Non-contact infrared temperature testing helps food service managers ensure food quality

FLUKE ®

Temperature control is one of the most critical factors in ensuring food quality and safety. Establishments that fail to meet standards may end up in the newspapers—and out of business.

But today new temperature solutions are helping chefs, managers and line workers monitor and control food temperatures and processes easier, faster and more accurately than ever while reducing overall risk.

Food service professionals can use these tools, such as the Fluke FoodPro infrared and FoodPro Plus infrared/contact thermometer, to apply the Hazard Analysis of Critical Control Point (HACCP) procedures recommended by the U.S. Food and Drug Administration (FDA). These temperature solutions help ensure that the foods you serve are both tasty and safe.

Understanding federal HACCP guidelines

The problem of food safety is serious. According to the FDA, "Ensuring safe food remains an important public health priority for our nation.† An estimated 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths are attributable to food borne illness in the United States each year."[1]

Health officials require the use of HACCP procedures for high-risk areas of food production, such as meat, poultry and seafood production and fruit and egg process plants. For most retail food service establishments and institutions, HACCP is recommended as a voluntary tool: a preventive approach that relies on a continuous system of monitoring and verification.

HACCP is a systematic seven-step approach to identifying, evaluating and controlling food safety threats:[2]

1. **Conduct a hazard analysis** to identify biological, chemical and physical hazards.
2. **Determine the critical control points.** A critical control point (CCP) is any point or procedure in the food production system where loss of control may result in an unacceptable health risk. Cooking, cooling, storage and serving are examples.
3. **Establish critical limits and preventive measures,** such as minimum cooking temperature and time, for each control point.
4. **Establish monitoring procedures.** Who will measure temperature, and how?
5. **Establish corrective actions.** What must happen if a critical limit is missed? For instance, will food be reprocessed or discarded?
6. **Establish verification procedures.** Don't forget to calibrate your test instruments to make sure they're working right.
7. **Establish record-keeping and documentation.** What measurements did you take when, and what were the results? What corrective steps were taken?

[1] Introduction to 2005 *Food Code*, developed by the FDA Center for Food Safety and Applied Nutrition.
[2] *Management of Food Safety Practices ñ Achieving Active Managerial Control of Foodborne Illness Risk Factors*, Annex 4, page 479, 2005 Food Code.

Warning: danger zone!

Food borne illnesses may be caused by physical or chemical contamination or by allergens contained in the foods naturally. In this paper we focus on the dangers that result from biological contamination by bacteria, parasites and viruses.

Control of temperature is an essential tool in reducing these hazards. The growth of micro-organisms slows or stops when food is refrigerated at temperatures below 40 °F (4 °C) or frozen (foods are stored frozen at 0 °F (–18 °C).

