

STUDENT COURSEBOOK

Chapter 4: Equipment, Utensils, and Linens

Materials • Design • Warewashing • Cleaning • Sanitizing • Linens • Storage • Disinfection

Training note: This coursebook summarizes Chapter 4 of the 2026 FDA Food Code for instruction. Jurisdictional adoption and requirements may vary.

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How to Use This Coursebook

Chapter 4 explains how food equipment, utensils, and linens must be constructed, installed, maintained, cleaned, sanitized, laundered, dried, and stored so they do not contaminate food.

Learning Objectives

- Recognize acceptable characteristics and important use limitations for equipment and utensil materials.
- Explain food-contact surface design and equipment installation requirements.
- Set up and operate a three-compartment sink correctly.
- Distinguish cleaning from sanitizing and identify when each is required.
- Apply manual and mechanical warewashing temperature and chemical-sanitizer requirements.
- Identify cleaning frequencies for food-contact surfaces and utensils.
- Explain linen laundering, air-drying, and clean-item storage requirements.
- Describe the new 2026 disinfection provisions for bodily-fluid contamination and outbreaks.

Chapter 4 at a Glance

Part	Topic
4-1	Materials for Construction and Repair
4-2	Design and Construction
4-3	Numbers and Capacities
4-4	Location and Installation
4-5	Maintenance and Operation
4-6	Cleaning of Equipment and Utensils
4-7	Sanitization of Equipment and Utensils
4-8	Laundering
4-9	Protection of Clean Items
4-10	Disinfection of Equipment and Utensils

1. Materials for Equipment and Utensils

Materials used for utensils and food-contact surfaces must be safe and must not migrate harmful substances or impart unwanted colors, odors, or tastes to food. Under normal use they must be durable, corrosion-resistant, nonabsorbent, sufficiently strong for repeated warewashing, smooth and easily cleanable, and resistant to damage.

Important Material Limitations

Material	Chapter 4 rule - student summary
Cast iron	Generally not used for utensils or food-contact surfaces; allowed as a cooking surface and for serving food in an uninterrupted cooking-to-service process.
Copper / brass	Generally may not contact food with pH below 6, such as vinegar, fruit juice, or wine; a beer-brewing exception applies during specified pre-fermentation/fermentation steps.
Galvanized metal	May not be used for utensils or food-contact surfaces that contact acidic food.
Sponges	May not contact cleaned and sanitized or in-use food-

	contact surfaces.
Wood	Generally limited, but Chapter 4 contains specific allowed uses such as hard maple or equivalently hard, close-grained wood for certain cutting boards, blocks, utensils, and rolling pins.
Lead / pewter / solder	Strict lead limits apply; food-contact pewter alloys and solder may not exceed specified lead limits.

Key idea: Food-contact materials must be safe, durable, smooth, and cleanable.

2. Design and Construction

Food-contact surfaces must be smooth, free of breaks, open seams, cracks, chips, pits, and similar imperfections; accessible for cleaning and inspection; and designed without difficult-to-clean internal angles, corners, and crevices. CIP equipment must allow effective cleaning and sanitizing solutions to circulate through the system.

- Equipment and utensils must be designed and constructed to be durable and retain their characteristic qualities under normal use.
- Food-contact surfaces should not have exposed screw, bolt, or rivet heads that interfere with cleaning.
- Equipment must allow drainage where moisture can accumulate.
- Cutting surfaces that become scratched or scored and can no longer be effectively cleaned and sanitized must be resurfaced or discarded.
- Warewashing machines must have accessible, readable data plates with operating specifications.

Equipment Certification

Food equipment and multiuse food-contact surfaces, including utensils and tableware, certified or classified for sanitation under a recognized American National Standard by an ANSI-accredited certification program are deemed to comply with Parts 4-1 and 4-2.

