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Section 1206 of Title 24

Prefer to comments / feedback

Additional submitted attachment is included below.

SECTION 120.6 – MANDATORY REQUIREMENTS FOR COVERED PROCESSES

Nonresidential~~, high-rise residential,~~ and hotel/motel buildings shall comply with the applicable requirements of Sections 120.6(a) through 120.6(g).

(a) **Mandatory Requirements for Refrigerated Warehouses**

Refrigerated warehouses that are greater than or equal to 3,000 square feet and refrigerated spaces with a sum total of 3,000 square feet or more that are served by the same refrigeration system shall meet the requirements of Section 120.6(a).

Refrigerated spaces that are less than 3,000 square feet shall meet the requirements of the Appliance Efficiency Regulations for walk-in coolers or freezers contained in the Appliance Efficiency Regulations (California Code of Regulations, Title 20, Sections 1601 through 1608).

1. **Insulation Requirements.** Exterior surfaces of refrigerated warehouses shall be insulated at least to the R-values in Table 120.6-A.

Table 120.6-A REFRIGERATED WAREHOUSE INSULATION

SPACE	SURFACE	MINIMUM R-VALUE (°F·hr·sf/Btu)
Freezers	Roof/Ceiling	R-40
Freezers	Wall	R-36
Freezers	Floor	R-35
Freezers	Floor with all heating from productive refrigeration capacity[1]	R-20
Coolers	Roof/Ceiling	R-28
Coolers	Wall	R-28

~~[1]All underslab heating is provided by a heat exchanger that provides refrigerant subcooling or other means that result in productive refrigeration capacity on the associated refrigerated system.~~

[1]All underslab heating is provided by a heat exchanger that provides refrigerant subcooling or other means that result in productive refrigeration capacity on the associated refrigerated system.

2. **Underslab heating.** Electric resistance heat shall not be used for the purposes of underslab heating.

EXCEPTION to Section 120.6(a)2: Underslab heating systems controlled such that the electric resistance heat is thermostatically controlled and disabled during the summer on-peak period defined by the local electric utility.

3. **Evaporators.** New fan-powered evaporators used in coolers and freezers shall conform to the following: A.

Single phase fan motors less than 1 hp and less than 460 Volts in newly installed evaporators shall be electronically commutated motors or shall have a minimum motor efficiency of 70 percent when rated in accordance with NEMA Standard MG 1-2006 at full load rating conditions.

B. Evaporator fans served either by a suction group with multiple compressors, or by a single compressor with variable capacity capability shall be variable speed and the speed shall be controlled in response to space temperature or humidity.

EXCEPTION 1 to Section 120.6(a)3B: Addition, alteration or replacement of less than all of the evaporators in an existing refrigerated space that does not have speed-controlled evaporators.

EXCEPTION 2 to Section 120.6(a)3B: Coolers within refrigerated warehouses that maintain a Controlled Atmosphere for which a licensed engineer has certified that the types of products stored will require constant operation at 100 percent of the design airflow.

EXCEPTION 3 to Section 120.6(a)3B: Areas within refrigerated warehouses that are designed solely for the purpose of quick chilling/freezing of products, including but not limited to spaces with design cooling capacities of greater than 240 Btu/hr-ft² (2 tons per 100 ft²).

C. Evaporator fans served by a single compressor that does not have variable capacity shall utilize controls to reduce airflow by at least 40 percent for at least 75 percent of the time when the compressor is not running.

EXCEPTION to Section 120.6(a)3C: Areas within refrigerated warehouses that are designed solely for the purpose of quick chilling/freezing of products (space with design cooling capacities of greater than 240 Btu/hr-ft² (2 tons per 100 ft²)).

4. **Condensers.** New fan-powered condensers on new refrigeration systems shall conform to the following:

A. Design saturated condensing temperatures for evaporative-cooled condensers and water-cooled condensers served by fluid coolers or cooling towers shall be less than or equal to:

i. The design wetbulb temperature plus 20°F in locations where the design wetbulb temperature is less than or equal to 76°F;

ii. The design wetbulb temperature plus 19°F in locations where the design wetbulb temperature is between 76°F and 78°F; or

iii. The design wetbulb temperature plus 18°F in locations were the design wetbulb temperature is greater than or equal to 78°F.

