

FSHN05-09

Guidance for Processing  
**SUSHI** *in Retail Operations*

AFDO, January 22, 2004

## Credits

The guidance for processing in retail operations has been prepared through support from the USDA Cooperative State Research, Education and Extension Service project no. 2001-11420 funded through the University of Florida in cooperation with Florida A&M University and the Association of Food and Drug Officials (AFDO) during October 2001 through January 2004. Development of these respective guides was conducted by assigned voluntary Subcommittees combining academic, regulatory and industry expertise and a formal Steering Committee. The committee participants can be viewed in the Listing of Committee Members. The same information can be viewed at [www.AFDO.org](http://www.AFDO.org) with additional visual aids and links to other website support and references. Design by Julissa Hernandez. Printed by IFAS Communication Services.

## Project Investigators

Victor Garrido, University of Florida  
Ray Mobley, Florida A&M University  
Steve Otwell, University of Florida  
Keith Schneider, University of Florida

## Sushi Subcommittee

Faye Feldstein, Food & Drug Administration  
Victor Garrido, University of Florida  
Steven Grover, National Restaurant Association  
John Lattimore, TX Department of Agriculture  
Jeanette Lyon, Food & Drug Administration  
Janis McCabe, Publix Supermarkets  
Steve Otwell, University of Florida \*  
Keith Schneider, University of Florida  
Jim Waddell, CA Department of Health  
\*Lead coordinator

## Project Steering Committee

Jim Austin, AFDO  
Shirley Bohm, FDA  
Alfred Bugenhagen, NY Dept. Agric. & Markets  
Joe Corby, NY Dept. Agric. & Markets  
Carl Custer, USDA FSIS OPH B  
Faye Felstein, FDA  
Dan Sowards, TX Dept. of Health  
Victor Garrido, University of Florida  
Steven Grover, National Restaurant Assoc.  
Janis McCabe, Publix Supermarkets, Inc.  
Ray Mobley, Florida A&M University

Steve Otwell, University of Florida  
Paul Panico, OH Dept. of Agriculture  
Gale Prince, The Kroger Co.  
Fred Reimers, HEB Grocery Co.  
Denise Rooney, AFDO  
Doug Saunders, VA Dept. of Agriculture  
Keith Schneider, University of Florida  
Jenny Scott, Natl. Food Processors Assn.  
Timothy Weigner, Food Marketing Institute  
Gerald Wojtala, MI Dept. of Agriculture  
Betsy Woodward, AFDO

## Background

This guidance has been prepared in response to a notable increase in on-site retail processing (manufacturing) of foods traditionally processed in controlled plant environments. Such retail processing can involve, but is not limited to acidifying, smoking, drying, fermenting, curing, reduced oxygen packaging, and other operations that are traditionally done at a food manufacturing plant level. The key distinction for processing as related to this guidance is that the processing occurs on-site in the retail setting.

This guidance is intended for retailers and regulatory personnel to help understand the controls to implement in a retail operation in order to process and sell safe food products. It can be referenced in developing considerations for **variances** for any exception or special provision to state or local food safety or sanitary codes. It addresses those special variances required by the FDA Food Code which may require HACCP plans for those jurisdictions that have adopted those portions of the FDA Food Code. In addition, it also applies to regulatory oversight and/or approval for regulatory overlap that may occur between the states' processing requirements and the state or local retail food safety and sanitary codes. This guidance assumes retail compliance with applicable retail food codes, prerequisite standard sanitary operations procedures, and labeling requirements specified in 21 CFR 101. This guidance is not intended to replace or duplicate existing regulations, but it does offer a reference for more uniform practices.

## Disclaimer

This guidance is not a binding set of requirements. The information provided in the guidance are recommendations based on current science, commercial experience and practical considerations as assembled by the assigned committees and reviewed by a variety of selected experts and the Project Steering Committee. Use of these recommendations would likely result in retail processing practices that are acceptable to the pertinent authorities for food safety. Retail compliance and enforcement will remain within the interpretations and decisions of the pertinent state and local regulatory authorities.

## Product Description

This recommended guidance is for sushi and related products (raw or cooked) either in the form of individual slices or combined in rolls made with acidified rice, seafood and vegetables, or similar rolls with vegetables alone, prepared in the retail establishment by combining the necessary ingredients, and packaged for display in refrigerated cases for public sale.