High temperatures kill micro-organisms, though temperature alone may not affect the toxins they create. Pasteurization begins at 140 °F (60 °C). Proper cooking requires holding the food hot enough long enough to kill the microorganisms likely to contaminate that food.
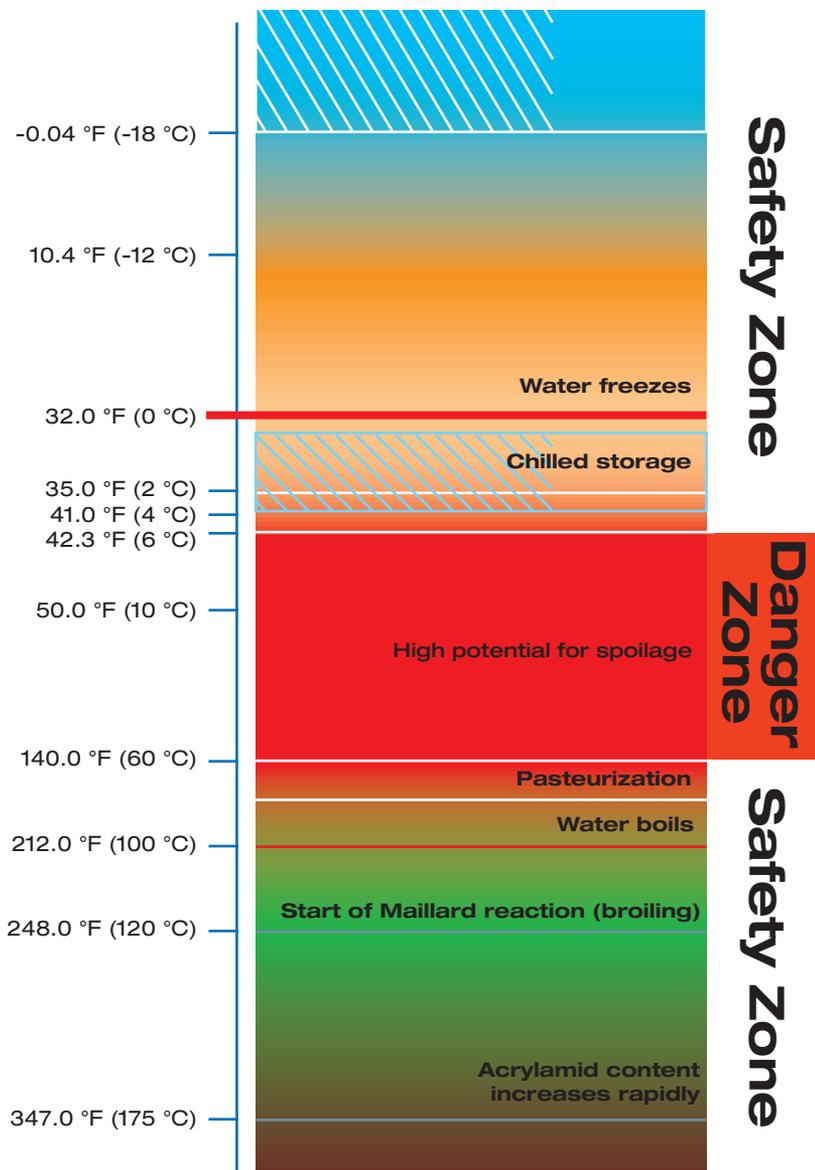
Between 40 °F (4 °C) and 140 °F (60 °C) is the danger zone where food borne bacteria and viruses can multiply and become hazardous. A key to food safety is to move foods rapidly through this danger zone into cold holding, cooking or serving.

In many some instances, foods can remain in the "danger zone" for a period of time. The key to safety is to minimize that time period and properly treat foods afterward by reheating. Even in the "danger zone," it takes some time for bacteria and viruses to multiply.
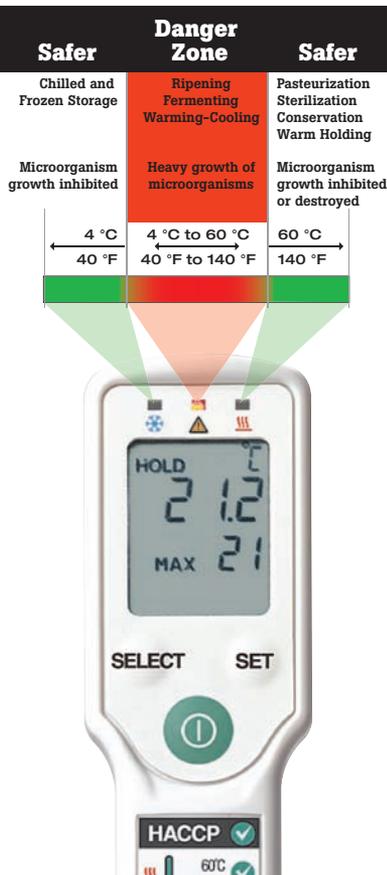
Benefits of non-contact temperature measurement

In the past, temperature testing typically meant you had to place a thermometer or probe into the food, record the temperature, then sanitize the probe (to prevent cross contamination) and move on to the next measurement.