EXCEPTION 1 to Section 120.6(a)4A: Compressors and condensers on a refrigeration system for which more than 20 percent of the total design refrigeration cooling load is for quick chilling/~~ or~~ freezing of products (space with design cooling capacities of greater than 240 Btu/hr-ft^2), or process refrigeration cooling for other than a refrigerated space.

B. Design saturated condensing temperatures for air-cooled condensers shall be less than or equal to:

i. The design drybulb temperature plus 10°F for systems serving freezers;

ii. The design drybulb temperature plus 15°F for systems serving coolers.

EXCEPTION 1 to Section 120.6(a)4B: Condensing units with a total compressor horsepower less than 100 HP.

EXCEPTION 2 to Section 120.6(a)4B: Compressors and condensers on a refrigeration system for which more than 20 percent of the total design refrigeration cooling load is for quick chilling/~~ or~~ freezing of products (space with design cooling capacities of greater than 240 Btu/hr-ft^2), or process refrigeration cooling for other than a refrigerated space.

C. The saturated condensing temperature necessary for adiabatic condensers to reject the design total heat of rejection of a refrigeration system assuming dry mode performance shall be less than or equal to:

i. The design drybulb temperature plus 20°F for systems serving freezers;

ii. The design drybulb temperature plus 30°F for systems serving coolers.

EXCEPTION 1 to Section 120.6(a)4C: Compressors and condensers on a refrigeration system for which more than 20 percent of the total design refrigeration cooling load is for quick chilling/~~ or~~ freezing of products (space with design cooling capacities of greater than 240 Btu/hr-ft^2 (2 tons per 100 ft^2)), or process refrigeration cooling for other than a refrigerated space.

D. All condenser fans for air-cooled condensers, evaporative-cooled condensers, adiabatic condensers, gas coolers, air or water fluid coolers or cooling towers shall be continuously variable speed, with the speed of all fans serving a common condenser high side controlled in unison.

E. The minimum condensing temperature setpoint shall be less than or equal to 70°F for systems utilizing air-cooled condensers, evaporative-cooled condensers, adiabatic condensers, gas coolers, air or water-cooled fluid coolers or cooling towers for heat rejection.

F. Condensing temperature reset. The condensing temperature set point of systems served by air-cooled condensers shall be reset in response to ambient drybulb temperature. The condensing temperature set point of systems served by evaporative-cooled condensers or water-cooled condensers (via cooling towers or fluid coolers) shall be reset in response to ambient wetbulb temperatures. The condensing temperature set point for systems served by adiabatic condensers shall be reset in response to ambient drybulb temperature while operating in dry mode.

EXCEPTION 1 to Section 120.6(a)4F: Condensing temperature control strategies approved by the Executive Director that have been demonstrated to provide at least equal energy savings.

EXCEPTION 2 to Section 120.6(a)4F: Systems served by adiabatic condensers in Climate Zones 1, 3, 5, 12, 14 and 16.

G. Fan-powered condensers shall meet the condenser efficiency requirements listed in Table 120.6-B. Condenser efficiency is defined as the Total Heat of Rejection (THR) capacity divided by all electrical input power including fan power at 100 percent fan speed, and power of spray pumps for evaporative condensers.

EXCEPTION to Section 120.6(a)4G: Adiabatic condensers with ammonia as refrigerant.

H. Air-cooled condensers shall have a fin density no greater than 10 fins per inch.

EXCEPTION to Section 120.6(a)4H: Micro-channel condensers.

EXCEPTION to Section 120.6(a)4~~A, 4B, 4C, 4E, 4F and 4G~~: Transcritical CO_2 refrigeration systems shall comply with section 120.6(a)8.

