

# Prescriptive Efficiency Requirements for Cooling Towers

## Draft Code Language

Last Updated: March 2017

## 1. INTRODUCTION

The California Statewide Utility Codes and Standards Team actively supports the California Energy Commission in developing revisions to the 2019 California Building Energy Efficiency Standards (Title 24, Part 6). Our joint intent is to achieve significant energy savings through the development of reasonable, responsible, and cost-effective code change proposals for the 2019 Title 24 code change cycle.

The Statewide Utility Team is proposing code change which adds a prescriptive requirement for cooling tower efficiency, in addition to the existing mandatory requirement. The current mandatory requirement is 42.1 gpm of condenser water flow per fan horsepower (gpm/hp), and the proposed prescriptive requirement is 80 gpm/hp.

**The Statewide Utility Team is requesting feedback on the draft code language presented in this document.** Input we receive will inform the code change proposal that the Statewide Utility Team will be proposing to the California Energy Commission in April 2017.

To provide feedback, please email us at [info@title24stakeholders.com](mailto:info@title24stakeholders.com) or contact the measure lead at:

Stefan Gracik

510-663-2070

[sgracik@integralgroup.com](mailto:sgracik@integralgroup.com)

For more information about the California Statewide Utility Codes and Standards Team's 2019 Title 24, Part 6 advocacy efforts, and the latest information on this code change proposal please visit: [www.title24stakeholders.com](http://www.title24stakeholders.com).

## 2. DRAFT CODE LANGUAGE

The proposed changes to the Standards, Reference Appendices, and the ACM Reference Manuals are provided below. Changes to the 2016 documents are marked with [underlining](#) (new language) and [strikethroughs](#) (deletions).

SECTION 140.4 – PRESCRIPTIVE REQUIREMENTS FOR SPACE CONDITIONING SYSTEMS

(h) **Heat Rejection Systems.**

1. **Scope.** Subsection 140.4(h) applies to heat rejection equipment used in comfort cooling systems such as air-cooled condensers, open cooling towers, closed-circuit cooling towers, and evaporative condensers.

2. **Fan Speed Control.** Each fan powered by a motor of 7.5 hp (5.6 kW) or larger shall have the capability to operate that fan at 2/3 of full speed or less, and shall have controls that automatically change the fan speed to control the leaving fluid temperature or condensing temperature or pressure of the heat rejection device.

**EXCEPTION 1 to Section 140.4(h)2:** Heat rejection devices included as an integral part of the equipment listed in TABLE 110.2-A through TABLE 110.2-I.

**EXCEPTION 2 to Section 140.4(h)2:** Condenser fans serving multiple refrigerant circuits.

**EXCEPTION 3 to Section 140.4(h)2:** Condenser fans serving flooded condensers.

**EXCEPTION 4 to Section 140.4(h)2:** Up to one third of the fans on a condenser or tower with multiple fans where the lead fans comply with the speed control requirement.

3. **Tower Flow Turndown.** Open cooling towers configured with multiple condenser water pumps shall be designed so that all cells can be run in parallel with the larger of:

A. The flow that is produced by the smallest pump; or

B. 50 percent of the design flow for the cell.

4. **Limitation on Centrifugal Fan Cooling Towers.** Open cooling towers with a combined rated capacity of 900 gpm and greater at 95°F condenser water return, 85°F condenser water supply, and 75°F outdoor wet-bulb temperature, shall use propeller fans and shall not use centrifugal fans.

**EXCEPTION 1 to Section 140.4(h)4:** Cooling towers that are ducted (inlet or discharge) or have an external sound trap that requires external static pressure capability.

**EXCEPTION 2 to Section 140.4(h)4:** Cooling towers that meet the energy efficiency requirement for propeller fan towers in Section 110.2, TABLE 110.2-G.

5. **Multiple Cell Heat Rejection Equipment.** Multiple cell heat rejection equipment with variable speed fan drives shall:

A. Operate the maximum number of fans allowed that comply with the manufacturer's requirements for all system components, and

B. Control all operating fans to the same speed. Minimum fan speed shall comply with the minimum allowable speed of the fan drive as specified by the manufacturer's recommendation. Staging of fans is allowed once the fans are at their minimum operating speed.

6. **Cooling tower efficiency.** Newly installed open-circuit cooling towers serving condenser water loops which total 900 gpm or greater, shall have a rated efficiency of no less than 80 gpm/hp when rated in accordance to the test procedures and rating conditions as listed in Table 110.2G.

**EXCEPTION to Section 140.4(h)6:** Building mounted replacement cooling towers.

**EXCEPTION to Section 140.4(h)6:** Buildings in Climate Zone 1 and 16 that have air economizers as specified in 140.4 (e)

## 2.1 Reference Appendices

There are no proposed changes to the Reference Appendices.

## 2.2 ACM Reference Manual

### Proposed standards modify the following sections

#### 5.8.3 Cooling Towers

##### *Cooling Tower Total Fan Horse Power*

*Applicability* All cooling towers

*Definition* The sum of the nameplate rated horsepower (hp) of all fan motors on the cooling tower. Pony motors should not be included.

*Units* Gpm/hp or unit less if energy input ratio (EIR) is specified (if the nominal tons but not the condenser water flow is specified, the condenser design water flow shall be 3.0 gpm per nominal cooling ton.)

*Input Restrictions* As designed, but the cooling towers shall meet minimum performance requirements in Table 110.2-G.

*Standard Design* The cooling tower fan horsepower is ~~60~~ 80 gpm/hp.

## 2.3 Reference Appendices

There are no proposed changes to the Reference Appendices.