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Economizer Requirements for Covered Processes - Computer Rooms

Additional submitted attachment is included below.

To: California Energy Commission

From: Paul Wicoff, P.E. / Burr Computer Environments, Inc.

Date: June 18, 2021

Re: 2022 Building Energy Efficiency Standards
Rule Making Docket #21-BSTD-01
Comment Title: Economizer Requirements for Covered Processes – Computer Rooms

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Please accept this memo as notification by myself, Paul Wicoff, on behalf of Burr Computer Environments, Inc. (BCEI), that BCEI is supportive of the following proposed 2022 Building Energy Efficiency Standards updates as they relate to the use of refrigerant economizers for process cooling systems applied to computer rooms.

- Section 140.9.a.1.C – Addition of pumped refrigerant economizers as a new economizer sub-type, with requirement of full economization for supply air temperatures of 65-80°F with outside air temperatures of 50°F or below.
- Section 141.1.b.1.C – Addition of pumped refrigerant economizer requirements for computer rooms, requiring full economization at supply air temperatures up to 80°F and at outside air temperatures of 40°F dry bulb and below.

BCEI is an engineering and construction management firm, specializing in designing and building data center environments globally, with extensive experience implementing refrigerant economizer systems for various owners and operators within the State of California. BCEI has first-hand experience with the performance and reliability of refrigerant economizer-based systems and has found that they are uniquely suited for critical computer room cooling. Therefore, these should be assigned prescriptive performance requirements in the Building Energy Efficiency Standards.

The proposed refrigerant economizer operational requirements included in Section 140.9.a.1.C promote increased energy efficiency without setting target performances that cannot be achieved. The temperature ranges fairly and adequately account for the supply air temperatures utilized in most computer room environments and for the heat transfer that can be reasonably expected from a refrigerant economizer heat rejection coil. Listing these requirements in the code will give building system engineers clear guidelines when selecting and comparing refrigerant economization-based cooling equipment. In turn, this will encourage equipment manufacturers to develop competitive, energy-efficient economizer solutions with a common benchmark of performance.

10400 Rodgers Road
Houston, Texas 77070
Office: (281) 374-8644 Fax: (281)374-8992

For similar reasons, the proposed refrigerant economizer requirements in Section 141.1.b.1.C are beneficial. However, the proposed verbiage "or 35°F wet-bulb and below" should be eliminated from this section. Integrated refrigerant economizers operate primarily based on ambient dry-bulb conditions and introducing a wet-bulb requirement could unreasonably restrict the use of these systems for computer room additions and alterations.

In addition to offering support for the inclusion of the code references as previously noted, BCEI would like to request that the refrigerant economizer prescriptive performance requirements are not further increased in forthcoming editions of the energy code. Doing so would likely inhibit the use of the technology as it stands today, forcing the use of air- or water-side economization. The potential problems this could create are as follows.

1. Being required to implement air-side economizers can risk sensitive server hardware operation.

   Many data centers are in locations subject to periodic low air quality. With an increase in demand for localized Cloud services stemming from the digitization of society, computer room environments must be built within densely populated areas that are prone to traffic-created pollution and dust. Furthermore, the increase in frequency, expansiveness, and duration of wildfires within the state raises problems with smoke and other wildfire related air-borne pollution.

   The air-borne particulates composing the above-mentioned pollutants are microscopic and are difficult to completely remove from the air stream. As a result, air-side economizers should only be used for computer room facilities known to house server equipment that can withstand damage caused by these particulates. Installation of air-side economizers for data centers that house more sensitive equipment creates risk of physical server damage and accompanying customer outages.

2. Being required to implement a water-side economizer can create significant demands on already stressed municipal and state water supplies.

   Most water-side economization occurs by evaporation of water to remove heat from a cooling system. For data centers, which can require cooling equal to many mega-watts, the overall evaporative flow rate can become extremely high. If more facilities are required to be designed with water-cooled economization, higher demand will be placed on already scarce water resources. This can cause supply and infrastructure issues for municipalities within the state, unnecessarily delay project delivery schedules, and risk existing data center operations.

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