3. Required Equipment, Thermometers, and Test Kits

- Cooling, heating, and holding equipment must be sufficient in number and capacity to maintain Chapter 3 food temperatures.
- A food thermometer must be readily accessible; a suitable small-diameter probe is required for thin foods such as meat patties and fish fillets.
- Manual warewashing requires a temperature-measuring device for frequently checking wash and sanitizing temperatures.
- Hot-water mechanical warewashing requires an irreversible registering temperature indicator to measure utensil surface temperature.
- Test kits or other devices must be available to accurately measure sanitizer concentration.
- The 2026 Code also requires a test kit or device to measure disinfecting-solution concentration.
- Cleaning agents and chemical sanitizers must be available for use during all hours of operation, except on-site-generated sanitizer as specified by the Code.

4. Manual Warewashing: The Three-Compartment Sink



Chapter 4 visual: wash, rinse, sanitize, and air-dry.

Except where an approved alternative applies, a sink with at least three compartments is required for manually washing, rinsing, and sanitizing equipment and utensils. Compartments must be large enough to immerse the largest items, or another approved method must be used.

Step	What happens
1. Prepare	Scrape or otherwise remove food debris as needed; keep the sink and drainboards clean.
2. Wash	Wash with the proper cleaning agent. Manual wash solution must be at least 110°F (43°C), or the temperature on the cleaning-agent label.
3. Rinse	Remove abrasives and cleaning chemicals with clean water using an approved rinsing procedure.
4. Sanitize	Use hot-water immersion or an approved chemical sanitizer at the required temperature, concentration, pH/hardness where applicable, and contact time.
5. Air-dry	Allow equipment and utensils to air-dry or adequately drain. Do not cloth-dry food-contact surfaces.

A two-compartment sink may be used only under the specific approval and batch-operation conditions in § 4-301.12. It may not be used for an ongoing warewashing process with continuous or intermittent flow of kitchenware or tableware.

5. Sanitizing: Hot Water and Chemicals



Chapter 4 visual: sanitizer concentration must be checked with the appropriate test kit or device.

Hot-Water Sanitizing

Method	Requirement
Manual hot-water immersion	Water maintained at 171°F (77°C) or above; immerse for at least 30 seconds.
Mechanical hot-water sanitizing	Machine must achieve a utensil surface temperature of 160°F (71°C), measured with an irreversible registering temperature indicator.
Fresh hot-water sanitizing rinse at manifold	Stationary-rack single-temperature machine: at least 165°F (74°C). Other machines: at least 180°F (82°C). The Code also sets a 194°F maximum, with a specified exception.

Chemical Sanitizers

Sanitizer	Key Chapter 4 requirements
Chlorine	Minimum solution temperature depends on concentration and pH. For example, 50-99 mg/L requires at least 100°F at pH 10 or less, or 75°F at pH 8 or less. Follow the EPA-registered label.
Iodine	At least 68°F; pH 5.0 or less (or manufacturer-specified effective pH); 12.5-25 mg/L.
Quaternary ammonium	At least 75°F; concentration and water hardness according to EPA-registered label directions.
Other chemical sanitizer	At least 75°F unless the EPA-registered label states otherwise; use according to the label.

Chemical sanitizer concentration must be accurately determined using a test kit or other device, and the test kit must be used according to the manufacturer's label instructions.

Chemical Contact Times

- Chlorine: generally at least 10 seconds.
- 50 mg/L chlorine under the specified pH and temperature conditions in § 4-703.11(C)(2): at least 7 seconds.
- Other chemical sanitizing solutions: at least 30 seconds unless another approved time/temperature/concentration/pH combination achieves sanitization.
- Always follow the EPA-registered label use instructions.

6. Mechanical Warewashing

Warewashing machines must be operated according to their data plate and manufacturer's instructions. Wash and rinse tanks must remain clean, solutions must remain clean, and spray nozzles must be maintained to deliver an effective spray pattern.