Table 120.6-B FAN-POWERED CONDENSERS – MINIMUM EFFICIENCY REQUIREMENTS

CONDENSER TYPE	REFRIGERANT TYPE	MINIMUM EFFICIENCY	RATING CONDITION
Outdoor Evaporative-Cooled with THR Capacity > 8,000 MBH	All	350 Btuh/watt	100°F Saturated Condensing Temperature (SCT), 70°F Outdoor Wetbulb Temperature
Outdoor Evaporative-Cooled with THR Capacity < 8,000 MBH and Indoor Evaporative-Cooled	All	160 Btuh/watt	100°F Saturated Condensing Temperature (SCT), 70°F Outdoor Wetbulb Temperature
Outdoor Air-Cooled	Ammonia	75 Btuh/watt	105°F Saturated Condensing Temperature (SCT), 95°F Outdoor Drybulb Temperature
Outdoor Air-Cooled	Halocarbon	65 Btuh/watt	105°F Saturated Condensing Temperature (SCT), 95°F Outdoor Drybulb Temperature
Adiabatic Dry Mode	Halocarbon	45 Btuh/watt	105°F Saturated Condensing Temperature (SCT), 95°F Outdoor Drybulb Temperature
Indoor Air-Cooled	All	Exempt	Exempt

5. **Compressors.** Compressor systems utilized in refrigerated warehouses shall conform to the following:

   A. Compressors serving refrigeration systems that are not transcritical CO_2, shall be designed to operate at a minimum condensing temperature of 70°F or less.

   B. Compressors for transcritical CO_2 refrigeration systems shall be designed to operate at a

   C.~~B.~~ New open-drive screw compressors in new refrigeration systems with a design saturated suction temperature (SST) of 28°F or lower that discharges to the system condenser pressure shall control compressor speed in response to the refrigeration load.

   EXCEPTION 1 to Section 120.6(a)5C~~B~~: Refrigeration plants with more than one dedicated compressor per suction group.

   EXCEPTION 2 to Section 120.6(a)5C~~B~~: Compressors and condensers on a refrigeration system for which more than 20 percent of the total design refrigeration cooling load is for quick chilling/~~ or~~ freezing of products (space with design cooling capacities of greater than 240 Btu/hr-ft^2 (2 tons per 100 ft^2)), or process refrigeration cooling for other than a refrigerated space.

   D~~C~~. New screw compressors with nominal electric motor power greater than 150 HP shall include the ability to automatically vary the compressor volume ratio (Vi) in response to operating pressures.

6. **Infiltration Barriers.** Passageways between freezers and higher-temperature spaces, and passageways between coolers and nonrefrigerated spaces, shall have an infiltration barrier consisting of strip curtains,

Commented [NJ1]: A note should be added clarifying that this table is not applicable to CO2. That table 120.6-C should be used for CO2

Commented [NJ2]: A firm number like this does not work for CO2. Please see my comment at 120.6(a)8G

Deleted: minimum condensing temperature of 60°F or less…

Deleted: **EXCEPTION to Section 120.6(a)5B:** Compressors with a design saturated suction temperature greater than or equal to 30°F shall be designed to operate at a minimum condensing temperature of 70°F or less.…

an automatically-closing door, or an air curtain designed by the manufacturer for use in the passageway and temperature for which it is applied.

EXCEPTION 1 to Section 120.6(a)6: Openings with less than 16 square feet of opening area.

EXCEPTION 2 to Section 120.6(a)6: Dock doorways for trailers.

7. **Refrigerated~~ion System~~ Warehouse Acceptance.** Before an occupancy permit is granted for a new refrigerated warehouse, or before a new refrigeration system serving a refrigerated warehouse is operated for normal use, the following equipment and systems shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the equipment and systems meet the acceptance requirements:

   A. Electric resistance underslab heating systems shall be tested in accordance with NA7.10.1.

   B. Evaporators fan motor controls shall be tested in accordance with NA7.10.2.

   C. Evaporative condensers shall be tested in accordance with NA7.10.3.1.

   D. Air-cooled condensers shall be tested in accordance with NA7.10.3.2.

   E. Adiabatic condensers shall be tested in accordance with NA7.10.3.3.

   F. Variable speed compressors shall be tested in accordance with NA7.10.4.

   G. Transcritical CO_2 refrigeration systems shall be tested in accordance with NA7.20.1

8. **Transcritical CO_2 Gas Coolers.** New fan-powered gas coolers on all new transcritical CO_2 refrigeration systems shall conform to the following:

   A. Air-cooled gas coolers are prohibited in Climate Zones 9 through 15.
   EXCEPTION to Section 120.6(a)8A: Systems which include energy reducing components which cause the system to achieve the same or better energy performance as that system without the energy reducing components but with an adiabatic gas cooler operating in adiabatic cooling mode may be applied with an air-cooled gas cooler in all climate zones.

