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| **Blood Bank Refrigerators Alarm Testing** |
| **Purpose** | This procedure provides instructions for verify the functionality of the audible alarm system on blood component storage equipment.  |
| **Policy Statements** | * Alarm testing must be performed a minimum of 4 times a year on a quarterly basis: Electronic manipulation 3 times a year, manual manipulation once a year.
* The alarm should sound at a temperature that allows appropriate action to be taken before stored components reach undesirable temperatures.
* Temperature changes should be allowed to occur slowly.
* The amount of fluid that alarm probes are normally immersed should mimic the volume of the smallest component stored in that refrigerator.
* Acceptable results:
	+ Low temperature of activation ≥ 2.4° C for main Blood Bank/Reagent Refrigerator
	+ Low temperature of activation ≥ 1.5° C for surgery Blood Bank Refrigerator
	+ High temperature of activation ≤5.5° C
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| **Related****Documents** | [TSf 17.13.1 Refrigerator Alarm Test](http://khan.childrensmn.org/Manuals/Lab/SOP/TS/Res/Sysf/199568.pdf)\*\*Note on recording charts temperature variations related to “alarm testing” |
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| **Materials** | **Equipment** | **Supplies** |
| **MPLS*** Main Blood Bank Refrigerator
* CV OR Refrigerator
* Core OR Refrigerator

**STP*** Surgery Refrigerator
* Helmer Refrigerator-Main Blood Bank
 | * Thermometer (NIST or NIST-calibrated)
* Water and Salt
* Container
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| **Procedure** | **Mpls-Main Blood bank Refrigerator and Surgery (OR) Refrigerators** |
|  | **Step** | Action |
| Electronic manipulation-performed three quarters a year | 1 | Confirm the key switch is in the alarm position. |
| 2 | Depress the Δ and  buttons simultaneously and hold for five seconds then release.* The main display temperature will increase indicating the simulated cabinet temperature.
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| 3 | Record the display temperature reading on the QC form as the high temperature alarm point when the alarm sounds and the alarm icon on the control panel illuminates.* The temperature will automatically drop into the normal operating range and the alarm will stop.
* The temperature on the display will continue to drop until the cold alarm sounds.
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|  | 4 | Record display temperature reading on the QC form as the low temperature alarm point when the alarm sounds and the alarm icon on the control panel illuminates.* The temperature will automatically return back into the normal operating range and the alarm will stop.
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| Manual manipulation-performed one quarter a year | **Step** | Action |
| 1 | Remove the upper chamber alarm probe from the probe bottle. |
| 2 | Place the upper chamber alarm probe into a container of water at 6-10°C. |
| 3 | Gently agitate periodically. |
| 4 | Close refrigerator door and observe the display. |
| 5 | Record the reading of the digital display at which the alarm activates on the QC form as the **high** temperature reading. |
|  | 6 | Note on form that reading was from “manual warming”. |
|  | 7 | Return probe to original probe container to deactivate alarm |
|  | 8 | Remove the upper chamber alarm probe from the probe bottle. |
|  | 9 | Place the upper chamber alarm probe into a container containing several spoonfuls of salt, ice and water at a temperature of 0 to -4°C.  |
|  | 10 | Gently agitate periodically. |
|  | 11 | Close refrigerator door and observe the display. |
|  | 12 | Record the reading of the digital display at which the alarms activates on the QC form as the **low** temperature reading. |
|  | 13 | Note on form that reading was from “manual warming”. |
|  | 14 | Return probe to original probe container to deactivate alarm. |
|  | **STP –Main Blood Bank Helmer Refrigerator** |
|  | **Step** | Action |
|  | 1 | Remove the upper chamber alarm probe from the probe bottle. |
|  | 2 | Immerse the upper chamber alarm probe and a NIST calibrated thermometer into a container containing several spoonfuls of salt, ice and water at a temperature of 0 to -4°C.  |
|  | 3 | Gently agitate periodically.  |
|  | 4 | Record the temperature of the independent thermometer on the QC form at which the alarm system activated indicating the **low** limit control point is reached. |
|  | 5 | Remove the thermometer and probe from the water. |
|  | 6 | Place the probe back into the original probe bottle, immersing at least 2 inches in the solution. |
|  | 7 | Allow to return to normal temperature to deactivate the alarm system. |
|  | 8 | Remove the upper chamber alarm probe from the probe bottle. |
|  | 9 | Immerse the upper chamber alarm probe and a NIST calibrated thermometer into a container containing water at 6-10°C |
|  | 10 | Gently agitate periodically. |
|  | 11 | Record the temperature of the independent thermometer on the QC form at which the alarm system activated indicating the **high** limit control point is reached. |
|  | 12 | Remove the thermometer and probe from the water. |
|  | 13 | Place the probe back into the probe bottle, immersing at least 2 inches in the solution. |
|  | 14 | Allow to return to normal temperature, which should deactivate the alarm system. |
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|  | **Step** | **Action** |
| Manual Manipulation-Performed one quarter a year | 1 | Remove the upper chamber alarm probe from the probe bottle. |
| 2 | Place the alarm probe into a container of water at 6-10°C. |
| 3 | Gently agitate periodically. |
| 4 | Close refrigerator door and observe the display. |
|  | 5 | Record the temperature of the digital display at which alarm sounds as the **high** temperature on the QC form. |
|  | 6 | Note on form that reading was from “manual warming”. |
|  | 7 | Return probe to original probe container to deactivate alarm. |
|  | 8 | Remove the upper chamber alarm probe from the probe bottle. |
|  | 9 | Place the probe into a contained containing several spoonfuls of salt, ice and water at a temperature of 0 to -4°C.  |
|  | 10 | Gently agitate periodically. |
|  | 11 | Close refrigerator door and observe the display. |
|  | 12 | Record the temperature of the digital display at which the alarms sounds as the **low** results on the QC form.  |
|  | 13 | Note on form that reading was from “manual warming”. |
|  | 14 | Return probe to original probe container to deactivate alarm. |
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| **Interpretation** | Acceptable results:* Low temperature of activation ≥ 1.5° for surgery Blood Bank Refrigerator
* Low temperature of activation ≥ 2.5° C for main Blood Bank/Reagent Refrigerator
* High temperature of activation ≤ 5.5° C

