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Owner:	*Tim Malone: Manager, Transfusion Services*
Policy Area:	*Lab / Transfusion Services*
Standards:	
Applicability:	*St. Anthony Hospital* *St. Clare Hospital* *St. Elizabeth Hospital* *St. Francis Hospital* *St. Joseph Medical Center*

Blood Refrigerator and Freezer QC and PM, R-W-TS0911-03

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PURPOSE

To provide instructions for performing quality control and preventive maintenance on refrigerators and freezers used for blood and reagent storage.

BACKGROUND

AABB Standards require that there be a process for scheduled monitoring of all critical equipment.

EQUIPMENT

See Critical Equipment and Acceptance Criteria J-PO-TS0373

DAILY MAINTENANCE -- TEMPERATURE RECORDING

See Daily Temperature Monitoring, J-F-TS0910

1. Check the previous 24 hour scribe tracing for consistency, checking to make sure it is recording on the correct day and hour on the chart. Adjust as necessary, documenting the adjustment on a Quality Form and the back of the chart.
2. Record the scribe temperature, and the interior thermometer temperatures on the Refrigerator Freezer Temperature Record Form R-F-TS1015-01.
3. Temperature range requirements for items stored and high and low alarm settings are as follows:

a.

Storage Item	Storage Temp Range	High Alarm Activation Temp	Low Alarm Activation Temp
Blood and Ortho manufactured Reagents (1-10C)	1.0-6.0° C	5.0-5.5^0 C	2.0°-1.5^0 C

Storage Item	Storage Temp Range	High Alarm Activation Temp	Low Alarm Activation Temp
RhIg (CSL Behring) and Immucor manufactured Reagents (2-8C)	2.0-8.0^0 C	7.0-7.5^0 C	2.5-3.0^0 C
Blood, RhIg and reagents	2.0-6.0^0 C	5.0-5.5^0 C	2.5-3.0^0 C
Frozen Plasma/Cryo	< -18^{0}C	≤ -20^0 C	NA
SJMC Ultra Low Freezer Frozen Plasma/Cryo	< -65^0 C	< -55^0 C	NA
Platelets	20.0-24.0^0 C	23.0-23.5^0 C	20.5-21.5^0 C

4.
   - Blood Refrigerators—Acceptable range for Blood Products is 1-6C, but if RhIG is stored in the same unit, the temperature range must be 2-6C. (RhIG has a 2-8C storage requirement.) Upper and lower temperatures must read within 1C, the scribe must read within 1C of the interior temperatures. Alarm is activated at < 2.5C and >5.5C. See Refrigerator Failure R-W-TS0901
   - Freezer—Acceptable range is –65C to –80C. Alarm is activated at > -55C. Scribe and interior temperature must read within 5C of each other.
     See Freezer Failure R-W-TS0902.
   - Reagent Refrigerators—Acceptable range 2C to 10C. See Refrigerator Failure R-W-TS0901.

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WEEKLY MAINTENANCE-- CHART REPLACEMENT

1. Remove the scribe chart each Monday morning. Document the following on the chart:
   - Designation and location of the refrigerator or freezer.
   - Date and time chart was removed.
   - Tech ID of person removing the chart
2. Install a new scribe chart after removing the current one. Document the following on the chart:
   - Designation and location of the refrigerator or freezer
   - Date and time the chart was installed
   - Tech ID of the person installing the chart.
3. Take care to align the pen with the correct time and day on the chart when installing it.
4. If the chart is not electronic, wind the chart drive to ensure continuous temperature recording for the next week. This is done by inserting the winding key through the hole in the chart plate and winding the arbor in the direction indicated by the arrow on the plate. **Do not overwind.**

MONTHLY MAINTENANCE

1. The temperature surveillance module is equipped with a battery power source in the event of a power failure. Check the battery:

- For the models that have a "battery test" switch: flip the switch down. The digital display on the surveillance module will go blank, the red power failure light will flash and the alarm will sound, intermittently beeping.
- If the red light does not flash, and / or the alarm does not beep, submit a work order to Clinical Engineering for a new battery. If the beep is weak, submit a work order for a battery test.
- Record that the failure light was on and that the alarm was beeping, or the required corrective action, the date, and tech ID on the Alarmed Equipment Maintenance Form, J-F-TS1003.

