

# Lesson 6:

## Chapter 2 Module 3

# Safe Food Temperatures

### **Chapter 2: Basic Guidelines for Safe Food Practices**

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## Chapter 2 – Module 3: Safe Food Temperatures

### SAFE FOOD TEMPERATURES

#### Key Words:

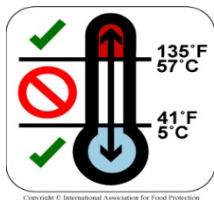
- Temperature Danger Zone (TDZ)
- Time/Temperature Control for Safety (TCS)
- Food Doneness
- Cross-Contamination
- Calibration
- Ice-Point Method
- Boiling Water Method
- Cross-Contact

#### Main Ideas:

- The Temperature Danger Zone (TDZ) is between 41°F and 135°F.
- There are different types of thermometers for different types of foods.
- Thermometers should be placed in the thickest part of the food
- A thermometer can be calibrated using the Ice-Point or Boiling Water Method

### Safe Food Temperatures

This module focuses on reducing risk of foodborne illness caused by bacteria by ensuring safe food temperatures. While food allergens can make people who have food allergies very ill, their presence in food is not affected by hot and cold food temperatures. Temperature control is especially important for **Time/Temperature Control for Safety Foods (TCS)** such as meat, poultry, fish, eggs, and dairy products.



The **Temperature Danger Zone (TDZ)** between 41°F and 135°F is most favorable to the growth of bacteria. It is important that TCS foods spend as little time as possible in the Temperature Danger Zone.

### FDA INSPECTION

When the Food and Drug Administration (FDA) inspected a national sample of full service restaurants, they found that over half of the restaurants failed to maintain proper holding times and temperatures placing customers at risk.

### Flow of Food

From receiving to food preparation to food service there are a number of times when food temperatures should be checked:

- Receiving of refrigerated foods (<41°F for most foods)
- Preparation of hot foods to the proper internal temperature
  - Ranging from 145°F to 165°F depending on the food item
- Cooling of hot foods for refrigerated storage
  - to 70°F in 2 hours and
  - to 41°F in an additional 4 hours
- Cold holding of refrigerated food at <41°F
- Hot holding of cooked food at >135°F
- Reheat leftovers to >165°F

### Measuring Food Doneness

Thermometers are the only reliable way to measure the temperature of a food. Cooks sometimes think that they can tell when a food has reached the proper doneness just by looking at the color of the food. However, **color is not a reliable indicator of doneness**. Research has shown that foods such as a ground beef patty may look brown on the outside, but still be undercooked on the inside. Unless a ground beef patty has reached an internal temperature of 155°F at the center of the patty, it could still contain bacteria that could make people sick. Restaurant employees should not guess assume a food is done. They should take the time to insert a thermometer into the food and measure the internal temperature.



### Selecting the Right Thermometer

There are several types of thermometers that can be used to measure food temperatures in restaurants. Selecting the right thermometer for the job is important for getting an accurate measurement of temperature. Table 1 shows several types of thermometers commonly used in restaurants and describes their uses.

One of the most common dial thermometers used in restaurants is the bimetallic-stemmed thermometer (pocket thermometer). These thermometers are inexpensive, easy to use, and accurate if they are calibrated frequently. It takes between 15 to 20 seconds to obtain an accurate temperature reading with these thermometers.

Two types of digital thermometers often used in restaurants are thermocouples and thermistors. These thermometers are more expensive than bimetallic-stemmed thermometers. Various types of probes are available for thermocouple thermometers. The type of probe used depends on the type of food or equipment where temperature is to be measured.

- **Immersion probes** are usually used to test the temperature of liquids such as soups, sauces, and frying oils.
- **Penetration probes** are used to measure the internal temperature of food such as hamburger patties or chicken breasts.
- **Surface probes** can be used to measure the temperature of flat cooking equipment such as griddles.

Other thermometers are designed for specific uses.

- **Refrigerator thermometers** are used in refrigerators to check air temperatures. Air temperatures of refrigerators should be  $\leq 40^{\circ}\text{F}$ . Bacteria can grow rapidly in refrigerated foods if the temperature is above  $41^{\circ}\text{F}$ . A refrigerator not maintaining proper temperature may need repairs.
- **Oven thermometers** are placed in ovens to check oven temperatures. If oven temperatures do not match the oven setting, then baking temperatures and/or times can be adjusted. For example, if an oven is set for a  $350^{\circ}\text{F}$  temperature, but an oven thermometer shows that it is actually  $345^{\circ}\text{F}$ , then the cook can increase the oven setting to  $355^{\circ}\text{F}$  to achieve an actual temperature of  $350^{\circ}\text{F}$  in the oven. This is important because foods might be undercooked at the lower temperature.

