

Commercial Refrigeration Program

Rebate qualifying criteria for individual measures



To receive a refrigeration program rebate, a project must meet at least one measure-qualifying criteria. In addition, it must meet the guidelines listed on the back of our rebate application form. Guidelines include minimum refrigeration system requirements indicative of generally accepted standard practices for new construction.

Many qualifying criteria below involve specific equipment performance ratings, system configurations, or control configurations. The customer or vendor is required to provide documentation showing the project meets the qualifying criteria. For some retrofit measures, documentation must include pre-existing refrigeration equipment, configuration, or controls.

Program rules require an invoice before issuing a rebate. An invoice must identify the makes and models of rebate-qualifying equipment or explicitly reference a proposal (which must also be provided) that provides this equipment detail.

Case measures

Antisweat heater control [Level 1] based on humidity (retrofit only except for small stores)

This rebate is for the retrofit of existing display cases or walk-ins. However, it also will be available for new facilities with less than 40 lineal feet of refrigerated display area.

The anti-sweat heater controller must measure the humidity or dewpoint near the cases and either turn off or substantially reduce anti-sweat heater power when humidity is low. The rebate is dependent on the length of display case line-ups and walk-in box display frontage. Cases must have at least 10 heater watts controlled per foot of display case front.

Antisweat heater control [Level 2] based on condensation (new and retrofit)

The anti-sweat heater controller must adjust the level of antisweat heat control by sensing for moisture condensation on metal surfaces of controlled cases. It can only control multiple cases by a single controller when they're of identical make, model, and temperature/

suction settings. The rebate is dependent on the length of display case line-ups and walk-in box display areas. Cases must have at least 10 heater watts controlled per foot of display case front.

Case lighting controls (retrofit only) - new

Occupancy sensor control of lights within glass door cases are eligible for this rebate in all stores. Time controls are eligible when the lights can be scheduled off at night for at least 7 hours. Projects can integrate occupancy sensors into cases, but each sensor must serve a control zone no larger than a single aisle, and the sensor shall not sense movement beyond the end of an aisle. Sensors must turn lights off or reduce power by at least 50 percent. Occupancy sensor time-delays shall be no more than 5 minutes.

Door addition to open cases—coolers and freezers (retrofit only)

This rebate is intended to add glass doors to existing cases or replace existing open cases with glass door cases. The rebate will be limited to the linear feet of existing case. New cooler doors must not have an antisweat heater in the glass to be eligible for this rebate.

High evaporator temperature cases (new or retrofit medium temperature)

Compressors in high evaporator temperature cases can operate at higher-than-normal suction pressures. The efficiency and capacity of compressors increase dramatically as the suction pressure increases. Therefore, in order to qualify for rebates, cases must be served by a compressor suction group at a higher-than-normal suction level as noted in the table below. (This will require an additional suction group on some systems). In addition, each suction group serving more than two higher evaporator temperature cases shall have multiple compressor capacity steps or compressor variable speed control.

Application	Minimum rated evaporator temperature	Minimum suction group saturated suction temperature
Produce and dairy	28°F	26°F
Meat	24°F	22°F

High-efficiency glass doors (medium temperature walk-ins and low-temperature cases only)

Medium-temperature (below 0° F) walk-in coolers:

The glass package must, at a minimum, consist of three panes of glass, or two panes with low-emissivity coating. The door extrusion and glass must not have anti-sweat heaters. In addition, the external frame and mullion anti-sweat heater power must be less than or equal to 18 watts per lineal foot of door front. Program rules allow for exceptions to the anti-sweat heater requirements on an individual basis for localities with unusually high humidity levels.

Low-temperature (0° to 40° F) cases (frozen food or ice cream): The unit must provide a total antisweat heat (mullion, frame, and glass) less than or equal to 40 watts per lineal foot of door front.

LED display case lighting (new and retrofit, low- and mid-temp)

Case must use only LED lights.

Night shades—coolers and freezers (new & retrofit)

Night shades provide a thermal barrier between the cooled portion of an open case and the ambient air. They must be permanently installed, retractable night covers. Both manually operated and motorized shades are eligible.

Replace island case—multideck with doors (retrofit)

Eligible projects include the removal of island cases and the installation of glass-door multideck cases using the same types of products. Case length and display length will determine rebate amounts. **Cases with open product area less than 36 inches wide:** the measurement is defined as the display length from one case to the other.

