



Associated Calibration & Training Ltd

### Infrared Thermometer Guide

An infrared thermometer's advantage against a conventional probe thermometer is speed and the fact that it is non-contact; but keep in mind an infrared thermometer only measures the surface temperature. Infrared thermometers are easy to use, simply point the instrument at the object you wish to measure and read the temperature on the LCD.

### What is infrared?

Infrared energy is emitted from the surface of all objects. This energy is part of the electro magnetic spectrum. Infrared radiation can have a wavelength of a fraction of a micron up to several hundred microns. Infrared thermometers measure infrared with a wavelength of between 4 and 14 microns.

### Infrared thermometer limitations

As it is the surface of an object that emits infrared, an infrared thermometer will not measure its internal (core) temperature. You cannot accurately measure through any covering (glass, polythene, clingfilm etc). Any surface you are measuring must be clean and dust free. Air temperature cannot be measured by an infrared thermometer.

### Emissivity

Emissivity is a measure of the efficiency in which a surface emits thermal energy. It is defined as the fraction of energy being emitted relative to that emitted by a thermal black surface (a black body). A black body is a material that is a perfect emitter of heat energy and has an emissivity value of 1. A material with an emissivity value of 0 would be considered a perfect thermal mirror. For example, if an object had the potential to emit 100 units of energy but only emits 90 units in the real world, then that object would have an emissivity value of 0.90. In the real world there are no perfect "black bodies" and very few perfect infrared mirrors so most objects have an emissivity between 0 and 1.

The table below is just a small selection of different emissivity values.

aluminium (anodised)	0.77	plastic (black)	0.95
brass (oxidised)	0.61	porcelain (glazed)	0.92
brick (red)	0.90	rubber	0.95
cement	0.54	skin (human)	0.98
copper (oxidised)	0.65	soil (dry)	0.92
glass	0.92	stainless steel	0.59
paper (white)	0.68	water	0.95
perspex	0.86	water (ice)	0.96
pipe (galvanized)	0.46	water (frost)	0.98
plastic (white)	0.84	wood (planed)	0.90

### Lens Care

Care must be taken with the infrared thermometer's lens. The infrared waves are focused and filtered by the lens, therefore if the lens gets dirty or damaged in any way (even light scratches) then the accuracy can change at some temperatures.