

**Oregon
Interpretive Ruling No. 93-94
(Revised July 29, 1994)**

**RESTRAINT REQUIREMENTS FOR WATER HEATERS IN SEISMIC ZONE 3
INSTALLED UNDER THE OREGON STATE PLUMBING SPECIALTY CODE AND
OREGON STATE ONE AND TWO FAMILY DWELLING SPECIALTY CODE**

Initiated By: TERRY L. SWISHER
BUILDING CODES DIVISION

Revision Requested By: LATERAL FORCE TASK GROUP

QUESTION CONSIDERED

What methods are approved for restraint of water heaters for earthquake protection under Section 1310(e) of the 1992 Oregon State Plumbing Specialty Code (OSPSC) and the Oregon State One and Two Family Dwelling Code (Dwelling Code) and Section M-1006.2 of the Dwelling Code mechanical provisions?

APPLICABLE CODE SECTIONS

1993 Dwelling Code, Part V, and 1992 OSPSC Chapter 13, Protection From Damage, Section 1310(e), Protection From Damage, says:

(e) In Seismic Zone 3 and 4 water heaters shall be anchored or strapped to resist horizontal displacement due to earthquake motion.

The 1993 Dwelling Code Mechanical provisions, Anchorage of Appliances, Section M-1006.2, says:

M-1006.2 Anchorage of appliances: Appliances designed to be fixed in position shall be securely fastened in place. In Seismic Zones Nos. 3 and 4 (see Seismic Risk Map in Appendix A) water heaters having nonrigid water connections and over 4-feet in height from the base to the top of the tank case shall be anchored or strapped to the building to resist horizontal displacement due to earthquake motion. (Emphasis added.)

BACKGROUND

Originally, the recommendation of the Lateral Force Task Group (which was subsequently approved by both the Structural Code Advisory Board and the Plumbing Board) was based on the premise that a specific code requirement (Section M-1006.2) overrules a general requirement [Section 1310(e)]. A matrix was developed to define the specific requirements as they applied in Seismic Zone 3. Preliminary information gathered from the Northridge earthquake in Los Angeles indicates water heaters installed with rigid piping and no strapping occasionally failed. Moreover, there are inconsistencies in the original interpretive ruling that have resulted in disagreements between installers of water heaters and inspectors over the application of these requirements. As a result of the above, the Lateral Force Task Group is revising the interpretive ruling to incorporate more restrictive, but clearly defined, water heater strapping requirements.

FINDINGS

Section 1310(e) and Section M-1006.2 require water heaters in Seismic Zones 3 and 4 to be anchored or strapped to resist horizontal movement during earthquake. Because preliminary information from Northridge earthquake indicates hard-piped water heaters without strapping did occasionally fail, the Lateral Force Task Group recommends elimination of this option allowed in the previous interpretive ruling. The anchoring methods included have been reviewed by the Lateral Force Task Group and found to be adequate to resist the lateral loads expected under earthquake conditions.

RULING

Water heaters installed in Seismic Zones 3 or 4 are required to be secured to prevent displacement. The following requirements establish minimum prescriptive methods for securing water heaters in Seismic

Zones 3 or 4 and are not intended to prevent other alternatives where conditions limit the use of these methods.

Water heaters installed within 12 inches above the floor are required to be strapped between the top one-third and top one-half of the tank. Water heaters installed more than 12 inches above the floor shall be strapped between 6 inches and the top one-third of the tank, and a second strap located near the bottom of the tank, 3 inches above or below the control or access panel. Strapping material shall be plumber's tape or equivalent strapping with a minimum tensile strength of 100 pounds. Stands shall be stable. Strapping shall be snug and connected to structural framing, masonry fireplace or chimney. Connectors shall have washers as necessary to assure the connector does not pull through the strapping. Approved connectors include:

Wood: 1 #12 screw with 1¹/₂-inch penetration at each end.

Concrete: 1/4-inch ϕ x 1¹/₂-inch expansion anchors or equivalent.

Masonry or Brick: 1/4-inch ϕ sleeve anchor or equal having a minimum embedment of 1¹/₂ inches.

These requirements apply to water heaters with a storage capacity of 66 gallons or less. Water heaters with more than 66 gallons but less than 100 gallons are required to have two straps regardless of height above floor. Water heaters 100 gallons or greater shall be secured according to an approved design.

When required by the water heater listing, noncombustible spacers shall be attached to the wall and placed between the wall and the heater. Engineered systems are to be installed according to the engineer's design.

The Building Codes Structures Board approves this revised interpretive ruling as an interpretation of Section 1310(e) of the 1993 Dwelling Code.