Today food service workers use infrared non-contact thermometers (IRTs) like the Fluke FoodPro and FoodPro Plus to get accurate temperature readings in an instant, just by pushing food back an inch from the surface, pointing the FoodPro at the food, and pulling the trigger. A light-emitting diode illuminates the spot being tested. There's no danger of cross contamination and no need to sanitize the instrument, because it never touches the food, and it's far faster than contact temperature measurement.

Temperature	Zone	Label
-0.04 °F (-18 °C)	Safety Zone	
10.4 °F (-12 °C)		
32.0 °F (0 °C)		Water freezes
35.0 °F (2 °C)		Chilled storage
41.0 °F (4 °C)		
42.3 °F (6 °C)	Danger Zone	
50.0 °F (10 °C)		High potential for spoilage
140.0 °F (60 °C)	Safety Zone	Pasteurization
212.0 °F (100 °C)		Water boils
248.0 °F (120 °C)		Start of Maillard reaction (broiling)
347.0 °F (175 °C)		Acrylamid content increases rapidly

The FoodPro Plus includes a temperature probe for those instances when internal temperature readings are needed. And both tools include automatic HACCP green lights that indicate when foods are within the low- or high-temperature safe zones, and a red light to warn when temperatures are in the danger zone.

Safer	Danger Zone	Safer
Chilled and Frozen Storage	Ripening Fermenting Warming-Cooling	Pasteurization Sterilization Conservation Warm Holding
Microorganism growth inhibited	Heavy growth of microorganisms	Microorganism growth inhibited or destroyed
4 °C	4 °C to 60 °C	60 °C
40 °F	40 °F to 140 °F	140 °F

Monitoring temperature at critical control points

As a food service manager, you need to focus on temperature readings at six critical control points. If your readings meet standards at these check points, you can be confident that you are managing food temperature correctly.

Critical control point: Receiving

Your first safeguard for incoming product is your supplier. Reputable manufacturers and vendors will have established their own HACCP procedures and should be happy to discuss their program with you.

Still, the quality of food you serve is your responsibility—not your supplier's. So you should conduct a visual inspection for appearance and condition, and use your infrared thermometer to verify that fresh foods are below 40 °F (4 °C), and frozen foods below 0 °F (–18 °C). Move topmost cartons aside to verify that the entire shipment meets cold holding or frozen food standards.

Critical control point: Storage

Once the food products are in your refrigerator, freezer or display case, it's all up to you. Use your infrared thermometer to check the accuracy of the thermometers and temperature controls on your cold storage facilities.

Critical control point: Cooking

Cooking is a critical step that determines both the quality and the safety of your product. To avoid bacterial growth and destroy existing organisms, many foods must be cooked to a specific temperature or held at temperature for a period of time.

Your infrared thermometer provides a quick check of food surface temperatures. For internal temperature checks, use a temperature probe. The Fluke FoodPro Plus has a probe built right into the unit.

In addition to safety, correct cooking temperature is a key factor in determining food taste and appearance. Your infrared thermometer can tell you with precision whether your well-oiled griddle is at the right temperature to produce perfect grilled foods. You can also use the IR thermometer to safely check the temperature of oil in deep fryers.

Critical control point: Holding and serving

Remember that danger zone: between 40 °F (4 °C) and 140 °F (60 °C) bacteria can reproduce. You want to keep cold foods cold and hot foods hot, outside the danger zone, while they're being held for consumers.

Your IRT can verify that the temperature of products held in open-top refrigeration units is below the 40 °F (4 °C) limit. To check the internal temperature of a product like chicken salad, use a spoon to move the food aside and shoot the IRT down into the gap.

For soups, stir the material, then lift a ladle above the container and shoot the product in the ladle. Why stir first? Surfaces cool quickly when exposed to the air, so without stirring, the surface would probably read much cooler than the soup underneath.

The IRT will not accurately measure a glossy surface like metal or glass, but you can shoot the label to determine the temperature of a wine bottle.