### Related terminology:

**Approved source** - a source that has been determined to conform to principles, practices, and standards that protect public health.

**Identifiable source** - can include the name and address of the immediate supplier and the actual source or location of the supplies.

**Potentially hazardous food** - means a food that is natural or synthetic and that requires temperature control because it is in a form capable of supporting the rapid and progressive growth of infectious or toxigenic microorganisms or the growth and toxin production of *Clostridium botulinum*. Potentially hazardous food includes an animal food that is raw or heat-treated, shell eggs, or a food of plant origin that is heat-treated or consists of raw seed sprouts, cut melons, and garlic-in-oil mixtures that are not modified in a way that results in mixtures that do not support growth as specified in this definition.

**Sushi** - ready-to-eat cooked rice that has been acidified with vinegar solutions formed with raw or cooked fish and other seafood such as imitation crabmeat made from surimi, fresh chopped vegetables, pickles, tofu, etc. Product forms can include; *Nigiri*, small balls of rice with raw fish held in place with strips of dried seaweed (nori); *Maki Rolls*, layers of rice and nori sheets rolled with a bamboo mat to form cylinders that contain various seafood, vegetables and other ingredients, i.e., California roll (cucumber, avocado and surimi crab), Philly roll (with cream cheese), Tekka maki (raw tuna); and *Hand rolls*, cone shaped rolls formed by a sheet of nori filled with various ingredients.

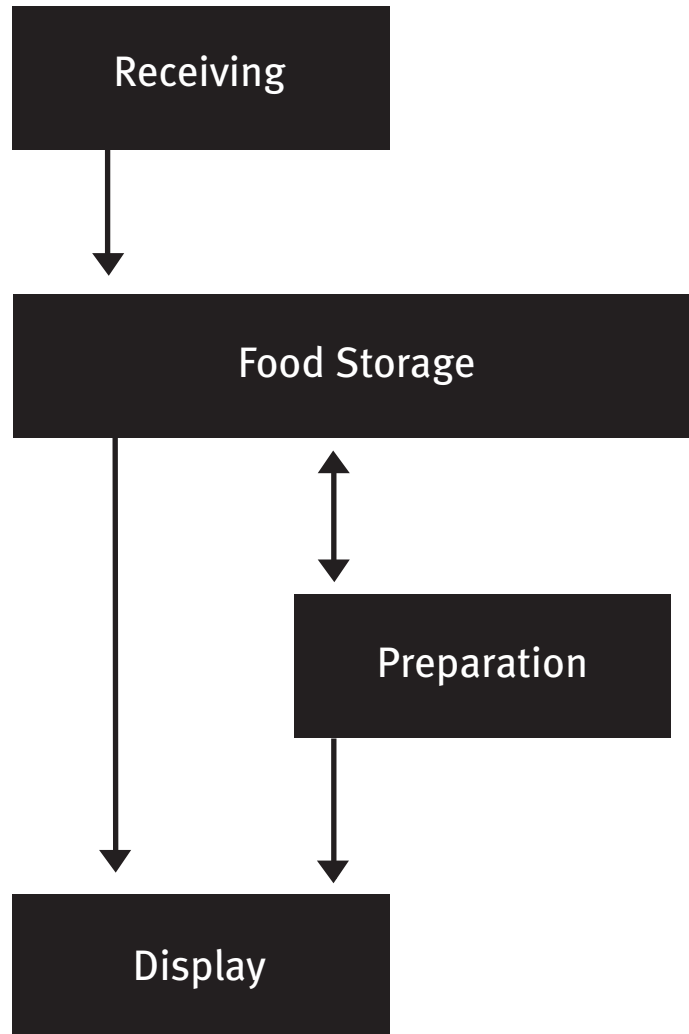
**Sashimi** - thin slices or slabs of raw fish that are presented ready-to-eat.

**Surimi** - a type of gelled fish paste that can be used to make simulated seafood products such as fabricated crab meat that can be used in sushi.

