



State of Oregon

Board memo

Building Codes Division

July 2, 2008

To: Residential Structures Board

From: Terry Swisher
Chief Plumbing Inspector

Subject: Proposed Statewide Alternate Method for Rainwater Harvesting for Non-Potable Uses

Actions requested:

The division is asking the board to review and approve the scientific and technical facts for an alternate method addressing rainwater harvesting statewide for non-potable residential uses:

Background:

The Building Codes Division will be bringing forward a series of proposals supporting the state's desire to conserve scarce resources and achieve energy efficiency. This proposal addresses rainwater harvesting for non-potable uses. The state approved the following scientific and technical facts specifically related to Alternate Method Ruling OPSC 08-01, rainwater harvesting for potable uses, formally referred to as Appendix M in the plumbing code:

- The statewide alternate method ruling OPSC 08-01 addresses general potable water uses.
- The statewide alternate method ruling OPSC 08-01 provisions address rainwater roof collection and catchment areas in terms of materials and slopes.
- The statewide alternate method ruling OPSC 08-01 provisions address rain leader piping, first-flush diverter systems, storage tanks and pumps.
- The statewide alternate method ruling OPSC 08-01 provisions address water treatment and disinfection methods.

Based on this approval, the division adopted a statewide alternate method for rainwater harvesting for potable purposes, statewide alternate method ruling No. OPSC 08-01. The statewide alternate method ruling No. OPSC 08-01 primarily addresses rainwater harvesting for potable water use. This new proposed alternate method addresses uses that require less treatment than potable water and are also applicable to certain commercial installations.

Based on numerous conversations with industry and developers, the division has created a statewide alternate method to address typical non-potable uses for rainwater. These include irrigation/garden, hose bibbs, toilets, urinals, clothes washing and HVAC make up water supplies. On June, 20, 2008, the Oregon State Plumbing Board reviewed and approved the scientific and technical facts related to statewide alternate method ruling OPSC 08-03, rainwater harvesting for commercial non-potable uses.

This proposed statewide alternate method ruling will be limited to rainwater collected from roof tops. Apartment buildings and commercial structures containing childcare and schools are not included at this time under this proposed statewide alternate method ruling. Until the division proposes future changes requiring statewide acceptance in these areas, the developer or building owner will need to work with the local jurisdiction under the currently allowed process for a site-specific alternate method. The proposed alternate method does not include industrial applications that are already addressed by the mechanical, structural or other codes. For example, rainwater systems used for fire sprinklers, cooling water, steam generation or other industrial applications.

Rainwater harvesting is currently used in many other states and countries. Rainwater harvesting is being done in Ohio, Texas, Arizona, New Mexico, Hawaii, Virgin Islands, Germany, Australia, India and many other locations around the world. Many of these locations rely on a variety of national construction standards.

The proposed statewide alternate method ruling is attached.

Recommendation:

Review and approve the scientific and technical facts related to the attached statewide alternate method for rainwater harvesting systems for residential non-potable uses.

The following scientific and technical facts apply to non-potable rainwater harvesting systems used in residential applications:

- Approved rainwater harvesting systems shall be installed as per the statewide plumbing code, the attached ruling, and ANSI accredited product listings and the manufacturer's installation instructions.
- The alternate method is limited to roof top collection systems in both residential and commercial applications with the exception of apartment buildings and commercial structures containing childcare and schools.
- Rainwater harvesting is currently used in many other states and countries, including California, Washington, Ohio, Texas, Arizona, New Mexico, Hawaii, Virgin Islands, Germany, Australia, India and many other locations around the world.

