

Your purchase of this code includes a free subscription for all State issued supplements and errata. You must register online at www.iapmmembership.org/reg to keep your code up-to-date!



2016 California Plumbing Code

California Code of Regulations
Title 24, Part 5

California Building
Standards Commission

Based on 2015 Uniform Plumbing Code®



Effective January 1, 2017

For Errata and Supplement effective dates see the History Note Appendix

CHAPTER 16

NONPOTABLE RAINWATER CATCHMENT SYSTEMS

»» **1601.0 General.**

»» **1601.1 Applicability. [HCD 1]** 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 15, Sections 1501.7 for "Alternate Water Sources for Nonpotable Applications" shall apply to rainwater catchment systems.*

1601.1.1 Allowable Use of Alternate Water. Where approved or required by the Authority Having Jurisdiction, rainwater shall be permitted to be used in lieu of potable water for the applications identified in this chapter.

1601.2 System Design. Rainwater catchment systems shall be designed in accordance with this chapter *by a person who demonstrates competency to design the alternate water source system as required by the Enforcing Agency. The Enforcing Agency may also require plans and specifications to be prepared by a licensed design professional.* Components, piping, and fittings used in a rainwater catchment system shall be listed.

1601.3 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).*

1601.4 Maintenance and Inspection. Rainwater catchment systems and components shall be inspected and maintained in accordance with *the manufacturer's recommendations and/or as required by the enforcing agency.*

1601.4.1 Maintenance Responsibility. The required maintenance and inspection of rainwater catchment systems shall be the responsibility of the property owner, unless otherwise required by the Authority Having Jurisdiction.

1601.5 Operation and Maintenance Manual. An operation and maintenance manual for rainwater catchment systems required to have a permit in accordance with Section 1601.3, shall be supplied to the building owner by the system designer *or installer.* The operating and maintenance manual shall include the following:

- (1) *Diagram(s) of the entire system and the location of system components.*
- (2) *Instructions on operating and maintaining the system.*
- (3) *Instructions on maintaining the required water quality for rainwater catchment systems.*
- (4) *Details on startup, shutdown, and deactivating the system for maintenance, repair, or other purposes.*
- (5) *Applicable testing, inspection, and maintenance frequencies in accordance with Section 1601.5.*
- (6) *A method of contacting the installer and/or manufacturer(s).*
- (7) *Directions to the owner or occupant that the manual shall remain with the building throughout the life cycle of the structure.*

1601.6 Minimum Water Quality Requirements. The minimum water quality for rainwater catchment systems shall comply with the applicable water quality requirements for the intended application as determined by the Authority Having Jurisdiction. Water quality for nonpotable rainwater catchment systems shall comply with Section 1602.9.4. *In the absence of water quality requirements for harvested rainwater, Table 1602.9.4 shall apply.*

Exceptions:

- (1) *Water treatment is not required for rainwater catchment systems used for aboveground irrigation with a maximum storage capacity of 360 gallons (1363 L).*
- (2) *Water treatment is not required for rainwater catchment systems used for surface, subsurface or drip irrigation.*

1602.0 Nonpotable Rainwater Catchment Systems.

1602.1 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. Additional design criteria is capable of being found in ARCSA/ASPE 63.

1602.2 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.

1602.3 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.

1602.4 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.

- »» **1602.5 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 1602.11.2. 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.
- »» **1602.6 Sizing.** The design and size of rainwater drains, gutters, conductors, and leaders shall comply with Chapter 11 of this code.
- »» **1602.7 Rainwater Catchment System Materials.** Rainwater catchment system materials shall comply with Section 1602.7.1 through Section 1602.7.3.
 - »» **1602.7.1 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.
 - »» **1602.7.2 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.
 - »» **1602.7.3 Storage Tanks.** Rainwater storage tanks shall comply with Section 1602.9.5.
- »» **1602.8 Rainwater Catchment System Color and Marking Information.** Rainwater catchment systems shall have a colored background in accordance with Section 601.3. Rainwater catchment systems shall be marked, in lettering in accordance with Section 601.3.3, with the words: "CAUTION: NONPOTABLE RAINWATER WATER, DO NOT DRINK."
- »» **1602.9 Design and Installation.** The design and installation of nonpotable rainwater catchment systems shall be in accordance with Section 1602.9.1 through Section 1602.9.5.8.



