[Note: New definitions to add]

TEMPERATURE MAINTENANCE: The system used to maintain the temperature of the building service hot water delivery system, typically by circulation and reheating or by a heat trace system.

[Note: Strike all of Section C404.2.1 and C404.2.2 and replace with the new language below.]

C404.2.1 Service water heating system type. Service hot water shall be provided by an electric air-source heat pump water heating (HPWH) system meeting the requirements of version 8.0 of the Northwest Energy Efficiency Alliance (NEEA) Advanced Water Heating Specification and this section.

Exceptions:

1. Solar thermal, wastewater heat recovery, other *approved* waste heat recovery, ground source heat pump, water-source heat pump system utilizing waste heat, and combinations thereof, are permitted to offset all or any portion of the required electric air-source HPWH system capacity where such systems comply with this code and the WA State Plumbing Code.

2. 24kW plus 0.1W/SF of building area of stand-alone electric resistance water heating capacity is allowed per building.

3. Commercial dishwashers, commercial food service equipment, laboratory equipment, and other domestic or commercial *approved* process equipment may utilize internal electric electrical resistance heaters for service hot water supply water temperatures 140°F or higher.

4. Specific conditions. Portions of buildings that cannot use an electric air-source HPWH are permitted to use electric resistance water heating for specific conditions *approved* by the *code official* for research, health care, process, or other specific needs that cannot practicably be served by electric air-source heat pump or other water heating systems. This does not constitute a blanket exception for any occupancy type.

C404.2.2 Supplemental water heaters. Supplemental electric resistance heating is permitted for the following uses:

1. Temperature maintenance of heated-water distribution systems, physically separate from the electric air-source heat pump service water heating system (including circulation systems and heat tracing for temperature maintenance) may utilize electric resistance heat. Temperature maintenance heating capacity shall be no greater than the electric air-source heat pump water heating capacity at entering source dry bulb (or wet bulb if rated for wet bulb temperatures) air temperature of 40°F.

2. Defrost of compressor coils may utilize electric resistance heaters.

3. Heat tracing of piping for freeze protection.

4. Emergency or supplemental electric resistance backup for the electric air-source heat pump water heating plant sized no greater than the electrical air-source heat pump service water

heating output capacity at entering source dry bulb (or wet bulb if rated for wet bulb temperature) air temperature of 40°F.

Table C406.1

EFFICIENCY PACKAGE CREDITS

	Commercial Building Occupancy					
Code Section	Group R-1	Group R-2	Group B ^a	Group E	Group M	All Other
	Additional Efficiency Credits					
8. High efficiency service water heating in accordance with Sections C406.8.1 and C406.8.2	4 <u>3</u>	5 <u>3</u>	NA	NA	NA	8 <u>3</u>
9. High efficiency service water heating in multifamily buildings <u>systems</u> in accordance with Section C406.9	7 <u>3</u>	8 <u>3</u>	NA	NA	NA	NA <u>3</u>

^a In Group B occupancies, the high-performance service water heating credit applies only to research and production laboratory spaces, and adjacent circulation serving those laboratory spaces, but not to associated office or other space uses.

C406.8.2 Load fraction. Not less than 60 percent of the annual service hot water heating energy use, or not less than 100 percent of the annual service hot water heating energy use in buildings with water-cooled systems subject to the requirements of Section C403.9.5 or qualifying for one of its exceptions, shall be provided by one or more of the following:

1. Service hot water system delivering heating requirements using heat pump technology with a minimum COP of 3.0. For air-source equipment, the COP rating will be reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (15.6°C) or lower. For water-source equipment, the COP rating will be reported at the design leaving load water temperature with an entering will be reported at the design leaving load water temperature with an entering water temperature of 74°F (23.3°C) or <u>An electric air-source heat pump water heating system(s) meeting the requirements of Tier 2 or higher of the Northwest Energy Efficiency Alliance Advanced Water Heating Specification.</u>

2. Waste heat recovery from service hot water, heat recovery chillers, building equipment, process equipment, or other *approved* system. Qualifying heat recovery must be above and beyond heat recovery required by other sections of this code.

