The cabinet may be constructed of wood, steel, aluminum, or stainless steel. Doors can be hinged or sliding and either solid or glazed.

Fig. 1 indicates the approximate loads (by cabinet size) for reach-in refrigerators with a 90 F ambient temperature.

Reach-in refrigerators are also built for low-temperature storage and for process applications, such as for bakeries. The low-temperature cabinets may use refrigerated plate coils or forced-air-finned-tube evaporators with automatic defrost systems.

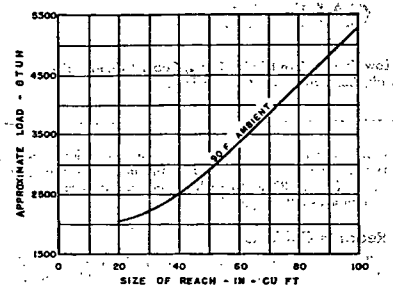


Fig. 1 .... Approximate Refrigeration Load for Reach-In Cabinets

Display Cases for Normal Temperatures

The two general types of display cases are the service type and the open self-service type. Either of these types may be refrigerated by a natural convection or forced-air system.

The service type or closed case may be either the single-duty or double-duty type. The single-duty case is refrigerated in the display section only, and the unrefrigerated base is left open from the rear of the case. The double-duty case is refrigerated in both the display and base sections.

When the single-duty case is cooled by natural convection, a finned-tube evaporator is usually located in the top of the case, and with a bare-tube coil is located near the bottom of the refrigerated section. A drain pan is installed beneath the finned coil, and the bottom of the case is pitched toward a drain outlet. Fig. 2 shows a cross-section view of this general arrangement.

Fig. 3 indicates the approximate loads on top display, closed type, meat cases for 75 and 90 F ambient temperatures.

The double-duty display case uses a top coil arrangement in the display section similar to that used in the single-duty or top display case. The coil for the base compartment is a bare-tube or finned coil located along the front wall of the case or beneath the main shelf in a horizontal position.

Fig. 4 shows a cross-section view of this coil arrangement.

Several types of open display cases are built for normal temperature storage. Single-deck cases can be supplied single- or double-duty. The double-duty type can be supplied with doors in the front or rear of the base compartment. In addition to the single-deck cases, multiple-deck cases are available with two, three, or four shelves.

Products displayed in these cases include fresh and cold meats, produce, dairy products, poultry, smoked meats, eggs, and many other foods. Temperatures required in the case for these products are shown in Table 1.

Evaporators in open self-service cases usually are the forced-air type, although the natural convection type may be used. Defrosting is accomplished by automatic defrost systems or compressor off-time.

Display Cases for Low Temperatures

Service-type low-temperature cases may have hinged or sliding doors on the top of the cabinet, or hinged doors at the back. When top doors of the sliding type are used, these often are glazed for the display of products stored and to allow for customer service.

The refrigeration of these cases may be accomplished by plate coils, liner coils or forced-air systems which incorporate automatic defrost means of some type.

Open self-service cases are available as single-duty, double-duty, wall, island, or multiple-shelf wall type. The most popular type of refrigeration system for these cases is the forced-air type with an automatic defrost system.

In many installations, either reach-in or walk-in type storage cabinets are used in conjunction with dispensing cabinets and are used as a reservoir to supply the dispensing cabinets. The refrigeration in such storage cabinets can be either plate type evaporators or finned evaporators using an automatic defrost system.

Table 2 shows typical condensing unit sizes for multiple sections of open cases for 75 and 90 F ambient conditions. It should be noted that these are general recommendations and that the manufacturer's recommendations should be followed for any specific case.

INSULATION

Insulation in commercial refrigerators may be of the loose fill, batt, rigid, or semi-rigid types, depending on its function in the cabinet. In some locations in a cabinet, the insulation must also serve as a supporting member. Such cabinets have a combination of rigid and batt type insulation.

Proper sealing against moisture penetration may be accomplished by using a vapor-proof insulating paper sealed with mastic, or by sealing all joints on the outer shell of a

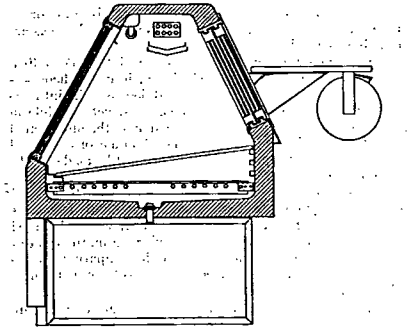


Fig. 2 .... Single-Duty Service-Type Display Case

metal cabinet with a water-proof, odorless mastic. Many foam-type insulating materials form their own vapor barrier as the result of the nature and cellular structure of the material.

