

## TEMPERATURE CONTROL



**Temperature is a measure of how hot or cold a product is. Temperature is most commonly measured on the Celsius scale and is shown using a ° symbol. The average human body has a temperature of 37°C, water boils at 100°C and water freezes to form ice at 0°C. The lower the temperature, the colder something is, and the higher the temperature, the hotter it is.**

Microbiological (bacterial) changes in food are temperature sensitive: cold slows it down; high heat destroys most bacteria.. Micro-organisms thrive in warm conditions (between 5°C – 60°C). In retail, temperature management is one of the key elements of maintaining food safety and shelf-life of perishable products.

The defrost cycle of a unit should not last longer than 30 minutes. During this time the fridge air temperature may rise above specifications, but the product temperature will/should be maintained.

The load line or capacity of a walk-in fridge or freezer must always be considered.

When a new fridge/freezer (walk-in, cabinet or under counter) is commissioned or has been repaired, always check the air temperature is attained (5°C or below) before packing stock into the unit.

The ambient temperature of a store can affect the operation of refrigerated units and influence the quality of product handled at that temperature. Ensure that the air conditioning units operate correctly. The ideal temperature in a fresh foods preparation area is 18°C - 22°C.

A fridge dial is not an accepted form of measurement as it has not been calibrated or verified and it is usually positioned in such a way that it monitors the efficacy of the motor and not the air temperature or product temperature. The sensors in cold rooms are more accurate if they are correctly positioned and the temperature reading has been verified by a hand-held instrument.

Temperature is measured using a thermometer. There are many kinds of thermometers depending on what is to be measured, how hot or cold it is, how accurate the measurements need to be, and how quickly a measurement must be taken. The two most common thermometers found in the food and retail industry are penetration probe thermometers and infrared thermometers.

### Why is it necessary to take temperatures?

It is important to monitor temperatures of food during each stage in order to ensure that there is no temperature abuse. This would be during transportation, receiving, preparation, merchandising and storage, to minimise the risk of food spoilage and food poisoning. There are so many places where temperature changes can occur, such as in a vehicle in the sun, during loading and unloading and while in preparation and storage.

Each store must hold a minimum of 2 thermometers. One thermometer should be kept at receiving and a second thermometer should be accessible in all perishable areas.

### NOTE

The following personnel should have access to a thermometer:

- Store manager, assistant managers and floor managers.
- Fresh department managers/supervisors.
- Receiving manager.
- Food safety ambassador.

Thermometers are expensive and delicate instruments and must be entrusted to a capable level of employee.

Thermometer preferred suppliers are found in the Store Safe File under the preferred supplier section.



**Important! Temperatures must be monitored and recorded, using the temperature template provided at the back of this file, but more importantly, the corrective action must be taken when temperatures are out of range. If there is more than a 2°C variance in temperature, then the product should be removed from display. When product safety is compromised we must act.**



### Penetration Probe Thermometer:

- Probe thermometers are used to read product core/centre temperatures e.g. chicken, pies, stews, vegetables and other cooked meals.
- The probe should be inserted into the centre of the product and left until the reading on the thermometer stabilises.
- When measuring different foodstuffs, the probe must be sanitized in between uses, to prevent cross contamination.
- Use sanitizer wipes to clean/wipe the probe between checking products.

**Infrared Thermometer:**

- These thermometers are used when it is not possible to take core temperatures e.g. frozen food and/or milk cartons or dairy products such as yoghurt where it is not possible to probe the product as it is frozen solid or one does not wish to pierce packaging or break food safety seals causing cross contamination.
- When using an infrared thermometer, be sure to take the temperature of the product and not the equipment in which the product is stored (the laser light is the guide, so point it at the product).
- Stand as close as possible to the product, but not touching the product. The thermometer should be held perpendicularly to the surface that needs to be measured as this will ensure the highest accuracy.
- For best results, take an average of 2-3 readings.