Machine condition	Key minimum
Hot-water sanitizing, stationary rack, single temperature - wash solution	165°F
Hot-water sanitizing, stationary rack, dual temperature - wash solution	150°F
Hot-water sanitizing, single-tank conveyor, dual temperature - wash solution	160°F
Hot-water sanitizing, multi-tank conveyor - wash solution	150°F
Chemical-sanitizing spray machine - wash solution	120°F
Hot-water sanitizing - utensil surface	160°F

Do not assume every high-temperature machine uses the same manifold temperature. Machine type matters.

7. When Food-Contact Surfaces Must Be Cleaned

Food-contact surfaces and utensils must be clean to sight and touch. They must be cleaned at times that prevent cross-contamination and pathogen growth.

- Before each use with a different type of raw animal food, except for the specific succession-of-raw-meat-and-poultry exception.
- Each time there is a change from raw food to ready-to-eat food.
- Between uses with raw fruits/vegetables and TCS food.
- Before using or storing a food thermometer.
- Any time contamination may have occurred.
- When used with TCS food, generally at least every 4 hours during the day, unless a specific exception applies.

Refrigerated-Room Exception to the 4-Hour Rule

Ambient temperature	Maximum cleaning interval
41°F or less	24 hours
>41°F to 45°F	20 hours
>45°F to 50°F	16 hours
>50°F to 55°F	10 hours

The corresponding cleaning frequency must be documented in the food establishment. Chapter 4 contains additional exceptions for certain storage containers, serving containers, equipment used with food under approved schedules, and in-use utensils held in water at 135°F or above.

Other Cleaning Frequencies

- Food-contact surfaces of cooking and baking equipment: at least every 24 hours, with the stated hot-oil exception.
- Microwave oven cavities and door seals: at least every 24 hours using the manufacturer's recommended procedure.
- Nonfood-contact surfaces: as often as necessary to prevent accumulation of soil residue.
- Iced-tea dispensers and consumer self-service utensils contacting non-TCS food: at least every 24 hours.
- Ice bins, beverage nozzles, ice makers, beverage/syrup lines, coffee grinders, and similar enclosed equipment: according to manufacturer frequency, or often enough to prevent soil or mold if no frequency is specified.

8. Cleaning Methods and the Correct Sequence

Equipment and utensils must be effectively cleaned to remove soil. Approved methods include manual cleaning, mechanical cleaning, clean-in-place systems, and specified dry-cleaning methods.

General Warewashing Sequence

- Preclean: scrape, soak, or otherwise remove food debris when necessary.
- Wash: use an appropriate cleaning solution.
- Rinse: remove abrasives and cleaning chemicals with clean water.
- Sanitize: sanitize food-contact surfaces and utensils after cleaning and before use.
- Air-dry: allow adequate draining/air drying before food contact.

3

Clean Equipment and Utensils – Air Dry



- Food-contact surfaces must be clean to sight and touch.
- Allow equipment and utensils to air dry.
- Do not use a towel or other cloth to dry food-contact surfaces.

Chapter 4 visual: cleaned and sanitized equipment and utensils must air-dry or adequately drain before use.

Cleaning removes soil. Sanitizing reduces microorganisms. A surface must be properly cleaned before it can be effectively sanitized.

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9. Linens and Wiping Cloths

- Clean linens must be free from food residue and other soil.
- Linens not in direct food contact are laundered between operations when they become wet, sticky, or visibly soiled.
- Cloth gloves used with raw animal foods must be laundered before use with a different type of raw animal food.
- Linens used in direct food-contact applications allowed by Chapter 3 and cloth napkins are laundered between each use.
- Wet wiping cloths are laundered daily.
- Dry wiping cloths are laundered as necessary to prevent contamination.
- Soiled linens must be kept in clean, nonabsorbent receptacles or clean washable laundry bags and stored/transported to prevent contamination.