   B. Design leaving gas temperature for air-cooled gas coolers shall be less than or equal to the design dry bulb temperature plus 6°R.

   EXCEPTION to Section 120.6(a)8B: Design leaving gas temperature for air-cooled gas coolers in Climate Zone 2, 4, and 8 shall be less than or equal to the design dry bulb temperature plus 8°R.

   C. Design leaving gas temperature for adiabatic gas coolers necessary to reject the design total heat of rejection of a refrigeration system shall be less than or equal to the design wet bulb temperature plus 15°R during adiabatic cooling operation.

   D. All gas cooler fans shall be continuously variable speed. When ambient air dry bulb temperatures are above the minimum gas cooler leaving temperature (as defined in 120.6(a)8G), the speed of all fans serving a common condenser high side and a common air-side flow path through the heat exchanger shall be controlled in unison. When ambient air dry bulb temperatures are at or below the minimum gas cooler leaving temperature, the fans may be individually staged ON and OFF.

   E. While operating below the critical point, the gas cooler pressure shall be controlled in accordance to 120.6(a)4F.

   F. While operating above the critical point, the gas cooler pressure setpoint shall be reset based on ambient conditions such that the system efficiency is maximized.

   G. The minimum saturated condensing temperature setpoint (or equivalent saturated condensing pressure setpoint) shall be no more than 5°R over the minimum condensing temperature required to produce the minimum compressor pressure differential required for proper compressor operation for systems utilizing air-cooled gas coolers, evaporative-cooled gas coolers, adiabatic gas coolers, air or water- cooled fluid coolers or cooling towers for heat rejection.

Commented [NJ3]: Note: temperature differences are properly shown as degrees Rankine (°R) [or Kelvin (°K) for SI units]. If differences are shown in many places in the document as °F and an overall correction to °R is not made then it could be used here for consistency.

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Commented [NJ4]: Dry operation of an adiabatic gas cooler at design conditions is not relevant as it would only occur in an emergency situation. The adiabatic gas cooler should be designed to provide leaving gas cooler temperatures of 15°R or less over the ambient wet bulb temperature. In practice the air has a wet bulb temperature as it enters the wet adiabatic pad, the air is cooled to within some amount of temperature difference from that wet bulb temperature based on the pad efficiency. That pre-cooled air then enters the heat exchanger and the gas leaving the heat exchanger will be at a temperature some amount above the pre-cooled air temperature. We believe a total of 15°R or less is achievable but the amount should be confirmed by various adiabatic gas cooler manufacturers. This temperature difference should also be determined with consideration to the information in Table 120.6-C as a close approach temperature will result in increase fan power for the same Btuh load.

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Commented [NJ5]: A flat number like 60°F or 70°F does not work correctly for all conditions. The pressure differential at the compressor (suction pressure to discharge pressure) is what matters. It is true that for a typical food application with a +20°F Saturated Suction Temperature (SST) the 60°F would work, but that is not true at all SST's. Example: At +45°F suction temperature (A/C) the lowest acceptable condensing temperature for proper compressor operation is 76°F.
Also, it should be noted that the use of the term "intermediate" is probably incorrect here. The intermediate pressure is the pressure in the flash tank and that is only related to minimum condensing temperature when parallel compression is applied to the system and the flash tank pressure is the suction pressure of the compressor connected directly to the flash tank. For systems without parallel compression what it important is the suction pressure of the transcritical compressors which is usually the "Medium Temperature" suction group that is at the highest temperature. That MT group could be food at +20°F, but there may be an additional suction group for air conditioning or a process suction group at +45°F or higher.

EXCEPTION to Section 120.6(a)8G: For systems including heat reclaim that can benefit from increased condensing pressure the minimum saturated condensing pressure can be increased during heat reclaim.

H. Fan-powered gas coolers shall meet the gas cooler efficiency requirements listed in Table 120.6-C. Gas cooler efficiency is defined as the Total Heat of Rejection (THR) capacity divided by all electrical input power (fan power at 100 percent fan speed).

