

How to Meet Guidelines for Purchasing Blood Storage Equipment



The Economic Impact of Controlled Temperature Storage

Blood is a vital component of human life. The ability to store and transfuse blood to patients has revolutionized medicine over the past century.

Appropriate cold storage of this precious commodity is critical to the continued advancement of medical science. The intrinsic value of blood and blood components, combined with precise storage requirements, makes refrigerators and freezers a major component in facility management and risk reduction.

Today, blood transfusions are commonplace, and one should never lose sight of the fact that without blood, many of the current medical practices would be impossible. The medical industry invests millions of dollars each year in the labor-intensive activities of blood donation, testing, matching and preparation.

Careful protocol dictates correct methods of collection, identification and transfusion to ensure that blood transfusions remain a safe activity for patient, donor and medical technician.

All this work and cost can be in vain if blood is not properly stored to retain its life-giving properties. This precious commodity should not be consigned to refrigerators designed for other laboratory uses. Blood requires particular storage methods and equipment specially designed to meet the standards set forth by the American Association of Blood Banks, the American National Red Cross and 510(k) clearance criteria for blood component storage.

Recommended Uniform Temperatures for Blood and Blood Derivatives

Standards for Blood Banks & Transfusion Services state: *“Blood components shall be stored at temperatures demonstrated to be optimal for their function and safety.”*

For best results, blood must be maintained at a consistent, even temperature. A well-designed refrigerator or freezer provides even cooling and rapid temperature recovery after door openings and the introduction of warm products to the refrigerator or freezer.

Refrigeration products should utilize a robust compressor system and an internal blower evaporator coil with automatic off-cycle defrost. This will provide proper and economical cooling power while removing surplus BTU capacity (excess heat) allowing quick temperature recovery when needed. A required method to achieve uniform cooling is the use of a fan to circulate the air around the product being stored. Several inches of vapor-sealed, polyurethane (CFC-free) insulation in cabinet walls, plus triple-pane glass doors, reduce heat gain and help maintain even cooling. Open design shelf and drawer layouts (as well as the see-through doors) allow easy identification and access to the product result in less time spent with open doors.

Temperature controllers use solid-state electronics to maintain uniformity and stability of temperature. By responding promptly to temperature changes, the controller provides the most efficient and cost-effective use of the refrigeration system. Controllers in Thermo Scientific Jewett® products are factory preset to provide constant temperatures between 2°C to 4°C at high ambient temperatures (to 90°F or 32°C).

In freezers, additional important features include thicker closed cell insulation, double-seal door gaskets to minimize frost build-up and, as with refrigerators, automatic defrost systems featuring built-in condensate evaporators.

These features are standard on Thermo Scientific Jewett refrigerators and freezers. A variety of units are available to meet the needs of a particular operation. Bag capacity, cubic feet, floor dimensions and number of doors are typically used as guidelines for the purchase of a specific model(s).

The recommended temperatures to achieve these goals are as follows:

Whole blood and liquid red cells	1°C to 6°C
Frozen plasma	-18°C
Cryoprecipitated AHF	-18°C
Red blood cells frozen in 40% glycerol	65°C

Expiration dates at these temperatures are as follows:

Whole blood in acid/citrate/dextrose solution	21 days
Whole blood in citrate/phosphate/ dextrose/ adenine solution	35 days
Whole blood in heparin	48 hours
Red blood cells	Same as appropriate for the whole blood from which cells were taken
Frozen red blood cells	10 years
Leukocyte-reduced red blood cells	Same as appropriate for the whole blood from which cells were taken
Fresh frozen plasma	12 months
Cryoprecipitated AHF	12 months



Thermo Scientific Jewett Blood Bank Refrigerators

Upright and Compact, 2°C to 4°C

Model	Capacity (blood bags)*	Cu. ft./ door type
BBR6	35	5.4 / single door
BBR11	180	11 / single door
BBR17	315	16.9 / single door
BBR25	480	24.8 / single door
BBR37	630	37.4 / double door
BBR55	960	55 / double door

Undercounter, 2°C to 4°C

Model	Capacity (blood bags)*	Cu. ft./ door type
CT1	60	5.4 / single door

*Bag capacity based on 450 ml blood bags.

Upright Plasma Freezers, -30°C and -40°C

Model	Capacity (300 ml packs)	Cu. ft./ door type
BPL306/406	48	5.4 / single door
BPL311/411	300	11 / single door
BPL317/417	525	16.9 / single door
BPL325/425	800	24.8 / single door
BPL337/437	1050	37.4 / double door
BPL355/455	1600	55 / double door

Undercounter, -30°C to -40°C

Model	Capacity (300 ml packs)	Cu. ft./ door type
CTF306/406	88	5.4 / single door

All our products are designed specifically to maintain blood supplies at temperatures within established standards.

For a complete listing of all products and configurations contact your Fisher HealthCare Account Manager.

Temperature Recorders for Required Documentation

Standards for Blood Banks & Transfusion Services require that “refrigerators and freezers have a system to monitor temperature continuously and record the temperature at least every four hours.”