To help track test intervals and exposure times, the Fluke FoodPro Plus has a built-in timer useful for tracking monitoring cycles and exposure times.

Critical control point: Cooling

Food cooling is a key step in controlling food-borne illness. Preparing a large pot of chili might seem like a straightforward job, but the FDA categorizes such food preparation as "complex" because the food must pass through the temperature danger zone three times: during cooking, when it is cooled for storage, and when it is reheated for serving. Other types of complex preparation are soups and gravies, large roasts, taco filling and egg rolls.

Your IRT makes it easy to verify that your food cooling process takes place on time: Cooled from above 140 °F to below 70 °F (60 °C to below 21.1 °C) within two hours, and further chilled to below 40 °F (4 °C) within four more hours.

Critical control point: Reheating

The final checkpoint where temperature plays a role is reheating. Use your IRT to confirm that foods are reheated to at least 165 °F (73.9 °C) to destroy any bacteria that may have developed due to improper cooling or storage.

Control time and temperature to keep customers safe

Your HACCP program will include many elements: employee hygiene, policies regarding employee illness, equipment maintenance, assessment of food types and preparation practices, evaluation of suppliers and more. The FDA provides a handy guide.[3]

None of these measures will be more important than your systematic program to monitor and control temperatures throughout the food preparation cycle. And no tool will be more useful than your FoodPro series infrared thermometer.

[3] *Managing Food Safety: A Manual for the Voluntary Use of HACCP Principles for Operators of Food Service and Retail Establishments*, FDA Center for Food Safety and Applied Nutrition, July 2005.

Tracking temperature and taste at Lou's Place

As much as great ingredients and prized recipes, careful tracking of food temperatures is vital to food quality, says Lou Bair, a food service director for industry leader ARAMARK.

A veteran of almost 35 years in the food service industry, Baird manages the company cafeteria at Fluke Corp., where his staff of eight serves some 2,900 meals each week.

Why focus on temperature?

"So we don't make people sick," Baird smiles, "and to maintain the highest quality and best flavor possible."

Baird makes sure his team is well trained on monitoring food temperatures using the Fluke FoodPro and FoodPro Plus thermometers. New employees spend a week in a 'buddy system' with an experienced person. And everyone takes part in a daily "huddle up for safety." At least twice each month, the team reviews the critical importance of controlling time and temperature for safety.

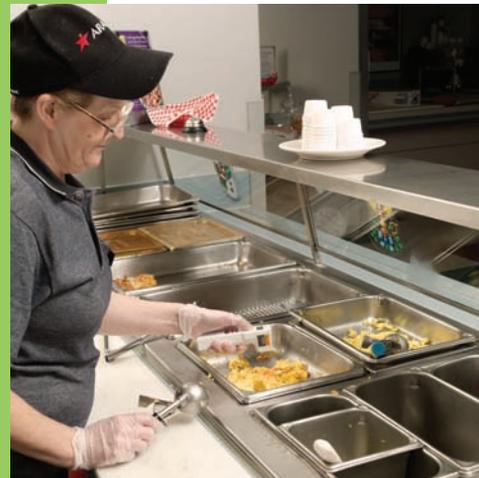Temperature requirements for food products on the service line are posted prominently, and employees take and record temperatures when the cafeteria opens, at lunch and in spot checks during the day. They double-check refrigerator temperatures twice daily. Logs of the readings over a two-month period are posted prominently.

"The infrared is really nice for testing most of the products," Baird says. "Once in a while we need the probe. I really like having both the infrared and the probe on one tool."

In addition to safety, the Fluke FoodPro helps deliver quality. Baird says hash browns, for instance, require just the right griddle temperature: too cool and they absorb too much oil; too hot and they burn. The infrared gives the chef a quick double check.

Thanks to the fast response and non-contact operation of the infrared instrument (no need to sanitize between measurements), Baird figures the testing process takes at least a third less time than with older thermometers.

Hanker for some great hash browns? You'll find them at Lou's place.