10. Drying and Storing Clean Items

- After cleaning and sanitizing, equipment and utensils must be air-dried or adequately drained before food contact.
- Cloth drying is not allowed, although already air-dried utensils may be polished with clean, dry cloths.
- Clean equipment, utensils, linens, and single-service/single-use articles must be stored in a clean, dry location protected from splash, dust, and contamination.
- They are generally stored at least 6 inches (15 cm) above the floor.
- Clean equipment and utensils must be stored in a self-draining position that permits air drying and must be covered or inverted.
- Single-service and single-use articles remain in original protective packaging or are otherwise protected until use.

11. New 2026 Requirement: Disinfection

The 2026 FDA Food Code adds Part 4-10, Disinfection of Equipment and Utensils. Disinfection is required when pathogens of concern are not controlled by available sanitizers.

- Disinfect when equipment, food-contact surfaces, nonfood-contact surfaces, or utensils are contaminated with vomit, fecal matter, blood, or another bodily fluid that can transmit disease.
- Disinfect during a foodborne disease outbreak or an imminent health hazard when required by the Code.
- Follow the EPA-registered disinfectant label use directions.
- If disinfectant is applied to a food-contact surface, rinse with potable water unless the EPA-registered label says otherwise.

2026 update: Sanitizing and disinfecting are not interchangeable. Chapter 4 now specifically addresses when disinfection is required.

Chapter 4 Quick Review

Remember	Core Rule
Food-contact materials	Safe, durable, corrosion-resistant, nonabsorbent, smooth, and cleanable.
Three-compartment sink	Wash -> rinse -> sanitize -> air-dry.
Manual wash temperature	At least 110°F, or label-specified temperature.
Manual hot-water sanitizing	171°F or above; at least 30 seconds.
Mechanical hot-water sanitizing	Utensil surface must reach 160°F.
TCS food-contact surfaces	Generally clean at least every 4 hours unless an exception applies.
Sanitizer testing	Use the correct test kit/device and follow label instructions.
Clean-item storage	Clean, dry, protected, generally at least 6 inches above floor.
Disinfection	Required in specified bodily-fluid, outbreak, or imminent-hazard situations.

End-of-Chapter Multiple-Choice Review

1. Food-contact materials should generally be:

- A. Absorbent and flexible
- B. Safe, durable, corrosion-resistant, and easily cleanable
- C. Decorative only
- D. Porous and lightweight

2. Copper generally may not contact food with a pH below:

- A. 4
- B. 5
- C. 6
- D. 7

3. Galvanized metal may not be used in contact with:

- A. Acidic food
- B. Dry rice
- C. Wrapped food
- D. Clean utensils

4. Sponges may not be used on:

- A. Floors
- B. Cleaned and sanitized or in-use food-contact surfaces
- C. Exterior walls
- D. Dry storage shelving

5. Food-contact surfaces must be:

- A. Rough and absorbent
- B. Smooth and easily cleanable
- C. Painted after every use
- D. Made only of stainless steel

6. A manual warewashing sink generally must have at least:

- A. 1 compartment
- B. 2 compartments
- C. 3 compartments
- D. 4 compartments

7. A three-compartment sink is used in which order?

- A. Rinse, wash, sanitize
- B. Wash, sanitize, rinse
- C. Wash, rinse, sanitize
- D. Sanitize, wash, rinse

8. The manual warewashing wash solution must generally be at least:

- A. 85°F
- B. 100°F
- C. 110°F
- D. 120°F

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9. Manual hot-water sanitizing requires water at least:

- A. 160°F
- B. 165°F
- C. 171°F
- D. 180°F

10. Manual hot-water sanitizing immersion lasts at least:

- A. 7 seconds
- B. 10 seconds
- C. 15 seconds
- D. 30 seconds

11. Hot-water mechanical warewashing must achieve a utensil surface temperature of:

- A. 145°F
- B. 155°F
- C. 160°F
- D. 180°F

12. A stationary-rack single-temperature machine's fresh hot-water sanitizing rinse at the manifold must be at least:

- A. 150°F
- B. 160°F
- C. 165°F
- D. 180°F

13. For most other hot-water sanitizing machines, the fresh sanitizing rinse at the manifold must be at least:

- A. 165°F
- B. 171°F
- C. 175°F
- D. 180°F

14. An iodine sanitizing solution must generally be between:

- A. 5-10 mg/L
- B. 12.5-25 mg/L
- C. 50-100 mg/L
- D. 200-400 mg/L

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15. A quaternary ammonium sanitizer is used at a concentration:

