**Health problem addressed**

The blood bank refrigerator is an essential piece of equipment in the immunohematology department and provides safe and convenient storage of whole blood, blood components (e.g., blood cells, plasma), and reagents. Blood bank refrigerators ensure freshness and integrity of blood and blood components.

**Product description**

The refrigeration system includes an electrically powered compressor, a condenser, a capillary tube or expansion valve, an evaporator, and interconnecting tubing. A thermostat regulates the refrigerator temperature. In many models, the compressor and motor are connected to the same shaft and sealed in a compact, airtight compartment, making more space available for storage. Systems are either cylindrical with rotating shelves or rectangular with pullout drawers or shelves. A temperature alarm is either included or optional. An emergency power system is necessary in the event of a power failure. Configurations include tabletop, or floor units.

**Principles of operation**

Refrigerant leaves the evaporator as gas at a low temperature and pressure. The compressor establishes a pressure difference in the system, drawing refrigerant gas through a suction valve, and circulating it to the condenser. Compressed gas enters the condenser at a higher-than-ambient temperature and is cooled to a liquid. As the liquid refrigerant leaves the condenser, a capillary tube or an expansion valve controls its flow to the evaporator. The capillary tube forms a heat exchanger to help further cool the refrigerant. As the refrigerant leaves, it enters a low-pressure area that permits it to expand rapidly and evaporate, absorbing heat from the refrigerator storage area, thereby cooling the storage area and its contents. Finally, the refrigerant gas is circulated from the evaporator back to the compressor and is drawn through the compressor suction valve to repeat the cycle.

**Operating steps**

- Refrigerator is installed in setting of use.
- Line power is plugged in.
- When refrigerator reaches desired temperature, it is safe to use.
- Laboratory technician should continuously monitor the temperature of the refrigerator. The technician should also check backup power systems periodically.

**Reported problems**

The most common problems involve the temperature-alarm system and the monitoring of refrigerator temperature. The alarm should be tested at monthly intervals to ensure proper operation. Because backup power sources have been known to fail, written instructions should be readily available to explain how to determine the cause of any temperature problem and how to handle temporary and prolonged power failures.

**Use and maintenance**

User(s): Laboratory technician

Maintenance: Biomedical engineering staff and/or service contract with the manufacturer or third-party organization

Training: Initial training by manufacturer, operator’s manuals, user’s guide

**Environment of use**

Settings of use: Immunohematology department

Requirements: Uninterruptible power source, battery backup, benchtop or floor space

**Product specifications**

- Approx. dimensions (mm): 2000 x 700 x 750 for floor units; 900 x 600 x 600 for tabletop units
- Approx. weight (kg): 230 for floor units; 100 for tabletop units
- Consumables: NA
- Price range (USD): 4,000-24,000 (7,000 typical) for floor units; 3,500-14,000 (4,000 typical) for tabletop units
- Typical product life time: 10 years
- Shelf life (consumables): NA

**Types and variations**

- Tabletop
- Floor