**Shamoji** - Japanese term for the spatula or spoon used to turn and spread the sushi rice.

**Wasabi** - Japanese hot mustard-type paste used to accompany sushi and sashimi.

# Flow Diagram of Operations



# Check List for Operations

## Receiving

---

**All food is obtained from an identifiable, approved source.** The source or supplier should be operating in accordance with applicable food safety requirements. Source identity can include the name and address of the immediate supplier that will be the first link to the actual source or location of the supplies. Identity of the supplier provides traceability of the food sources which can be important in food safety decisions. For seafood, this can include identity for approved harvest waters, prior handling conditions, and duration and methods of transport. **No seafood from a recreational fisherman or other non-approved sources is used in the sushi operations.**

**All seafood, including fish, shellfish, crustaceans, eggs (roe) and surimi comes from a source that operates under a HACCP plan.** Evidence for such a source can include a letter from the supplier that indicates compliance with any pertinent HACCP requirements. In some instances, this HACCP information can be obtained upon request. The HACCP information and prior supplier agreements with the sushi operation should provide controls to prevent potential food safety hazards due to parasites in certain raw fish, elevated histamine levels in certain fish, and other seafood safety concerns (Appendix 1 - Food Safety Hazards).

**Certain fish will require freezing either by the suppliers or retail operations prior to serving as a raw ready-to-eat item due to potential parasite problems (see controls for parasites in Appendix 1 - Food Safety Hazards).**

**Vegetables, both whole and pre-cuts, and other edible products, i.e., seaweed (nori), vinegar, and spices, are obtained from approved and identifiable sources.**

**If commercially prepared, pre-acidified sushi rice is used, it should be obtained from an approved and identifiable source operating under a HACCP plan which includes records for the rice production within limits outlined in this guide.** If pre-acidified rice or flavored vinegar is provided from a source outside the sushi operations, this source should be approved, identifiable and able to provide processing records that document proper acidification, and the duration and temperature for storage similar to the recommended guidelines for sushi operations (Appendix 2 - Sushi Rice).

**All potentially hazardous foods are delivered at or below 41°F (5°C) or solidly frozen.** A calibrated thermometer is used to monitor the internal and/or surface temperature of the incoming foods before acceptance (Appendix 3 - Calibrations).

**Retail establishment actively manages a program for routine inspection of incoming products for approved sources, product condition and temperature as necessary, integrity of packaging and proper label information, and documents product acceptance or rejection with dates, times and the person making the decision, plus any necessary comments.**

## Food Storage

---

All foods should be protected from contamination and stored in a manner to reduce or prevent bacterial growth that could promote spoilage or potential food safety problems. Food storage can involve items held at room temperature or in refrigeration or freezers. These items may require further preparation or packaging, or they could be ready-to-eat as raw or previously cooked foods. Raw ingredients and raw, unprepared foods should be stored segregated from finished products or ready-to-eat foods. It is best to segregate these items in separate storage units. Proper packaging and placement is necessary when these items have to be stored in the same unit. Storage can include temperature control units used to hold perishable foods.

**The storage unit(s) are clean and orderly.**

Products are contained and/or covered for protection.

Containers of sushi products or ingredients that are removed from the original (identified) packages are relabeled, marked for identification and dated.

Ready-to-eat items and items ready-for-display are segregated from products that require further handling or processing.

Products are not stacked without adequate support and means to prevent any leakage between products.

Dripping is prevented in or on packaged products due to condensation, cooler pan leaks or other wet sources.

Products are stored above the floor (approx. 6 inches) and away from walls and the ceiling. Storage includes containers, shelves, supports, pallets or other materials that do not absorb water and can be easily cleaned.

The schedule for product rotation should use a 'First-in First-out' rule (FIFO).

**Display counters are not considered storage units and should not be used to store raw ingredients. Display counters for sushi should be maintained at or below 41°F (5°C).**

**Refrigeration unit(s) are operating to assure the food can be maintained at or below 41°F (5°C).**

**Frozen storage unit(s) are operating to assure the frozen foods are solidly frozen and maintained preferably at or below 0°F (-18°C).** Freezing to kill potential parasites requires frozen storage at -4°F (-20°C) or below for 7 days (total time), or freezing at -31°F (-35°C) or below until solid and stored at -31°F or below for 15 hours, or freezing at -31°F or below until solid and stored at -4°F or below for 24 hours.

