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Subject: Language to Address possible conflict between 110.2 and 120.6
Date: Friday, October 17, 2014 6:50:33 PM
Attachments: SECTION 110 Lanugage to address conflict with 120.6-10.17.2014.docx

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Good Evening,

One of the outstanding issues we have been thinking about this week is the potential conflict between equipment efficiency values in Section 110.2 (Mandatory Requirements for Space-conditioning Equipment) and Section 120.6 (Mandatory Requirements for Covered Processes). Please find proposed language that addresses this concern attached. The proposed language adds an exception that clarifies equipment that serves exempt process loads and covered process loads do not need to comply with efficiency standards in Section 110.2. Both "Process, Exempt" and "Process, Covered" are defined in Section 100.1.

Let us know if you have any questions,

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SECTION 110.2 – MANDATORY REQUIREMENTS FOR SPACE-CONDITIONING EQUIPMENT

Certification by Manufacturers. Any space-conditioning equipment listed in this section may be installed only if the manufacturer has certified to the Commission that the equipment complies with all the applicable requirements of this section.

(a) **Efficiency.** Equipment shall meet the applicable efficiency requirements in TABLE 110.2-A through TABLE 110.2-K subject to the following:

1. If more than one efficiency standard is listed for any equipment in TABLE 110.2-A through TABLE 110.2-K, the equipment shall meet all the applicable standards that are listed; and
2. If more than one test method is listed in TABLE 110.2-A through TABLE 110.2-K, the equipment shall comply with the applicable efficiency standards when tested with each listed test method; and
3. Where equipment can serve more than one function, such as both heating and cooling, or both space heating and water heating, it shall comply with all the efficiency standards applicable to each function; and
4. Where a requirement is for equipment rated at its "maximum rated capacity" or "minimum rated capacity," the capacity shall be as provided for and allowed by the controls, during steady-state operation.

EXCEPTION 1 to Section 110.2(a): Water-cooled centrifugal water-chilling packages that are not designed for operation at ANSI/AHRI Standard 550/590 test conditions of 44°F leaving chilled water temperature and 85°F entering condenser water temperature with 3 gallons per minute per ton condenser water flow shall have a maximum full load kW/ton and NPLV ratings adjusted using the following equation:

Adjusted maximum full-load kW/ton rating = (full-load kW/ton from TABLE 110.2-D) / Kadj

Adjusted maximum NPLV rating = (IPLV from TABLE 110.2-D) / Kadj

Where:

Kadj = (A) x (B)

$A = 0.00000014592 \times (LIFT)^4 - 0.0000346496 \times (LIFT)^3 + 0.00314196 \times (LIFT)^2 - 0.147199 \times (LIFT) + 3.9302$

LIFT = LvgCond – LvgEvap (°F)

LvgCond = Full-load leaving condenser fluid temperature (°F)

LvgEvap = Full-load leaving evaporator fluid temperature (°F)

$B = (0.0015 \times LvgEvap) + 0.934$

The adjusted full-load and NPLV values are only applicable for centrifugal chillers meeting all of the following full-load design ranges:

- Minimum Leaving Evaporator Fluid Temperature: 36°F
- Maximum Leaving Condenser Fluid Temperature: 115°F
- LIFT ≥ 20°F and ≤ 80°F

Centrifugal chillers designed to operate outside of these ranges are not covered by this exception.

EXCEPTION 2 to Section 110.2(a): Positive displacement (air- and water-cooled) chillers with a leaving evaporator fluid temperature higher than 32°F shall show compliance with TABLE 110.2-D when tested or certified with water at standard rating conditions, per the referenced test procedure.

EXCEPTION 3 to Section 110.2(a): Equipment primarily serving exempt process loads and equipment primarily serving covered process loads.

TABLE 110.2-G PERFORMANCE REQUIREMENTS FOR HEAT REJECTION EQUIPMENT

Equipment Type	Total System Heat Rejection Capacity at Rated Conditions	Subcategory or Rating Condition	Performance Required [a,b,c,d]	Test Procedure [e]
Propeller or axial fan Open-circuit cooling towers	All	95°F entering water 85°F leaving water 75 °F entering air wb	42.1 gpm/hp	CTI ATC-105 and CTI STD-201
Centrifugal fan Open-circuit cooling towers	All	95°F entering water 85°F leaving water 75 °F entering air wb	20.0 gpm/hp	CTI ATC-105 and CTI STD-201
Propeller or axial fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75 °F entering air wb	14.0 gpm/hp	CTI ATC-105S and CTI STD-201
Centrifugal fan closed-circuit cooling towers	All	102°F entering water 90°F leaving water 75 °F entering air wb	7.0 gpm/hp	CTI ATC-105S and CTI STD-201
Propeller or axial fan evaporative condensers[f]	All	R-507A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wetbulb	≥ 157,000 Btu/h·hp	CTI ATC-106
Propeller or axial fan evaporative condensers[f]	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wetbulb	≥ 134,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers[f]	All	R-507A test fluid 165°F entering gas temperature 105°F condensing temperature 75°F entering wetbulb	≥ 135,000 Btu/h·hp	CTI ATC-106
Centrifugal fan evaporative condensers[f]	All	Ammonia test fluid 140°F entering gas temperature 96.3°F condensing temperature 75°F entering wetbulb	≥ 110,000 Btu/h·hp	CTI ATC-106
Air cooled condensers[f]	All	R22 test fluid 125°F condensing temperature ~~R22 test fluid~~ 190°F entering gas temperature 15°F subcooling 95°F entering drybulb	≥ 176,000 Btu/h·hp	ANSI/AHRI 460

[a] For purposes of this table, open-circuit cooling tower performance is defined as the water flow rating of the tower at the given rated conditions divided by the fan motor nameplate power.

[b] For purposes of this table, closed-circuit cooling tower performance is defined as the process water flow rating of the tower at the given rated conditions divided by the sum of the fan motor nameplate rated power and the integral spray pump motor nameplate power.

[c] For purposes of this table air-cooled condenser performance is defined as the heat rejected from the refrigerant divided by the fan motor nameplate power.

[d] Open cooling towers shall be tested using the test procedures in CTI ATC-105. Performance of factory assembled open cooling towers shall be either certified as base models as specified in CTI STD-201 or verified by testing in the field by a CTI approved testing agency. Open factory assembled cooling towers with custom options added to a CTI certified base model for the purpose of safe maintenance or to reduce environmental or noise impact shall be rated at 90 percent of the CTI certified performance of the associated base model or at the manufacturer's stated performance, whichever is less. Base models of open factory assembled cooling towers are open cooling towers configured in exact accordance with the Data of Record submitted to CTI as specified by CTI STD-201. There are no certification requirements for field erected cooling towers.

[e] Applicable test procedure and reference year are provided under the definitions.

[f] For refrigerated warehouses or commercial refrigeration applications, condensers shall comply with requirements specified in Section 120.6(a) or Section 120.6(b), respectively.