The thickness of insulation required depends upon the temperature maintained within the cabinet. General practice has been to insulate with 3 or 4 in. of insulation in cabinets designed for temperatures of from 35 to 40 F, and to use 4 to 6 in. of insulation in those cabinets designed for temperatures of 0 F or lower.

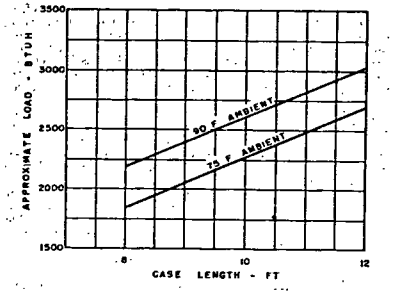


Fig. 3 .... Approximate Refrigeration Load for Single-Duty Service-Type Meat Display Case

For further information on insulation of commercial refrigerators, refer to the section Domestic and Commercial Refrigerators in Chapter 22.

CABINET CONSTRUCTION

Framing used in commercial fixtures may be metal, or wood which has been treated with a waterproofing material. Wood is also used in the framing of cooler sections and as supporting members or thermal breakers in metal cabinets.

Welded steel construction is more common than wood in the construction of portable commercial cabinets. Such construction lends itself readily to mass-production methods and, more particularly, to hermetical sealing of the cabinets.

Commercial cabinets for market installations are usually of the endless construction in order to form a continuous display as the fixtures are joined. The use of steel construction in these cabinets is almost a necessity, because of the close tolerances in dimensions required to join the fixtures. Separate end sections are provided for the first and last units in a continuous display arrangement.

Methods of joining self-service cases vary to some extent, but cases usually are either bolted or wedged together.

In open self-service cases condensation may occur on metal parts located near the top of the refrigerated zone. To eliminate this condensation it is necessary to apply heat to this area. This may be done by applying heater wire directly to the metal, or by applying some type of heater element to the under side of the metal. The wattage required for this heater is best determined by test of the particular cabinet under high humidity conditions. Typical heater requirements are shown in Table 3.

Heaters are used around doors in reach-in or walk-in type cabinets, and the heater element or wire is either attached to the metal around the opening or imbedded in the breaker material.

Table 2 .... Typical Condensing Unit Sizes (Horsepower) for Multiple Sections of Open-Type Cases

Length Ft	Frozen Food		Ice Cream		Fresh Packaged Meats		Produce		Multiple Shelf Dairy	
	Ambient Temp—F									
	75	90	75	90	75	90	75	90	75	90
8	1	1½	1½	2	½	¾	½	¾	1½	1½
12	1½	2	2	3	¾	1	¾	1	2	2
16	3	3	3	5	1	1½	1	1¼	2	3
20	3	3	5	7½	1½	2	1	1½	3	3
24	3	5	5	7½	1½	2	1½	2	3	5
28	5	5	—	—	2	3	1½	2	5	—
32	5	5	—	—	2	3	2	3	—	—
36	5	7½	—	—	3	3	2	3	—	—

REFRIGERATION EQUIPMENT

Evaporators

Evaporators used in commercial refrigerators may be: (1) finned-tube, (2) bare-tube, (3) plate, or (4) icemaker type.

The finned-tube type is the most common, and usually consists of aluminum fins mechanically bonded to copper tubes. Fin spacing depends upon the particular application but

Table 3 .... Typical Requirements for Heaters to Prevent Condensation

Type of Case	Watts per Foot of Length			Average
Meat	20	16	12.5	15
Frozen Food	25	27	35	31
Ice Cream	35	27	35	33

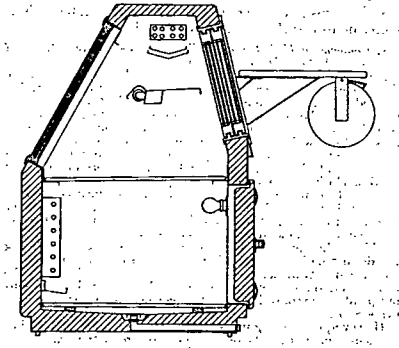


Fig. 4 .... Double-Duty Service-Type Display Case