**State Of Oregon
Building Codes Division
Alternate Method Ruling No. OPSC 08-03**

**APPROVAL OF RAINWATER HARVESTING SYSTEMS AS A STATEWIDE
ALTERNATE METHOD OF PROVIDING WATER FOR NON-POTABLE USES**

Statewide Alternate Methods are approved by the Division administrator in consultation with the appropriate advisory board. The advisory board's review is limited to the technical and scientific merits of the proposal. In addition:

- *building officials shall approve the use of any material, design or method of construction addressed in a statewide alternate method,*
- *the decision to use a statewide alternate method is at the discretion of the designer,*
- *statewide alternate methods do not limit the authority of the building official to consider other proposed alternate methods encompassing the same subject matter*

Initiated By: The Building Codes Division

APPLICABLE CODE SECTION:

None

BACKGROUND:

The State of Oregon approved scientific and technical facts for limited rainwater harvesting systems for potable uses, alternate method ruling No. OPSC 08-01. Based on numerous conversations with industry and developers, the division has created a proposed supplemental statewide alternate method to address typical non-potable uses for rainwater. These include irrigation/garden, hose bibbs, toilets, urinals, clothes washing and heating, ventilation, and air conditioning (HVAC) make-up water supplies. These uses require less treatment and limited or no disinfection. This alternate method addresses uses applicable to residential and commercial installations.

Rainwater harvesting under this method may not be used for apartments or commercial buildings used for childcare or schools. Rainwater harvesting systems used in commercial or residential applications that only provide irrigation are exempt from this ruling and the plumbing code. Rainwater under this alternate method may only be collected from roofs.

Rainwater harvesting is currently used in many other states and countries. Rainwater harvesting is being done in Ohio, Texas, Arizona, New Mexico, Hawaii, Virgin Islands, Germany, Australia, India and many other locations around the world. Many of these locations rely on a variety of national construction standards.

PROCEDURAL HISTORY:

The division initiated this alternate method ruling as a means of addressing sustainability in Oregon. On June 20, 2008, the Oregon State Plumbing Board approved scientific and technical facts relating to the statewide alternate method No. 08-3, rainwater harvesting for commercial

potable uses. This alternate method addresses additional rainwater harvesting for non-potable uses only.

TECHNICAL DISCUSSION:

Under Oregon law, when the division considers making an alternate method ruling on a method of construction, it must consider “standards and interpretations published by the body that promulgates any nationally recognized model code adopted as a specialty code of this state.” ORS 455.060.

The International Association of Plumbing and Mechanical Officials (IAPMO) through its Evaluative Services and in the text of the Uniform Plumbing Code, recognizes stormwater harvesting management, including rooftop harvesting methods. However, because the current model code does not specifically address rainwater this alternate method is necessary. Product standards and approved materials are listed in Table 14-1 of the Uniform Plumbing Code.

FINDINGS:

As approved by the Oregon State Plumbing Board, the following scientific and technical facts apply to rainwater harvesting system for non-potable uses as an alternate method:

- The statewide alternate method ruling OPSC 08-03 provisions address rainwater roof collection and catchment areas in terms of materials and slopes.
- The statewide alternate method ruling OPSC 08-03 provisions address rain leader piping, first-flush diverter systems, storage tanks and pumps.
- Approved rainwater harvesting systems shall be installed as per the statewide plumbing code, the attached ruling, American National Standards Institute (ANSI) accredited product listings and to the manufacturer’s installation instructions.
- The non-potable statewide alternate method ruling OPSC 08-03 is limited to roof top collection systems in both residential and commercial applications with the exception of apartment buildings and commercial structures containing childcare and schools.
- Rainwater harvesting is currently used in many other states and countries, including California, Washington, Ohio, Texas, Arizona, New Mexico, Hawaii, Virgin Islands, Germany, Australia, India and many other locations around the world.

SCOPE OF RULING:

Following consideration of the scientific and technical facts approved by the Oregon State Plumbing Board and the Residential Structures Board, the division rules that rainwater harvesting systems for irrigation/gardens, hose bibbs, toilets, urinals, clothes washing and make-up water for HVAC systems shall be allowed. The division has determined that rainwater harvested only for commercial or residential gardens or irrigation are exempted from the requirements of this alternate method ruling except #11, and must simply be designed to not interact with the potable water supply, the building sanitary sewer or septic system, or cause damage to property or erosion. This ruling does not recognize installation in apartments or commercial buildings used for childcare or schools, at this time. The proper system design, maintenance and use are the responsibility of the building owner.