**What temperatures need to be taken?**

- The vehicle delivering perishables or frozen food products - the temperature can be read off the temperature dial in the vehicle. If the supplier does not have a temperature monitoring device, please advise them that this is a regulated requirement. The product temperature is the critical measurement.
- Measure perishable and frozen food product temperatures. Since you cannot measure every lug or box, take a measurement of one at the bottom and top, or front and back of the vehicle, before accepting delivery. Best practice would be to measure the temperature of 10% of the total load. Record these temperatures.
- Storage fridges and freezers.
- Display fridges and perishable product.
- Display freezers.
- Pie warmers and product.
- Cold salad/meat displays and product.
- Bain-marie cabinets and hot food products.
- Chafing dishes and hot food products.

**What temperature must certain foods be?**

- Chilled products need to be between 0°C and 5°C.
- Hot foods above 60°C.
- Chilled fruit, vegetables and salads between 0°C and 5°C.
- Frozen product at -18°C.

## Calibration and Verification of thermometers

### Why is Calibration important?

Calibration defines the accuracy and quality of measurements recorded using a piece of equipment. Temperature measurement must be done with an **accurate instrument**. Over time there is a tendency for results and accuracy to “drift” when using technologies or measuring specific parameters such as temperature and humidity. To be confident in the results being measured, there is an ongoing need to maintain the calibration of equipment throughout its lifetime for reliable, accurate and repeatable measurements.

The goal of calibration is to minimise any measurement uncertainty by ensuring the accuracy of test equipment. Calibration quantifies and controls errors or uncertainties within measurement processes to an acceptable level.

Within the SPAR retail stores, the implications of using a piece of equipment that has not been calibrated could be that a critical food temperature is incorrectly measured; this could result in:

- A food safety issue.
- Breach of food safety regulations and customers become ill.
- Environmental Health Practitioner (EHP) issue of notices of closure.
- Legal action.

Any of the above will result in damage to the reputation of a business. The possible cost of reputation, when compared to the cost of a simple two-point annual calibration, means it's often not worth the risk of ignoring calibration.

If deemed necessary, SPAR may be summoned in a court of law or by an insurance agent to prove that food was correctly handled. In the case of temperature, only valid accurate measuring instruments and the accompanying records are accepted.

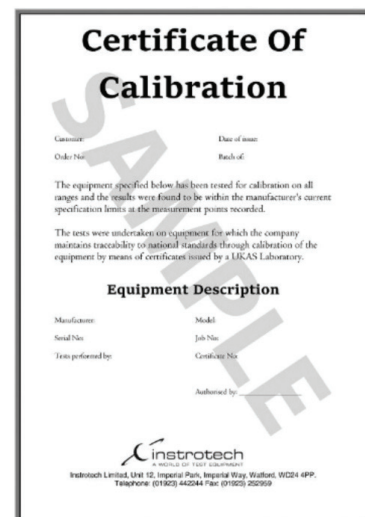
### Calibration

A calibration certificate must accompany a new instrument and/or each thermometer must be sent for calibration on an annual basis and as per the calibration certificate expiry date.

The thermometer must be calibrated against National Standards annually.

The thermometer manufacturer or suitable laboratory service must:

- Place a sticker and date to this effect on the instrument.
- Supply a calibration certificate, which must bear the date and the instrument number (which must refer to the number on the instrument).



**Certificate Of Calibration**

Customer: \_\_\_\_\_ Date of issue: \_\_\_\_\_  
Order No.: \_\_\_\_\_ Batch of: \_\_\_\_\_

The equipment specified below has been tested for calibration on all ranges and the results were found to be within the manufacturer's current specifications limits at the measurement points recorded.

The tests were undertaken on equipment for which the company maintains traceability to national standards through calibration of the equipment by means of certificates issued by a UKAS Laboratory.

**Equipment Description**

Manufacturer: \_\_\_\_\_ Model: \_\_\_\_\_  
Serial No.: \_\_\_\_\_ Job No.: \_\_\_\_\_  
Test performed by: \_\_\_\_\_ Certificate No.: \_\_\_\_\_

Authorised by: \_\_\_\_\_

**Instratech**  
Intratech Limited, Unit 12, Imperial Park, Imperial Way, Watford, WD24 4PP.  
Telephone: (01835) 442044 Fax: (01835) 252059

**Verification**

Verification is the process used to check the accuracy of all instruments used in a facility, on an ongoing basis.

