

BLOOD BANK REFRIGERATOR AND FREEZER

I. PRINCIPLE

The Helmer® blood bank refrigerator, -model iB125 (with i.C³) is used for storage of blood products, reagents and patient samples. The temperature range is set to 1.5 - 5.5° C. The refrigerator is equipped with a continuous recording chart and audible alarm system. A remote alarm is monitored 24 hours daily by the hospital switchboard operator. The refrigerator operates on electrical power which automatically switches to emergency power in the event of a power outage.

The Helmer® blood bank freezer is used for storage of frozen blood components at less than -18° C. The freezer is equipped with a continuous recording chart and audible alarm.

II. CLINICAL SIGNIFICANCE

UnityPoint-Health Pekin will ensure the refrigerated blood products are within the American Red Cross (ARC) guidelines of 1 - 6° C and the frozen products are within the ARC guidelines of -80°C to -20°C. This provides the ability to return units to ARC or transfer to other hospitals and maintains the integrity of the blood products available for transfusion and the reagents used for patient testing.

III. REAGENT

- A. 10% Glycerol – for the refrigerator
 - 1. 10 ml glycerin from Histology
 - 2. 90 ml of Clinical Laboratory Reagent Water (CLRW)
 - 3. Double or triple reagent to ensure the temperature probe is submersed.
- B. 50% Glycerol – for the freezer
 - 1. 50 ml glycerin
 - 2. 50 ml Clinical Laboratory Reagent Water (CLRW)
 - 3. Triple amounts to ensure the probe bottle is full and the probe is submersed.

IV. INSTRUMENTATION/EQUIPMENT

- A. Helmer® iB125 refrigerator (with i.C³)
- B. Helmer® freezer

V. PROCEDURE:

- A. Maintenance
 - 1. Daily:
Refrigerator
 - a. Read and document the following temperatures on the Temperature Log:
 - 1. Chart temperature.

2. Sensor 1 - Upper-top LED temperature readout.
 3. Sensor 2 - Lower-bottom LED temperature readout.
 4. Internal thermometer in blood bag on second shelf (immersed in 250 ml of 10% glycerol in water)
- b. Acceptable temperature range of all above is 1-6° C.
 - c. Any temperature variations that fall outside of the acceptable range as well as alarm tests must be documented on the chart, along with corrective action, tech initials and date.

Freezer

- a. Read and document the temperature on the temperature log on top of the freezer, usually done by second shift.
 1. Internal thermometer
 2. Chart temperature – compare to internal thermometer
 - b. Acceptable range is - 80° C to -20° C
 - c. Any temperature variations and alarm tests will be documented on the log along with the corrective action, tech initials and date
2. Weekly:
- a. Replace chart on Monday on both the refrigerator and freezer
 1. Above the chart, press the small button that says C. That will move the needle off of the chart paper.
 2. Unscrew the knob and remove chart. Replace with a new chart matching the date and time with the needle. Screw the knob back on and press the small button that says C again and the needle will move back.
 - b. Date and initial when ending the one chart.
 - c. Date and initial when starting a new chart.

3. Quarterly

- a. Test the door alarms on both the Main and Back-up (old BB refrigerator in Chemistry) Blood Bank Refrigerators.
- b. Clean the condenser grill (finned area in the back of unit).on both the Main and Back-up Blood Bank refrigerators..
- c. Test the LOW and HIGH chamber temperature alarms on both the Main and Back up Blood Bank refrigerators. (The refrigerator alarm on the Main Blood Bank refrigerator goes directly to the Operator. Call the Switchboard Operator to notify them you are testing the alarms.)

Main Blood Bank Refrigerator

1. The iB125 and the iB125 (with i.C³) has a built-in Peltier device. The Peltier device physically heats or cools the upper temperature probe: you do not have to insert the probe in chilled or warm

- water. This automatic method does not affect the chamber temperature and normally takes less than five minutes
2. From the “Home” screen , touch the **Temperature Alarm Test** icon (black with a red triangle).
 3. Initiate alarm test by touching the **High Alarm Test** or **Low Alarm Test** icon . The icon for the selected test begins to flash.
 4. Temperature changes are displayed in the Temperature Display on the left side of the screen.
 5. As the temperature moves into alarm conditions, the temperature reading turns red.
 6. The message “Peltier Test Probe Cooling (or Warming)” is displayed in the Alarm Condition area.
 7. When completed, the test result is displayed in the Test Status section of the display.
 8. If the temperature alarm test takes longer than ten minutes, the i.C³ will automatically cancel the test.
 9. To cancel alarm test: Touch the **Cancel Test** icon (see picture B) to end the alarm test. “*Test Stopped*” is displayed in the Test Status section of the display.
 10. At the time of an alarm test, the Alarm Test icon is displayed on the Temperature Graph to show the change in temperature was test-induced. Event data for the alarm test is recorded and highlighted in blue in the Event Log.
 11. The temperature for the High Alarm event should be 5.5°C +/- 0.2°C and the Low Alarm event 1.5°C +/- 0.2°C.
 12. If the values do not match, consult the Helmer® Refrigerator Operation Manual for troubleshooting and/or call the Facilities Management Department at ext. 3465 or operator during off hours.