**Routine monitoring for proper refrigerated storage unit temperatures involves use of a continuous time-temperature recording device or by periodic checks with a calibrated thermometer.** All recorders and thermometers are calibrated periodically or as needed (Appendix 3 - Calibrations). When storage conditions above 41°F (5°C) are detected, an evaluation is conducted of all products stored in the unit. The evaluations will record considerations for the actual temperature of the products and duration of exposure. All unacceptable temperature abused, off-color, off-odor, off-condition, out-of-date or otherwise suspect product is discarded.

**Frozen products are thawed under refrigeration at or below 41°F (5°C).** Thaw in a manner that prevents cross-contamination with other refrigerated foods. If more rapid thawing is necessary, the products are placed in clean flowing water no warmer than 70°F (21°C) **only until thawing is complete.** Once product is thawed and before exceeding 41°F (5°C), it should be processed or returned to proper refrigerated storage. Packaging is recommended to protect the product from direct contact with the thaw water. If thawing requires direct contact of water with the food, the procedure should be conducted in a clean and sanitized sink or container that is designated and dedicated to this operation. Thawing is not conducted in standing water, at room temperature or in running water warmer than 70°F (21°C) or at room temperature.

## Preparation – Sushi

---

**The work area, facilities and utensils should be designated or dedicated to the sushi operations.** If it is necessary to share work space and facilities, a schedule of operations, personnel traffic, product traffic and cleaning should be planned to prevent potential cross-contamination of the ready-to-eat sushi products.

**Standard Operating Procedures for basic sanitation and food safety are used and documented daily (Appendix 5 - Daily SOP's Check List).**

**Bamboo and plastic mats are lined with plastic film and rewrapped within 4 hours of continuous use and between contact with different sushi products.** All mats are cleaned and sanitized daily.

**The preparation schedule should be arranged to prevent the exposure of potentially hazardous foods for more than 4 hours outside of refrigeration.**

**Fruits and vegetables should be washed before cutting for use in sushi. Any cutting surface should be cleaned to avoid cross-contamination before proceeding with further processing for the sushi.**

## On-Site Preparation of Sushi Rice

---

Special care is taken in preparation of the rice used with sushi to prevent potential bacterial growth while assuring the rice can still be formed into balls and rolls. Bare hand contact should be minimized to prevent cross-contamination of the ready-to-eat product. Heat during the cooking of rice can activate certain bacterial spores that can grow and release toxins unless the rice is preserved or refrigerated. Refrigerated rice is more difficult to form for sushi. For this reason, sushi rice should be carefully protected during handling without refrigeration. Proper acidification of cooked rice with vinegar recipes helps preserve the rice for temporary handling at temperatures above 41°F (5°C), but the acid level, measured by pH, should be carefully monitored for each batch. It is best to acidify the rice when it is warm to assure better mixing and penetration of the acid solution.

**The production time and final acid level (pH) is recorded for each batch of sushi rice.** Acidified rice has an initial measurable, targeted pH of 4.1 and should be thoroughly mixed to assure the rice does not exceed an equilibrium pH of 4.6 (Appendix 2 - Sushi Rice). Properly acidified rice is not considered a potentially hazardous food.

## Display

---

Display involves holding the finished products in temperature control units for a specified duration and condition for public sale. Originally, preparation of sushi was for immediate consumption. Retail preparation and display introduces more prolonged holding that should be controlled and monitored to assure product safety before consumption.

**The display unit maintains the sushi products at or below 41°F (5°C).**

**Packaged product should be properly labeled and include instructions for proper storage and shelf-life (Appendix 4 - Product Labels).** Typically the product is displayed for less than 24 hours in the retail establishment before discarding. Displayed product is not placed in storage for later display. Lot and/or date coding is recommended.