Deleted: EXCEPTION to Section 120.6(a)8G: Transcritical CO_2 refrigeration systems with a design intermediate saturated suction temperature greater than or equal to 30°F shall have a minimum condensing temperature setpoint of 70°F or less.…

Commented [NJ6]: See comments at table 120.6-C

Table 120.6-C TRANSCRITICAL CO_2 FAN-POWERED GAS COOLERS – MINIMUM EFFICIENCY REQUIREMENTS

CONDENSER TYPE	REFRIGERANT TYPE	MINIMUM EFFICIENCY	RATING CONDITION
Outdoor Air-Cooled	Transcritical CO_2	160 Btuh/watt	1400 psig, 100°F Outlet Gas Temperature, 90°F Outdoor Dry bulb Temperature
Adiabatic Dry Mode	Transcritical CO_2	90 Btuh/watt	1400 psig, 100°F Outlet Gas Temperature, 90°F Outdoor Dry bulb Temperature

9. Automatic Door Closers. Doors designed for the passage of people that are between freezers and higher-temperature spaces, or between coolers and nonrefrigerated spaces, shall have automatic door closers.

(b) **Mandatory Requirements for Commercial Refrigeration.**

Retail food ~~stores~~ or beverage stores with 8,000 square feet or more of conditioned floor area, and that utilize either refrigerated display cases, or walk-in coolers or freezers, shall meet all applicable State and federal appliance and equipment standards consistent with Section 110.0 and 110.1 or, for equipment not subject to such standards, the requirements of Subsections 1 through 4.

1. Remote **Condensers serving refrigeration systems.** Fan-powered condensers shall conform to the following requirements:

   A. All condenser fans for air-cooled condensers, evaporative-cooled condensers, adiabatic condensers, gas coolers, air- or water-cooled fluid coolers or cooling towers shall be continuously variable speed, with the speed of all fans serving a common condenser high side controlled ~~in unison.~~ Also, provisions may allow for the independent staging ON and OFF of individual fans within the unit when ambient conditions and load requirements deem necessary.

   B. The refrigeration system condenser controls for systems with air-cooled condensers shall use variable-setpoint control logic to reset the condensing temperature setpoint in response to ambient drybulb temperature.

   C. The refrigeration system condenser controls for systems with evaporative-cooled condensers shall use variable-setpoint control logic to reset the condensing temperature setpoint in response to ambient wetbulb temperature.

   D. The refrigeration system condenser controls for systems with adiabatic condensers shall use variable setpoint control logic to reset the condensing temperature setpoint in response to ambient drybulb temperature while operating in dry mode.

   EXCEPTION 1 to Section 120.6(b)1B, C and D: Condensing temperature control strategies approved by the executive director that have been demonstrated to provide equal energy savings.

   EXCEPTION 2 to Section 120.6(b)1D: Systems served by adiabatic condensers in Climate Zone 16.

   E. The saturated condensing temperature necessary for adiabatic condensers to reject the design total heat of rejection of a refrigeration system assuming dry mode performance shall be less than or equal to:

      i. The design drybulb temperature plus 20°F for systems serving freezers;

      ii. The design drybulb temperature plus 30°F for systems serving coolers.

   F. The minimum condensing temperature setpoint shall be less than or equal to 70°F.

   G. Fan-powered condensers shall meet the specific efficiency requirements listed in Table 120.6-D~~C~~.

Commented [NJ7]: The rating conditions presented here must be reviewed and commented on by dry type air-cooled gas cooler manufacturers and adiabatic gas cooler manufacturers. The ability of these devices to meet these requirements is unknown to us.

Commented [NJ8]: Rating an adiabatic gas cooler during dry mode operation is unrelated to actual operation and could be a very significant cost driver for the selection of this equipment. They will only operate without water in an emergency and at some ambient conditions the system will not operate without water. Perhaps this minimum efficiency should be XX Btuh/watt at 1400psig, 100°F Outlet Gas Temperature, 80°F wet bulb

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Commented [NJ9]: The pressure in an adiabatic gas cooler which is operating without water, "Dry Mode" will be controlled to the same pressure an air-cooled gas cooler is controlled to so for the same leaving gas cooler temperature the controlled to pressure is the same.