1. Except as otherwise provided for in this alternate method, the provisions of the Oregon plumbing code, where appropriate, shall be applicable to rainwater harvesting systems for non-potable uses. The alternate use of rainwater harvesting systems for non-potable uses are in addition to the other requirements of the Plumbing Code.
2. The following definitions apply to rainwater harvesting systems:
 - Catchment** – Means only a roof surface used for the collection of rainwater.
 - Downspout** – The rain leader from the roof to the rainwater storage vessel.
 - First-Flush Diverters** – A device which collects the initial rainwater from a catchment during a rain event and disposes of the potentially contaminated water.
 - Leader** – An exterior vertical drainage pipe for conveying storm water from the roof or gutter drains.
 - Non-Potable Water** – Rainwater harvested for the purpose of supplying water to hose bibbs, toilets, urinals, clothes washing irrigation/garden and HVAC make-up water.
 - Potable Water** – Water that is satisfactory for drinking, culinary, and domestic purposes.
3. All piping and plumbing component materials used in the installation of a rainwater harvesting system shall be as approved for the specific use in the Oregon plumbing code or be listed by an ANSI accredited product certification program.
4. Collection roofing, gutters, piping, fittings, valves, screens, downspouts, leaders, flushing devices, tanks and liners shall be approved for the intended use.
5. All surfaces, tanks and equipment shall be washed clean before they are put into service.
6. Materials used in rainwater harvesting systems shall be listed by an ANSI accredited product certification program.
7. Harvested rainwater must be filtered or treated to an appropriate quality. No treatment is necessary for irrigation/garden use only.
8. All piping in the system shall be easily recognizable. Harvested rainwater piping downstream of the storage tank shall be marked by being purple in color, or being marked clearly with purple tape or stripe, or being painted purple with compatible paint, or being labeled at intervals of not more than five feet with the words NON-POTABLE WATER.
9. Rain barrels may be used at downspouts for collection of water for irrigation only. Rain barrels shall be screened with a fine mesh (0.5 inch x 0.5 inch) to prevent mosquitoes from entering. No plumbing permit is required for rain barrels.
10. Outlets and fixtures served with harvested rainwater shall be easily recognizable by color or a symbol for non-potable water.



Universal Symbol for Non-Potable Water

11. No part of a private potable water system source, treatment system, plumbing system or water served fixture shall be connected with any part of a public drinking water system without appropriate backflow protection.

12. Rainwater shall only be collected from roof surfaces. Roof surfaces shall be constructed of slate, metal, tile, concrete, fiberglass or other approved material.
13. Roof catchments shall be accessible, maintained clean and free from debris. Roof catchment area shall be based upon the foot print of the roof and not the actual area of the roof surface. The foot print area of the roof catchment shall be calculated by measuring the outside dimension of the roof and multiplying length times width.
14. Gutters intended to capture rainwater for harvesting shall be the continuous or seamless type and constructed of materials which are approved for their intended use. A gutter shall be screened with an approved material over its entire opening to keep out leaves, debris and other large contaminants or have a screened collection point. Gutter screens shall not have an opening greater than one-half (1/2) inch (12 mm).
15. Gutters shall have a continuous grade with a minimum slope of one-sixteenth (1/16) inch per foot to the outlet leader with no sags or flat portions where water will collect or stand. Gutters shall be clean and maintained on a regular basis. Run off of wash water shall be diverted from the storage tanks to a location which will not cause damage to property or cause erosion.
16. Gutter outlets may be connected indirectly to the rain leader with a screened leaf protected receptor inlet.
17. All piping from gutters to the storage tanks shall be continuously graded from the roof to the tank. Piping shall have a continuous grade with a minimum slope of one-fourth (1/4) inch (6 mm) per foot (300 mm) to the storage tank. Except for first-flush washers, no section of piping shall be installed in a manner which will hold water and not drain completely. Trapping of piping is prohibited.
18. Plastic piping shall be protected from UV radiation by a factory applied protective coating or painted with a compatible latex paint. Piping and solvent cements shall be approved for the intended use.
19. Metal rain leaders shall be seamless aluminum, galvanized steel or other approved material.
20. Piping from down spouts to storage tanks shall be sized according to Table 11-1 of the plumbing code.
21. All rainwater harvesting systems shall have a first-flush diverter installed in a manner which will divert the first flow of water from the catchment surface during each rain event. Water drained from the first-flush diverter will be piped away from the storage tank and terminate in a location which will not cause damage to property or erosion.
22. First-flush diverters shall be sized so that the minimum volume of the water diverted is at least equal to ten (10) gallons (30.8L) per each rain event and be listed factory assemblies or constructed of approved materials on site.
23. First-flush diverter vessels shall have a cleanout fitting in the bottom of the device. First-flush diverters shall be provided with an automatic means of self-draining between rain events.
24. Storage tanks may be constructed of fiberglass, polypropylene, metal, concrete, ferrocement, wood or listed material. Storage tanks shall be opaque or painted to prohibit algae growth. Polypropylene tanks shall not be painted.