# Appendices

**1. Food Safety Hazards**

2. Sushi Rice

**3. Calibrations**

4. Product Labels

**5. Daily SOP Check List**

## Appendix 1

## Food Safety Hazards – Sushi

The following information and list of fish species with potential seafood safety hazards is based on FDA's "Fish & Fisheries Products Hazards & Controls Guidance" available in third edition (June 2001) from <[www.ifasbooks.ufl.edu](http://www.ifasbooks.ufl.edu)> or by phone 800-226-1764 as publication no. SGR-121 (\$20) or it can be viewed at [www.cfsan.fda.gov/~comm/haccp4.html](http://www.cfsan.fda.gov/~comm/haccp4.html). The retail processing of sushi must assure the use of proper controls to prevent, eliminate or reduce these potential hazards. The controls are often a shared responsibility between the supplier and retailer.

## Fish:

The list of potential fish hazards includes live parasites, elevated histamine, the natural toxin, ciguatera, and no hazard listed. The listing is by common names of certain related fish species. Retailers should consult the FDA Hazards Guide for the specific fish species in question. Species listed with concerns for live parasites would require freezing either by the supplier or retailer prior to serving a raw ready-to-eat food.\* For tuna, the concern for parasites is distinguished by species. The larger tuna (yellowfin, bluefin, blackfin, bigeye, and albacore) do not present a significant parasite problem that would require freezing prior to use in sushi.

	parasites	histamine	ciguatera	no hazard
Bass, Sea	√			
Bluefish		√		
Cod	√			
Corvina	√			
Eel				√
Flounders	√			
Grouper	√		√	
Halibut	√			
Jacks	√	√	√	
Mackerels	√	√		
Mahi-Mahi		√		
Marlin		√		
Perch, Ocean	√			
Pollock	√			
Pompano			√	
Salmon	√			
Sea Trout	√			
Snappers	√		√	
Sole	√			
Rainb. Trout	√			
Tuna - small*	√	√		
Tuna - large*		√		
Turbot	√			
Wahoo		√		
Yellowtail				√

## Crustaceans (Shellfish):

**Crab, Lobster and Shrimp** - typically supplied as previously cooked items that are subject to bacterial cross-contamination after cooking. These items can include surimi based products such as imitation crab meat made from fish. Retailers should question the processing procedures, post-processing conditions, and sanitation records prior to selecting a supplier.

## Mollusk (Shellfish):

**Clams, Oyster and Mussels** - must be harvested from approved waters and handled by certified dealers that maintain harvest tags on shellstock or labels on the shucked products to identify the product harvest locations and dates. Retailers must check for the tags or label information on all deliveries of shellstock or shucked meats (meat removed from the shell). The shellstock tags must be stored in their retail establishment for 90 days. Abalone is included in this group but does not require tags.

**Conch, Whelks, Octopus, Squid and Urchin** - typically supplied as raw shucked meat (meat removed from the shell) that is subject to bacterial contamination during processing. Harvest tags are not required but suppliers should assure harvest from safe sites. Retailers should determine the processing and sanitation conditions.

## Biological

---

### Hazard: Parasites

**Problem:** Consumption of certain raw seafood that may contain 'live' parasites that are naturally found in certain fish and could infect consumers.

**Controls:** Freezing or cooking of the fish or seafood product before consumption. According to the FDA's Food Code, seafood is properly cooked when it reaches an internal temperature of 145°F (63°C) for 15 seconds. Freezing to kill potential parasites requires frozen storage at -4°F (-20°C) or below for 7 days (total time), or freezing at -31°F (-35°C) or below until solid and stored at -31°F or below for 15 hours, or freezing at -31°F or below until solid and stored at -4°F (-20°C) or below for 24 hours.

### Hazards: Bacterial and Viral Pathogens

**Problem:** Certain bacteria, i.e., *Salmonella*, *Listeria* and *Vibrio* spp. and certain viruses, i.e., Hepatitis A, noroviruses and others, can contaminate and, in the case of bacteria, grow on ready-to-eat sushi products due to previous handling of the ingredients.

**Controls:** Ensure that ingredients come from approved sources, monitor condition of incoming products, maintain and monitor proper temperatures and time in storage and preparation; properly acidify the sushi rice, practice proper hygiene, and monitor SOP's for sanitation.

## Chemical

---

### **Hazard: Histamines**

**Problem:** Certain fish are prone to develop an elevated histamine content, the result of bacterial degradation of histidine, if they are thermally abused after harvest and during further handling. They can cause temporary illnesses in some people following consumption of the raw or cooked fish.