Commented [NJ10]: A note should be added stating this section and Table 120.6-D are not applicable to transcritical CO2 and to use 120.6(b)5

Table 120.6-D~~C~~ FAN-POWERED CONDENSERS –SPECIFIC EFFICIENCY REQUIREMENTS

CONDENSER TYPE	MINIMUM SPECIFIC EFFICIENCY[a]	RATING CONDITION
Evaporative-Cooled	160 Btuh/watt	100°F Saturated Condensing Temperature (SCT), 70°F Entering Wetbulb Temperature
Air-Cooled	65 Btuh/watt	105°F Saturated Condensing Temperature (SCT), 95°F Entering Drybulb Temperature
Adiabatic Dry Mode	45 Btu/watt (halocarbon)	105°F Saturated Condensing Temperature (SCT), 95°F Entering Drybulb Temperature
~~[a]See Section 100.1 for definition of condenser specific efficiency.~~		

[a]See Section 100.1 for definition of condenser specific efficiency.

EXCEPTION 1 to Section 120.6(b)1G: Condensers with a Total Heat Rejection capacity of less than 150,000 Btuh at the specific efficiency rating condition.

EXCEPTION 2 to Section 120.6(b)1G: Stores located in Climate Zone 1.

EXCEPTION 3 to Section 120.6(b)1G: Existing condensers that are reused for an addition or alteration.

H. Air-cooled condensers shall have a fin density no greater than 10 fins per inch.

EXCEPTION 1 to Section 120.6(b)1H: Microchannel condensers.

EXCEPTION 2 to Section 120.6(b)1H: Existing condensers that are reused for an addition or alteration.

EXCEPTION to Section 120.6(b)1B, 1C, 1D, 1E, 1F, 1G: Transcritical CO_2 refrigeration systems.

EXCEPTION to Section 120.6(b)1: New condensers replacing existing condensers when the attached compressor system Total Heat of Rejection does not increase and less than 25 percent of both the attached compressors and the attached display cases are new.

2. **Compressor Systems.** Refrigeration compressor systems and condensing units shall conform to the following requirements:

A. Compressors and multiple-compressor suction groups shall include control systems that use floating suction pressure logic to reset the target saturated suction temperature based on the temperature requirements of the attached refrigeration display cases or walk-ins.

EXCEPTION 1 to Section 120.6(b)2A: Single compressor systems that do not have continuously variable capacity capability.

EXCEPTION 2 to Section 120.6(b)2A: Suction groups that have a design saturated suction temperature of 30°F or higher, or suction groups that comprise the high stage of a two-stage or cascade system or that primarily serve chillers for secondary cooling fluids.

B. Liquid subcooling shall be provided for all low temperature compressor systems with a design cooling capacity equal or greater than 100,000 Btu/hr with a design saturated suction temperature of -10°F or lower, with the subcooled liquid temperature maintained continuously at 50°F or less at the exit of the subcooler, using compressor economizer port(s) or a separate medium or high temperature suction group operating at a saturated suction temperature of 18°F or higher.

EXCEPTION 1 to Section 120.6(b)2B: Low temperature cascade systems that condense into another refrigeration system rather than condensing to ambient temperature.

EXCEPTION 2 to Section 120.6(b)2B: Transcritical CO_2 refrigeration systems.

C. Compressors for transcritical CO_2 refrigeration systems shall be designed to operate at a minimum condensing temperature of 60°F or less.

Commented [NJ11]: Not applicable to transcritical CO2

EXCEPTION to Section 120.6(b)2C: Compressors with a design saturated suction temperature greater than or equal to 30°F shall be designed to operate at a minimum condensing temperature of 70°F or less.

EXCEPTION to Section 120.6(b)2: Existing compressor systems that are reused for an addition or alteration.

3. **Refrigerated Display Cases.** Lighting in refrigerated display cases, and lights on glass doors installed on walk-in coolers and freezers shall be controlled by one of the following:

   A. Automatic time switch controls to turn off lights during nonbusiness hours. Timed overrides for any line-up or walk-in case may only be used to turn the lights on for up to one hour. Manual overrides shall time-out automatically to turn the lights off after one hour.

