

(Effective until March 15, 2024)

WAC 51-11C-40344 Section C403.4.4—Part load controls.

C403.4.4 Part load controls. Hydronic systems greater than or equal to 300,000 Btu/h (88 kW) in design output capacity supplying heated or chilled water to comfort conditioning systems shall include controls that are configured to:

1. Automatically reset the supply-water temperatures in response to varying building heating and cooling demand using coil valve position, zone-return water temperature or outdoor air temperature. The temperature shall be reset by not less than 25 percent of the design supply-to-return water temperature difference.

EXCEPTION: Hydronic systems serving hydronic heat pumps.

2. Automatically vary fluid flow for hydronic systems with a combined pump motor capacity of 2 hp or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or the maximum reduction allowed by the equipment manufacturer for proper operation of equipment by valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.

3. Automatically vary pump flow on heating water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows:

3.1. Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.

3.2. Where pumps have automatic direct digital control configured to operate pumps only when zone heating or cooling is required, a variable speed drive shall be provided for pumps with motors having the same or greater nominal output power indicated in Table C403.4.4 based on the climate zone and system served.

4. Where variable speed drive is required by Item 3 of this section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

- EXCEPTIONS:
- 1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
 - 2. Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.
 - 3. Variable pump flow is not required on dedicated equipment circulation pumps where configured in primary/secondary design to provide the minimum flow requirements of the equipment manufacturer for proper operation of equipment.
 - 4. Variable speed drives are not required on heating water pumps where more than 50 percent of annual heat is generated by an electric boiler.

**Table C403.4.4
Variable Speed Drive (VSD) Requirements for Demand-Controlled Pumps**

Climate Zones 4c, 5b	VSD Required for Motors with Rated Output of at Least
Heating water pumps	≥7.5 hp
Chilled water and heat rejection loop pumps	≥7.5 hp

[Statutory Authority: RCW 19.27A.020, 19.27A.025, 19.27A.160 and chapter 19.27 RCW. WSR 19-24-040, § 51-11C-40344, filed 11/26/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.045,

19.27A.160, and 19.27.074. WSR 17-10-062, § 51-11C-40344, filed 5/2/17, effective 6/2/17. Statutory Authority: RCW 19.27A.025, 19.27A.160, and 19.27.074. WSR 16-03-072, § 51-11C-40344, filed 1/19/16, effective 7/1/16. Statutory Authority: RCW 19.27A.020, 19.27A.025 and chapters 19.27 and 34.05 RCW. WSR 13-04-056, § 51-11C-40344, filed 2/1/13, effective 7/1/13.]

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EXCEPTIONS: 1. Hydronic systems serving hydronic heat pumps.
2. Hydronic systems with thermal energy storage where resetting the supply-water temperature would reduce the capacity of the storage.

2. Automatically vary fluid flow for hydronic systems with a combined pump motor capacity of 2 hp or larger with three or more control valves or other devices by reducing the system design flow rate by not less than 50 percent or the maximum reduction allowed by the equipment manufacturer for proper operation of equipment by valves that modulate or step open and close, or pumps that modulate or turn on and off as a function of load.

3. Automatically vary pump flow on heating water systems, chilled-water systems and heat rejection loops serving water-cooled unitary air conditioners as follows:

3.1. Where pumps operate continuously or operate based on a time schedule, pumps with nominal output motor power of 2 hp or more shall have a variable speed drive.

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4. Where variable speed drive is required by Item 3 of this section, pump motor power input shall be not more than 30 percent of design wattage at 50 percent of the design water flow. Pump flow shall be controlled to maintain one control valve nearly wide open or to satisfy the minimum differential pressure.

EXCEPTIONS: 1. Supply-water temperature reset is not required for chilled-water systems supplied by off-site district chilled water or chilled water from ice storage systems.
2. Variable pump flow is not required on dedicated coil circulation pumps where needed for freeze protection.
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