

(Effective until July 1, 2020)

WAC 51-11C-40333 Section C403.3.3—Air economizers.

C403.3.3 Air economizers. Air economizers shall comply with Sections C403.3.3.1 through C403.3.3.5.

C403.3.3.1 Design capacity. Air economizer systems shall be configured to modulate *outdoor air* and return air dampers to provide up to 100 percent of the design supply air quantity as *outdoor air* for cooling.

C403.3.3.2 Control signal. Economizer controls and dampers shall be configured to sequence the dampers with the mechanical cooling equipment and shall not be controlled by only mixed air temperature. Air economizers on systems with cooling capacity greater than 65,000 Btu/h shall be configured to provide partial cooling even when additional mechanical cooling is required to meet the remainder of the cooling load.

EXCEPTION: The use of mixed air temperature limit control shall be permitted for systems that are both controlled from space temperature (such as single *zone* systems) and having cooling capacity less than 65,000 Btu/h.

C403.3.3.3 High-limit shutoff. Air economizers shall be configured to automatically reduce *outdoor air* intake to the design minimum *outdoor air* quantity when *outdoor air* intake will no longer reduce cooling energy usage. High-limit shutoff control types for specific climates shall be chosen from Table C403.3.3.3. High-limit shutoff control settings for these control types shall be those specified in Table C403.3.3.3.

**Table C403.3.3.3
High-limit Shutoff Control Setting for Air Economizers^b**

| Device Type | Climate Zone | Required High Limit (economizer off when): | |
|---|--------------|--|--|
| | | Equation | Description |
| Fixed dry-bulb | 4C, 5B | $T_{OA} > 75^{\circ}\text{F}$ | Outdoor air temperature exceeds 75°F |
| Differential dry-bulb | 4C, 5B | $T_{OA} > T_{RA}$ | Outdoor air temperature exceeds return air temperature |
| Fixed enthalpy with fixed dry-bulb temperatures | All | $h_{OA} > 28 \text{ Btu/lb}^{\text{a}}$ or $T_{OA} > 75^{\circ}\text{F}$ | Outdoor air enthalpy exceeds 28 Btu/lb of dry air ^a or outdoor air temperature exceeds 75°F |
| Differential enthalpy with fixed dry-bulb temperature | All | $h_{OA} > h_{RA}$ or $T_{OA} > 75^{\circ}\text{F}$ | Outdoor air enthalpy exceeds return air enthalpy or outdoor air temperature exceeds 75°F |

For SI: °C = (°F - 32) × 5/9, 1 Btu/lb = 2.33 kJ/kg.

^aAt altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 75°F and 50 percent relative humidity. As an example, at approximately 6,000 feet elevation the fixed enthalpy limit is approximately 30.7 Btu/lb.

^bDevices with selectable setpoints shall be capable of being set to within 2°F and 2 Btu/lb of the setpoint listed.

C403.3.3.4 Relief of excess outdoor air. Systems shall be capable of relieving excess *outdoor air* during air economizer operation to prevent over-pressurizing the building. The relief air outlet shall be located to avoid recirculation into the building.

C403.3.3.5 Economizer dampers. Return, exhaust/relief and outdoor air dampers used in economizers shall comply with Section C403.2.4.3.

[Statutory Authority: RCW 19.27A.025, 19.27A.160, and 19.27.074. WSR 16-03-072, § 51-11C-40333, filed 1/19/16, effective 7/1/16.]

(Effective July 1, 2020)

WAC 51-11C-40333 Section C403.3.3—Hot gas bypass.

C403.3.3 Hot gas bypass limitation. Cooling systems shall not use hot gas bypass or other evaporator pressure control systems unless the system is designed with multiple steps of unloading or continuous capacity modulation. The capacity of the hot gas bypass shall be limited as indicated in Table C403.3.3, as limited by Section C403.5.1.

**Table C403.3.3
Maximum Hot Gas Bypass Capacity**

| Rated Capacity | Maximum Hot Gas Bypass Capacity (% of total capacity) |
|-----------------------|--|
| $\leq 240,000$ Btu/h | 50 |
| $\geq 240,000$ Btu/h | 25 |

For SI: 1 British thermal unit per hour = 0.2931 W.

[Statutory Authority: RCW 19.27A.020, 19.27A.025, 19.27A.160 and chapter 19.27 RCW. WSR 19-24-040, § 51-11C-40333, filed 11/26/19, effective 7/1/20. Statutory Authority: RCW 19.27A.025, 19.27A.160, and 19.27.074. WSR 16-03-072, § 51-11C-40333, filed 1/19/16, effective 7/1/16.]