

Energy Efficient Refrigeration for grocery stores, convenience stores and restaurants

TECHNICAL DATA SHEET

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Refrigeration represents a significant portion of the electric bill for grocery stores, convenience stores and restaurants. Walk-ins, reach-ins and display cases are the primary types of refrigeration equipment and account for about 63 percent of commercial refrigeration use. A variety of measures can produce considerable savings for businesses.

For example: A 2,000 square foot restaurant will conservatively use 13,000 kWh on refrigeration annually (roughly \$845). By employing a combination of measures described below, a restaurant owner could realize savings of 30 percent or \$254 each year.

NO COST ENERGY SAVING PRACTICES

Maintain clean coils: Evaporator and condenser coils should be cleaned regularly. Refrigeration systems with heat transfer surfaces that are free of dirt and scale buildup are more efficient because they don't have to work as hard.

Maintain door seals: A compressor has to work harder when warm air infiltrates the refrigerated space through a door that doesn't seal properly.

Load items as quickly as possible and load cold items when received: The longer the door stays open the more energy is spent as the system works to return to the temperature set point. Items that are allowed to warm up before they are loaded into the refrigerator put more of a strain on the refrigeration system than items that are loaded while they are still cool.

ENERGY SAVING RETROFIT TECHNOLOGIES

Floating head pressure controls allow compressor head pressures to vary with outdoor conditions. This saves energy dollars and helps refrigeration equipment last longer. Floating head pressure controls often are standard features on new systems; however, older equipment can be retrofitted. Estimated savings range from 3 percent to 10 percent.

Energy efficient case lighting fixtures reduce lighting energy use and reduce the cooling load on the compressor because they generate less heat. T-8 fluorescent lamps and electronic ballasts are often used in new, energy efficient cases; existing cases

Average annual refrigeration costs for the following types of businesses are:

Sit-down restaurant:	\$0.30 – \$0.50 per square foot
Fast food restaurant:	\$0.70 – \$1.10 per square foot
Small grocery:	\$0.90 – \$1.50 per square foot
Large grocery:	\$1.45 – \$2.30 per square foot

"Energy Savings Potential for Commercial Refrigeration Equipment"
— U.S. Department of Energy, June 1996

can be retrofitted. Energy savings potential is estimated to be about 10 percent.

Heat recovery systems use heat removed from display cases to heat water. The amount of water that can be heated will depend on the situation. However, a 7.5 hp compressor can supply close to 100 percent of the hot water requirements in a medium-sized grocery store throughout the year.

High efficiency evaporator and condenser fans save energy for fan operation and by imparting less heat to the refrigerated space. Energy efficient motors on fans can save between 5 percent and 13 percent per year.

Automatic door closers or strip curtains on walk-ins reduce the infiltration of warm air into the refrigerated space.

Anti-sweat heater controls sense humidity conditions in the store and turn the heaters off when they are not needed. Anti-sweat heaters are electric heaters installed in virtually all low temperature — and many medium temperature — display cases to keep their external surfaces free of condensation during high humidity conditions. Typically, they are on all the time. Energy savings estimates range from about 6 percent for grocery store display cases to 14 percent for reach-in freezers, and 20 percent for reach-in refrigerators.

Liquid pressure amplifiers are small refrigerant pumps that raise liquid line pressure to increase system

efficiency. For systems with air-cooled condensers, the lower the outdoor air temperature, the greater the efficiency gains. Energy savings can be up to 20 percent.

ENERGY SAVING PURCHASES

When purchasing new equipment, look for the following features, which are described above:

Floating head pressure controls

Energy efficient case lighting

Heat recovery systems

High efficiency evaporator and condenser fans

Automatic door closers or strip curtains

Anti-sweat heater controls

Liquid pressure amplifiers

In addition, requiring the following features on new equipment will help minimize your operating costs.

ENERGY STAR® rated refrigeration equipment has earned the EPA's ENERGY STAR® logo because it is more efficient than standard equipment. For example, ENERGY STAR rated commercial solid door refrigeration equipment is at least 30 percent more efficient than standard units. Look for the ENERGY STAR logo when purchasing any new commercial refrigeration equipment.

Defrost controls can make the defrost cycle more energy efficient. The most effective controls are demand controls, which initiate defrosting in a variety of ways. These include measuring the temperature or pressure drop across the evaporator, measuring frost accumulation and sensing humidity. All of these methods, if used properly, are more effective than using a simple timer clock to initiate defrosting. Energy

savings estimates range from about 1 percent to 6 percent of refrigeration system energy use.

Mechanical sub-cooling is an effective method of cooling liquid refrigerant below its saturation pressure in order to increase system capacity and improve efficiency. Energy savings are estimated to be as much as 25 percent for grocery store refrigeration systems.

Ambient sub-cooling involves the use of an oversized condenser or an additional heat exchanger to sub-cool liquid refrigerant. Savings estimates range from about 1 percent for grocery store systems to about 9 percent for walk-in coolers.

Evaporative condensers use a wetted filter to cool ambient air as it enters the condenser, increasing its ability to reject heat. Most refrigeration systems use air-cooled condensers to expel heat. Energy savings estimates range from about 3 percent to 9 percent for grocery store refrigeration systems.

For further assistance with ways to improve your energy efficiency, contact your Focus on Energy advisor or call 800.762.7077.

FOR MORE INFORMATION

Focus on Energy offers technical data sheets on food service equipment and lighting. To obtain these publications and learn about other ways to improve your energy efficiency, contact your Focus on Energy advisor, or call 800.762.7077.