Back up Blood Bank Refrigerator (in Chemistry)

1. From the MAIN screen, use the buttons to navigate to and select the System Alarm Test & Status option. The SYSTEM ALARM TEST & STATUS screen appears.
2. Press the UP or DOWN button until the Start Low or Start High Alarm Auto Test option is highlighted. Press the ENTER button. You are returned to the HOME screen. Under the reading for the upper temperature probe, a LOW ALARM TEST IN PROGRESS or HIGH ALARM TEST IN PROGRESS message appears. When the test is complete, the

LOW or HIGH ALARM TEST IN PROGRESS message clears.

3. View the event log to determine the temperature at the time the low or high temperature alarm event started. It should be $1.5^{\circ} \pm 0.2^{\circ} \text{C}$ for the low alarm and $5.5 \pm 0.2^{\circ} \text{C}$ for the high alarm. (If the values do not match, consult the Helmer® Refrigerator Operation Manual for troubleshooting and/or call the Facilities Management Department at ext. 3465 or operator during off hours.
4. To cancel an automatic test in progress:
From the MAIN screen, use the buttons to navigate to and select the System Alarm Test & Status option. The SYSTEM ALARM TEST & STATUS SCREEN appears. Press the UP or DOWN button until the Cancel High or Low Test option is highlighted. Press the ENTER button. The test is cancelled.

d. Test the Freezer alarms.

1. Using a separate 8 oz. bottle or glass container make a solution of 1:1 ratio of water to propylene glycol.
 2. Cool the solution in the freezer until the contents have stabilized to the chamber temperature.
 3. Remove the solution from the freezer and remove the chamber temperature probe from the probe bottle and place it down into the solution.
 4. While slowly and constantly stirring the probe in the solution and watching the monitor temperature, allow the container contents to warm up.
 5. Note the temperature when the alarm sounds and the HIGH TEMP light flashes. This is the high alarm set point and should activate at -19°C .
 6. Document this temperature on the Instrument Temperature Log.
 7. Remove the probe from the container and return it to the probe bottle.
 8. Door open alarm
 - a. Open the freezer door and note the time.
 - b. The alarm should activate at 3 minutes and the DOOR ALARM lamp should flash.
 - c. Close the door and the alarm should clear.
 - d. Document the door alarm test on the log.
4. As needed:
- a. Check the level of the solution in the probe bottles and refill if necessary.

- b. Burnt out light bulbs will be replaced by the Maintenance/Biomed Department.
- c. Clean the interior of the refrigerator with a general-purpose laboratory cleaner suitable for stainless steel.
- d. Clean the door gaskets with a soft cloth and mild soap and water solution.

B. Troubleshooting:

1. See Helmer® Refrigerator Operation Manual for specific troubleshooting help.
2. If the remote alarm goes off, the switchboard operator will call the blood bank and page maintenance. The date, time, problem and corrective action is to be documented by maintenance personnel.
3. Backup refrigeration when problems cannot be fixed quickly:
 - a. Notify supervisor or lab manager of situation.
 - b. Call maintenance department of any major malfunction at ext 3465.
 - c. If they cannot make prompt repairs before the temperature goes out of range, blood products must be moved to the monitored Back-up Blood Bank refrigerator in chemistry. This refrigerator has a built in working chart monitor and has quarterly alarm checks performed. If blood products are moved to the Back-up refrigerator the top and bottom temperatures and the chart must be checked and recorded daily. The simulated blood bag of H₂O and Glycerin must also be moved and stored with the blood products. The temperature on this bag must be checked and recorded daily as well. Frozen products can be stored in the freezer at the back of chemistry. It has a working chart monitor.
 - d. Monitor and record temps every 4 hours if the chart is not operational.
4. After any major repair, the alarms are to be tested.
5. After any major repair, the temperature is to be monitored for 24 hours and deemed to be acceptable before placing product back in.

C. Settings Programs:

1. See the Helmer® Refrigerator Operation Manual for the Back-up refrigerator and the i.C³ User Guide for the Main BB refrigerator when changing settings (such as date and time).
2. The password is 1234.
3. See the Helmer® Freezer Service Manual for troubleshooting.

VI. REFERENCES


- A. AABB Standards for Blood Banks and Transfusion Services, 29th Edition, Bethesda, MD.
- B. Helmer® Refrigerator Operation Manual, i. Series™, Helmer, Inc., i.C³User Guide, 4395 Bergen Blvd., Noblesville, IN 46060
- C. Helmer® Freezer Service Manual, i. Series™, Helmer, Inc., 4395 Bergen Blvd., Noblesville, IN 46060

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Effective Date: 12/09/18
 Date Reviewed/ Date Revised: 03/08/2018, 12/09/18
 TRM.42500, TRM.42750, TRM.42850, TRM.42950

D. AABB Technical Manual, 19th Edition, Bethesda, MD, American Association of Blood Banks, Bethesda, MD, 2017.

POLICY CREATION :	Date
Author: Sharrol Brisbin, MT (ASCP)	02/01/1999
Medical Director: Kathryn Kramer, MD	02/01/199

MEDICAL DIRECTOR		
DATE	NAME	SIGNATURE
12-10-18	Kathryn O. Kramer MD	
SECTION MEDICAL DIRECTOR		

REVISION HISTORY (began tracking 2011)			
Rev	Description of Change	Author	Effective Date
12/9/18	Products to backup refrigerator	Jenny Turner	12/9/18

Reviewed by:

Lead	Date	Coordinator/ Manager	Date	Medical Director	Date
Jennifer Turner	12-10-18				