Use of Infrared Thermometers

These meters work on the principle that all bodies give off infrared radiation in proportion to their temperature. Using infrared detectors this temperature can be measured; however there are some problems in applying this technology to the everyday operations of industry. The accuracy of these measurements will depend on the following.

1. Emissivity

This relates to the ability of a body to absorb or reflect incident radiation. As a rule black bodies absorb all incident radiation so that all emitting radiations are a result of their own body heat. They have an emissivity factor of 1.0. However shiny surfaces reflect a lot of incident radiation and therefore need special compensation i.e. emissivity factor less than 1.0. This is not an exact science. It is not uncommon to get readings in a fridge that pick up your own body heat reflected from the shiny surfaces.

2. Ambient temperature compensation

Infrared detectors have internal temperature sensors which compensate for changes in ambient temperatures. Check the manufacturer's specifications to make sure that they can operate at these ambient temperatures.

3. The laser dot is not the point of measurement

The surface being measured is described by the base of a cone whose tip is at the sensor and whose diameter varies with the distance between them. This "cone angle" is given as a ratio and is specified by the manufacturer. A 6:1 ratio for example means a distance of 6cm will measure a spot of 1cm. It is important that the target you are measuring is bigger than the spot size.

4. Take the reading and remove the thermometer

Continuously holding the sensor over a product can cause errors through the heating or cooling effects of incident radiation on the sensor. Take the reading, remove the instrument from the product & then repeat the reading.

5. Reduce errors especially in the food industry.

Many entry level Infrared devices have a preset emissivity for example 0.95. These instruments amplify the objects temperature to allow for the lower preset emissivity value. However not only does the instrument amplify the target temperature they also amplify any radiant energy from walls & ceilings that has fallen on the target. This radiant energy is detected by the IR instrument & is also amplified.

These errors can be reduced if you aim the IR thermometer at a small gap between similar items – which creates a blackbody effect. Using this strategy avoids emissivity & reflection errors but only works if your IR thermometer has its emissivity set to 1. In summary then using an instrument that set to 1 will reduce the amplification effect from radiant energy from the surroundings & will avoid emissivity and reflection errors.

6. Hold with a steady hand

IR thermometers offer excellent ease of use & hygiene however if in doubt or your process is critical, check your IR measurement with a contact temperature probe.

Have your instrument IANZ certified annually to ensure it is accurate & working correctly.

Written by:
Anne Evans
Technical Director
Homersham Ltd
November 2008

New Homersham's have had IR calibration added their IANZ accreditation scope in Dec 2009

Postal Address
Homersham Ltd
PO Box 280
Christchurch 8140
NEW ZEALAND

Phone: 03 3588309
Phone: 0800 659888

Website: www.homershams.co.nz

Delivery Address
Homersham Ltd
3 Homersham Place
Burnside
Christchurch 8053
NEW ZEALAND

Fax: 03 3582516
Fax: 0800 659777

E-mail: info@homershams.co.nz

132
new zealand accredited
calibration
laboratory