

# Functional Calibration of Thermometers

Guideline:  
QCAI.008(Rev2.0)

Guideline Effective Date:  
DDMMYY

Revision Date:  
01JAN05

## 1.0 Principle

Thermometers are calibrated to detect and prevent inaccurate temperature readings.

## 2.0 Scope and Related Policies

2.1. Equipment used in the collection, processing, serological testing, storage and distribution of blood products shall be maintained in a clean and orderly manner and shall have regular documented calibration and preventative maintenance. 9.1 (D1.3; D3.4), 9.3 (22.2.2; 22.3.1; 22.3.2)

Records of validation, calibration, maintenance, malfunction and repair shall be retained for 5 years post-decommission. 9.1 (D4.1; App. A), 9.3 (19.6.4.1; Table 4)

2.2. All analog thermometers used in the handling, processing, storage and transport of blood products shall be verified against a certified calibrated thermometer before initial use and at least annually thereafter. Comparisons shall be documented. 9.1 (D5.5.3), 9.3 (22.2.5)

- The NIST thermometer shall be re-calibrated according to manufacturer's instructions.
- Digital (electronic) thermometers used to assess blood storage temperatures shall be calibrated monthly. 9.2

## 3.0 Specimens

N/A

## 4.0 Materials

National Institute of Standards and Technology (NIST) certified thermometer(s) or thermometer with NIST-traceable calibration certificate

Liquid-in-glass thermometer

Water container

Crushed ice

Form QCAI.008F



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## 5.0 Quality Control/Management

- 5.1. Records of calibration should be retained for 5 years post-decommissioning of the thermometer.
- 5.2. Multiple thermometers may be calibrated at one time.
- 5.3. Thermometers no longer reading within 1° C of the calibrated thermometer should be discarded.
- 5.4. Thermometers with splits or breaks in the liquid are not acceptable.
- 5.5. Use thermometers that do not contain mercury whenever possible. When purchasing thermometers, buy liquid in glass or digital thermometers.

## 6.0 Procedure

- 6.1. Sort thermometers into groups to be calibrated and tested based on temperature range and type (i.e., mercury vs alcohol vs digital).
- 6.2. If testing newly purchased thermometers, place a piece of tape around the top of each thermometer with an identification number.
- 6.3. Inspect each thermometer for splits in the liquid part of the column. If splits are present, do not calibrate until the split is united. If this cannot be done, discard the thermometer.
- 6.4. Fill a container with water (water should be at a temperature close to which the thermometer is used to monitor).
  - 6.4.1. If calibrating for 37° C, place the NIST thermometer and thermometers to be tested at the same water depth in a 37° C waterbath.
  - 6.4.2. If calibrating for 1–6° C, place the NIST thermometer and thermometers to be tested at the same water depth in a container filled with water and crushed ice.

Make sure that the thermometer tips or probes are in the liquid and not in the upper ice.



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- 6.4.3. If calibrating for temperatures below 0 ° C, place the NIST thermometer into the freezer. If thermometer to be tested is kept in a solution that is liquid then place the NIST thermometer in the liquid, if not place it in the freezer air near the thermometer to be tested.
- 6.5. Stir the water constantly in a random motion until the thermometer indicates the desired temperature.
- 6.6. Allow the thermometers to equilibrate for 5 minutes.
- 6.7. Observe and record the temperature of each thermometer on QCAI.008F.
- 6.8. Determine if each thermometer is recording accurately:
  - 6.8.1. A thermometer is acceptable if the temperature reading on a thermometer(s) agrees with the NIST thermometer within 1 ° C.
  - 6.8.2. If the difference between the thermometer reading and the NIST thermometer reading is greater than 1 ° C:
    - Return the thermometer to the supplier, if newly purchased **or**
    - Discard the thermometer.

## 7.0 Reporting

- 7.1. Record the following on form QCAI.008F:
  - Thermometer identification number(s)
  - Temperature reading of thermometer being checked
  - Temperature reading of NIST thermometer
  - Whether the thermometer is acceptable for use
  - Date of **calibration** testing
  - Signature or initials of the person performing the calibration.



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7.2. Some facilities may choose to record the following on a label attached to the thermometer:

- Date of calibration
- OK✓
- Initials.

## 8.0 Procedural Notes

N/A

## 9.0 References

- 9.1. Canadian Society for Transfusion Medicine. Standards for hospital transfusion services, version 1. Ottawa: Canadian Society for Transfusion Medicine, 2004: D1.3, D3.4, D4.1, D5.5.3, Appendix A.
- 9.2. Brecher ME ed. Technical manual, 14<sup>th</sup> ed. Bethesda, MD: American Association of Blood Banks.2002: 758–9;781.
- 9.3. Canadian Standards Association. Blood and blood components (CAN/CSA Z902-04). Mississauga, Ontario: Canadian Standards Association, 2004: 19.6.4.1, 22.2.2, 22.2.5, 22.3.1, 22.3.2, Table 4.

### Facility endorsement if guideline is used as a Standard Operating Procedure (SOP)

Approved By:

\_\_\_\_\_  
*(Senior Management)*

\_\_\_\_\_  
*(Senior Management)*

Facility effective date:

\_\_\_\_\_  
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*(Date of implementation)*



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Change Log	
Change Description	Effective Date
Original	01 April 2000
<b>Revision 1</b> Step 6.4.3 Added checking of freezer thermometers. Removed option to use inaccurate thermometers for non-critical temperature monitoring.	01 April 2002
<b>Revision 2</b> Changed “patient” to “recipient”, “must” to “shall” and updated to CAN/CSA Z902-04 in all cases where applicable <b>2.1:</b> Changed “Records of maintenance, malfunction and repair shall be kept during the working lifetime of the equipment” to “Records of validation, calibration, maintenance, malfunction and repair shall be retained for 5 years post-decommissioning.” (CAN/CSA Z902 #19.6.4.1 and CSTM D4.1) <b>2.2:</b> Reworded to include all analog thermometers used in the handling, processing, storage and transport of blood products and changed “annually” to “before initial use and at least annually thereafter and comparisons shall be documented.” (CAN/CSA Z902 #22.2.5; CSTM D5.5.3) Added statement about NIST thermometer. Deleted statement about thermometers used for shipment of blood. <b>5.0:</b> Updated title <b>5.1:</b> Changed “for the life of” to “for 5 years post-decommissioning of” <b>9.0:</b> Deleted previous references 9.2, 9.4; added new reference 9.3 Updated Competency Companion (QCAI.008D, QCAI.008E)	01 January 2005