(signed September 19, 1994)

John Talbott, PE, Chair
Building Codes Structures Board

Date

The Plumbing Board approves this revised interpretive ruling as an interpretation of Section 1310 (e) of the OSPSC.

(signed September 6, 1994)

Edward J. Gormley, Chairman
State Plumbing Board

Date

The recommendations and findings of the Building Codes Structures Board and State Plumbing Board are accepted and the interpretations are adopted as stated above.

(signed September 20, 1994)

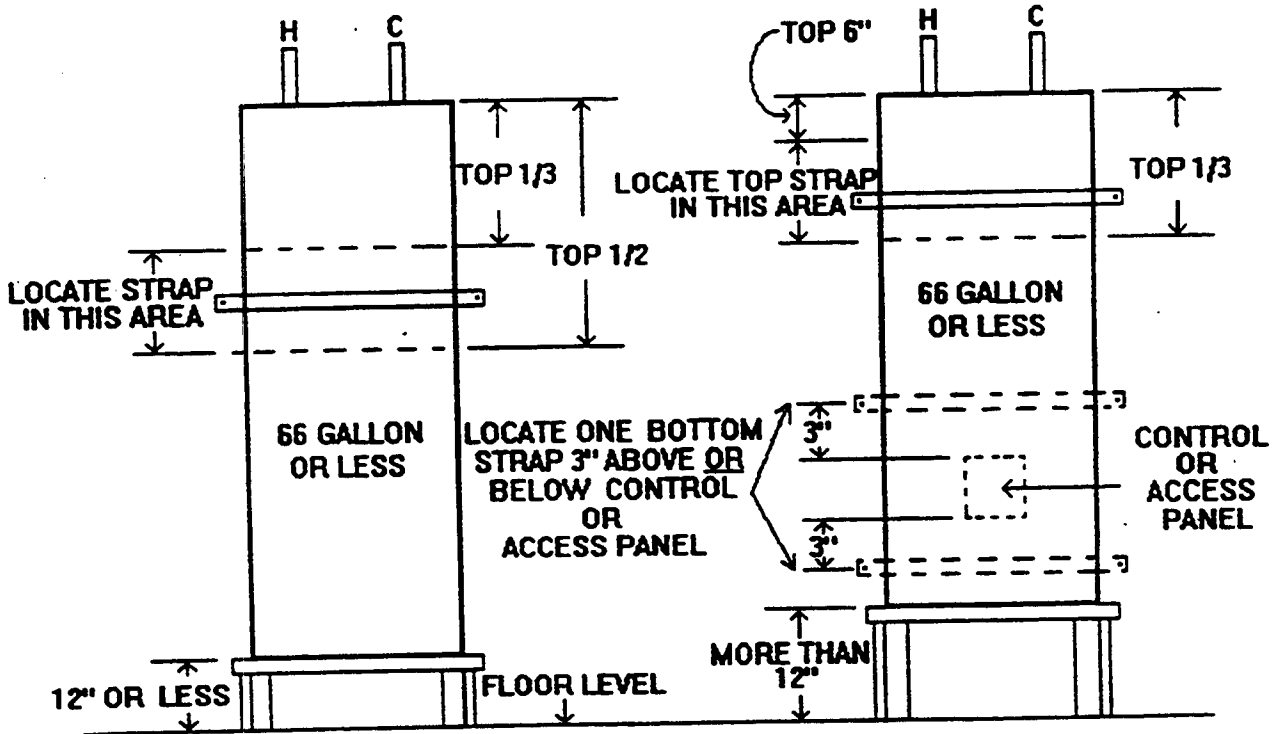
Gary J. Wicks, Administrator
Building Codes Division

