CHAPTER 5

CONTROLLING TIME AND TEMPERATURE OF FOOD

Learning safe methods to prepare, cook, store and serve food requires that employees take food safety seriously. Knowing, using, and closely monitoring proper time and temperature controls ensures safe thawing, cooking, cooling, holding and reheating of food.

USING FOOD THERMOMETERS

Because microorganisms can grow quickly in food that is exposed to the Temperature Danger Zone, between 41°F to 135°F, strict adherence to correct time and temperature control is essential to safe storing, thawing, cooking, cooling and holding food. The only sure way to know food temperatures are safe is to check food temperatures frequently. In commercial food service, this is done with a calibrated, food thermometer at least once every four hours.

There are a number of different types of food thermometers, such as a digital instant read thermistor, thermocouple and infrared laser thermometers. Users should rely on the manufacturer's instructions for proper use and maintenance. For this section, we'll refer to the least expensive and most common type of thermometer: a bimetallic stem or probe thermometer.

The proper use of a food thermometer includes knowing proper techniques to calibrate the thermometer, accurately measuring the internal temperatures of food items, correctly sanitizing the thermometer, and keeping accurate records of food temperatures in a log. Food service thermometers must read from 0°F to 220°F.

Calibrate

To ensure accurate temperature measurements, thermometers must be regularly calibrated. Calibrate thermometers using the following steps:

Fill a clean food-grade container with ice and add drinkable water to cover the ice. A drinking glass or small food storage container works well.

Allow the ice water mixture a minute or two to reach minimum temperature and then stir to ensure the temperature is even throughout.

Place the thermometer probe into ice water, fully submerging and covering the tip or sensing area of the stem. The sensing area is clearly marked with dimples. Leave the thermometer submerged in the ice water for 30 seconds, allowing the indicator needle to stop moving. The indicator needle should point directly at 32°F.

If the needle does not indicate 32°F, use pliers to securely grasp the adjusting nut located below the dial and gently rotate the adjusting nut until needle reads 32°F.

Measure

To take a food temperature reading, completely insert the thermometer stem or probe into the center or thickest part of the food item, and away from bones or gristle. Soups, sauces, and other liquids should first be thoroughly stirred to ensure the temperature is even throughout before checking temperatures. Allow the needle to reach the maximum or minimum food temperature then stop moving. Wait 15 seconds and then read and record the food temperature.

Sanitize

Ideally, the thermometer should be washed, rinsed and sanitized after each use. It is also acceptable to sanitize the thermometer between uses by swabbing with a disposable alcohol wipe.

Record Keeping

Correct temperatures are only half of the two main critical controls that keep food safe. The other main component is time. Therefore, check temperatures every two hours as a best practice to allow time for corrective action. To ensure both temperature and time control, keep a written record of food temperatures each time they are measured, and document that critical limits are met or corrective actions are taken.

SAFE METHODS FOR THAWING FOOD

Thawing is a critical step in food preparation and when done improperly, increases foodborne illness risk. Never thaw frozen food by placing it on the counter at room temperature. To prepare frozen food for service, or as an ingredient in other preparations, safely thaw the item using one of these four procedures:

Refrigeration: The safest method for thawing is to place frozen food in refrigerated storage, at 41°F or lower, until thawed. Place the food in a container sufficient to capture and hold any liquid that the food will release during thawing, and place below all other foods in storage, especially ready-to-eat items, to prevent cross-contamination.

Cold Water: Place frozen food into a container and place under running, potable (drinking) water at 70°F or lower so the item is covered and submerged with running water until thawed. Running water allows loose particles to run over the edge of the container and down the drain. Be certain to clean and sanitize the prep sink and surrounding splash area after thawing, and before placing any other food item in the prep sink.

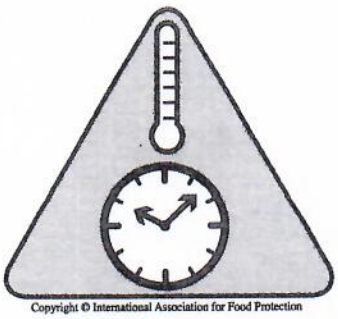
Microwave: Place frozen food in a microwave oven, and select power and time settings specifically for thawing. This method should be used only if the food will be immediately and completely cooked after thawing. Be certain to stir or turn food frequently during thawing to ensure even temperature distribution.

Cooking: Cook frozen food items and allow the item to thaw during the cooking process. Be sure to cook food completely before service.

Thawed food must be completely cooked to its correct temperature, or stored under refrigeration so that its internal temperature is 41°F or lower within four hours.

RECOMMENDED MINIMUM INTERNAL COOKING TEMPERATURES

Cooking foods to recommended internal cooking temperatures will destroy most harmful micro-organisms. Temperature requirements differ according to each type of food. Each food item must be cooked until reaching the recommended minimum internal temperature for 15 seconds, as measured at the thickest part of the item. Remember cooking will not destroy toxins.



Internal Cooking Temperatures Chart

Food is recommended to be cooked to the internal temperature indicated for at least 15 seconds in order to be considered safe for consumption.

