University of Washington Medical Center 1959 NE Pacific Street. Seattle, WA 98195 Transfusion Services Laboratory Policies and Procedures Manual	Original Effective Date: 03-14-2016 Revision Effective Date: 11-11-2022	Number: EQ-0002.03
TITLE: **Thermometer Calibration Verification**		

PURPOSE:
To verify liquid in glass thermometers perform as intended and give accurate temperature readings that are traceable to a NIST standard

PERTAINS TO LOCATIONS:
Montlake TSL

PRINCIPLE & CLINICAL SIGNIFICANCE:
Principle
Standardization and calibration of thermometers ensures accurate temperature readings of the equipment used for storage of blood and blood components, as well as during serologic testing.

Clinical Significance
Temperature-dependent equipment such as heat blocks and blood processing equipment are monitored daily to ensure temperature requirements are met. The internal temperatures of blood storage devices are continually monitored. Failures in either case can affect the accuracy of patient and blood component test results and the safety, purity, and potency of blood components. As part of the complete quality assurance program, thermometer calibration is performed annually to ensure testing results and safety, purity and potency of blood components are not compromised by inaccurate temperatures or temperature readings.

POLICIES:
- Liquid-in-glass and electronic thermometer calibration checks are performed:
  - At the time of purchase
  - Annually using a NIST traceable reference
  - As needed, when discrepancy is expected
- NIST traceable reference thermometers are sent annually for calibration or as often as specified by the manufacturer
- Calibration verifications are performed at a temperature close to that which the thermometer will monitor
- Correlation with the NIST traceable references should be within 0.5ºC. If greater than 0.5ºC, the thermometer should be removed from service and discarded.

SPECIMEN REQUIREMENTS:
NA

REAGENTS/SUPPLIES/EQUIPMENT:

Reagents:	Supplies:	Equipment:
N/A	• Labels for labeling thermometers • Test Tubes	• NIST Thermometer (with in-date certification) • Heatblock (36 to 38ºC) • Freezer (≤ -18) • Refrigerator (1-6ºC) • Platelet Chamber or room (20-24ºC)

QUALITY CONTROL:

NIST thermometer calibration must be within the last 12-month period

INSTRUCTIONS:

STEP	ACTION
1	**If verifying** / **Then** 1 thermometer / Go to next step >1 thermometer / Sort thermometers by key factors (temperature of intended use, increments, immersion) to allow testing in groups. Then go to next step.
2	Document the following information on the *Thermometer Calibration Verification* form • NIST Thermometer ID (serial number) • NIST Thermometer Calibration Expiration Date For each thermometer to be calibrated: • Thermometer ID (serial number) • Thermometer Measurable Range (example: -5 to 15 ºC) • Reading increments (0.5ºC or Other and specify increments)
3	Visually inspect the thermometer for: • Separation of liquid column • Degradation of the liquid • Cracks, defects or other degradation of the glass • Scale legibility, improper or uneven scale graduations • Foreign objects in the liquid
4	Document the result of the visual inspection on the *Thermometer Calibration Verification* form **If visual inspection is** / **Then enter** Acceptable / • Check “Pass” box in the “Visual Inspection” field • Go to next step Not acceptable **does not** pose safety risk / • Check “Fail” box in the “Visual Inspection” field • Check “No” box in the “Acceptable for Use” field • Check “Removed” box in the “Disposition” field • Remove thermometer from service Not acceptable **does** pose safety risk (eg. broken glass) / • Check “Fail” box in the “Visual Inspection” field • Check “No” box in the “Acceptable for Use” field • Check “Discarded” box in the “Disposition” field • Remove thermometer from service

STEP	ACTION	
5	Ensure all thermometers are submerged to the appropriate immersion level	
6	**If thermometer is used at temperature range**	**Then**
	1-6 °C	Place thermometer(s) with a NIST-traceable thermometer in a blood refrigerator maintained between 1-6 °C
	20-24 °C	Place thermometer(s) with a NIST-traceable thermometer in a platelet chamber maintained between 20-24 °C or calibrate at room temperature if between 20-24 °C
	36-38 °C	Insert thermometer(s) and a NIST-traceable thermometer in a water filled test tube and place in a heatblock maintained between 36-38°C
	≤ -18°C	Place the thermometer(s) with a NIST-traceable thermometer in freezer ≤ -18°C
7	Allow at least 5 minutes for the thermometers to equilibrate to the test temperature	
8	Document the temperature reading on the thermometer (s) and the NIST thermometer on the *Thermometer Calibration Verification* form	
9	Go to section Interpretation	

CALCULATIONS/INTERPRETATIONS/RESULTS REPORTING/NORMAL VALUES/CRITICAL VALUES

Interpretation

STEP	ACTION	
1	Calculate the temperature variance between the test thermometer(s) and the NIST thermometer and document the variance on the *Thermometer Calibration Verification* form	
2	Determine if the variance is acceptable and document result	
	If the variance is	**Then enter**
	<± 0.5°C	• Check “Yes” box in the “Variance Acceptable” field • Go to next step
	≥± 0.5°C	• Check “No” box in the “Variance Acceptable” field • Check “Removed” box in the “Disposition” field • Remove thermometer from service.

<table>
<tr><th>STEP</th><th>ACTION</th></tr>
<tr><td>3</td><td>Determine if the thermometer is acceptable for use and document results
<table>
<tr><th>If</th><th>Then enter</th></tr>
<tr><td>Visual Inspection Passed AND Variance IS acceptable</td><td>• Check “Yes” box in the “Thermometer Acceptable for Use” field.
• Check appropriate box in the “Disposition Field” (Either “Placed in use” or “Stored as backup”)
• Go to next step</td></tr>
<tr><td>Variance IS NOT acceptable</td><td>• Check “No” box in the “Thermometer Acceptable for Use” field.
• Check “Removed” box in the “Disposition Field”
• Remove thermometer from service</td></tr>
</table></td></tr>
<tr><td>4</td><td>Label the calibrated thermometer with the following:
• Thermometer ID
• Next calibration date (12 months from today)
• Tech ID</td></tr>
<tr><td>5</td><td>Complete “Tech ID” and “Date” fields on the Thermometer Calibration Verification form, submit completed form to supervisory for review.</td></tr>
</table>

CALIBRATION:
The NIST thermometer must have been calibrated within the last 12 months

PROCEDURE NOTES AND LIMITATIONS:
Procedure Notes
- The thermometers must not touch the metal sides or bottom of any containers they are placed in for calibration
- Thermometers should be calibrated at a temperature within the range of temperatures measured in daily use

Limitations
Gaps in the liquid column will result in erroneous temperature readings and must be eliminated prior to calibration

REFERENCES:
- Technical Manual. Bethesda, MD: AABB, current edition
- Standards for Blood Banks and Transfusion Services. Bethesda, MD; AABB, current edition

RELATED DOCUMENTS:
FORM *Thermometer Calibration Verification*

APPENDICES:
NA

UWMC SOP Approval:			
UWMC CLIA Medical Director	Andrew Bryan, MD	Date	
Transfusion Service Manager	Nina Sen	Date	
TSL QA Manager	Tayer Reeves	Date	
Transfusion Service Medical Director	Monica B. Pagano, MD	Date	
UWMC Biennial Review:			
		Date	
		Date	

REVISION HISTORY:
08/05/2020: Updated to include UWMC Northwest Transfusion Service and clarify process and documentation

11/04/2022: Revised *Thermometer Calibration Verification* Form, updated policy to include instructions for completing revised form. Modified acceptable variance from <1.0°C to <0.5°C and removed language concerning correction factors. Removed Northwest Hospital TSS.