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Comments on Nonresidential Integrated Pumped Refrigerant Economizer Proposals for 2022

Additional submitted attachment is included below.



10/07/20

In Regards To -

Docket Number: 19-BSTD-03

Project Title: 2022 Energy Code Pre-Rulemaking

TN #: 234665

Document Title: *Integrated Pumped Refrigerant Economizer for Computer Rooms, prepared by VERTIV*

Submission Date: 9/11/20

And –

Staff Pre-Rulemaking Workshop, 9/23/20: *Nonresidential Integrated Pumped Refrigerant Economizer Proposals for 2022*

To: Haile Bucaneg and Ronald Balneg, California Energy Commission

From: Jim Marsh, Munters Data Centers

Statement Contesting Proposal to Add *Integrated Pumped Refrigerant Economizer* to 2022 Building Efficiency Standards, Title 24, Part 6, Section 140.9 (a) 1. Economizers

For reference, Munters submitted a recommendation on 10/05/20 to add *Integrated Refrigerant Economizer* to 2022 Building Efficiency Standards, Title 24, Part 6, Section 140.9 (a) 1. Economizers. This new category would cover all refrigerant economizer types that meet the prescriptive full economizer thresholds currently proposed for all economizer types in new construction: 65°F dry-bulb or 50°F wet-bulb and below.

It is noted here that the changes proposed for Section 140.9 (a) 1. Economizers in the CASE Report do not differentiate between economizer types since it applies to all economizers. If that remains the case in the 2022 code, the definitions of economizers in Section 100.1 (b) will need to be revised to reflect the three main economizer types of air, water, and refrigerant with variations, e.g. direct vs. indirect, dry vs. evaporative, etc.

Vertiv's 9/11/20 submitted proposal to add *Integrated Pumped Refrigerant Economizer* states an equivalency to air and water economizers. Integrated pumped refrigerant economizer effectiveness is more closely equivalent to water economizer as it is recognized in Title 24 2019, i.e. full economizer threshold of 40°F dry-bulb and below as stated to be the same by Vertiv, 9/11/20 submission, page 24, 7. Proposed Revisions to Code Language / 7.1 Standards / Section 140.9 – Prescriptive Requirements for Covered Processes:

SECTION 140.9 – PRESCRIPTIVE REQUIREMENTS FOR COVERED PROCESSES

Subsection 140.9 (a) 1.C.: An integrated pumped refrigerant economizer capable of providing 100 percent of the expected system cooling load as calculated in accordance with a method approved by the Commission, at outside air temperatures of 40°F dry-bulb and below.

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Comment re Page 6, 3. Market Analysis

Vertiv/Emerson Liebert DSE Free-Cooling Economization split-system with integrated pumped refrigerant economizer appears to be a proprietary product. Counter to the assertion in Vertiv's 9/11/20 submission that "Vertiv is not the only manufacturer of this type of proven technology that has been installations spanning the last six years" ., there are no other manufacturers of integrated pumped refrigerant economizer in split system perimeter computer room air conditioner (CRAC) apparent in the market today. Reference [Google: intergrated pumped refrigerant economizer](#)

There are or have been other pumped refrigerant cooling systems including Vertiv XD, OptiCool and discontinued Schneider Electric rack level cooling but no other well established market vendor with a one-to-one evaporator-to-condenser system, sharing DX and pumped fluid piping, operating as a traditional perimeter CRAC split-system in non-economization mode.

Vertiv's proposed addition of *Integrated Pumped Refrigerant Economizer* would be technology restrictive to a proprietary product that currently does not meet the proposed prescriptive full economizer dry-bulb temperature threshold. Note: unless there is an evaporative component, wet-bulb temperature threshold does not apply. It is conceivable that integrated pumped refrigerant economizer could potentially meet the proposed prescriptive full economizer thresholds with the addition of an evaporative step equivalent in assisting economizing effectiveness to that which has been applied to water economizer.

With an elevated return air temperature design of 95°F at 80% critical IT load the integrated pumped refrigerant full economizer threshold is no higher than 55°F dry-bulb, see <https://www.vertiv.com/en-us/support/tools-applications/free-cooling-economizer-calculator/>

The *9/23/20 Nonresidential Computer Room Efficiency Proposals for 2022* provides lower full economization thresholds as is prescribed in the 2019 standards, including an added refrigerant economizer designation with 40°F dry-bulb full economizing threshold consistent to water economizer:

- In existing facility with newly installed computer room, or
- Where local water authority does not allow cooling towers, or
- Allow projects to meet the prescriptive economizer temperature requirements if
 - Computer room fan system does not exceed 0.35 W/cfm, and
 - Supply air/return air temperature differential is at least 25°F, and
 - Cooling system efficiency is 20 percent better than required efficiencies identified in Table 110.2-A through K or Title 20, Table C-7

Answers to Staff Questions from 9/23 Workshop

- Are the incremental cost assumptions compared to waterside economizers accurate to assume a \$0 incremental cost? **No. if additional steps and costs are required to bring air-cooled chillers up to proposed 2022 full economizer thresholds, then some added steps and costs would be required for integrated pumped refrigerant economizer to meet same.**
- Should the term 'Integrated' be included in the prescriptive requirement? **Yes (see next response for clarification).** The term integrated is used differently in other sections of the code, and would this limit other methods of this style of economizer? **No. Not being familiar with how the term is used differently in other sections of the code, the term 'Integrated Refrigerant Economizer' was suggested by Munters to reflect equivalency to 'Integrated Air Economizer' and 'Integrated Water Economizer' as is stated in 2019 standard and taken to mean integrated into a packaged or split system handling full year cooling, not a separate system for economization that could be operated independently. If Integrated is removed, it seems as if it should be removed from all three types.**
- Other stakeholders pushed to change the term 'refrigerant' to 'fluid' for another proposal regarding refrigerant economizers. **No, refrigerant is the more definitive term.** Should the term 'without using any water' be removed from the definition? **Yes. Water is not a required aspect of refrigerant economizer and does not need to be called out just as air economizer does not call out 'without using any water'.**
- Should pumped fluid economizers be modeled equivalent to airside and waterside economizers? **Yes. The conditions and results should all be consistent for modeling and comparison.**