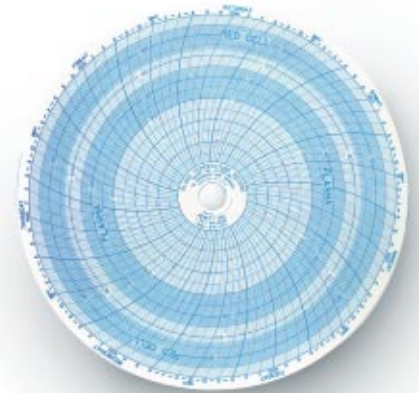
In general, this is done with an automatic chart recorder, which is designed to be accurate, dependable and cost effective. The chart serves as acceptable documentation of temperature integrity. Separate recorders may be used to monitor room air temperature to meet the latest regulations for platelet handling.

The electronic temperature recorder features a stainless steel thermistor probe that senses conditions and responds quickly to temperature changes. (The electronic thermistor sensor is faster and more accurate than either mercury or inert gas probes.) A permanent record of the temperature is recorded on a seven-inch chart which tracks temperature history for seven days. (These charts are larger than other such recording charts, allowing greater precision and easier-to-read data.)

The fiber-tipped marking pen uses a sealed, self-contained, non-fading red fluid supply for continuous ink flow, without the skips and blots common to other systems. Emergency battery back-up power enables the recording thermometer to operate for up to six hours in the event of a power outage. An electronic recording thermometer is standard on BBR Series Blood Bank Refrigerators and BPL Series Blood Plasma Freezers.



Refrigerators	Freezers
Model 7ER -10°C to +60°C	Model 7ER -100°C to +38°C





Alarms and Monitors are Required Safeguards

Standards for Blood Bank & Transfusion Services require that the *“alarm be set to activate at a temperature that will allow proper action to be taken before the blood or components reach undesirable temperatures,” and that the alarm should “signal in an area that has adequate personnel coverage to ensure that immediate corrective action can be taken.”*

Alarm systems are necessary to monitor the product temperature, as well as the AC electrical power, and to signal unsafe temperatures or power failure in time to rectify the situation or move the product. Without this security system, an entire refrigerator or freezer of blood products could be lost.

Required Safeguards

The Thermo Scientific HemaPro and DTPM series of monitors features a digital temperature display and an electronic temperature sensor. They provide a different visual and audible signal for each occurrence to alert personnel to the specific problem (including door-ajar conditions - HemaPro 2000 only). Temperature settings are factory preset to standard or custom specifications and maintain an accuracy of $\pm 0.1^{\circ}\text{C}$. A built-in microprocessor continuously tests its circuitry for accuracy and digital meter integrity. Touch-pad alarm test functions on the HemaPro Series simplify inspection to ensure proper operation.

Remote monitoring systems that mimic the audible and visual warnings of the primary monitor at a remote location (switchboard, emergency room, security, etc) are available. Remote systems are needed when blood banks are not manned 24 hours per day, such as after hours, on holidays and on weekends.

The Thermo Scientific Jewett line-up provides the following temperature/power surveillance modules and factory-set activation points:

HemaPro™ 101 or HemaPro 2000 for BBR Refrigerators	+1.5°C to +5.5°C
HemaPro 101 or HemaPro 2000 for BPL Freezers	-20°C
DTPM 1000 for CT1 Refrigerators	+1.5°C to +5.5°C
DTPM 3000 for BPL306/406 Freezers	-20°C

Maintenance and Security Features Prevent Added Cost

Built-in maintenance and security features promote trouble-free operation of blood refrigeration equipment which, in turn, safeguards the blood supply and cuts down on engineering/maintenance department calls and expenditures.

Stainless steel and painted finishes make cleaning and sanitizing an easier process. Washable intake filters allow cleaning of air intakes for better cooling. Ball bearing rollers on drawers prevent sticking and jamming, which results in shorter open door times. Solid bottom drawers help contain spills. Casters for easy movement of the unit allow access to air intakes, filters, etc., for cleaning and dusting. Locking door handles provide another important safeguard by restricting unauthorized access to the blood supply. Unauthorized access could lead to tampering, mistakes and improper handling of the blood. In addition, positive door latches ensure that doors on double-door units will not open unexpectedly.

A comprehensive warranty is important to ensure prompt attention to problems. Any problem should be corrected as soon as possible to avoid further complications or eventual system failure.

Conclusion

Appropriate blood storage is essential to the protection of the community's health and to avoid wasting this precious source of life.

An investment in quality equipment to meet established regulatory standards as well as inventory needs will guarantee greater returns in the long run in financial savings, risk reduction and lives saved. Quality equipment will reduce the frequency of costly downtime situations and produce a higher level of user satisfaction.

The purchase of blood storage equipment is an important decision, well worth the time and effort you put into making the right choice.

Please feel free to contact us at any time for more information on our equipment or with any other questions you may have on blood storage refrigeration equipment.



We offer an extensive variety of centrifugation products for the blood bank and clinical laboratory with specific packages ranging from basic to advanced applications.

The purpose of this manual is to provide important information about purchasing blood bank refrigerators and freezers in order to meet current guidelines.

This publication is not published by the American Association of Blood Banks (AABB). Furthermore, this is not a complete listing of all guidelines that pertain to blood banks. For more comprehensive information, please consult the following AABB publications:

Standards for Blood Banks & Transfusion Services, 24th edition; Standards Committee, American Association of Blood Banks; Copyright 2006.
Technical Manual, 15th Edition, published 2005.

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