

THERMOMETERS

Objective: *After completing this week's lesson your employees should be able to calibrate thermometers and use them properly*

Tell employees that in last week's lesson they learned that deliveries must be inspected carefully for proper temperature. In fact, time and temperature play a critical role in the process of maintaining a safe food supply. They affect food quality and safety from the moment food arrives at the back door to the time a prepared meal is presented to the customer.

To manage both time and temperature, you need to monitor and control them. Emphasize to employees that the thermometer may be the most single important tool they have to protect food.

The most common thermometers used in the industry are the **bimetallic stemmed thermometer**, the **thermocouple**, and the **thermistor**. Also, infrared thermometers are becoming increasingly popular. Your employees will want to know what these different thermometers look and feel like, so have some on hand as you discuss each. Be sure to pass them around and let the employees get a close look at the tools they will be working with.

Bimetallic Stemmed Thermometers

Tell employees that this common, versatile thermometer is often capable of measuring temperatures from 0°F to 220°F (-18°C to 104°C). It typically has the following features:

- An adjustable calibration nut to keep it accurate
- Easy-to-read, numbered temperature markings
- A dimple to mark the end of the sensing area (that begins at the tip)
- Accuracy to +/- 2°F (1°C)

Thermocouples and Thermistors

Tell employees that thermocouples and thermistors measure temperatures through a metal probe or sensing area and display the results on a digital readout. Point out that many come with interchangeable probes designed to measure the temperature of food and equipment. These include:

- **Immersion probes.** Measures temperature of liquids, such as soups, sauces or frying oil.
- **Surface probes.** Measures temperature of flat cooking equipment, such as griddles.
- **Penetration probes.** Measures internal temperature of food, such as poultry, roasts, fish, etc.
- **Air probes.** Measures the temperature inside refrigerators or ovens

Infrared (Laser) Thermometer

Tell employees that infrared thermometers use infrared technology to produce accurate temperature readings of food and equipment surfaces. Because they are noncontact thermometers, they can reduce the risk of cross-contamination and damage to food. Explain that to gain the most accurate reading using these thermometers, employees should:

- Remove any barriers between the product and the thermometer
- Hold the thermometer as close to the product as possible (without touching it)
- Avoid taking temperature measurements through glass or shiny or polished-metal surfaces

Emphasize that in order to get an accurate temperature reading, the employee must use the right thermometer for the type of food being checked.

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How to Calibrate Thermometers

Tell employees that calibration is the process of ensuring that a thermometer gives accurate readings by adjusting it to a known standard. Most thermometers can be easily calibrated. Two accepted methods of calibration are the ice-point method and the boiling-point method. To calibrate your thermometers properly, follow one of these methods. Demonstrate the procedure while you describe it.

Ice-Point Method for Calibrating a Thermometer

Step	Process	Notes
1.	Fill a large container with crushed ice. Add clean tap water until the container is full.	Stir the mixture well.
2.	Put the thermometer stem or probe into the ice water so the sensing area is completely submerged. Wait 30 seconds, or until the indicator stops moving.	Do not let the stem or probe touch the containers bottom or sides. The thermometer stem or probe must remain in the ice water.
3.	Hold the calibration nut securely with a wrench or other tool and rotate the head of the thermometer until it reads 32°F (0°C).	On some thermocouples or thermistors, it may be possible to press a reset button to adjust the readout.

Boiling-Point Method for Calibrating a Thermometer

Step	Process	Notes
1.	Bring clean tap water to a boil in a deep pan.	
2.	Put the thermometer stem or probe into the boiling water so the sensing area is completely submerged. Wait 30 seconds, or until the indicator stops moving.	Do not let the stem or probe touch the pan's bottom or sides. The thermometer stem or probe must remain in the boiling water.
3.	Hold the calibration nut securely with a wrench or other tool and rotate the head of the thermometer until it reads 212°F (100°C) or the appropriate boiling-point temperature for your elevation.	The boiling point of water is about 1°F (about 0.5°C) lower for every 550 feet (168m) above sea level. On some thermocouples or thermistors, it may be possible to press a reset button to adjust the readout.