### Types of Thermometers Commonly Used in Restaurants

The thermometers shown in the table below are the types of food thermometers most commonly used in restaurants.





| Type  | Picture   | Uses  | Placement  |
|---|---|---|--|
| <b>Pocket Thermometer</b>                           |    | Measures internal temperature of foods at end of cooking time<br>Measures food temperatures during receiving, cold holding, and hot holding | Place 2 to 3 inches deep into food<br>Best for deep and thick foods such as roasts, combination dishes (such as lasagna), and soups          |
| <b>Thermocouple with Probe, Digital Thermometer</b> |    | Measures food temperatures near end of cooking period   | Place probe at least ¼ inch deep in food<br>Measures both thick and thin foods, including hamburger patties, pork chops, and chicken breasts |
| <b>Refrigerator, Dial Thermometer</b>               |   | Measures air temperature of refrigerator, which should be ≤40°F   | Place or hang on refrigerator shelf  |
| <b>Oven, Dial Thermometer</b>                       |  | Measures oven temperatures between 100° to 600°F  | Place or hang on oven rack   |

Table 1: Thermometers commonly used in restaurants and their applications

In addition to these commonly used thermometers, there are several other types of thermometers available for use in restaurants. Check with your local restaurant supply company.



### Thermometer Placement

Pocket thermometers and thermocouples are designed to measure the internal temperature of foods near the end of cooking time. They are not designed to remain in food while it is cooking. Thermometers will give correct temperature readings only if they are properly placed in the food. Foods cook from the outside in, making the center of the food the coolest.

- Thermometers should be placed in the thickest part of the food.
- Insertion of the thermometer in fat or gristle or near bone will cause an inaccurate reading.
- With irregularly shaped foods such as a roast, insert the thermometer in several places.
- Insert thermometers sideways for thin items such as hamburger patties or chicken breasts.

### Preventing Cross-Contamination and Cross-Contact with Thermometer Use

- **Cross-Contamination** occurs when germs are accidentally spread from one food to another. Small amounts of bacteria and viruses grow rapidly and can cause unintentional illness.
- **Cross-Contact** occurs when food allergens are spread between foods. The smallest amount of a food allergen can make a sensitive customer ill.

**Cross-Contamination** or **Cross-Contact** could easily happen if food thermometers are not cleaned and sanitized between uses. To avoid cross-contamination and cross-contact, a food thermometer should be **washed, rinsed, and sanitized each time** it is used to test a food temperature. Most thermometers should be washed carefully by hand and not immersed in water.

### Thermometer Calibration

Over time, many thermometers may begin to give inaccurate readings. This can increase risk of foodborne illness for customers. Calibration means adjusting a thermometer to give accurate temperature readings. Most pocket thermometers and digital thermometers can be calibrated.

When the thermometer is placed in a food, accuracy is critical. If a thermometer is out of adjustment and not properly calibrated, it will give inaccurate information. An improperly calibrated thermometer might read 165°F for cooked chicken when the actual temperature is lower. In that case, the food has not reached the proper internal temperature to prevent foodborne illness.

- ✓ Thermometers that are scaled in Fahrenheit should be accurate to within  $\pm 2^\circ\text{F}$  for measuring food temperatures.
- ✓ To ensure accuracy, calibration should be done weekly.

There are two basic methods to check accuracy of food thermometers and adjust them to correct readings:

- **Ice-Point Method** uses crushed ice and water to check the freezing point (32°F)
- **Boiling-Point Method** uses boiling water to check the boiling point (212°F)