Take appropriate corrective action if temperatures of activation are too low or too high or if the alarm systems fails to function as expected (does not activate or fails to deactivate.)Corrective actions may include:* Retesting the alarm activation
* Verifying the Alarm key switch is on.
* Checking the battery/power source.
* Verifying the warm and cold alarm set points (Refer to the equipment instrument manual.)
* Contacting engineering or the manufacturer for service.
* Transferring of blood products if the equipment/ alarm is found faulty.

 Record the nature of the corrections on the appropriate QC sheet and necessary repairs on the Equipment Service notebook. |
| **References** | 1. AABB Standards, current edition.
2. AABB Technical Manual, current edition.
3. Installation and Operation Manual, Allegiance Gold Series Refrigerator, 2000
4. Helmer Refrigerator Operation Manual, 2006
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| **Approval****Workflow** | Transfusion Service/Laboratory Director |
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| **Historical Record** | **Version** | **Written/Revised by:** | **Effective Date:** | **Summary of Revisions** |
| 1 | D Voita | 6/1978 | Initial Version |
|  | 2 | C Berglund | 5/1984 |  |
|  | 3 | J Jaimez | 6/15/1993 |  |
|  | 4 | J Wenzel | 8/1997 | Merger |
|  | 5 | J Wenzel | 9/1999 |  |
|  | 6 | J Wenzel | 9/7/2001 |  |
|  | 7 | J Wenzel | 10/2002 |  |
|  | 8 | J Wenzel | 6/2003 |  |
|  | 9 | J Wenzel | 1/17/2006 | New Mpls Helmer BB refrigerator |
|  | 10 | J Wenzel | 12/23/2009 | On line format |
|  | 11 | S. Cassidy | 02/24/10 | New refrigerator-Surgery |
|  | 12 | S. Cassidy | 04/10/2012 | CMS format |
|  | 13 | S. Cassidy | 09/30/2019 | Changed alarm activation set points |