**WAC 51-11C-40353   Section C403.5.3—Air economizers.**

**C403.5.3 Air economizers.** Air economizers shall comply with Sections C403.5.3.1 through C403.5.3.5.

**C403.5.3.1 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.

**C403.5.3.2 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.

**C403.5.3.3 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 C403.5.3.3. High-limit shutoff control settings for these control types shall be those specified in Table C403.5.3.3.

**Table C403.5.3.3**
**High-Limit Shutoff Control Setting for Air Economizers[b]**

| Device Type | Required High Limit (Economizer off when): | | Required High Limit For Cycling Fans[c] (Economizer off when): | |
| --- | --- | --- | --- | --- |
| | Equation | Description | Equation | Description |
| Fixed dry-bulb | $T_{OA} > 75°F$ | Outdoor air temperature exceeds 75°F | $T_{OA} > 70°F$ | Outdoor air temperature exceeds 70°F |
| Differential dry-bulb | $T_{OA} > T_{RA}$ | Outdoor air temperature exceeds return air temperature | $T_{OA} > (T_{RA} - 5)$ | Outdoor air temperature exceeds return air temperature - 5 |
| Fixed enthalpy with fixed dry-bulb temperatures | $h_{OA} > 28$ Btu/lb[a] or $T_{OA} > 75°F$ | Outdoor air enthalpy exceeds 28 Btu/lb of dry air[a] or outdoor air temperature exceeds 75°F | $h_{OA} > 26$ Btu/lb[a] or $T_{OA} > 70°F$ | Outdoor air enthalpy exceeds 26 Btu/lb of dry air[d] or outdoor air temperature exceeds 70°F |
| Differential enthalpy with fixed dry-bulb temperature | $h_{OA} > h_{RA}$ or $T_{OA} > 75°F$ | Outdoor air enthalpy exceeds return air enthalpy or outdoor air temperature exceeds 75°F | $h_{OA} > (h_{RA} - 2)$ or $T_{OA} > 70°F$ | Outdoor air enthalpy exceeds return air enthalpy or outdoor air temperature exceeds 70°F |

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

[a]At 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.

[b]Devices with selectable setpoints shall be capable of being set to within 2°F and 2 Btu/lb of the setpoint listed.

[c]Where fans cycle on only to provide heating and cooling, limits are adjusted lower to compensate for fan energy use in economizer mode.

[d]For cycling fans at altitudes substantially different than sea level, the fixed enthalpy limit shall be set to the enthalpy value at 70°F and 50 percent relative humidity.

**C403.5.3.4 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.

**C403.5.3.5 Economizer dampers.** Return, exhaust/relief and outdoor air dampers used in economizers shall comply with Section C403.7.9.