**Controls:** Proper handling time and temperatures that provide immediate and proper refrigeration or freezing of the fish as evident in a suppliers HACCP program, and continuing refrigeration or frozen storage until consumed. Retailers should examine each fish or fish portions carefully for signs of thermal abuse or initial decomposition. Questionable fish and fish with a temperature in excess of 41oF should be rejected.

### **Hazard: Ciguatera**

**Problem:** A natural toxin that can accumulate through the normal food chain of certain fish that can cause illness in some consumers when the fish is eaten raw or cooked.

**Controls:** Do not use certain fish species when harvested from known or designated areas that are problematic for ciguatera. The original producer or supplier's HACCP program should monitor to prevent harvest and use of such fish. Potential problems can not be detected by sensory judgments of the raw or cooked fish.

## Appendix 2

# Sushi Rice

Special care is taken in preparation of the rice used in sushi to prevent potential bacterial growth while assuring the rice can still be formed into balls and rolls. Heat during the cooking of rice can activate certain bacterial spores that can grow to be toxic unless the rice is preserved or refrigerated. Refrigerated rice is more difficult to form for sushi. Acidification of cooked rice with vinegar recipes helps preserve the rice for temporary handling at temperatures above 41°F (5°C), but the acid level, measured by pH, must be carefully monitored for each batch.

### Preparation of the Sushi Rice (white)

#### The work area should include:

A dedicated or designated sink and table for preparation of the rice and sushi should be cleaned and sanitized before handling the food. A designated sink should be segregated from other concurrent food handling activities.

Use of single-use gloves to prevent bare hand contact with ready-to-eat food.

Clean and properly supplied hand washing facilities.

Orderly storage of clean, sanitized containers and utensils, i.e., rice bowls and shamoji for handling the rice.

A written recipe that specifies:

the amount of rice and water prior to cooking, and the cook schedule. The cooked rice and vinegar solution is to be thoroughly mixed to acidify the rice to an initial target pH of 4.1. It is best to acidify the rice when it is warm to assure better mixing and penetration of the acid solution.

the vinegar solution, with salts and sugar. It should be made fresh for use or from a designated container labeled to identify the contents, concentration and age of the vinegar solution to assure a proper acidifying formulation.

a clean mixing bowl deep enough to allow adequate mixing without clumping, yet shallow enough to allow proper cooling. It is best to have less than 4 inches depth in the rice for proper cooling.



**Special Note:** The initial pH of the sushi rice should be measured within 30 minutes after addition of the vinegar solution. The sushi rice with an initial pH greater than 4.6 should be re-acidified with more vinegar solution and rechecked to assure a targeted pH of 4.1 and an equilibrium pH that does not exceed 4.6. Sushi rice must be mixed, measured for pH, and comply with the limits prior to being used in a sushi robot device.

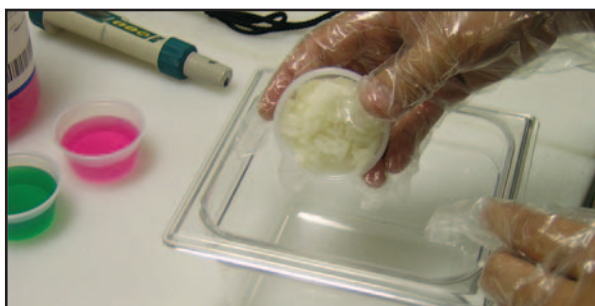
## Measuring & Recording pH of the Sushi Rice

Conduct the pH test within 30 minutes after acidification of the cooked rice and as often as necessary to assure a targeted pH of 4.1 and an equilibrium pH of 4.6.

Make a rice slurry by gathering a 1/4 cup sample of the cooked, acidified rice taken from various locations in the batch and add 3/4 cup of distilled water in a clear plastic or metal blend cup (Do not use glass containers in the food preparation area). Blend the slurry for approximately 20 seconds to create a thorough mix.

Insert a pH probe or paper into the liquid portion of the slurry. Repeated measurements with a new slurry from the same batch of rice are recommended to assure a proper reading (Appendix 3 - Calibrations)

Record the measurement(s).



