

## REFRIGERATORS AND FREEZERS

Linda McCormack\*

Most people purchase only three refrigerators in a lifetime. Because the average refrigeration appliance lasts 15 to 17 years, give careful thought to its selection. Today's refrigeration equipment appears in many forms, shapes and colors. Before buying, consider:

**Family size.** Will your family size grow in the next few years? If so, it may be wise to buy a refrigerator larger than you now need. A family needs a minimum of 9 cubic feet of refrigerator space for two persons and an extra cubic foot for each additional person.

**Shopping frequency.** If you shop just once a week, you will need more refrigeration space than if you shop more often.

**Frozen food use.** If you freeze home-grown fruits and vegetables, store game or buy in large quantities, buy a model with a large freezer section or a separate freezer.

**Entertaining frequency.** Consider the capacity of the refrigerator.

**Cost of operation.** Operating costs should be given considerable weight because the cost of electricity is increasing. The size, energy consumption and features of a refrigerator or freezer make a difference in the operating cost. Maintaining the temperature in a freezer at 0°F costs a great deal more per cubic foot than keeping refrigerator space at 37°F. Features such as an ice-maker, butter conditioner, cold water dispenser, ice-cube dispenser and three door models require more power to operate or function.

Weigh the cost of the frost-free feature versus manual defrost. A frost-free model uses between 500 and 700 kilowatt hours a year more than manual defrost. This is almost 50 percent more energy. However, if a manual defrost model is not defrosted regularly, its efficiency will be lost. Ice acts as an insulator and makes it more difficult for the cooling fluids to pull heat from the freezer unit.

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**Separate controls.** Look for separate controls for the refrigerator and freezer sections. Separate controls allow more efficient control of temperatures in the two sections.

**Power save switches.** Power saver switches on models that use a heater to reduce moisture condensation are important and should be used when the outside humidity is low. Some models have eliminated the heater by circulating the hot coolant around the door area.

**Noise and heat.** Extra features such as automatic or partially automatic defrost systems, automatic ice-makers and cube or ice-water dispensers add to the operating noise. The movement of air by fans to circulate cold air in the refrigerator and freezer compartments may also cause noise.

Air will be heated as it cools the condenser and is exhausted into the room through the toe board on the front of the unit. Models using hot coolant to reduce moisture condensation around the door may have hot spots around the lower door opening.

**Warranty.** Most refrigerators have a 1-year warranty on the cabinet against defects in material and workmanship, and an additional 4-year warranty on the sealed refrigeration system.

**Certification seals.** A dark blue and silver AHAM (Association of Home Appliance Manufacturers) seal certifies the net refrigerator volume and net shelf area for refrigerator-freezers and for upright freezers. A light blue and silver seal certifies net refrigerated volume only for chest freezers. With both seals AHAM declares that the certification is accurately stated and determined in accordance with the requirements of the certification program. The measurements are made according to standards in nation-wide use and are published in Certification Directories distributed to dealers every 6 months.

**Energy label.** An energy label is attached to each new unit shipped from the factory. It provides consumers with point-of-sale, comparative information

on energy costs. The label tells the certified cubic foot volume, average monthly energy consumption in kilowatt hours, and average monthly cost of operation in dollars and cents (based on 4¢ per kwh) for that specific model.

Also provided is a table that lists monthly cost of energy at different electric rates to help the consumer determine the cost at his local rate. In addition, the range of energy costs for all brands within a given size and defrost classification is given. This is also published in the Certification Directory which is distributed to dealers every 6 months.

## REFRIGERATORS

### Construction, Use and Features

*Size.* Refrigerator sizes are quoted in interior volume to the nearest 0.1 cubic foot, with 16 to 20 cubic feet being the most popular sizes. The volume quoted is the sum of usable space of the general refrigerator and freezer compartments. Smaller models of 4.0 to 10.0 cubic feet are usually purchased for special purposes such as use in an office, a recreation room or a vacation home.

*Style.* When shopping for refrigerators, decide first whether a standard refrigerator or a combination refrigerator-freezer is needed.

a. **Standard or Conventional.** The simplest refrigerator is one with a single door and a small freezer compartment inside. The freezing compartment must be manually defrosted. It is the least expensive to buy and the least costly to operate. The freezer compartment rarely goes below 15°F, thus frozen food can be stored for short periods only.

b. **Combinations.** Various types exist, the most popular model has two doors with the freezer on top. Other models include freezer space at the bottom or on the side.

Side-by-side models give the most storage space in the least amount of floor area and eliminate much stooping and stretching. The newest type refrigerator is a three-door side-by-side model with two freezer sections. The small upper freezer gives easy access to often used items with a minimal loss of cold air. The lower freezer is designed for general frozen food storage.

The partition between the fresh food and freezer compartments of the side-by-side model may not be well insulated, causing fresh food placed too close to the freezer wall to freeze.

*Construction.* The cabinet is constructed of a welded, double-steel shell, with insulation between in order to preserve foods and to keep room heat from penetrating the interior of the cabinet.