Calibrate This!

Directions: Put the following steps for calibrating a thermometer using the ice-point method in order, from 1 through 4.

- ___ Put the thermometer stem into the ice water.
- ___ Fill a large container with crushed ice and tap water.
- ___ Hold the calibration nut securely with a wrench and rotate the head of the thermometer until it reads 32°F (0°C)
- ___ Wait 30 seconds, or until the indicator stops moving.

Probe Match

Directions: You are using a digital thermometer to check the temperature of various items. You have several different probes. Match the proper probe for the item.

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| ___ 1. A 5-gallon stockpot of soup | a. Surface probe |
| ___ 2. A cooked roast | b. Immersion probe |
| ___ 3. The temperature inside an oven | c. Penetration probe |
| ___ 4. The surface temperature of a grill | d. Air probe |

Thermometer Word Find

Directions: Answer the following questions and then find the answers in the Word Search below. If you have trouble answering any of the questions, the answers appear at the bottom of the page.

1. Type of thermometer probe used to measure the temperature inside ovens or refrigerators
2. Thermometer that often has an adjustable calibration, nut to keep it accurate
3. Method of calibrating thermometers based on the boiling point of water
4. Used to adjust a bimetallic stemmed thermometer to keep it accurate
5. Method of calibrating thermometers based on the freezing point of water
6. Type of thermometer probe used to measure the temperature of liquids
7. Noncontact thermometer used to check the surface temperature of food and equipment
8. Type of thermometer probe used to measure the internal temperature of food
9. Type of thermometer probe used to measure the temperature of flat cooking equipment
10. Type of thermometer that measures temperature through a metal probe or sensing area, which displays it on a digital readout
11. The single most important tool an establishment has to protect food

Q B E T G N Y W V A Y V H Y I Q K R Q X W M F T R
G I S I N C X K N A Z W L O P M R E D H F P D C L
X M P E G I U M B F L F E I Y G M T N W R I T J X
L E C H O R O C J I T E R Z B O U E A A P B K P C
I T R X B U G P L T D D E S A N E M R I N C I N G
F A J S J I N B G T H E R M I S T O R S X W U Y J
N L B V C N M V X N Z O R E V P C M H Q I W B D L
P L A G N F M E K D I K K H N A H R X E H O M B S
Z I T I X R T Y U T K L D O L Q E E P P T R N S O
V C P X T A L L N R P P I I M M H H H L A R K K A
B S I Q R R M F P I L T B O B I O T Q V C M N T D
C T J B U E I G Y V A R T Y B L X Z A C P H K L H
D E A Y R D M W E R A D I U Y D V Q C W L O I M U
Y M A F I I B X T T Z C F C W Q Y D L K I Y G G F
I M F H S G M E I R E Y S A P W B X O P G G V W N
M E H P I H N O J P Z K N K R F Y C D N E G M J E
V D I F S E N G O B F I W G Z G Q J K W J T V E U
T M S C P N G I Y P U J G W Q J Z Y Y W L S B I S
J G S B U V N M N N I X V X E H Y U Y V Z E T A V
Q U C T J T U D N X A Z P Z D V R E S C H I I Y T
E K J X T W O A R L I I Z A F G Z F G G Q K O A Q
S S M S N S M V A A N C D W S T S U D D W P G K O
I T A Q Q N V V H A H G D N T X B G K T J R C A S
E C A F R U S H A G E L P U O C O M R E H T I D Z
O C I J P P P S G R I A K N G W X Y J Q P C N A S

- Answers**
1. Air
 2. Bimetallic Stemmed
 3. Boiling Point
 4. Calibration Nut
 5. Ice Point
 6. Immersion
 7. Infrared
 8. Penetration
 9. Surface
 10. Thermocouple
 11. Thermometer