Cases 36 inches or wider: the measurement is defined as the perimeter length minus 6 feet (based on 1.5 feet for each corner).

Replacement cooler cases must have no antisweat heat in the door glass.

Thermostatic expansion valves (TXV) to electronic expansion valves (EEV) (new and retrofit)

A customer who switches a rack refrigeration system from TXVs to EEVs would qualify for a rebate. EEVs should allow at least a 1°F increase in a suction group's

saturated suction temperature (SST) or at least a 5°F reduction in the minimum saturated condensing temperature (SCT).

Documentation requirements: A manufacturer or designer should provide alternate designs with the different design-saturated temperatures or a statement clearly comparing SST and minimum SCT value differences.

Include documentation of control setpoints prior to and following project completion.

Condenser measures

Adiabatic condenser (new)

New adiabatically pre-cooled condensers and gas coolers are eligible for rebates.

Retrofit projects using add-on products providing similar pre-cooling also are eligible on a case-by-case basis and could qualify for custom rebates. The system must control the adiabatic condenser (or gas cooler) with pre-cooling water down to an outdoor temperature of 65°F or lower.

Low-speed condenser fans (new)

New condensers (and gas coolers) with axial (propeller) fans with a maximum running speed of less than 900 rpm are rebate eligible. Condensers with variable speed-controlled ECM motors **are not eligible** when they are designed to run at higher speeds under high loads or ambient conditions and only reduce the speed below 900 rpm for a portion of their annual running time.

Preservation of condenser subcooling (retrofit only)

Rebate-qualifying systems do not already transfer a significant amount of condenser subcooling to the liquid flowing to the expansion valves (e.g. typical flow-through receiver configurations).

The project must transfer at least two-thirds of subcooled liquid from the condenser to the distribution lines. The system should maintain subcooling under winter part-load conditions (50 percent load at 0°F outside temperature).

Conversion to a liquid bypass flow arrangement (surge receiver) is preferred. However, program rules would consider the following designs on a case-by-case basis:

- A double-dip tube receiver.
- Liquid inlet and outlet ports arranged to preserve subcooling as the liquid flows through the receiver.
- Piping liquid through a separate subcooling coil after the receiver.

Program rules determine rebate levels by the horsepower of compressors. The compressors must serve the evaporators fed by the subcooled liquid (mechanical subcooler horsepower is not to be included).

Solid-state condenser fan control (retrofit only)

The program will provide rebates to projects which replace ambient temperature controls with pressure controls or controls based on a more appropriate temperature (liquid line). Program rules allow for the evaluation of other existing and new condenser fan control schemes on a case-by-case basis.

The condenser must have at least three fans. The new system must control each fan individually, except when it controls fan speeds simultaneously. The condenser fan control algorithm should minimize energy use by either cycling condenser fan power or reducing fan speed without affecting head pressure.

The customer should include the following with the rebate application:

- Brief written descriptions of the previous and new control schemes.
- Best available information on pre-existing and new control settings and deadbands (input values within a control system).

Evaporator fan motor measures

High-efficiency evaporator fan motors (new and retrofit)

Rebate-eligible projects include permanent split capacitor motors and DC brushless motors.

We will consider other motor technologies that demonstrate equivalent efficiency levels.

A motor which receives a rebate through our Drive Power program will not be eligible for an additional rebate.

Permanent magnet fan motors (new & retrofit)

Permanent magnet synchronous motors are eligible. We will consider motor technologies that demonstrate equivalent efficiency levels.

Projects will only receive one rebate for a motor that qualifies for both our Drive Power and Refrigeration programs.

Compressor measures

Conversion to solid-state compressor controller (retrofit only)

Existing rack systems which use electromechanical control systems are eligible. Otter Tail Power Company will consider rebates for solid-state rack controls installed in conjunction with rack capacity additions. Please verify eligibility with Otter Tail Power Company.

The new system must control at least three compressors at the same suction pressure level. We will consider fewer for systems that use compressor variable speed control. The controller must use a microprocessor-based control system. It must vary the combination of compressors to match the load and give the best system efficiency at various load conditions.

The controller must optimally match more compressors to the load than can be achieved by electromechanical controls.

