

RAINWATER HARVESTING SYSTEM GUIDELINES

3316.3—PERMISSIVE RAINWATER HARVESTING SYSTEM GUIDELINES FOR NON-RESIDENTIAL OCCUPANCIES

3316.3.1 OVERVIEW

A rainwater harvesting system begins at the point of collection and terminates as waste after the water collected has been used in plumbing fixtures, industrial applications, or used for irrigation purposes. The parts of the collection and distribution system include:

1. The Roof Surface
2. Gutters and Downspouts
3. A Roof Washer
4. The Cistern
5. A Pump
6. The Piping System

3316.3.2 SCOPE

Commercial applications for rainwater harvesting are unique for each application. For this reason, each rainwater harvesting system proposed for use in commercial structures must be engineered and site specific.

The following rainwater harvesting applications are allowed in commercial buildings:

1. Non-residential applications such as office buildings, factories and retail stores: water closets, urinals, irrigation, industrial applications, and water feature usage.
2. Residential applications such as hotels: Irrigation and water feature usage.

3316.3.3 GENERAL PROVISIONS

All components of the system not specifically addressed by this guide shall meet all applicable Uniform Plumbing Code (code) sections.

1. To ensure proper system installation, the code, this guide, and any applicable manufacturer's installation instructions must be followed.
2. Engineered systems shall be installed per plans and specifications of the engineer of record.
3. Harvested rainwater may only be used for water closets, urinals, hose bibbs, industrial applications, irrigation purposes, and water feature uses.

4. Rainwater shall only be harvested from roof surfaces. Harvest shall not occur from the following locations:
 - 4.1 Any vehicular or pedestrian area;
 - 4.2 Surface water runoff; or
 - 4.3 Bodies of standing water.
5. Rainwater harvested from roof surfaces shall be pretreated by either a roof washing system or other filtration system of no more than 50 microns. The quantity of the first flush generated by the rainwater harvesting system during any rain event shall be:
 - 5.1 Calculated as the first 0.02 inch of rainfall per 24-hour period per square foot of roof area; and
 - 5.2 Diverted away from the cistern.

Exceptions:

 1. A first flush is not required where a post storage filtration or treatment system is installed and approved by the Administrative Authority.
 2. A first flush is not required for systems used exclusively for irrigation purposes.
6. Discharge of any diverted water shall go to a location approved by the Administrative Authority.

3316.3.4 DEFINITIONS

In addition to other definitions used in the Uniform Plumbing Code, the following definitions apply to rainwater harvesting systems:

AUXILIARY SUPPLY means the piping arranged and protected from contamination to provide an alternate means of filling a cistern.

CISTERN is the central storage component of the rainwater harvesting system. Protection and maintenance of the cistern is essential for the health of the system.

CODE means the Uniform Plumbing Code.

DEBRIS EXCLUDER means a screen or other device installed on the gutter or downspout system to prevent the accumulation of leaves, needles, or other debris in the system.

FLAT means having a slope no greater than 1 in 50.

HARVESTED WATER means rainwater harvested for the purpose of supplying water to hose bibbs, water closets, urinals, industrial applications or irrigation.

PIPING SYSTEM is the system of pipes that conveys the harvested rainwater and distributes it to various fixtures.

PUMP OR PRESSURE SYSTEM means the mechanical device necessary to distribute the harvested rainwater from the cistern to the designated fixtures.

RAINWATER HARVESTING SYSTEM (RWS) means a cistern(s), pipe, fittings, pumps and other plumbing appurtenances required for and/or used to harvest and distribute rainwater.

RETURN ELBOW means a section of pipe with a 180-degree bend.

ROOF DRAINAGE SYSTEM means the roof drains, overflow drains, scuppers, gutters and downspouts used to convey the rainwater from the roof surface to the roof washer and the cistern.

ROOF SURFACE means the surface rainwater harvesting systems rely on for the collection of rainwater that has fallen on a building roof.

ROOF WASH OR ROOF WASHER means a device or method for removal of sediment and debris from collection surface by diverting initial rainfall from entry into the cistern(s).

ROOF FILTRATION means a device to mechanically remove sediment and debris.

SCREEN means corrosion resistant wire or other approved mesh having openings in determined sizes.

SLOPE OR SLOPING means having a slope greater than 1 in 50.

SUN BARRIERS mean a structure erected specifically to shelter a cistern from the direct rays of the sun.

TRANSFER PUMP means the mechanical device to transfer collected water from downspouts to remote cisterns.

3316.3.5 PERMITS

The following permits may be required for the installation of a rainwater harvesting system:

1. A plumbing permit for rainwater harvesting systems.
2. An electrical permit for the pump or other electrical controls.

3. Building permits for cistern footings, foundations, enclosures and roof structures.
4. Grading permits, +/- erosion control, may be necessary for underground tanks.
5. Contact your regional office of the Department of Ecology regarding possible water right application process.

3316.3.6 ZONING REQUIREMENTS

Rainwater harvesting systems must comply with applicable provisions of the local Planning and Zoning Code including design review requirements.