3. On site renewable energy water-heating systems.

C406.9 High performance service water heating in multifamily buildings. For a whole building, building addition, or tenant space with not less than 90 percent of the conditioned floor area being Group <u>R-1</u>, R-2, <u>A-2</u>, <u>A-3</u>, <u>I-2</u>, <u>or F</u> occupancy, not less than 90 percent of the annual building service hot water energy use shall be provided by an electric air-source heat pump <u>water heating</u> system(s) meeting the requirements of Tier 3 or higher of the Northwest Energy Efficiency Alliance Advanced Water Heating Specification. with a minimum COP of 3.0. This efficiency package is allowed to be taken in addition to Section C406.8.2.

C503.5 Service hot water systems. New service hot water systems that are part of the alteration shall comply with Sections C404, except Sections C404.2.1 and C404.2.2, C408, C503.5.1 and C503.5.2.

[Note: add new language below]

C503.5.1 High input-rated service water heating systems for other than Group R-1 and R-2

occupancies. In buildings where the combined input rating of the water-heating equipment installed in a building is equal to or greater than 1,000,000 Btu/h (293 kW), the combined input-capacity-weighted-average efficiency of water-heating equipment shall be no less than the following for each water heating fuel source:

- Electric: A rated COP of not less than 2.0. For air-source heat pump equipment, the COP rating will be reported at the design leaving heat pump water temperature with an entering air temperature of 60°F (15.6°C) or less.
- 2. Fossil Fuel: A rated Et of not less than 92 percent as determined by the applicable test procedures in Table C404.2.

Exceptions:

- 1. Where not less than 25 percent of the annual service water-heating requirement is provided from any of the following sources:
 - 1.1. Renewable energy generated on site that is not being used to satisfy another requirement of this code; or
 - 1.2. Site recovered energy that is not being used to satisfy other requirements of this code.
- 2. Redundant equipment intended to only operate during equipment failure or periods of extended maintenance.
- 3. Electric resistance heated systems installed as part of an alteration where the water heating equipment is installed at the grade level in a building with a height of four stories or greater.
- 4. Hot water heat exchangers used to provide service water heating from a district utility (steam, heating hot water).
- 5. Water heaters provided as an integral part of equipment intended to only heat or boost the heat of water used by that equipment.
- 6. For electric heat systems, supplemental water heaters not meeting this criteria that function as auxiliary heating only when the outdoor temperature is below 32°F (0°C) or when a defrost cycle is required are not required to have a rated COP of 2.0. Such systems shall be sized and configured to lock out electric resistance or fossil fuel heating from operation when the outdoor temperature is above 32°F (0°C) unless the system is in defrost operation.

C503.5.2 High input-rated service water heating system for Group R-1 and R-2 occupancies. In buildings with over 1,000,000 Btu/h installed service water heating capacity serving Group R-1 and R-2 occupancies, at least 25 percent of annual water heating energy shall be provided from any combination of the following water heating sources:

- 1. Renewable energy generated on site that is not being used to satisfy other requirements of this code; or
- 2. Site-recovered energy that is not being used to satisfy other requirements of this code.

Exception: Compliance with this section is not required if all service water heating is accomplished by equipment complying with one or more of the the following:

- 1. Electric Resistance: One or more electric resistance water heaters with an input capacity weighted average rating of 105% of the rated efficiency of Table C404.2.
- 2. Electric Heat Pump:
 - a. One or more heat pump water heaters with rated input ≤ 12 kW and rated in accordance with 10 CFR Part 430 with an input capacity weighted average rating of 105% of the rated efficiency of Table C404.2.
 - b. One or more commercial heat pump water heaters not rated in accordance with 10 CFR Part 430: Such systems shall be sized and configured to lock out electric resistance or fossil fuel heating from operation when the outdoor temperature is above 32°F (0°C) unless the system is in defrost operation.
- 3. Fossil Fuels: One or more fossil fuel water heaters with an input capacity weighted rated Et of not less than 92% as determined by the applicable test procedures in Table C404.2.
- 4. Hot water heat exchangers used to provide service water heating from a district utility (steam, heating hot water).