2. Check the door gaskets for leaks. Submit a work order to Clinical Engineering if a leak is found.
3. Refrigerators:
   Inspect the liquid containers for temperature and alarm sensors for cloudiness. Refill with 300 ml fresh DI water. Clean as needed.
   - Remove the old bag by carefully cutting away the plastic.
   - Cut off the port of a new bag, without breaking the seal.
   - Coat one inch of the calibrated thermometer with lubricant.
   - Inset the thermometer into the cut port of the new bag, using a twisting motion.
   - Push it into the bag just far enough so that it can be easily read.
   - Cut the tubing with the spike off the bag, leaving about 10 inches.
   - Remove the plunger from a 12cc syringe, and insert the tip into the end of the cut tubing.
   - Pour about 300 ml of DI H2O into the bag through the syringe. Once the water is in the bag, push out as much air as possible, and seal the tubing with the Sebra, about one inch from the b

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QUARTERLY MAINTENANCE—ALARM ACTIVATION

Refrigerator:

1. Fill an 8 oz styrofoam cup 2/3 full of DI water.
2. In a separate container, crush ice made from DI water into 1/8 inch particles.
3. Locate the alarm sensor and remove it from its liquid container. The cable attached to the sensor should be long enough that the sensor can reach outside the refrigerator. Close the door on the cable so as not to disturb the interior temperature of the refrigerator. The double door Jewett and the OR Jewett require an extension cable from the Jewett TEST kit.
4. Attach the alarm sensor to the NIST thermometer by wrapping a rubber band around them so that their tips are aligned.
5. Fill remaining 1/3 of the cup with DI ice to within ¼ inch of the top.
6. Insert the NIST/alarm sensor assembly into the water/ice mixture and stir constantly in a random motion. Keep the tips of the NIST and alarm sensor in the bottom of the cup—not in the upper slush formed by the floating ice. The alarm should sound between 2.5 and 3C.
7. Record the temperature at which the alarm sounds (It should be between 2.5 and 3C.) on the Alarmed Equipment Maintenance Form, J-F-TS1003-01. Silence it for now. Note and record that the audible alarm and the out-of-temperature warning light were activated.

8. Leaving the NIST/alarm sensor in the container, slowly remove the bits of ice until the temperature returns to the safe range (3-5C). Turn the alarm back on.
9. Continue to remove the ice from the 8 oz container and put it into an extra container. When it is all removed, gradually add a few drops of tap water, stirring all the while, until the upper alarm sounds.
10. The upper alarm should sound between 5 and 6C. Record the temperature at which it sounds on the form J-F-TS1003-01. Note and record that the audible alarm and the out-of-temperature warning light were activated.
11. If either the low activation is out of the 2.5-3C range, or the high activation is out of the 5-6C range, complete a Temperature Failure Form R-F-TS1011, and start a Manual Temperature Log—RBCs, R-F-TS1012, taking the temperature manually every four hours until the alarm is certified.

    NOTE: If the interior temperatures exceeds 6C or goes below 1C, the Blood Products must be removed. RhIG should be removed to alternate storage if the temperature is outside of the 2-8C degree storage requirement. See Refrigerator Failure Instructions, R-W-TS0901-01.
12. Call Clinical Engineering, and submit a work order for adjustment and / or repair.

Freezer:

1. The freezer alarm activation check is done at the same time the freezer is defrosted.
2. Take the temperature before beginning the defrost, and record on the Alarmed Equipment Maintenance Form, R-F-TS1003.
3. Take the temperature when the alarm sounds as the sensor warms during the defrost, and record on the form.
4. If the activation is out of range, (>–20C) Complete a Temperature Failure Log, see Freezer Failure Instructions, J-W-TS0902.
5. Call Clinical Engineering and submit a work order for adjustment and / or repair.

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ANNUAL MAINTENANCE

Electrical and Safety Checks done by Clinical Engineering.

AS NEEDED MAINTENANCE

Wipe out the interior of each unit with a damp cloth and a mild soap. If there has been a spill, use a 10% bleach solution.

Defrost as needed—at least quarterly during alarm activation check.

CORRECTIVE ACTION

1. Document all corrective action on the Alarmed Equipment Maintenance Form, J-F-TS1003-01. All temperature failures on the Temperature Failure Log, J-F-TS1011, and all manual temperatures on the Manual Temperature Log for RBCs, J-F-TS1012.
2. Document all equipment malfunctions on a Quality Form.

REFERENCES

AABB Standards for Blood Banks and Transfusion Services, current edition
AABB Technical Manual, current edition

Attachments:

No Attachments

Approval Signatures

Approver	Date
Arlene Brennan: Administrative Coordinator	07/2018
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Shane Anderson: MD, Medical Director	06/2018
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Brian Folz: Medical Director	05/2018
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Applicability

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