3316.3.7 APPLICATION

The following information must be provided with each permit application for a rainwater harvesting system:

1. Site or plot plan, including site elevations.
2. A water budget consisting of:
 - a. System demand.
 - b. Potential production based on 0.623 gallons/square foot/inch of precipitation, considering the average rainfall for the system location.
3. Isometric drawing of rainwater harvesting system (including piping and section diagrams) and domestic potable water systems, including sizing and dimensions.
4. Specifications and manufacturer's installation instructions for:
 - 4.1 Cistern(s).
 - 4.2 Pump.
 - 4.3 Filtration and/or disinfection.
 - 4.4 Roof washing or pre-filtration systems.
5. Engineering. Installation, including but not limited to the following systems, will require structural engineering:
 - 5.1 Cisterns that are located on top of a building structure.
 - 5.2 Cisterns that are located on sloping sites.

Information in addition to that listed above may be necessary in some instances. The size and complexity of the building, site and system will determine the necessity for additional information.

3316.3.8 REQUIREMENTS FOR SYSTEM COMPONENTS

3316.3.8.1 Roof Surface. The roof surface may be constructed of any material accepted by the Administrative Authority.

Exception: Copper or zinc roofing materials shall not be used.

3316.3.8.2 The Roof Drainage System. Gutters and downspouts used to collect rainwater shall comply with the following:

1. Gutters and downspouts may be manufactured of any material. Gutter and downspout materials are not required to meet material specifications found in the uniform plumbing code.

Exception: Copper or zinc gutters and downspouts shall not be used.

2. Gutter and downspout systems leading to the cistern shall be fitted with debris excluders.

3316.3.8.3 Roof Washers and Pre-filtration. All rainwater harvesting systems using impervious roof surfaces shall have at least one roof washer or pre-filtration system. A roof washer or pre-filtration system is not required for pervious roof surfaces such as eco-roofs. Roof washers and pre-filtration systems shall meet the following design requirements:

1. All collected rainwater shall pass through a roof washer or pre-filtration system before the water enters the cistern(s).
2. If more than one cistern is used, a roof washer or pre-filtration system shall be provided for each cistern.

Exception: Where a series of cisterns are interconnected to supply water to a single system.

3. The following requirements apply to all roof washers:
 - 3.1 The inlet to the roof washer shall be provided with a debris screen that protects the roof washer from the intrusion of waste and vermin. The debris screen shall be corrosion resistant and shall have openings no larger than 0.5 inches and no smaller than 0.25 inches nominal.
 - 3.2 The roof washer shall automatically divert a minimum of the first 0.02 inch of rainfall per 24-hour period per square feet of roof area from each rainfall event away from the cistern. The device shall not rely on manually operated valves or other devices to do the diversion.

- 3.3 The roof washer shall have minimum dimensions of 30 inches tall, and 24 inches in diameter or 24 inches square.
 - 3.4 The roof washer shall contain 6 inches of pea gravel. The entire surface of the gravel shall be covered with filter fabric (LINQ 125EX; LINQ TYPAR3201; TNS E040; TNS R040; AMOCO 4535 or Marafi 140NL). The filter fabric shall be topped with 18 inches of sand conforming to OAR 340-71-295 (3) (e) or silica sand meeting either NSF 61 or AWWA B 100-53, Section A 2.4.
 - 3.5 The roof wash drain shall be located at the bottom of the roof washer. The outlet pipe shall be 0.5 inches nominal, capped with 3/16 inch drain hole and the discharge shall be directed to an approved location.
 - 3.6 The outlet pipe to the cistern shall be located within the pea gravel layer of the roof washer. The pipe shall be 4 inch nominal, or equal in area to the total area of downspouts supplying the roof washer, and shall be fitted with an approved clean-out fitting. Access to the clean-out fitting shall be provided.
 - 3.7 The pipe entering the cistern shall terminate in a return elbow a minimum of 4 inches below the overflow.
 - 3.8 Roof washers shall be readily accessible for regular maintenance.
4. Pre-filtration screens or filters shall be maintained consistent with manufacturer's specifications.

3316.3.8.4 Cisterns. The following are the minimum requirements for cisterns:

1. General.
 - 1.1 All cisterns shall be listed for use with potable water.
 - 1.2 Cisterns shall be capable of being filled from both the rainwater harvesting system and the public or private water system.
 - 1.3 The municipal or on-site well water system shall be protected from cross contamination in accordance with Section 603.4.5 of the Uniform Plumbing Code.
 - 1.4 Backflow assemblies shall be maintained and tested yearly. The test results shall be provided to the Health Department.
 - 1.5 Cisterns may be used as storm-water collection points that help to minimize flood damage, while providing a reservoir for later use.

1.6 Cisterns shall have access to allow inspection and cleaning.

2. Size.

2.1 Any cistern, or combination of cisterns used, shall have a minimum capacity of 1,500 gallons, and shall be sized adequately for the intended use of the water.