This process should be followed and documented monthly or in the situation whereby the instrument has had a hard knock/fall on the floor or has been accidentally dropped, verification needs to take place.

This must be recorded on the **verification form**.

**Probe thermometer method:**

- Step 1: Fill a plastic tub or container to the very top with ice (crushed ice is preferable but not essential).
- Step 2: Slowly add very cold water until the water reaches about 1 centimetre below the top of the ice (the rim). Note: If the ice floats up off the bottom of the plastic tub or container, then the ice bath will more than likely be warmer than 0.0°C. Pour off any excess water.
- Step 3: Gently stir the ice mixture and let it sit for a minute or two.
- Step 4: Insert the probe thermometer (or thermometer stem) into the mixture and stir in the vertical centre of the ice slurry; allow to settle. Do not let the tip of the probe touch the bottom of the container so hold the probe midway in the solution. Hold for approximately 30 seconds and the device will take a reading.
- Step 5: The temperature of melting ice is 0°C and the thermometer reading must be within the 0.5°C. Should the reading not be 0.5°C the staff member must notify management immediately and discontinue using the thermometer. The thermometer must be sent for repair.

**Infrared thermometer method:**

- Step 1: Fill a plastic tub or container to the very top with ice (crushed ice is preferable but not essential).
- Step 2: Slowly add very cold water until the water reaches about 1 centimetre below the top of the ice (the rim). Note: If the ice floats up off the bottom of the plastic tub or container, then the ice bath will more than likely be warmer than 0.0°C. Pour off any excess water.
- Step 3: Gently stir the ice mixture and let it sit for a minute or two.
- Step 4: Make sure your infrared thermometer is set to an emissivity setting of 0.95 or 0.97.
- Step 5: Hold your infrared thermometer so that the lens or opening is directly above and perpendicular to the surface of the ice bath. The infrared thermometer needs to be placed as close to this surface when taking a reading without touching the surface.  
Note: If you hold your infrared thermometer too far from the surface of the ice bath or hold it at an angle, your measurement will include the sides of the plastic tub or container or even the table it is resting on and give you an inaccurate reading.
- Step 6: Taking extra care to ensure that the field of view (the size and shape of surface area being measured) is well inside the sides of the plastic tub or container, press the button on your infrared thermometer to take the measurement.  
If you perform the test correctly, and your infrared thermometer is properly calibrated, it should read within your unit's accurately stated specification of 0.0°C.  
The accuracy of any infrared thermometer, regardless of make and model, is generally anywhere between  $\pm 1^{\circ}\text{C}$  and  $\pm 2^{\circ}\text{C}$ . This factor needs to be taken into consideration when verifying the instrument against an ice bath. This is just the nature of an infrared thermometer; it is not nearly as accurate as a probe thermometer which generally has the accuracy of 0.5°C.



**Use of the thermometer**

- Ensure the thermometer is switched off when not in use.
- Fridge/freezer temperature must be checked at the top of the load line or at the “air tight” grid.
- Allow sufficient time for the thermometer to reach the indicated temperature.
- When measuring the temperature of packaged chilled foods e.g. at receiving, take the product surface temperature only (if the product has been pierced, it cannot be sold.)
- To measure the surface product temperature, place the probe between the surface of two products placed alongside each other. Allow sufficient time for the temperature reading to occur.
- The product temperature of hot food, means the actual food and not the table surface, therefore insert the probe into the middle of the food. It is essential that the probe is sanitized after each product checked.
- When checking pies do not place the sanitized probe against the foil.
- Do not remove the product from the display unit before reading the temperature.
- Insert probe into the thickest part of the product e.g. a whole roast chicken would be between the leg and the thigh or the breast of the chicken. Avoid contact with any bone part inside the meat when measuring the temperature.
- If using infrared thermometer to ensure the highest accuracy of the results, the infrared thermometer needs to be placed as close to the surface as possible (but not touching the surface) and held perpendicularly to the surface that needs to be measured. Always look out for surfaces that are highly reflective e.g. shiny plastic or pie foil containers and be aware that these can distort the reading.