*Insulation.* The quality of insulation is very important. About 80 percent of the heat that gets into the

interior comes through the walls. The usual materials are fiber glass boards or blankets and polyurethane or polystyrene foam. Insulation keeps out heat, and permits any moisture vapor entering from the outside air to migrate to the inside of the cabinet.

*Finish.* The inside of the refrigerator is made of porcelain enamel, synthetic enamel or plastic. Porcelain enamel is easy to clean and will not rust, scratch, change color or absorb odors. However, it will chip if hit sharply and is relatively expensive. Synthetic enamel is very easily stained by foods and scratches easily, exposing the base metal which rusts. Plastic is less expensive than porcelain and more commonly used in the interiors. Plastic interiors absorb and retain odors and are easily stained by some foods.

*Shelves.* Aluminum, steel or tempered glass is used. Steel is stronger and less likely to bend when heavily loaded. Cantilevered shelves, which lock into the back of the refrigerator but can be moved, are more adaptable than shelves that are fixed or that slide. Sliding shelves should have positive stops and a rear guard rail to prevent dishes from falling off the back when the shelf is pulled forward. Divided shelves and adjustable shelves increase storage flexibility. Narrow shelves on the door take care of many smaller articles. Consider the size of containers frequently used for refrigerator storage.

*Condenser.* The condenser is a coil that cools by sending the heat from the refrigerator into the room. Refrigerators with the condenser located on the back are becoming difficult to find. The most common location is at the bottom of the refrigerator. A fan or blower circulates air over the condenser and blows the heat into the room. Dust, dirt and animal hair will trap heat and act as an insulator on the condenser coils, which in turn inhibits the flow of heat from the coils and thus requires more energy. About every 3 months disconnect the refrigerator and clean the condenser coils. New designs of refrigerators may require different approaches for effective removal of dust and dirt. Some may be cleaned with suction, while others need a blower effect. Read the instructions for specific details.

*Doors.* The doors should be as well insulated as the walls. Some refrigerator doors are convertible — they can be hinged to open to either the left or the right. Offset hinges are often installed to permit the door to swing open at a 90-degree angle, so the refrigerator can be flush with the cabinets.

Doors have a gasket of vinyl plastic for a tight closing to prevent heat or moisture leakage. The gasket should be fungus resistant. A magnetic latch is often used or a continuous magnetic seal may be imbedded in the gasket on all four sides. The seal of the door may be checked by shutting a dollar bill or a similar textured paper between the door and the frame at different places. If the door is properly

sealed, the piece of paper will not pull out when the door has been closed.

**Defrost System.** The temperature of the fresh-food section of a refrigerator should be about 37°F and the freezer section from 0° to 5°F.

Not all refrigerators defrost in the same way. The conventional one-door model uses the simplest and oldest method, manual defrost. It is the most efficient but the least convenient system.

Two-door or combination models have automatic-cycle defrost or are frost-free. Cycle-defrost systems work in one of two ways — either a time clock interrupts the refrigeration cycle early in the morning, or hot refrigerant is circulated through the cooling or evaporator coils at predetermined times.

Frost-free models never need defrosting. As food chills, the moisture is taken out of the air so that frost does not collect on food packages or the walls of the freezer. The frost that forms is melted either by a heater or by hot refrigerant run through the coils. This defrost cycle occurs from one to four times per day and is a significant factor in power usage.

#### *Special Features.*

a. **Automatic ice-makers** determine which type of ice cube control is most suitable. One, regulated by the weight of the cubes deposited in the ice storage bucket, allows the homemaker to increase or decrease the amount of ice which the ice-maker will produce before it shuts off. Another kind varies the size of the cubes by regulating the amount of water that flows into the ice-maker.

b. **Meat keepers** maintain a temperature 7° to 15°F. colder than the storage shelves.

c. **Wheels or rollers** allow moving ease for cleaning.

d. **Instant ice, cold water and beverage dispensers** are found on the door of some models. This convenience reduces door storage space and may add to the operating costs.

e. **Butter conditioners** on the door maintain butter at an easy spreadable temperature.

f. **Special chill compartments** that speed dessert or beverage chilling are in no-frost models.

g. **Hydrator or crisper drawers** help keep succulent vegetables and fruits crisp.

h. **Activated charcoal filters** absorb and hold food odors and control and maintain almost 100 percent humidity. Foods such as fresh vegetable are kept moist and fresh without being wrapped or covered for days longer than by other methods of storage.

#### **Energy Tips for Efficient Use**

● Defrost before build-up is greater than ¼ inch if manually defrosted. Frost is a combination of water

and air and serves as an excellent heat insulator. Thus it is necessary to minimize frost formation as well as to remove it before it becomes excessive.

● Keep foods covered or wrapped to avoid extra moisture in the air. Moisture causes faster frost build-up and makes frost-free models run more. Use covering materials which fit tightly and permit ready transfer of heat but do not permit evaporation to take place.

● Keep drainage tubes and drain pans clean in automatic or no-frost models.