Food Type

FOOD TYPE	MINIMUM INTERNAL TEMPERATURE
Fruits & vegetables (that will be hot-held for service)	135°F
Commercially prepared, ready-to-eat food (that will be hot-held for service)	135°F
Eggs (for immediate service)	145°F
Solid / whole fish	145°F
Solid / whole meat (pork, beef, lamb, commercial game)	145°F
Ground meat and fish	155°F
Injected or mechanically tenderized meat	155°F
Eggs (that will be held for service)	155°F
Solid / whole poultry	165°F
Stuffing and casseroles	165°F
Stuffed meats	165°F
Microwaved potentially hazardous / TCS foods	165°F
Previously cooked potentially hazardous / TCS foods	165°F

Internal Cooking Temperatures for Whole Meat Roasts

Including beef, corned beef, lamb, pork, and cured pork roasts such as ham. Use these requirements also for unused portions of whole meat roasts, cooked as noted above, then reheated.

TEMPERATURE	TIME IN MINUTES
130°F	112
131°F	89
133°F	56
135°F	36
136°F	28

TEMPERATURE	TIME IN MINUTES
138°F	18
140°F	12
142°F	8
144°F	5
145°F	4

It is important to cook foods to their recommended internal cooking temperature to destroy microorganisms.

Poultry
Cook to 165°F for 15 seconds

Ground Meats
Cook to 155°F for 15 seconds

Solid/Whole Meats
Cook to 145°F for 15 seconds

Fish/Eggs
Cook to 145°F for 15 seconds

Food Cooked in a Microwave

When cooking food in a microwave, all foods regardless of type, must be cooked to an internal temperature of 165°F for fifteen seconds. After cooking, allow mircorwave-cooked foods to stand for two minutes. Stir foods and take a temperature reading to ensure food is evenly heated throughout.

Food for Children

The US FDA Food Code 2009 recommends that all foods offered on a children's menu be served fully cooked. For example, a hamburger offered on a children's menu should be cooked well-done, or to 155°F for 15 seconds.

NON-CONTINUOUS COOKING

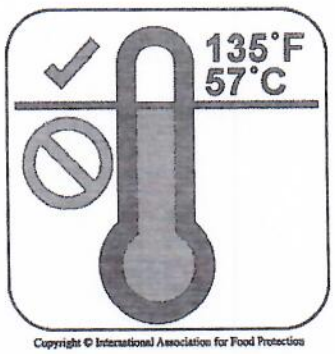
To improve speed of service, many food service operations partially cook food items prior to peak service times. Whether "par-cooked," "pre-cooked," the process is now covered in the 2009 US FDA Food Code. For raw meats cooked using a "non-continuous" cooking process, the process is:

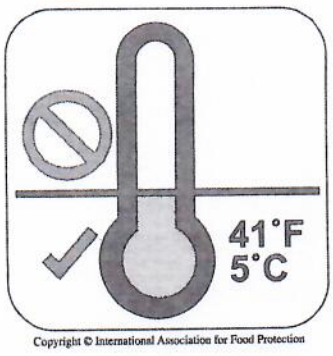
1. Cook initially for no longer than 60 minutes
2. Cool in accordance with potentially hazardous / TCS food requirements
3. Hold at 41°F for non-frozen food or 0°F for frozen food
4. Reheat all components of the final food product to 165°F for a minimum of 15 seconds
5. Any food not served immediately or hot-held for service must be properly cooled and stored

Note: The regulatory authority may require a written plan approved in advance, prior to allowing this process in the food service operation.

Cooking is a critical step in the flow of food. The safety of the cooked or ready-to-eat (RTE) food must be maintained until service. Once cooked correctly, food should be served, properly hot-held, or cooled immediately for cold storage

HOT & COLD HOLDING READY-TO-EAT FOOD

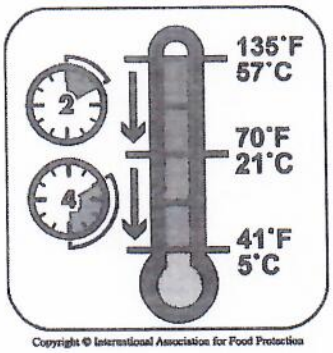




After TCS foods have been cooked correctly, be sure to hold foods at proper temperatures to minimize the growth of microorganisms. Foods allowed to fall into the Temperature Danger Zone, between 41°F and 135°F, can allow microorganisms to grow to a level that will cause illness or result in toxic by-products. Either case will result in food that may cause foodborne illness when consumed.

Foods being held for service must have temperatures checked at least every four hours to ensure compliance with temperature requirements. Cold foods must be held at 41°F or lower and hot foods must and 135°F or higher. A best practice for time and temperature control is to check temperatures of TCS foods being held for service at least every two hours. This allows time for corrective action should food temperatures fall into the Temperature Danger Zone.