**Requirements for temperature monitoring:**

- A thermometer must be available at receiving and all food preparation areas, and in good working order.
- Perishables and frozen product temperatures must be taken and recorded at receiving.
- Temperatures of products merchandised in fridges and freezers must be taken and recorded twice daily.
- Corrective actions must be documented if an “out of spec” temperature is recorded.
- There must be no evidence of temperature abuse e.g. a chicken sandwich merchandised on tables instead of in a refrigerated unit.
- Thermometers on fridges and freezers and all hand-held thermometers must be calibrated annually.

**To maintain the cold chain****1. Delivery and receiving**

- Give chilled and frozen deliveries priority.
- The truck door must remain closed until receiving is ready to receive the stock.
- Check stock temperature and reject non-conformances.
- Record the temperatures on the checklist and file.
- Unload and receive stock as fast as possible.
- Move chilled and frozen product straight into the back-up fridge and freezer as fast as possible.

**2. Back-up refrigerators and freezers**

- All equipment must be maintained.
- Doors must be sealed correctly; strip curtains must be clean and in good condition.
- Equipment must be clean and free of odours and mould.
- Do not leave the door open.
- Fans must be cleaned and sanitized according to a schedule when the frequency is indicated (usually monthly). Fans must be firmly sealed and lights in working order.
- No ice build-up must be evident.
- Chiller must not have excess condensation, no water may drip on product, correct drainage must be installed, drains must be clean and free of mould and odours.
- To promote optimum air circulation, no goods should be stored directly on the floor (shelves or pallets must be used). Ensure correct stacking practices. Do not stack above the fan level.

**3. Move stock to shop floor and display as quickly as possible**

- Never leave stock out of the fridge/freezer while doing other jobs.
- Only move stock to the floor when you need to unpack it.

**4. Display fridges and freezers**

- Do not fill above load line.
- Do not block air flow.

**5. Food Preparation**

- Work with small quantities at a time.
- Work as fast as possible and place back into the back-up fridge or freezers or into the display unit.

**Guidelines for handling hot food to attain the correct temperature**

Always ensure that all equipment is in good working order. Check that all your infrared light bulbs are working. Check that infrared light bulbs are not positioned too high (they are not effective if they are more than 60cm above the food).

Always ensure the bain-marie/hot display unit is preheated to 60°C and above before you place the food into the unit.

Do not place cold food directly into the heating unit. Preheat the food in the oven or on the stove plate first.

Food must be heated to at least 80°C and above.

If your unit does not retain the temperature at 60°C, reduce the amount of food you place in the unit and check the thermostat.

Never add freshly heated food to food that has already been in the heating unit from a previous batch.

Hot foods may only be displayed for a 4 hour period, following which if it has not been sold, it must be discarded to waste.

Food out of the heated display may not be cooled down and reheated or sold chilled the following day. Hot foods have a 1-day shelf life. Reheating food is dangerous.

### **Managing non-conformances via corrective action**

A non-conformance is when the food safety result does not conform to the specified food safety standard e.g. fridge temperature is above 5°C.

Should routine temperature monitoring indicate that the product, fridge or freezer temperature is out of specification, follow these actions:

- Check that stock is still sound i.e. that no product deterioration has occurred.
- If quality deterioration has occurred isolate the stock and discard.
- Call the fridge repair company.
- Once the unit has been repaired, allow it to run until optimum air temperature has been achieved before repacking stock.

#### **Recheck the stock within the hour**

A non-conformance is noted on a checklist. If no corrective action takes place the problem will persist. In the case where food safety is questioned in a court of law, one needs to prove that they have acted in a responsible manner and can produce evidence that they have tried to rectify the problem in order to avoid a non-conformance in the future.

Corrective action is usually actioned by the supervisor or manager in charge of the section. It is the manager's duty to confirm the correct procedure was followed, as the manager will ultimately be held responsible for his/her section.