FIGURE 1602.9

1602.9.1 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 1602.9.

1602.9.2 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 1602.11.2.

1602.9.3 Rainwater Catchment System Surfaces. Rainwater shall be collected from roof surfaces or other impervious manmade, above-ground 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 1504.0.

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

1602.9.3.1 Other Surfaces. Natural precipitation collected from surface water runoff, vehicular parking surfaces, or manmade surfaces at or below grade shall be in accordance with the water quality requirements for on-site treated nonpotable gray water systems in Section 1504.0.

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

1602.9.3.2 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.

1602.9.4 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 determined by the Authority Having Jurisdiction, the minimum treatment and water quality shall be in accordance with Table 1602.9.4.

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.

1602.9.4.1 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.

1602.9.5 Rainwater Storage Tanks. Rainwater storage tanks shall be constructed and installed in accordance with Section 1602.9.5.1 through Section 1602.9.5.7.

**TABLE 1602.9.4
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

- » **1602.9.5.1 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.
- » **1602.9.5.2 Location.** Rainwater storage tanks shall be permitted to be installed above or below grade.
- » **1602.9.5.3 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 *California Building Code*.
- » **1602.9.5.4 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/ft²) (1465 kg/m²) 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 where empty. The combined weight of the tank and hold down system shall meet or exceed the buoyancy force of the tank.

» **1602.9.5.5 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.*

» **1602.9.5.5.1 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.

1602.9.5.6 Opening and Access Protection. Rainwater tank openings shall be protected to prevent the entrance of insects, birds, or rodents into the tank *and piping systems.*

(A) Animals and Insects. Screens installed on vent pipes, inlets, and overflow pipes shall have an aperture of not greater than 1/16 of an inch (1.6 mm) and shall be close fitting.

(B) Human Access. A minimum of one access opening shall be provided to allow inspection and cleaning. Rainwater tank manholes and access openings shall be secured by either a lockable device or other approved method to prevent unauthorized access.

1602.9.5.7 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."

1602.9.5.8 Storage Tank Venting. Where venting by means of drainage or overflow piping is not provided, or is considered insufficient, a vent shall be installed on each tank. The vent shall extend from the top of the tank and terminate not less than 6 inches (152 mm) above grade and *shall be provided with a vent sized in accordance with this code, and based on the size of the influent pipe.* The vent terminal shall be directed downward and covered with a 1/16 of an inch (1.6 mm) mesh screen to prevent the entry of vermin and insects. *Tank vent pipes shall not be connected to the sanitary drainage system vent.*

1602.9.6 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.

1602.9.7 Roof Drains. Primary and secondary roof drains, conductors, leaders, and gutters shall be designed and installed in accordance with this code.

1602.9.8 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.

1602.9.9 Freeze Protection. Tanks and piping installed in locations subject to freezing shall be provided with an approved means of freeze protection.

1602.9.10 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.

1602.9.11 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 system.

1602.9.12 Roof Gutters. Gutters shall maintain a minimum slope and be sized in accordance with Section 1103.3.

1602.10 Signs. Signs in buildings using rainwater shall be in accordance with Section 1602.10.1 and Section 1602.10.2, *and applicable requirements of the California Building Code.*

1602.10.1 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.

1602.10.2 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.

1602.11 Inspection and Testing. Rainwater catchment systems shall be inspected and tested in accordance with Section 1602.11.1 and Section 1602.11.2.

1602.11.1 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. Storage tanks shall be filled with water to the overflow opening for a period of 24 hours, and during inspection, or by other means as approved by the Authority Having Jurisdiction. Seams and joints shall be exposed during inspection and checked for watertightness.

» **1602.11.2 Cross-Connection Inspection and Testing.** An initial inspection and test in accordance with Section 1602.5 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 1602.11.2.1 through Section 1602.11.2.3.

» **1602.11.2.1 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.

» **1602.11.2.2 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.

1602.11.2.3 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.
- (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 1602.11.2.1 and Section 1602.11.2.2.
- (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.