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To:	CEC
From:	Jeff Stein
Subject:	Proposed Revision to Computer Room Economizer Exception 4
Date:	February 5, 2018

Please revise EXCEPTION 4 to Section 140.9(a)1 as follows:

EXCEPTION 4 to Section 140.9(a)1: A computer room <u>with a design cooling load < 50 tons</u> may be served by a fan system without an economizer if it is also served by a fan system with an economizer that also serves other spaces within the building provided that all of the following are met:

i. ~~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~~

i. <u>The economizer system can deliver either (a) the design computer room load, or (b) the *available economizer capacity*, to the computer room at all times. *Available economizer capacity* is the total cooling capacity of the economizer system on the same floor as the computer room and within 30 ft of the computer room minus the current cooling load of other spaces on that floor.</u>

ii. <u>The economizer system can deliver either (a) the design computer room load, or (b) 5 tons, to the computer room when there is no cooling load in other spaces on the floor.</u>

iii. 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~~

iv. ~~The noneconomizer system does not operate when the outside air drybulb temperatures is below 60°F and, the cooling load of other spaces within the building served by the economizer system is less than 50 percent of design load.~~

Rationale:

The existing exception is basically for small/medium sized computer rooms in large office buildings where economizing can be provided most of the time from the spare capacity available from the central air handling system. It is not cost effective to put in a separate economizer system in this cases but it is cost effective to put in a VAV box from the central system. The existing requirement basically says you need to provide a VAV box that can meet the entire load of the computer room, when the house air system has spare capacity.

The problem we found on some of our projects was that for medium sized computer rooms there was not enough house air in the vicinity of the computer room to put in a VAV box sized for the whole computer room load and there was no reasonable way to get more house air onto that floor and to the computer room. For example, suppose a 6 story office building with packaged RTUs has a 20 ton MDF room that wants to be located on the 3rd floor North for IT considerations. The house air duct main serving 3rd floor North is sized for 5,000 cfm but a 20 ton MDF room would need about 12,000 cfm of house air. In these cases we typically just size the VAV box as large as possible, i.e. use up the available house air in the vicinity of the computer room (5,000 cfm in the case above).

This proposed change relaxes the requirement so the VAV box does not have to meet the entire computer room load if it maxes out the available house air and can provide at least 5 tons of cooling. 5 tons can easily be provided by a 16" cooling-only VAV box so this is not an onerous requirement. It also limits abusing this exception by claiming not to have any available economizer capacity.

The exception is now limited to design cooling loads < 50 tons because adding the option to max out available

house air would create an unintended loophole for data centers. Without the 50 ton limit a 2,000 ton data center with a small office space could claim this exception by running a 12" VAV box from the office to the data center. This exception was never intended to apply to large computer rooms and data centers.

Criteria iii is deleted because it is largely redundant with proposed new wording and because Title 24 is a design standard so detailed sequences of operation belong in the user's manual, not the standard. Furthermore, iii is not sufficiently detailed to adequately describe the most efficient sequence. For example, suppose a large office building has a 100,000 cfm AHU and a 3 ton computer room served by a VAV box and a CRAC unit. At night when it is cold out and the building is unoccupied it is more efficient to serve the computer room with the CRAC Unit than with the AHU economizer due to the fixed losses of the large AHU supply fan motor and VFD. Another example, is morning warmup. It will generally be more efficient to serve the computer room with the CRAC unit while the AHU is in morning warmup mode. So rather than add the details and scenarios when the noneconomizer system should operate we felt it better to move it to the user's manual.

The other changes to this exception are editorial for clarity.

We would be happy to edit the Users Manual accordingly.