

Computer Rooms & Data Centers

When Do the Standards Apply?

The *2016 Building Energy Efficiency Standards* apply to all space conditioning systems serving computer rooms.

The Energy Standards define a computer room as:

“A room within a building whose primary function is to house electronic equipment and that has a design equipment power density exceeding 20 watts/ft² (215 watts/m²) of conditioned floor area.”

When the Standards apply, the energy requirements specific to computer rooms can be found in §140.9(a) of Title 24, Part 6. The requirements for computer rooms are prescriptive and may be traded off if the performance method of compliance is used.

What Is Covered?

Economizers:

Each individual cooling system primarily serving a computer room(s) shall include either an air or a water economizer capable of providing 100 percent of the cooling load at outside air temperatures as follows:

Air economizer: 55°F dry-bulb/50°F wet-bulb and below

Water economizer: 40°F dry-bulb/35°F wet-bulb and below

Exception 1: Individual computer rooms are exempt from the economizer requirements if the total cooling capacity of the room is less than 5 tons and the building does not have any economizers. The cooling capacity is determined by summing the capacities of all systems serving the room.

Exception 2: Economizer requirements are not required when adding up to a total of 50 tons of new cooling capacity to existing computer room(s) in an existing building. This exception permits addition of new IT equipment to an existing facility originally built without any economizers.

Exception 3: Economizer requirements are not required when adding up to a total of 20 tons of new cooling capacity to new computer room(s) in an existing building.

Exception 4: Computer rooms served by a fan system with an economizer that also serves other spaces within the building are exempt from the economizer requirements if all of the following are met:

- The economizer system is sized to meet the design cooling load of the computer room when the other spaces within the building are at 50 percent of their design load; and
- The economizer system has the ability to serve only the computer room, e.g., shut off flow to other spaces within the building when unoccupied; and
- The noneconomizer system does not operate when the outside air dry bulb temperature is below 60°F, and the cooling load of other spaces within the building served by the economizer is less than 50 percent of design load.

Reheat:

Section 140.9(a)2 prohibits reheating, recooling, or simultaneous heating and cooling in computer rooms. In addition, the definition of cooling includes both

mechanical cooling and economizers. This provision is mainly to prohibit the use of computer room air conditioner and computer room air handler units with humidity controls that include reheat coils.

Humidification:

Only adiabatic humidification (humidification that does not add heat, such as direct evaporative and ultrasonic), is permitted. Humidification that relies on adding heat to the system such as steam or infrared, is prohibited.

Power Consumption of Fans:

The total fan power at design conditions of each fan system shall not exceed 27 W/kBtu·h of net sensible cooling capacity.

Fan Control:

Unitary air conditioners with mechanical cooling capacity exceeding 5 tons and chilled water fan systems shall be

designed to vary the airflow rate as a function of actual load. They shall have controls and/or devices (such as two-speed or variable-speed control) that will result in fan motor demand of no more than 50 percent of design wattage at 66 percent of design fan speed.

Containment:

Computer rooms with air-cooled computers in racks that have a design load exceeding 175 kW per room shall include air barriers such that there is no significant air path for computer discharge air to recirculate back to computer inlets without passing through a cooling system.

See Figure 1.

Exception 1: Expansions of existing computer rooms.

Exception 2: Computer racks with a design load less than 1 kW/rack.

Exception 3: Equivalent energy performance based on computational fluid dynamics or other analysis.

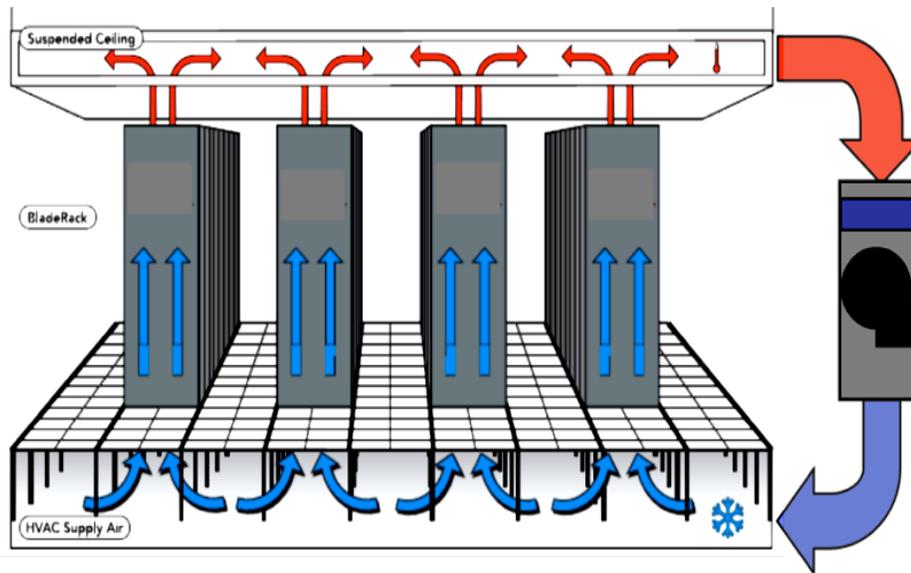


Figure 1: Example of Aisle Containment Using Chimney Racks

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