1/4 cup of acidified rice



1/2 cup of distilled water



mix into a slurry

### Brown Rice

Typically this rice is not acidified since the harder surface coating on the brown rice is difficult to penetrate with typical acid solutions. In the non-acidified condition, cooked rice is considered a potentially hazardous food that must be maintained at a temperature greater than 135°F (57.2°C) or at or below 41°F (5°C). For cooling, this potentially hazardous food should be cooled within 2 hours from 135°F (57.2°C) to 70°F (21°C); and within 4 hours from 70°F (21°C) to 41°F (5°C) or below. The cooked brown rice should be chilled immediately after preparation to reduce the chance of foodborne illness.

## Temperature Monitoring Devices-Thermometers

Many types of thermometers and temperature recording devices are readily available for use in food handling operations. We recommend thermistors, thermocouples and infrared thermometers with either a digital or analog readout. All of these instruments are acceptable for use in the food processing operations as long as the operator understands how they are used and if they are calibrated for proper readings.



The method and frequency of calibration for thermometers will depend on the use and temperature range where the equipment is used. In the absence of manufacture's recommendations, thermometers should be calibrated at least once a month with more frequent calibrations when the instrument is physically abused or if the readings are questionable.

### Temperature Monitoring Devices (TMD) - Calibration Procedures (options):

- a. TMD's can be calibrated against a thermometer certified by the National Institute of Standards and Technology (NIST) by simply comparing both units at two preset temperatures (hot and cold).
- b. TMD's can be calibrated using an ice-water slush. Insert the temperature probe into a mixture of ice and water slush and stir (2-3 min) until the thermometer stabilizes. The probe should be at the center of the container. The thermometer should read  $32\pm 1^{\circ}\text{F}$  ( $0\pm 1^{\circ}\text{C}$ ). Adjust accordingly or discard and replace the faulty thermometer.
- c. Hot point calibration is used when monitoring temperatures higher than room temperature (e.g., cooking temperatures). Heating blocks or boiling water can be used for this calibration. When using the boiling water procedure, the probe is placed inside a container with boiling water until the thermometer stabilizes (2-3 min). The probe should be at the center of the container. The thermometer should read  $212\pm 1^{\circ}\text{F}$  ( $100\pm 1^{\circ}\text{C}$ ) or appropriate temperature according to elevation (Table 1 - Altitude to Boiling Point of Pure Water Relationship). Adjust accordingly or discard and replace the faulty thermometer.
- d. A combination of the procedures b and c is recommended for a more accurate calibration of thermometers used to monitor a wide range of temperatures.



## Altitude to Boiling Point of Pure Water Relationship

Feet Above Sea Level	Boiling Point (°F)
0	212
500	211
1,000	210
1,500	209
2,000	208
2,500	207
3,000	206
3,500	205
4,000	204
4,500	203
5,000	203
6,000	201
7,000	199
8,000	197
10,000	194
12,000	190
14,000	187

Source: Thermometer Calibration, food safety webpage, University of Nebraska Cooperative Extension (<http://foodsafety.unl.edu/html/thermometer.html>)



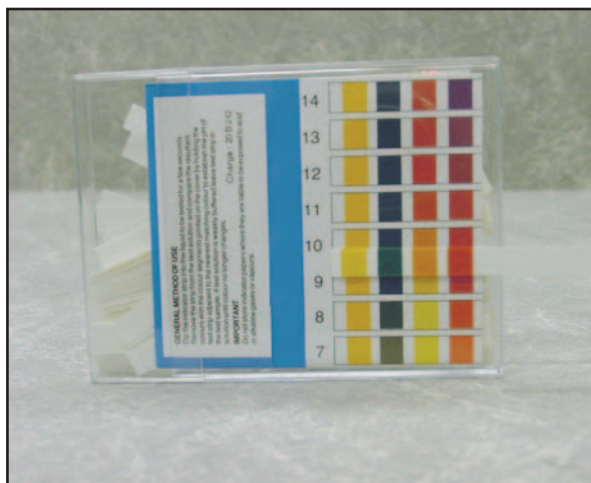
## Acidity Monitoring Devices - pH Meters & pH Papers

Devices for monitoring acidity or pH can range from complex laboratory size units to convenient hand-held battery operated units. Also, in certain situations firms can use simple pH test strips or papers. It is essential to understand the limitations and operation of these devices to assure accurate readings in food operations. The meters are preferred for their more precise readings, but the probes used with the meters should be made of unbreakable substances such as epoxys, plastics or ceramics. The pH papers are less precise and subject to interference with other substances. Selection of papers should consider reading increments of 0.2 within a pH range about the target levels to be monitored in the food operation (i.e., If the target level is 4.1, the paper should be selected for a range of 3.0 to 5.0).

