ThermoWorks

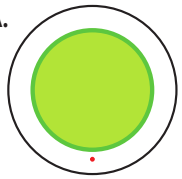
IR ACCURACY

Verifying Infrared Thermometer Accuracy

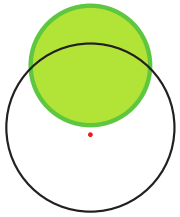
To test the accuracy of an infrared thermometer requires access to a stable surface of a known temperature. You cannot verify the accuracy of an IR thermometer by comparing it to an immersion type thermometer that is beneath the surface of a liquid or semi-solid in a non-controlled experiment. A probe in a food product will not read the same as the surface of that product as measured by an IR thermometer. Similarly, pointing an IR thermometer at human skin will not yield a reading of 98.6°F but rather something closer to 93°F or 94°F depending on many factors. (A reading of 98.6°F is actually "core" body temperature and must be measured in a body orifice.) Boiling water is not a preferred test method as the steam above the water can interfere with the measurement. The following simple instructions should help you perform a field check of an IR thermometer at moderate temperatures.

1. The infrared thermometer should be at or near the room temperature where the test will be conducted. For example, if you've just brought the thermometer out of a hot or cold automobile, or retrieved it from a walk-in chiller, allow it to rest for 15 to 20 minutes at the new room temperature before conducting the following test of accuracy.
2. Ensure that the lens or IR sensor is free of debris, grime, or condensation which can affect the accuracy of the reading. Use a soft cotton swab and alcohol to gently wipe it clean if needed. Avoid scratching the lens or sensor.
3. Distance to Target Ratio: The Distance to Target Ratio is normally indicated on each thermometer or in the instructions. Example: For a 12:1 ratio, at a 12" distance from the test object the target diameter being measured will be approximately 1" diameter. Further in distance will increase the test area creating a larger diameter of surface area being tested. The temperature reading will be an average of the temperature in the target diameter.
4. Field of View: *(fig A)* The Laser should be used as a guide to help indicate the area you are testing. In the IRFS, IR-Gun, IRK or IRT, the laser is located just below the actual lens; the laser should be aimed just below the test area. The IR lens or sensor should be held at a 90° angle from the surface of the target or the actual target area becomes elliptical.
5. Emissivity Setting: If your IR thermometer allows the setting of emissivity, it should be set for 0.95 to 0.97 for the following tests. Some thermometers are factory-set and will usually be fixed at one or the other. Both should yield reasonably close results in these checks.
6. Ice Water Test: Fill a glass with ice and add only enough water to fill the gaps between ice pieces. Allow the ice/water to rest for a minute or two. Stir a few times for uniformity. Hold the infrared thermometer directly over the top of the ice/water at a distance of about 3". Make sure the lens is at a 90° angle and that the lens itself is centered over the ice/water per the illustrations shown here *(fig A & B)*. If you aim at an angle, your field of view will include the walls of the glass or the background of the table top and your readings will not be accurate. If you perform the test correctly, and your IR thermometer is accurate, it should read approximately 32.0°F within the stated accuracy specification of your thermometer.
7. Infrared Comparator Cup: *(fig C)* This device allows you to compare the accuracy of an infrared thermometer to a calibrated immersion type thermometer at a temperature other than ice/water. Inside the machined aluminum cup is a flat surface with a solid matte black coating. The cup walls shield the surface from air currents in the room. The mass of the base provides for some stability in the temperature. Once inserted, the reference thermometer is allowed to stabilize for several minutes. The IR thermometer is then carefully pointed at the target inside the cup, using the same care as used with the ice/water test. The reading of the IR thermometer should match that of the reference thermometer within the stated specification.

A.

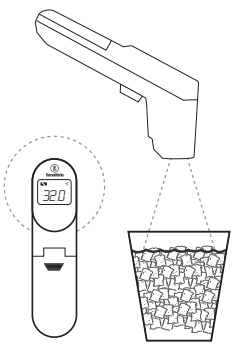


Correct - Laser centered below test area

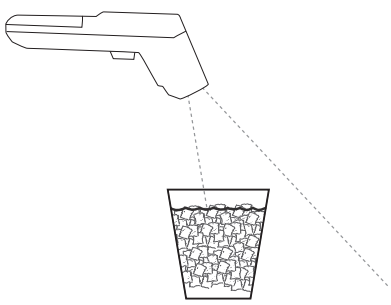


Incorrect - Laser centered on test area

B.



Correct - IR sensor is 90° angle to surface



Incorrect - Angle brings surrounding surface into measurement

C.

814-132 Infrared Comparator Cup

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