● Allow foods to cool before placing them in a refrigerator or freezer. Foods that need to cool quickly can be placed in a container of cold or ice water. This allows faster cooling by conduction (direct contact with cold) than would be done by convection (removal of heat by the cooling fluid in the refrigerating system).

● Avoid unnecessary door openings by removing several items for the meal at once. Refrigerators use less energy when more time is taken to remove several items than when the door is opened several times to remove a few things each time.

● When the refrigerator will not be used for an extended period of time, such as during vacations, unplug the refrigerator, empty and clean it, and leave the door open. If the refrigerator cannot be emptied, turn the dial to its lowest setting.

● If the gasket around the door becomes damaged or otherwise ineffective, replace it to reduce the chance of heat leakage. Refrigerator or freezer doors sometimes need to be adjusted so that they close tightly. Moisture forming on the gasket is usually a sign of a poor seal.

● Follow the owner's manual to place food in the refrigerator or freezer for maximum air flow and maximum use of cooler areas.

● Locate the refrigerator away from heat sources such as ranges, heating ducts, dishwashers and direct sunlight. Avoid having it compete with high room temperatures to keep foods cool inside.

#### **SEPARATE FREEZER UNITS**

Quality is especially important in a freezer because you entrust it with hundreds of pounds of expensive food to be kept at 0 degrees up to a year.

A home freezer may be a convenience, but is a big energy user. According to *Consumer Reports*, 14½ cents a pound on the purchase price of food would have to be saved to break even with the cost of keeping food frozen at home in a separate freezer. Freezers consume over 1000 kwh yearly. A standard 15-cubic-foot freezer uses more electricity in a year than a radio, TV, dishwasher and washing machine combined. If the same freezer is frost-free, it will use more electricity.

## Construction, Use and Features

Consider several factors before purchasing a freezer: family food patterns, financial resources, space and freezer capacity in the refrigerator. Other considerations are:

**Size.** Freezers vary in size from 3 to 32 cubic feet. Storage capacity may be estimated using this guideline: 1 cubic foot/equivalent to 35 pounds of frozen food.

An upright occupies less space than a chest of similar capacity.

**Style.** Chest and upright models are available. Uprights may be no-frost type or conventional (manual defrost) type. Chest freezers are designed for manual defrosting and collect frost more slowly than manual defrost upright models. All chest models require defrosting one to three times a year.

**Chest-type freezers.** Opening from the top, chest-type freezers need clearance room above. They are convenient for storing irregularly shaped packages and large items. Chest-type freezers may be less expensive than upright models and usually cost less to operate because less cold air is lost when opened.

**Upright freezers.** Opening from the front, upright freezers have shelves and slideout drawers that make food easily accessible. Adjustable shelves allow storage of bulky items.

**Construction.** Component parts, refrigerating mechanism and construction features are similar for freezers and refrigerators. The main difference is the lower interior temperatures required by freezers.

The insulation varies from 4 to 6 inches in thickness and must provide maximum protection against transfer of heat. Added insulation is necessary when the condenser coils are placed against the exterior walls of the cabinet. Leveling screws are necessary for proper adjustment. Since the freezer is a heavy appliance, if not properly adjusted, the door or lid may become warped or out of alignment.

Coils in a chest freezer are frequently wrapped around the box. In some upright models each shelf is supplied with coils for more rapid freezing.

**Special Features.** The selection of special features depends upon family preferences. The following are available.

1. Automatic ice-maker
2. Interior light
3. Movable shelves and storage baskets
4. Quick freeze shelf or compartment
5. Convenient defrost drain
6. Door shelves and other storage devices, such as swing-out storage baskets on upright models

7. Signal light or alarm to warn when the freezer is off or temperature has risen
8. Rollers to facilitate cleaning
9. Readily accessible temperature control
10. Lock on the door
11. Counter-balanced lids on chest freezers

## Energy Tips for Efficient Use

- Look for a model with extra improved insulation.

- The freezer should be kept filled to near capacity and food rotated frequently.

- A chest freezer uses less energy. Since cold air is heavier than warm air, less moisture-laden warm air enters the chest when the lid is raised than enters an upright when the door is opened for the same period. Thus, an upright may cost slightly more to operate than a chest of the same capacity.

- Make sure items are wrapped tightly in plastic wrappers, bags or foil paper, if a frostless model, to eliminate evaporation and excessive operating time.

- Put no more unfrozen food into your freezer than it will freeze within 24 hours. This will be about 2 or 3 pounds of food for each cubic foot of capacity. Overloading forces the freezer to run overtime and may overheat the compressor. Foods may freeze too slowly and may lose quality or spoil.

- Allow for a free flow of air around motors and compressors. Also keep coils clean by vacuuming or dusting them when dust buildup is visible.

- Consider the location of the freezer. Many freezers are located in garages or utility rooms that are not air-conditioned. A 15-cubic-foot frost-free freezer will consume about 24 percent more energy when the room temperature is 90°F. than when it is 70°F. When the room temperature is above 90°F. the energy use of the freezer will double. It should be located away from the sun; away from heat producing appliances, specifically the range and dishwasher; away from the heating system; and where the air can freely move over and away from the condenser coils.

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