COOLING FOOD PROPERLY



Cooling food is not as simple as placing the item in a refrigerator. Never place hot food directly into cold storage. Using correct cooling techniques will minimize the amount of time ready-to-eat food spends in the Temperature Danger Zone and help keep food safe.

The Two-Stage Cooling Method

Two-stage cooling refers to the process of cooling food to safe storage temperatures in two steps.

The first step, or Stage 1, requires the hot food item be cooled from 135°F to 70°F within two hours, and Stage 2 requires the food item be cooled from 70°F to 41°F or lower within an additional four hours. The total time for both stages combined may not exceed six hours.

If the food is not cooled to 70°F or lower within the first two hours, the food must be immediately reheated to 165°F for fifteen seconds in less than two hours, or thrown away.

The Temperature Danger Zone, between 41°F to 135°F, is the temperature range that allows harmful bacteria to rapidly multiply in food. The most dangerous part of the Temperature Danger Zone is the range between 125°F to 70°F. Therefore, using approved cooling techniques help to move food rapidly through these temperatures to keep food safe.

Cooling Techniques

The following are techniques that will result in quickly and safely cooling food for cold storage.

Refrigerator walk-ins or reach-ins are designed to keep cold food cold, not make hot food cold. Refrigerators cannot cool hot food to 41°F within the required cooling time requirements. Also, placing hot food into refrigeration can raise the temperature of other TCS foods in storage into the Temperature Danger Zone causing them to become unsafe. Therefore, use the following techniques to safely cool food for storage.

A blast chiller - place hot food into the chiller until cooled. Although a relatively expensive piece of equipment to acquire, high volume establishments may find the cost is offset by faster cooling times. This is one of the fastest and safest methods for cooling food. Monitor temperature and time to ensure cooling requirements are met.

Ice bath - place hot food into a container and submerge it into ice water. When appropriate, stir foods frequently to release heat and reduce the temperature evenly throughout.

Chill sticks or paddles - use these hollow containers, constructed of durable food-grade plastic, by filling with water and freezing or filling with ice. When ice paddles or sticks are inserted into bulk foods, such as soups and sauces, the food temperature is quickly lowered. Monitor temperature and time to ensure cooling requirements are met.

Small batch cooling - divide food into smaller portions and store in shallow metal pans. Use an ice bath to cool divided food down to 70°F within two hours, then place into refrigeration. Monitor food temperature to ensure the food reaches 41°F according to two-stage cooling method.

All ready-to-eat or TCS food prepared in-house must be date marked before storing and is good for up to seven days. Include the day it was made or prepared as Day One.

Blast chiller

REHEATING FOOD PROPERLY

Food that has been previously cooked and properly cooled and stored may be prepared again for service if properly reheated. When reheated food will be hot-held, the item must be heated to an internal temperature of 165°F for 15 seconds, in two hours or less. This time limit minimizes exposure to the Temperature Danger Zone.

Ice paddle

BEST EMPLOYEE PRACTICE

The Temperature Danger Zone

Employees must know the temperature ranges that make up the Temperature Danger Zone, between 41°F and 135°F. Employees must ensure that food spends as little time as possible in the Temperature Danger Zone. By following guidelines for proper thawing, cooking foods to their recommended minimum internal temperature for 15 seconds, cooling food according to the two-stage method, and always reheating food to no less than 165°F, employees are doing their part to ensure they are serving safe food.

CHAPTER FIVE REVIEW QUIZ

True or False

1. T_____ F_____ When cooling for storage, hot food must measure 70°F or lower within the first two hours.
2. T_____ F_____ Food on menus for children must be cooked well-done.
3. T_____ F_____ All microwave foods must be cooked to 165°F for 15 seconds and stirred to ensure that the heat is evenly distributed throughout.
4. T_____ F_____ To ensure accurate temperature measurements, thermometers must be regularly calibrated.

Complete the Sentence

1. To measure the temperature of a food, completely insert the stem of the _____ into the center of the thickest part of the food item.
2. Four safe methods of cooling foods are: ice bath, small batch cooling, chill sticks or paddles and a _____ chiller.
3. _____ thaw food at room temperature.
4. Cooking food to its recommended internal _____ will destroy most harmful microorganisms.

Multiple Choice

1. The Temperature Danger Zone is between:
   a. 39°F to 135°F.
   b. 40°F to 135°F.
   c. 35°F to 135°F.
   d. 41°F to 135°F.
2. All of the following are safe ways to thaw frozen food except:
   a. Placing the frozen food in a refrigerator at 41°F or lower.
   b. Placing the frozen food under drinkable running water at 70°F or lower.
   c. Carefully covering the frozen food then place in a sanitized container at room temperature.
   d. Cooking the frozen food as part of a regular cooking procedure.
3. Poultry must be cooked to a minimum internal cooking temperature of:
   a. 165°F for 15 seconds.
   b. 185°F for 15 seconds.
   c. 120°F for 30 seconds.
   d. 70°F for 15 seconds.
4. To correctly use a thermometer, it must be calibrated and _____
   a. chilled.
   b. reheated.
   c. sanitized.
   d. insulated.