Suction pressure and/or refrigerated case temperature will be the mechanism for sensing load. If the system uses suction pressure to control the compressors, it must incorporate floating suction pressure control at reduced loads into the control scheme. The system should also control all capacity stages with a single setpoint, using a proportional integral derivative (PID) loop or single deadband/timing. This will allow the system to bring on additional stages. It can then control the system more closely than electromechanical controls with sequential offsets and deadbands for each compressor. This causes the system to operate at lower-than-necessary temperatures at low-load conditions.

The system should incorporate floating head pressure with a minimum condensing temperature of 70°F or lower. However, we will not allow an additional rebate for conversion to floating head pressure unless the pre-existing system did not permit floating head pressure, or if additional system modifications are necessary to allow for operation at reduced head pressures. We will consider exceptions.

Digital capacity modulation (new and retrofit)

A rebate-eligible project will promote fine-step capacity control on one compressor in each suction group. It will reduce suction pressure fluctuation and increase average suction pressure. It can increase fine-step capacity modulation of one compressor by either a variable-speed control, at least two stages of cylinder unloading, or digital capacity control. Prior to installation, it should detail compressor control algorithm to maximize suction

group's time-averaged suction pressure. It can do this by reducing pressure swings or increasing the suction pressure setpoint. The rebate requires control setting descriptions of pre-existing and new control settings and deadbands. We also will consider baseline design compressor control strategies for new rack systems.

We will base rebates on the total horsepower of suction groups. At least one compressor must have fine compressor capacity modulation with a strategy to increase time-averaged suction pressure.

Floating head pressure on rack (retrofit only)

Rebate-eligible systems must modify floating head pressure. Project examples include the following:

- Installing a new control device
- Increasing liquid line sizing
- Installing heating equipment to compensate for heat recovery system capacity losses.

The project must be able to float the condenser saturation temperature to 70°F or lower before the condenser capacity is reduced. It can do so by cycling fan power, slowing fans down, or flooding back the condenser. It must minimize fan power.

Projects also should minimize boosting of head pressure for defrost and preserve condenser subcooling. Qualifying methods include the use of mechanical devices, liquid-to-suction heat exchangers, and surge-type receivers. The condenser must be located outdoors.

The rebate application must include a refrigeration contractor's signed statement indicating that floating head pressure operation is appropriate and that the system's relief devices comply with applicable codes.

Floating head pressure on stand-alone

Rebate-eligible projects must adjust or install control devices so the condenser saturation temperature will float down to 75°F or lower when the outside temperature is low.

They also must control condenser fans to minimize head pressure. All fans must operate until the head pressure floats down to its minimum value, or the current setting that floats based on ambient temperature.

The project must insulate liquid lines. It must incorporate subcooling, including the following:

- A subcooling coil located after the receiver.
- A liquid-to-suction heat exchanger.
- A surge-type receiver to preserve condenser subcooling.

New facilities should use balanced port or electronic expansion valves to assure adequate refrigerant feed to the evaporator.

The rebate application must include a refrigeration contractor's signed statement verifying that the system is suitable for floating head pressure operation and the extent to which it can lower the head pressure. The contractor should also assure that any required relief devices are of sufficient capacity to comply with applicable codes.

The condenser or condensing unit must be installed outdoors.

Conversion to parallel rack system (retrofit only)

Rebate-eligible projects will replace or convert existing stand-alone systems.

If project adds a load, we will base the rebate on the final system's total compressor horsepower, with a limit of twice the pre-existing system's compressor horsepower.

The resulting parallel rack system must have at least three compressors at the same suction pressure level, (or fewer if it uses compressor variable speed control). It may not serve loads with evaporator saturation temperatures more than 8° F apart.

Projects must apply floating head pressure control to the rack system, as outlined under the **Floating head Pressure on rack section**. We will provide an additional rebate for that item. We will make exceptions to the floating head pressure requirement for projects that combine pre-existing indoor condensing units.

Other measures

Outdoor Air Cooling (walk-in coolers only)

Project should control the outdoor air-cooling system based on measurements of both outdoor and indoor temperatures. When the outdoor temperature is below the cooler setpoint temperature, the system will use outdoor air cooling and deactivate compressors.

Strip curtains—coolers and freezers (new & retrofit)

Rebate-eligible projects will install strip curtains in walk-in cooler and freezer doorways to reduce air flow and heat gain. Strip curtains shall be at 0.06 inches thick. The manufacturer must approve the curtains for freezer applications.