.3 Discovery of Cross-Connection.** In the event that a cross-connection is discovered, the following procedure, in the presence of the Authority Having Jurisdiction, shall be activated immediately:

- (1) Rainwater catchment water piping to the building shall be shut down at the supply source(s), and the rainwater water riser shall be drained.

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- (2) Potable water piping to the building shall be shut down at the meter.
  - (3) The cross-connection shall be uncovered and disconnected.
  - (4) The building shall be retested following procedures listed in Section 1702.11.2.1 and Section 1702.11.2.2.
  - (5) The potable water system shall be chlorinated with 50 ppm chlorine for 24 hours.
  - (6) The potable water system shall be flushed after 24 hours, and a standard bacteriological test shall be performed. Where test results are acceptable, the potable water system shall be permitted to be recharged.