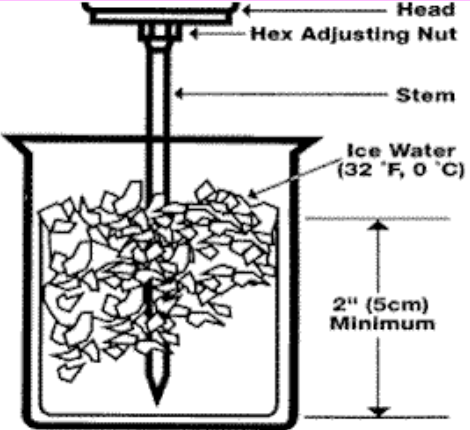
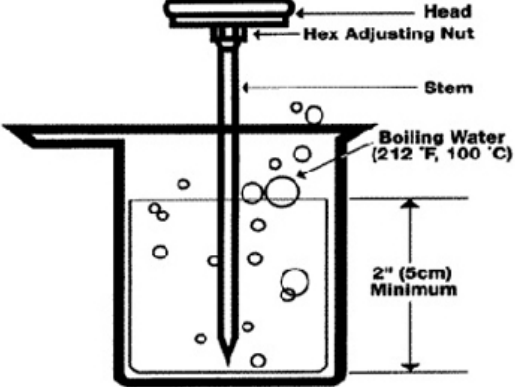
|   |  |
|---|--|
| <p><b>Ice-Point Method</b></p> <p>Fill a large glass with crushed ice<br/>Add cold water to the top of the ice and stir well<br/>Insert thermometer stem at least 2 inches into the ice water mixture<br/>Wait at least 30 seconds before reading the thermometer temperature<br/>Without removing the thermometer stem from the ice water, hold the adjusting nut under the head of the thermometer and turn the thermometer head so it reads 32°F.</p>                      |  <p>The diagram shows a thermometer being used in a glass of crushed ice and water. Labels include: Head, Hex Adjusting Nut, Stem, Ice Water (32 °F, 0 °C), and 2" (5cm) Minimum. A vertical double-headed arrow indicates the minimum immersion depth.</p> |
| <p><b>Boiling-Point Method</b></p> <ul style="list-style-type: none"><li>• Bring a pot of clean water to a rolling boil on a range.</li><li>• Immerse the thermometer stem at least 2 inches into the boiling water.</li><li>• Wait at least 30 seconds before reading the thermometer temperature.</li><li>• Without removing the thermometer stem from the hot water, hold the adjusting nut and turn the head of the thermometer so the temperature reads 212°F.</li></ul> |  <p>The diagram shows a thermometer being used in a pot of boiling water. Labels include: Head, Hex Adjusting Nut, Stem, Boiling Water (212 °F, 100 °C), and 2" (5cm) Minimum. A vertical double-headed arrow indicates the minimum immersion depth.</p>   |

Table 2: Thermometer calibration techniques.  
Pictures obtained from: <http://www.fsis.usda.gov>

## **STANDARD OPERATING PROCEDURES: SAFE FOOD TEMPERATURES**

- Insert food thermometers at end of cooking period to check internal temperatures of Time/Temperature Control for Safety foods or any food products containing meat, poultry, and eggs
- Every restaurant should have a working thermometer
- Wash, rinse, and sanitize food thermometers between each use
- Check and calibrate food thermometers for accuracy weekly
- Use refrigerator thermometers to ensure refrigerator temperature is  $\leq 40^{\circ}\text{F}$
- Use oven thermometers to ensure that oven temperatures are accurate

[View Video linked from Chapter 2 Module 3.](#)

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## Safe Food Temperatures

**Module Quiz:** Please make sure you have read Chapter 2 – Module 3 and watched the corresponding video before you take the quiz. If you have any questions about the information found in Module 3, please ask your manager before you begin.

1. At which of the following points in food flow should food temperatures be checked with a thermometer?
  - a. Receiving of refrigerated foods
  - b. End cooking temperature of hot foods
  - c. Cold holding of refrigerated foods
  - d. Hot holding of foods
  - e. All of the above
2. High risk foods should spend as little time as possible in the Temperature Danger Zone. What is the temperature range for this Temperature Danger Zone?
  - a. below 41°F
  - b. 0°F to 32°F
  - c. 41°F to 135°F
  - d. above 140°F
3. The best way to tell if a food such as meat or poultry has cooked long enough is:
  - a. When it has a brown color
  - b. When it has cooked the length of time stated in the recipe
  - c. Check tenderness with a fork
  - d. Check the internal food temperature with a thermometer
4. When checking temperatures of thin foods like hamburger patties, pork chops, or chicken breasts place the thermometer:
  - a. On the surface of the meat
  - b. Into the center of the meat from the side
  - c. Into the center of the meat from the top
  - d. A thermometer is not needed.
5. Air temperatures of refrigerators should be \_\_\_\_\_ or lower.
  - a. 0°F
  - b. 32°F
  - c. 40°F
  - d. 45°F
6. A cook is using pocket thermometer to test the internal temperature of a beef roast. How deep should the thermometer be inserted in the roast?
  - a. 1/4 inch
  - b. 1/2 inch
  - c. 1 inch
  - d. 2 to 3 inches



7. A food thermometer should be washed, rinsed, and sanitized between uses for each food.
  - a. True
  - b. False
  
8. How often should food thermometers be calibrated?
  - a. Daily
  - b. Weekly
  - c. Monthly
  - d. Yearly
  
9. When using the Ice-Point Method to calibrate a pocket thermometer, the temperature should be adjusted to read \_\_\_\_\_.
  - a. 32°F
  - b. 41°F
  - c. 135°F
  - d. 212°F