2.2 For above grade cisterns, the ratio of the cistern size shall not be greater than 1:1 height to width, provided that for an engineered steel tank with an engineered foundation, the height may exceed the width, subject to approval of the Administrative Authority. The ratio for below grade cisterns is not limited.

3. Location.

3.1 Cisterns may be installed either above or below grade.

3.2 Below grade cisterns shall be provided with manhole risers a minimum of 8 inches above surrounding grade.

3.3 Above grade cisterns may be located in the following places:

3.3.1 Basements or crawl spaces.

3.3.2 Garages.

3.3.3 Sheds.

3.3.4 Within specially constructed sun barriers.

3.3.5 Greenhouses.

3.4 All cisterns shall be installed in accordance with the manufacturer's installation instructions. Where the installation requires a foundation, the foundation shall be flat and shall be capable of supporting the cistern weight when the cistern is full.

4. Protection. Cisterns shall be protected from direct sunlight.

5. Inlets, outlets and openings.

5.1 All cistern openings shall be protected from unintentional entry by humans or vermin. Manhole covers shall be provided and shall be secured and locked to prevent tampering.

- 5.2 Where an opening is provided that could allow the entry of personnel, the opening shall be marked, "DANGER – CONFINED SPACE".
 - 5.3 Cistern outlets shall be located at least 4 inches above the bottom of the cistern.
6. Overflow. The cistern shall be equipped with an overflow device.
- 6.1 The overflow device shall consist of a pipe 4 inches in diameter minimum or a pipe with a cross sectional area equal to or greater than the total of all downspouts. The overflow device shall be located within 2 inches of the top of the cistern.
 - 6.2 The overflow outlet shall be protected with a screen having openings no greater than 0.25 inches.
 - 6.3 The Administrative Authority shall approve the discharge location of the overflow water.
 - 6.4 Where appropriate and approved by the Administrative Authority, property owners may infiltrate excess collected water into the aquifer.

3316.3.8.5 Pump. Where a pump is provided in conjunction with the rainwater harvesting system, the pump shall meet the following provisions:

1. The pump and all other pump components shall be listed and approved for use with potable water systems.
2. The pump shall be capable of delivering a minimum of 15psi residual pressure at the highest outlet served. Minimum pump pressure shall allow for friction and other pressure losses. Maximum pressures shall not exceed 80psi.

3316.3.8.6 Piping.

1. There shall be no direct connection of any rainwater harvesting pipe system and any domestic potable water pipe system.
2. Materials.
 - 2.1 Pipe used to convey harvested rainwater shall be identified per Section 601.2 and Table 6-1 of the Uniform Plumbing Code.
 - 2.2 Fittings and other system components shall be listed for use in conjunction with specified piping.

- 2.3 Both piping and fittings shall be installed as required by applicable code and standards.
- 2.4 All other products entering into the construction of a rainwater harvesting system shall be listed as required by code for the purpose intended, and suitable for use in a potable water system.
3. All rainwater pipe shall be marked “CAUTION: NON-POTABLE WATER, DO NOT DRINK” every four feet along its length, but in no case less than once per room. The lettering shall comply with Section 601.2 of the Uniform Plumbing Code.
4. Where rainwater harvesting pipe and potable water pipe are installed in the same trench, wall cavity, or other location, the potable water pipe shall be separated by a minimum distance of twelve inches (12”) above the rainwater harvesting pipe.

3316.3.8.7 Labeling. Every water closet or urinal supply, hose bibb or irrigation outlet shall be permanently identified with an indelibly marked placard stating: “CAUTION: NON-POTABLE WATER, DO NOT DRINK”.

3316.3.8.8 Recording System. Rainwater harvesting system installations shall be recorded against the title deed at the County Assessor’s Office. A copy of the recorded document shall be supplied to the Building Official.

3316.3.8.9 Inspections. Rainwater harvesting systems shall be inspected according to the following schedule:

1. Inspection of all elements before they are covered (rough-in inspection)
2. Other inspections as needed
3. Final inspection including testing. In addition to other testing required by the code for plumbing systems, the following also apply:

- 3.1 Piping. A flow test shall be preformed through the system to the point of water distribution and disposal. In addition, the water distribution system shall be tested and proved tight at the operating pressure. Where the manufacturer permits, a 50 psi air test may substitute for the test above. All lines and components shall be watertight.

3316.3.8.10 System Maintenance. Rainwater harvesting systems shall be maintained in functioning order for the life of the system. It is the property owner’s responsibility to maintain the system until the system is abandoned as prescribed in this guide.

3316.3.8.11 System Abandonment. If the owner of a rainwater harvesting system elects to cease use of, or fails to properly maintain such system, they shall abandon the system. To abandon the system one shall:

1. Remove the system entirely;
2. Replace the rainwater harvesting pipe system with an approved potable water supply pipe system. Where an existing potable pipe system is already in place, fixtures may be re-connected to the existing system; and
3. Record the abandonment in the County noting the deletion of the system. A copy of the recorded document shall be supplied to the Administrative Authority.

Rainwater harvesting system abandonment and potable water installations require permit, inspection(s) and approval(s).