### Calibration of pH Monitoring Devices

The **pH meters** need to be calibrated immediately before use and when readings are suspect. The calibration is based on the readings from standard buffer solutions selected to provide specific pH readings. Only use buffers that have not exceeded the labeled expiration dates. Use buffers that provide readings that range about the targeted level of pH to be monitored in the food operations. For example, if the target pH is 4.1, two buffers for calibration should provide readings of 4.0 and 7.0. If the pH meter does not read the buffers correctly, make the necessary adjustment in the device according to the manufacturer's instructions or replace the device.

The **pH papers** or strips are usually not calibrated, but firms are encouraged to test their papers against results from a calibrated pH meter and buffers. Make sure that the strips used are adequate for the pH range needed and that the shelf-life of the strips does not exceed the labeled expiration date.





## Appendix 5

# Daily SOP Check list

Store Name/Number: \_\_\_\_\_

DATE: \_\_\_\_\_

<b>Storage</b>	<b>Time/Temp</b>	<b>Time/Temp</b>	<b>Time/Temp</b>	<b>Time/Temp</b>
Refrigerators (°F / Time)	°F	°F	°F	°F
Freezers (°F / Time)	°F	°F	°F	°F
<b>Display</b>	<b>Time/Temp</b>	<b>Time/Temp</b>	<b>Time/Temp</b>	<b>Time/Temp</b>
Display temperature (°F / Time)	°F	°F	°F	°F
Clean and Orderly. Food in good condition and properly labeled.				
<b>Sushi Rice Preparation</b>	<b>Prep Time</b>			
	<b>Rice pH</b>			
	<b>Lot #</b>			

### SOP CHECK LIST

<b>Work Area</b>	<b>Comments</b>			
Orderly; Clean and Sanitized tables, countertops and sinks. Orderly, all work surfaces cleared. Clean floor and drains				
Proper storage and labeling of chemicals and cleaning items				
Wet and dry trash separate and removed from work area.				
All utensils, pots, pans, bowls, cutting boards, cooking or heating equipment properly cleaned and sanitized.				
Thermometer and recorder available and calibrated				
<b>Personnel</b>				
Personnel Health, hand-washing practices, glove use, clean and well maintained outer garments, proper hair covering and no jewelry.				
<b>Food Storage</b>				
All food protected, dated and labeled properly				
Refrigerators and freezers clean, orderly and operating correctly.				
	<b>Pre-Op</b>	<b>Time</b>	<b>Post-Op</b>	<b>Time</b>
<b>Employee Initials</b>				
Manager Review				

This particular form is not mandated but it does indicate information that should be recorded to demonstrate an appropriate process for food safety. Different and additional forms can be used to record the same information.







1. This document is FSHN05-09, one of a series of the Food Science and Human Nutrition Department, Florida Cooperative Extension Service, IFAS, University of Florida, Gainesville, FL 32611. Published: February 2005. Please visit the EDIS Web site at **<http://edis.ifas.ufl.edu>**

2. Keith R. Schneider, PhD, assistant professor, University of Florida, Food Science and Human Nutrition Department, University of Florida, Gainesville, FL 32611; Victor Garrido, research coordinator and W. Steve Otwell, PhD, professor, Food Science and Human Nutrition Department, Aquatic Food Product Lab, University of Florida, Gainesville, FL 32611; and Ray Mobley, PhD, Florida A&M University.

The Institute of Food and Agricultural Sciences is an equal opportunity/affirmative action employer authorized to provide research, educational information and other services only to individuals and institutions that function without regard to race, color, sex, age, handicap, or national origin. For information on obtaining other extension publications, contact your county Cooperative Extension Service office. Florida Cooperative Extension Service / Institute of Food and Agricultural Sciences / University of Florida / Larry R. Arrington, Dean