   B. Motion sensor controls on each case that reduce display case lighting power by at least 50 percent within 30 minutes after the area near the case is vacated.

4. **Refrigeration Heat Recovery.**

   A. HVAC systems shall utilize heat recovery from refrigeration system(s) for space heating, using no less than 25 percent of the sum of the design Total Heat of Rejection of all refrigeration systems that have individual Total Heat of Rejection values of 150,000 Btu/h or greater at design conditions.

   EXCEPTION 1 to Section 120.6(b)4A: Stores located in Climate Zone 15.

   EXCEPTION 2 to Section 120.6(b)4A: HVAC systems or refrigeration systems that are reused for an addition or alteration.

   EXCEPTION 3 to Section 120.6(b)4A: Stores where the design Total Heat of Rejection of all refrigeration systems is less than or equal to 500,000 Btu/h.

   B. The increase in hydrofluorocarbon refrigerant charge associated with refrigeration heat recovery equipment and piping shall be no greater than 0.35 lbs per 1,000 Btu/h of heat recovery heating capacity.

5. **Transcritical CO_2 Gas Coolers**. New fan-powered gas coolers on all new transcritical CO_2 refrigeration systems shall conform to the following:

   A. Air-cooled gas coolers are prohibited in Climate Zones 10 through 15.

   B. Design leaving gas temperature for air-cooled gas coolers shall be less than or equal to the design dry bulb temperature plus 6°F.

   C. Design leaving gas temperature for adiabatic gas coolers necessary to reject the design total heat of rejection of a refrigeration system assuming dry mode performance shall be less than or equal to the design dry bulb temperature plus 15°F.

   D. All gas cooler fans shall be continuously variable speed, with the speed of all fans serving a common condenser high side controlled in unison.

   E. While operating below the critical point, the gas cooler pressure shall be controlled in accordance to 120.6(b)1A.

   F. While operating above the critical point, the gas cooler pressure setpoint shall be reset based on ambient conditions such that the system efficiency is maximized.

   G. The minimum condensing temperature setpoint shall be less than or equal to 60°F for air-cooled gas coolers, evaporative-cooled gas coolers, adiabatic gas coolers, air or water-cooled fluid coolers or cooling towers.

   EXCEPTION to Section 120.6(b)5G: Transcritical CO_2 refrigeration systems with a design intermediate saturated suction temperature greater than or equal to 30°F shall have a minimum condensing temperature setpoint of 70°F or less.

Commented [NJ12]: See comments in CO2 section above at section 120.8(a)8 for this entire section

H. Fan-powered gas coolers shall meet the condenser efficiency requirements listed in Table 120.6-E. Gas cooler efficiency is defined as the Total Heat of Rejection (THR) capacity divided by all electrical
input power (fan power at 100 percent fan speed).

Table 120.6-E TRANSCRITICAL CO_2 FAN-POWERED GAS COOLERS – MINIMUM EFFICIENCY REQUIREMENTS

CONDENSER TYPE	REFRIGERANT TYPE	MINIMUM EFFICIENCY	RATING CONDITION
Outdoor Air-Cooled	Transcritical CO_2	160 Btuh/watt	1400 psig, 100°F Outlet Gas Temperature, 90°F Outdoor Dry bulb Temperature
Adiabatic Dry Mode	Transcritical CO_2	90 Btuh/watt	1100 psig, 100°F Outlet Gas Temperature, 90°F Outdoor Dry bulb Temperature

Commented [NJ13]: See all comments at Table 120.6-C above

6. **Commercial Refrigeration Acceptance.** Before an occupancy permit is granted for a new retail food or beverage store, or before a new refrigeration system serving a retail food or beverage store is operated for normal use, the following equipment and systems shall be certified as meeting the Acceptance Requirements for Code Compliance, as specified by the Reference Nonresidential Appendix NA7. A Certificate of Acceptance shall be submitted to the enforcement agency that certifies that the equipment
and systems meet the acceptance requirements. ~~A.~~ Transcritical CO_2 refrigeration systems shall be tested in accordance with NA7.20.1.