25. Storage tanks shall be listed for use with water and be provided adequate access for cleaning and maintenance purposes. Storage tanks which have been previously used for other purposes are prohibited. Storage tanks must be completely covered and any vent or other opening screened to prevent mosquito breeding. Covers must be sturdy and be constructed in such a way that they will not allow water to pond or collect on the surface.
26. Storage tanks shall be as close to the catchment area as is practical and protected from sunlight or other light source in an approved manner. In areas where freezing temperatures are frequent adequate provisions shall be made to protect the tank and connected piping from freezing.
27. Storage tanks shall be provided with an overflow equal in size to the tank inlet. Overflows shall be piped away from the tank and the water shall be disposed of in a manner which will not cause damage to property or erosion. Overflow drains shall be equipped with durable animal guards or screens. Connection of overflow piping to any sanitary or storm/sanitary combined sewer piping is prohibited.
28. Above ground storage tanks shall be placed on a stable, level surface of sufficient strength to accommodate the size and weight of a full tank.
29. Buried plastic storage tanks shall be reinforced and able to withstand the weight of the surrounding fill and soil and full capacity of water. Concrete tanks which are above ground or underground must be constructed to withstand the load of water capacity and any other applicable structural forces.
30. Storage tanks shall be watertight and designed to withstand the structural loads required for their size and shape. Tanks shall be vented when necessary. The vent shall turn down and be equipped with a screen to prevent mosquitoes from entering.
31. Storage tanks shall not be connected directly to a public or community water supply without proper backflow protection. Make up water to rainwater storage tanks, when provided, may be made through a properly sized and constructed air gap as per Oregon plumbing code Table 6-3.
32. Pressure tanks and pumps shall be of an approved type listed, designed and intended for water use. Pressure switches shall be set to provide a minimum residual water pressure of fifteen (15) pounds per square inch (103.4 kPa) in the building but shall be set no higher than eighty (80) pounds per square inch (552 kPa). Pressure tanks shall be of the expandable diaphragm type and sized based upon the peak flow capacity of the pump.
33. Pumps shall be a minimum of ½ horsepower or as specified by the manufacturer. A full size check valve shall be installed between the storage tank and the pump inlet. Pump inlet piping shall be a minimum of one (3/4) inch (20mm) or as specified by the manufacturer. Pressure tanks shall be sized based upon the demand required for the intended use. On-demand type of pump systems, which incorporate the pump, motor, controller, check valve and pressure tank may be used.
34. Pumps shall be at an elevation which is as close as practical to the elevation of the storage tank. Pumps shall be installed in a location which is adequately protected from freezing, overheating or where other potential damage may result.
35. Water intake supply from storage tanks to pumps shall be from a floating submerged intake pipe or equivalent.

36. A preliminary screening of all water shall be installed between the catchment and the storage tank. The screen mesh shall not have an opening greater than (1/2) inch (12mm). The screen should be washed clean of debris after each rain event. Storage tank screening shall be fine enough to prevent mosquitoes from entering.
37. Initially storage tank water may be treated with chlorine laundry bleach (which does not contain additives) by manually adding one (1) ounce (.0296 L) for every 200 gallons of water in the tank.
38. Adequate filters shall be installed for the intended water use. Cartridge filter elements must be replaced as recommended by the manufacturer.

CONCLUSION:

After considering the technical and scientific approval by the Oregon State Plumbing Board, the division rules that rainwater harvesting systems for non-potable uses are acceptable as a construction method, subject to stated limitations, and Alternate Method Ruling OPSC 08-03 is approved.

Mark S. Long, Administrator
Building Codes Division

Date