VeraTemp+ Professional Non Contact Thermometer
Methodology & Standards

Operating Principle: VeraTemp+ Professional Non Contact Thermometer

All objects, solid, liquid or gas, emit energy by radiation. The intensity of this energy depends on the temperature of the object. The non-contact infrared thermometer is able to measure the temperature of a person or object by the energy the person/object emits. This measurement can be taken because of an external temperature probe on the device that permanently analyzes and registers the ambient temperature. As soon as the operator holds the thermometer near the body and activates the radiation sensor, the measurement is taken instantly by detection of the infrared heat generated by the arterial blood flow. Body heat can therefore be measured without any interference form the heat of surrounding environment.

What is Normal Body Temperature Range?¹
The overall health of an individual is determined by examining several vital signs such as body temperature, pulse rate, respiration rate, heartbeat and blood pressure. For all these measurements, there are recommended ranges that help in demarcating a healthy person from an ill health individual. Normal body temperature varies by person, age, gender, activity, and time of day. The average normal body temperature of a healthy, resting adult human being has been stated to be at 98.6 degrees Fahrenheit or 37.0 degrees Celsius. A temperature over 100.4 degrees Fahrenheit usually means you have an infection or illness.

Our body controls the temperature within a narrow range by means of a process called thermoregulation. This is crucial as temperature affects the enzyme activities and chemical reactions of the body. The normal range of human body temperature varies due to an individuals metabolism rate, the higher (faster) it is the higher the normal body temperature or the slower the metabolic rate the lower the normal body temperature.

By normal body temperature range, we mean the range of temperature that is optimal for carrying out the bodily functions and metabolic activities. Low temperature (hypothermia) or high temperature (hyperthermia) without any apparent reason can be a sign of underlying disease. Other factors that might affect the body temperature of an individual may be the time of day or the part of the body in which the temperature is measured at. The body temperature is lower in the morning, due to the rest the body received, and higher at night after a day of muscular activity and after food intake. The

¹ Significantly drawn from http://www.buzzle.com/articles/normal-body-temperature-range.html
lowest body temperature is measured around 3 a.m. in the morning, while the highest is recorded at around 6 p.m. in the afternoon. Also, the higher the activity level at that time, the more is the temperature value.

Normal Body Temperature ranges for babies, children and adults

Normal Body Temperature Range for Babies
For babies, the normal body temperature range is between 96.8°F to 98.6°F (36°C to 37°C). Temperature measurement for a baby below 96.8°F is considered low and required warming up, whereas temperature within a range of 98.6°F to 99.5°F is low-grade, which can be caused due to over dressing and over wrapping. The body temperature of a baby falling within a range of about 100.4°F to 101.3°F is considered to have fever.

Normal Body Temperature Range in Children
The normal body temperature range for children is 96.8-98.24°F, which is nearly the same as adults. In case of children above 6 years old, the daily fluctuation of temperature is about 2 degrees Fahrenheit. For a child, rectal temperature measurement of about 100.4°F or higher is considered as a sign of fever.

Normal Body Temperature Range for Adults
Also referred to as normothermia, the normal human body temperature of a resting adult body is 98.6 degrees, when measured in a Fahrenheit scale and 37.0 degrees when measured in a Celsius scale. These are the normal body temperatures for core body measurements. However, the accepted normal body temperature range measured orally (beneath the tongue) is 98.2±1.3°F and 36.8±0.7°C. An adult has fever if his or her oral temperature measurement is 99.5°F or higher.

In the concluding note, the normal body temperature range for an adult woman is slightly higher than an adult man. In comparison to this, the normal body temperature is higher in children, while it is lower in elderly individuals.

