

“Short” BEST PRACTICE GUIDE

**USE OF INFRARED EAR THERMOMETERS TO PERFORM
TRACEABLE NON-CONTACT MEASUREMENTS OF HUMAN BODY
TEMPERATURE**

Based on the CCT-TG-BTM best practice guide: “Use of infrared ear thermometers to perform traceable non-contact measurements of human body temperature”

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1. Purpose

To aid the clinician to obtain the best performance from an ear thermometer for determining human core body temperature, including an estimate of the likely overall uncertainty¹.

2. Ear thermometer indicated temperature versus human core body temperature

The ear thermometer aims to infer core body temperature from a measurement of the temperature of the tympanic membrane/deep ear canal. Due to the nature of the measurement site, provided the ear thermometer is performing correctly, the measured temperature should be close to core body temperature. Several influence factors need to be considered to obtain best performance.

3. Influence factors

Obstruction in the ear canal: The ear canal should be inspected before measurement and, if necessary, dirt, fluid or ear wax removed, to allow an unobstructed view of the tympanic membrane.

Alignment: The ear thermometer must be aligned to measure the temperature of the tympanic membrane/deep ear canal. This may require “ear tugging” to straighten the ear canal to give a clear view of the measurement site.

Ambient conditions: The ear thermometer operates within specified ambient conditions given by the manufacturer. Using it outside of those conditions could result in significant temperature errors.

Influence of thermometer warming: It is important not to allow the thermometer to warm up above the ambient conditions – for example through continual handling. This can adversely affect performance. The thermometer should only be held during measurement.

Drift: The thermometer accuracy will degrade over time. To correct for this, the device requires periodic and traceable calibration. The calibration status and when the next calibration is due should be clearly indicated on the device.

Device stress: If the device has been dropped, for example, or taken outside of its operating conditions (e.g., overheated), it may no longer reliably measure body temperature and its performance **must** be confirmed before continuing use.

Change of probe cover: Ear thermometers require a change of probe cover after each use. This is an **essential** sanitary process but does introduce a small uncertainty into the measurement. The calibration should be performed using the sensing head covers supplied by the manufacturer.

4. Expected accuracy in use

The maximum permissible error for a new device constructed to ISO 80601-2-56:2017 is 0.3 °C in the range from 34 °C to 43 °C.

In use, following the manufacturer’s instructions and taking the precautions outlined above, **a good estimate of the expanded uncertainty in the temperature measurement is 0.5 °C (k = 2).**

¹ This document is a summary of the key findings of: “CCT-TG-BTM best practice guide: Use of infrared ear thermometers to perform traceable non-contact measurements of human body temperature”. This can be downloaded for free from: bipm.org