- A. Chosen by the employee
- B. Specified by the EPA-registered label/manufacturer directions
- C. Always exactly 50 ppm
- D. Always exactly 100 ppm

16. Sanitizer concentration is checked with:

- A. A timer only
- B. A food thermometer
- C. An appropriate test kit or other device
- D. A visual guess

17. Food-contact surfaces and utensils used with TCS food are generally cleaned at least every:

- A. 2 hours
- B. 4 hours
- C. 8 hours
- D. 24 hours

18. In a refrigerated room at 41°F or less, the listed maximum cleaning interval may be:

- A. 4 hours

- B. 10 hours
- C. 16 hours
- D. 24 hours

19. Food-contact surfaces must be cleaned when changing from raw food to:

- A. Another raw food only
- B. Ready-to-eat food
- C. Frozen food
- D. Dry storage

20. A food thermometer must be cleaned before:

- A. Using or storing it
- B. Reading a menu
- C. Opening the refrigerator
- D. Taking inventory

21. Cooking and baking equipment food-contact surfaces are generally cleaned at least every:

- A. 4 hours
- B. 8 hours
- C. 12 hours
- D. 24 hours

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22. Microwave cavities and door seals are generally cleaned at least every:

- A. 4 hours
- B. 12 hours
- C. 24 hours
- D. 7 days

23. After cleaning, food-contact surfaces and utensils must be:

- A. Sanitized before use
- B. Towel dried
- C. Painted
- D. Wrapped while wet

24. After sanitizing, utensils should generally be:

- A. Dried with a cloth
- B. Air-dried or adequately drained
- C. Stacked while wet
- D. Rinsed with dirty water

25. Clean equipment and utensils are generally stored at least how far above the floor?

- A. 2 inches
- B. 4 inches
- C. 6 inches
- D. 12 inches

26. Wet wiping cloths must be laundered:

- A. Daily
- B. Weekly
- C. Monthly
- D. Only when torn

27. Soiled linens should be stored in:

- A. Food containers
- B. Clean nonabsorbent receptacles or clean washable laundry bags
- C. Hand sinks
- D. Clean utensil racks

28. The 2026 Code added a test-device requirement for measuring:

- A. Dish weight
- B. Disinfecting solution concentration
- C. Floor temperature
- D. Plate diameter

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29. Disinfection is required when surfaces are contaminated with:

- A. Clean water
- B. Vomit, fecal matter, blood, or another bodily fluid that can transmit disease
- C. Steam
- D. Unopened packages

30. A disinfectant applied to a food-contact surface must generally be followed by:

- A. Potable-water rinsing unless the EPA label specifies otherwise
- B. Towel drying only
- C. Oil application
- D. No further action under any circumstances

Answer Key

1-10	11-20	21-30
1. B	11. C	21. D
2. C	12. C	22. C
3. A	13. D	23. A
4. B	14. B	24. B
5. B	15. B	25. C
6. C	16. C	26. A
7. C	17. B	27. B
8. C	18. D	28. B
9. C	19. B	29. B
10. D	20. A	30. A

Source and Training Use

Primary source: U.S. Food and Drug Administration, 2026 Food Code, Chapter 4 - Equipment, Utensils, and Linens, pp. 87-117. This coursebook paraphrases and organizes Chapter 4 for student instruction. Consult the official Food Code and the applicable regulatory authority for exact regulatory language and jurisdiction-specific requirements.

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