Normal Body Temperature and Age

<table>
<thead>
<tr>
<th>Age</th>
<th>Normal Temp° Ranges</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Celsius</td>
</tr>
<tr>
<td>0 to 2 years</td>
<td>36.4°C - 38.0°C</td>
</tr>
<tr>
<td>3 to 10 years</td>
<td>36.1°C - 37.8°C</td>
</tr>
<tr>
<td>11 to 65 years</td>
<td>35.9°C - 37.6°C</td>
</tr>
<tr>
<td>65+ years</td>
<td>35.8°C – 37.5°C</td>
</tr>
</tbody>
</table>
The Different Methods of Temperature Measurement

Core Temperature
Core Temperature is the most precise measurement and involves measuring the temperature in the pulmonary artery by means of a catheter equipped with a thermal probe which can read the temperature in situ. The same method is employed for probes measuring the esophageal temperature. However, such invasive temperature measurement method requires special expertise and equipment.

Rectal Thermometry
Rectal temperature adjusts slowly in comparison to the evolution of the body's internal temperature. It has been demonstrated that rectal temperature remains raised long after the internal temperature of the patient has started to drop and vice versa. Furthermore, rectal perforations have been known to occur as a result of this method and without appropriate sterilization techniques, rectal thermometry can spread germs often found in feces.

Oral Thermometry
Oral temperature is easily influenced by recent ingestion of food or drinks and by breathing through the mouth. To measure oral temperature, the mouth must remain closed and the tongue lowered for three to four minutes which is a difficult task for many patients to accomplish. Furthermore, variance in recorded temperature can arise from the different placement of the probe in the different positions of the mouth.

Axillary (armpit) Thermometry
Although it may be easy to measure axillary temperature, it has been proven that it does not provide an accurate measurement of the internal temperature. To take this type of temperature, the thermometer must be wedged tightly over the axillary artery. Despite the low sensitivity and relative inaccuracy of axillary temperature in detecting fever, this method is recommended by The American Academy of Pediatrics as an acceptable screening for fever in newborns.

Tympanic (ear) Thermometry
In order to obtain a precise temperature reading using a Tympanic device, good command of the measurement technique is required. The thermometer probe must be placed as close as possible to the warmest part of the external ear canal. An incorrectly placed probe could lead to a false temperature reading.

Temporal
The temporal artery is close to the surface of the skin and therefore accessible for reading. The temporal artery is linked to the heart by the carotid artery which is directly linked to the aorta. It forms part of the main trunk of the arterial
system. So long as the patient’s blood flow is permanent and regular, the method allows precise measurement of the temperature. Temporal thermometers can obtain temperature data by rubbing probe over or being in contact with skin or they can be totally non-contact.

**VeraTemp+ Professional Non Contact Thermometer** is a totally non-contact temporal thermometer. The efficiency, hygienic nature, speed and comfort of taking a temperature in this manner make it ideal compared with the other temperature measurement methods. The VeraTemp+ is designed to produce an *instant* forehead temperature without contact by reading the radiated temperature of the temporal artery.

### Normal Temperatures According to Measurement Method

<table>
<thead>
<tr>
<th>Measurement Method</th>
<th>Normal Temp° C</th>
<th>Normal Temp° F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectal</td>
<td>36.6°C - 38.0°C</td>
<td>97.9°F - 100.4°F</td>
</tr>
<tr>
<td>Oral</td>
<td>35.5°C - 37.5°C</td>
<td>95.9°F - 99.5°F</td>
</tr>
<tr>
<td>Axillary</td>
<td>34.7°C - 37.3°C</td>
<td>94.5°F - 99.1°F</td>
</tr>
<tr>
<td>Auricular</td>
<td>35.8°C - 38.0°C</td>
<td>96.4°F - 100.4°F</td>
</tr>
<tr>
<td>Temporal <strong>VeraTemp+</strong></td>
<td>35.8°C - 37.8°C</td>
<td>96.4°F - 100.1°F</td>
</tr>
</tbody>
</table>

The temperature of the human body varies throughout the day. It can also be influenced by numerous external factors including age, sex, type and thickness of skin.