

Exhibit O

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**WASHINGTON STATE
ENERGY CODE
2006 EDITION**

CHAPTER 51-11 WAC



WASHINGTON STATE BUILDING CODE COUNCIL

EFFECTIVE JULY 1, 2007

1. When the heat gain or loss of the ducts, without insulation, will not increase the energy requirements of the building.
2. Within the HVAC equipment.
3. Exhaust air ducts.
4. Supply or return air ducts installed in unvented crawl spaces with insulated walls, basements or cellars in one- and two-family dwellings.

503.10 Ducts

503.10.1 Leakage Testing: High-pressure and medium-pressure ducts shall be leak tested in accordance with the 1985 Edition of the SMACNA HVAC Air Duct Leakage Test Manual with the rate of air leakage not to exceed the maximum rate specified in that standard.

503.10.2 Seams and Joints: All low-pressure supply and return duct transverse joints, and enclosed stud bays or joist cavities/space used to transport air, shall be securely fastened and sealed with welds, gaskets, mastics (adhesives), or mastic-plus-embedded-fabric systems installed in accordance with the manufacturer’s installation instructions.

EXCEPTIONS: 1. Ducts or building cavities used for air distribution that are located entirely within the conditioned space of the building are exempt from this section.

2. UL 181A listed tapes used with listed rigid fibrous glass ducts may be used as the primary sealant, when installed in accordance with the listing.

3. UL 181B listed tapes used with listed flexible air ducts may be used as the primary sealant, when installed in accordance with the listing.

4. Where enclosed stud bays or joist cavities/spaces are used to transport air sealing may be accomplished using drywall, drywall tape plus joint compound.

5. Tapes installed in accordance with the manufacturer’s installation instructions, providing detailed information specific to application on ducts, including approved duct materials and required duct surface cleaning.

503.10.3 Dampers: Requirements for automatic or manual dampers are found in the Washington State Ventilation and Indoor Air Quality Code.

503.11 Pipe Insulation: All piping shall be thermally insulated in accordance with Table 5-12.

EXCEPTION: Piping installed within unitary HVAC equipment.

Cold water pipes outside the conditioned space shall be insulated in accordance with the Washington State Plumbing Code (Chapter 51-56 WAC).

SECTION 504 — SERVICE WATER HEATING

504.1 Scope: The purpose of this section is to provide criteria for design and equipment selection that will produce energy savings when applied to service water heating.

504.2 Water Heaters, Storage Tanks and Boilers

504.2.1 Performance Efficiency: All storage water heaters shall meet the requirements of the National Appliance Energy Conservation Act and be so labeled. All electric water heaters in unheated spaces or on concrete floors shall be placed on an incompressible, insulated surface with a minimum thermal resistance of R-10.

For combination space and service water heaters with a principal function of providing space heat, the Combined Annual Efficiency (CAE) may be calculated by using ASHRAE Standard 124-1991. Storage water heaters used in combination space heat and water heat applications shall have either an Energy Factor (EF) or a Combined Annual Efficiency (CAE) of not less than the following:

	Energy Factor (EF)	Combined Annual Efficiency (CAE)
< 50 gallon storage	0.58	0.71
50 to 70 gallon storage	0.57	0.71
> 70 gallon storage	0.55	0.70

504.2.2 Insulation: Heat loss from unfired hot-water storage tanks shall be limited to a maximum of 9.6 Btu/h/ft² of external tank surface area. The design ambient temperature shall be no higher than 65°F.

504.2.3 Combination Service Water Heating/Space Heating Boilers: Service water heating equipment shall not be dependent on year round operation of space heating boilers.

EXCEPTIONS: 1. Systems with service/space heating boilers having a standby loss Btu/h less than:

$$(13.3 \text{ pmd} + 400)/n$$

determined by the fixture count method where:

pmd = probable maximum demand in gallons/hour as determined in accordance with Chapter 49 of Standard RS-11.

n = fraction of year when outdoor daily mean temperature exceeds 64.9°F.

The standby loss is to be determined for a test period of 24 hours duration while maintaining a boiler water temperature of 90°F above an ambient of 60°F and a five foot stack on appliance.

2. For systems where the use of a single heating unit will lead to energy savings, such unit shall be utilized.

504.3 Automatic Controls: Service water heating systems shall be equipped with automatic temperature controls capable of adjustment from the lowest to the highest acceptable temperature settings for the intended use. Temperature setting range shall be set to 120°F or 49°C.

504.4 Shutdown: A separate switch shall be provided to permit turning off the energy supplied to electric service water heating systems. A separate valve shall be provided to permit turning off the energy supplied to the main burner(s) of all other types of service water heater systems.