Proposal Summary

2022 California Energy Code (Title 24, Part 6)

Non Residential HVAC Controls: Air Efficiency Requirements]

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Prepared by: Shaojie Wang, Tim Minezaki, Energy Solutions

Introduction

The document summarizes proposed revisions to the California Energy Code (Title 24, Part 6) that will be discussed during a utility-sponsored stakeholder meeting on November 5, 2019. The Statewide Utility Codes and Standards Enhancement (CASE) Team is seeking input and feedback. To provide your comments, email info@title24stakeholders.com by November 19, 2019.

Measure Description

This submeasure aims to expand the economizer requirement to cover large variable refrigerant volume (VRV) systems and heat pump systems with significant interior zones or internal loads. The measure will also expand economizer requirements to include smaller-sized units. In addition, the measure will improve economizer effectiveness by requiring power-modulated exhaust and revising outside air intake and exhaust design guidelines.

Draft Code Language

The proposed changes to the Standards and Reference Appendices are provided below. Changes to the 2019 documents are marked with red underlining (new language) and ~~strikethroughs~~ (deletions). Expected sections or tables of the proposed code (but not specific changes at this time) are highlighted in yellow.

Section 120.2 – Require Controls for Space-Conditioning Systems

(i) **Economizer Fault Detection and Diagnostics (FDD).** All newly installed air handlers with a mechanical cooling capacity ~~greater than~~ over ~~54,000 Btu/hr~~36,000 Btu/hr and an installed air economizer shall include a stand-alone or integrated Fault Detection and Diagnostics (FDD) system in accordance with Subsections 120.2(i)1 through 120.2(i)8.

Section 140.4 - Prescriptive requirements for space conditioning systems

(e) Economizers

1. Each cooling air handler that has a design total mechanical cooling capacity over ~~54,000 Btu/hr~~36,000 Btu/hr, or chilled-water cooling systems without a fan or that use induced airflow that has a cooling capacity greater than the systems listed in Table 140. 4-C, shall include either:
   A. An air economizer capable of modulating outside-air and return-air dampers to supply 100 percent of the design supply air quantity as outside-air; or

B. A water economizer capable of providing 100 percent of the expected system cooling load, at outside air temperatures of 50°F dry-bulb and 45°F wet-bulb and below.

C. DX Single Zone VAV

A. DX units serving a single zone shall use the ASHRAE Guideline 36-2018 Single-Zone VAV Air-Handling Unit sequence of operation, with the following clarification: supply air temperature shall be controlled to SATsp-C by modulating and/or staging the compressor(s).

EXCEPTION 1 to Section 140.4(e)1: Where special outside air filtration and treatment, for the reduction and treatment of unusual outdoor contaminants, makes compliance infeasible.

EXCEPTION 2 to Section 140.4(e)1: Where the use of outdoor air for cooling will affect other systems, such as humidification, dehumidification, or supermarket refrigeration systems, so as to increase overall building TDV energy use.

EXCEPTION 3 to Section 140.4(e)1: Systems serving high-rise residential living quarters and hotel/motel guest rooms.

EXCEPTION 4 to Section 140.4(e)1: Where comfort cooling systems have the cooling efficiency that meets or exceeds the cooling efficiency improvement requirements in TABLE 140.4-D.

EXCEPTION 5 to Section 140.4(e)1: Fan systems primarily serving computer rooms. See Section 140.9(a) for computer room economizer requirements.

EXCEPTION 6 to Section 140.4(e)1: Systems design to operate at 100 percent outside air at all times.

TABLE 140.4-C CHILLED WATER SYSTEM COOLING CAPACITY

Climate Zones	Total Building Chilled Water System Capacity, Minus Capacity of the Cooling units with Air Economizers	
	Building Water-Cooled Chilled Water System	Air-Cooled Chilled Water Systems or District Chilled Water Systems
15	≥ 960,000 Btu/h (280 kW)	≥ 1,250,000 Btu/h (365 kW)
1-14	≥720,000 Btu/h (210 kW)	≥940,000 Btu/h (275 kW)
16	≥1,320,000 Btu/h (385 kW)	≥1,720,000 Bu/h (505 kW)

TABLE 140.4-D ECONOMIZER TRADE-OFF TABLE FOR COOLING SYSTEMS

Climate Zone	Efficiency Improvement [a]	
1	70%	[a] If a unit is rated with an IPLV, IEER or SEER, then to eliminate the required air or water economizer, the applicable minimum cooling efficiency of the HVAC unit must be increased by the percentage shown. If the HVAC unit is only rated with a full load metric, such as EER or COP cooling, then that metric must be increased by the percentage shown.
2	65%	
3	65%	
4	65%	
5	70%	
6	30%	
7	30%	
8	30%	
9	30%	
10	30%	
11	30%	
12	30%	
13	30%	
14	30%	
15	30%	
16	70%	

2. If an economizer is required by Section 140.4(e)1, and an air economizer is used to meet the requirement, then it shall be:
   A. [no change]
   B. [no change]
   C. [no change]
   D. [no change]
   E. Have a ~~The~~ space conditioning system that shall include the following:
      A. Unit controls shall have mechanical capacity controls interlocked with economizer controls such that the economizer is at 100 percent open position when mechanical cooling is on and does not begin to close until the leaving air temperature is less than 45°F.
      B. ~~Direct Expansion (DX) units greater than 65,000 Btu/hr that control the capacity of the mechanical cooling directly based on occupied space temperature shall have a minimum of 2 stages of mechanical cooling capacity.~~
      C. DX units ~~not within the scope of Section 140.4(e)2E,B~~ that include an air side economizer to meet 140.4(e) shall (i) comply with the requirements in TABLE 140.4-F, and (ii) shall have controls that do not false load the mechanical cooling system by limiting or disabling the economizer or by any other means except at the lowest stage of mechanical cooling capacity.

TABLE 140.4-F DIRECT EXPANSION (DX) UNIT REQUIREMENTS FOR COOLING STAGES AND COMPRESSOR DISPLACEMENT

Cooling Capacity	Minimum Number of Mechanical Cooling Stages	Minimum Compressor Displacement

~~≥ 65,000 Btu/h and~~ < 240,000 Btu/h	3 stages	~~≤ 35% full load~~ ≤ 25% full load
≥ 240,000 Btu/h	4 stages	~~≤ 25% full load~~ ≤ 10 % full load

(+ ”p”) Economizer Outside Air and Exhaust Air Separation – Systems with airside economizers shall mitigate exhaust air re-entrainment by either:

1. separating outside air and exhaust air openings by at least 10 feet, or
2. locating outside air and exhaust air opening on different faces of the air handling unit.

(+ “q”) Economizer Relief – Systems with airside economizers and *design exhaust flow rates* exceeding 2,000 cfm shall include one of the following options for economizer relief:

1. Modulating return fan(s)
2. Modulating relief fan(s)
3. Barometric relief path with a total pressure drop at design exhaust rate less than 0.06” from the occupied space to outdoors.

Design exhaust airflow rate shall be defined as the design supply airflow rate minus any continuous exhaust flows, such as toilet exhaust fans, whose makeup is provided by the economizer system.