Date

ATTACHMENT A

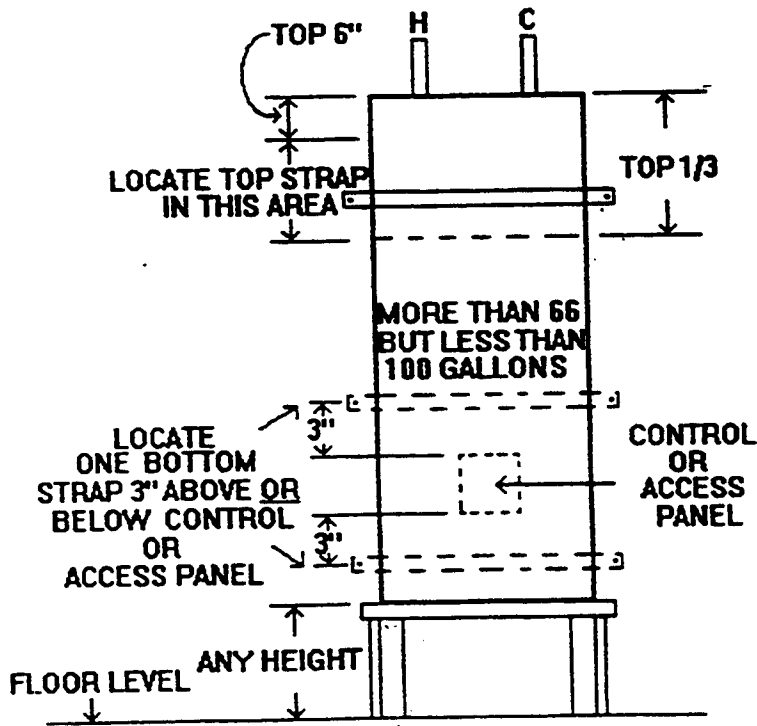
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66 GAL OR LESS
12" OR LESS ABOVE FLOOR

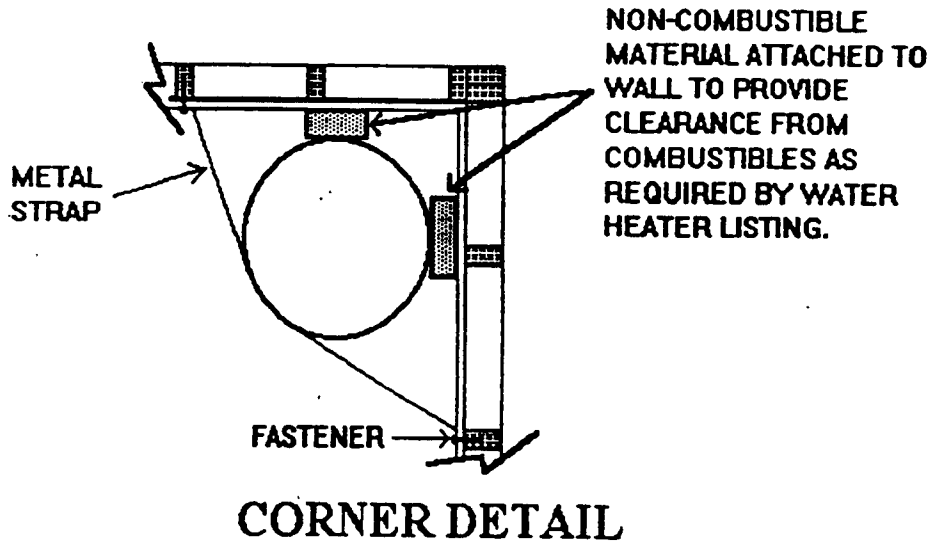
66 GAL OR LESS
ELEVATED MORE THAN 12"



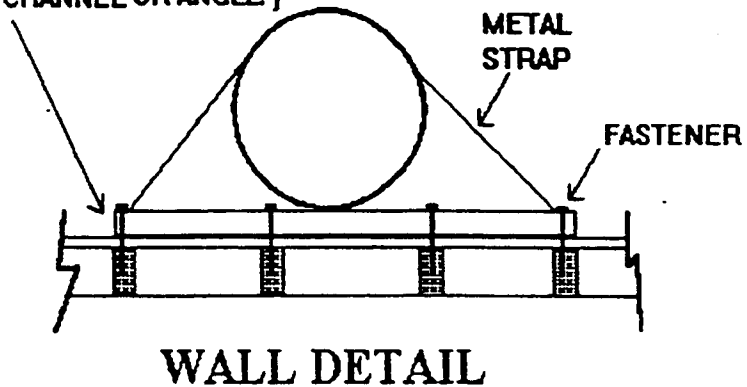
MORE THAN 66 GAL BUT LESS THAN 100 GAL
ANY HEIGHT ABOVE FLOOR

ATTACHMENT B
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THE FOLLOWING METHODS ARE APPROVED FOR ALL RESIDENTIAL AND COMMERCIAL WATER HEATERS OF LESS THAN 100 GALLONS CAPACITY.



METAL MEMBER ATTACHED TO STUDS.
PROVIDE CLEARANCE FROM COMBUSTIBLES
AS REQUIRED BY WATER HEATER LISTING.
(SUCH AS, STEEL CHANNEL OR ANGLE.)



- NOTES: 1. DETAILS ON THIS PAGE ARE SUGGESTED - OTHER EQUIVALENT METHODS ARE ACCEPTABLE.
2. SEE INTERPRETIVE RULING TEXT FOR FASTENER TYPES AND SIZES.