



COOLERS AND FREEZERS



Overview

Walk-in refrigerators and freezers for storing ingredients and final products are common features of many food and beverage manufacturing facilities. Proper temperature control on meat, beverages, and produce is essential to ensuring product freshness and preventing bacterial contamination. Coolers and freezers can be very energy intensive, so regular maintenance and proper operation are essential to energy efficiency.

Best Management Practices for Energy Efficiency

Conduct Regular Inspections

Elements throughout the refrigeration cycle should be inspected regularly to ensure proper operation. A sample inspection frequency based on MnTAP's experience is as follows:

Daily

- Ensure door closes tightly
- Remove blockages from evaporator exhaust
- Confirm that air flows freely to evaporator intake
- Review cooler or freezer temperature against industry regulations

Monthly

- Check strip curtains on door for damage
- Check seal on door gaskets
- Clean ice or frost buildup from evaporator
- Clean condenser coils and fins
- Check insulation for cracks or damage

Annually

- Confirm proper seal on door sweep
- Lubricate hinges
- Clean out drain lines

About MnTAP

The Minnesota Technical Assistance Program (MnTAP) is a confidential, no-cost, and non-regulatory program at the University of Minnesota that provides technical assistance focused on pollution prevention to organizations in Minnesota.

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Establish Facility Best Management Practices

Regular facility operations in and around coolers and freezers can promote energy efficiency.

Examples evaluated under this grant are as follows:

- Minimize door open time. When coolers and freezers are loaded and unloaded frequently, chilled air can escape through the repeated opening and closing of the doors.
- Reduce the number of times doors are opened and can lead to energy loss.
- Turn off cooler lights when no one is inside.
- Insulate pipes to prevent excessive heating or cooling.

Optimize Refrigeration System

- Floating head pressure control adjusts the head pressure based on the ambient wet-bulb temperature. During colder winter temperatures, the compressor can operate at a set minimum head pressure, resulting in reduced energy use.
- Free cooling uses cold outdoor air to provide or supplement cooling when conditions are right. The amount of cooling depends on the ambient air as well as the type of product being cooled.

Commercial Refrigeration Examples

MnTAP staff members worked with a commercial bakery to study energy efficiency opportunities in their freezers and drew on [ENERGY STAR's energy efficiency resource for the baking industry](#). During the visit, MnTAP observed regular facility operations surrounding use of R-507A refrigerant. MnTAP used the volume and fullness of the freezers, ambient and freezer temperatures, and existing industry estimates to identify the following opportunities for savings:

Replace Freezer Door Gaskets

Existing door gaskets were observed to be damaged and in need of replacement. Industry guidance suggests that seal losses are 1 cubic foot per minute per foot (CFM/ft) through freezer door gaskets and between 0.25 and 0.5 CFM/ft for well-sealed gaskets on sliding doors.¹

After measuring the gasket length and operating conditions for all on-site freezers, MnTAP staff members determined that gasket replacement or repair would save 5,600 kilowatt-hours (kWh) and \$560 in energy costs.

NAICS Code: 3118**
Industry Sector: Bakeries

Energy savings:
5,600 kWh

Cost savings:
\$560

Status:
Proposed

Reduce Freezer Door Open Time

MnTAP staff members observed sliding freezer doors being left open by facility personnel during loading and unloading for approximately five minutes per hour at a site visit. Using research on infiltration air flow in refrigerated warehouses¹ and transient infiltration air flow in walk-in coolers², MnTAP staff members assume that all of the air that was originally in the freezer has left during the five-minute open time, and there is ambient air in the freezer that needs to be cooled. MnTAP did not account for the strip curtains retaining air since they would be opened twice for someone entering and leaving the freezer and since the curtains observed on the freezer doors had some gaps. MnTAP staff members did not consider that the strip curtains would retain air inside because they are opened twice (i.e., when someone enters and leaves) per entry and had some gaps. Based on all three freezers' dimensions and assuming similar open times for each freezer, leaving doors open would use 7,800 kWh of energy use and \$780 per year. Reducing the amount of time doors are left open will reduce the amount of energy the freezers use.

1. Jekel, Todd. ["Door Infiltration Estimator Overview."](#) (2017).

2. Faramarzi, Ramin, Hodayun K. Navaz and Kristina Kamensky. "A Novel Approach to Visualize and Quantify the Transient Air Infiltration/Exfiltration in Walk-in Coolers." (2018).