PART 2, Suggested Guide to Food Establishment Design

INTRODUCTION

The following guide to food establishment design is provided to assist you in selecting the proper equipment to meet the needs of your business. An excellent way to begin a self-assessment of your needs is to first determine the menu you plan to provide your customers, and then to utilize this menu to list the specific steps in the food preparation process for each menu item.

This process generally includes:

- defining whether specific food items are potentially hazardous;
- determining how food items are received into your facility;
- deciding the storage method and length of time food items are to be stored prior to preparation;
- reviewing how foods are to be prepared (e.g., cooked to order, as opposed to prepared in advance of order), including an assessment of necessary cooking, cooling, and holding methods;
- determining the extent of necessary hand contact by food preparation workers during the preparation and serving stages;
- ensuring that all food items are maintained at proper time and temperatures throughout these processes until service.

Keeping these specific needs in mind as you read the various sections of this guide will allow you to design an equipment layout that will meet your needs, as well as the requirements of applicable regulations.

Food must be obtained from approved sources that comply with all laws relating to food and food labeling. The use of food prepared in any place that is not operated under the jurisdiction of an appropriate regulatory agency and that does not have a current permit or license to operate from that agency, if required, is prohibited.

FOOD SERVICE EQUIPMENT

Equipment that complies with the design and construction standards of the National Sanitation Foundation (NSF) is acceptable. The NSF *Manual on Sanitation Aspects of Installation of Food Service Equipment* is an excellent reference.

Adequate facilities must be provided to promote good hygienic practices, sanitary food handling and to minimize the potential of cross contamination between finished and raw products. Provision of separate areas designed to segregate food handling operations involving raw and ready-to-eat products greatly reduces the possibility of cross contamination. A separate food preparation sink, for washing raw fruits and vegetables, if these items are served, is suggested. Where the use of portable chopping boards is planned, they may be colored, coded or labeled for specific use.

All food on display, during service or while being held, should be adequately protected from contamination by the use of packaging, serving line, storage or salad bar protector devices, sneeze guards and display cases, or by other effective and acceptable means.

Where frozen desserts are being portioned and dispensed, running water dipping wells should be provided for the in-use storage of dispensing utensils, e.g. ice cream scoops.

Between uses, food dispensing utensils should be stored in the food with the handle extended out of the food, or clean and dry, or in a dipper well with running water at an adequate velocity and volume to cleanse them during intervals between intermittent use.

Equipment, including food preparation tables, ice makers and ice storage equipment should not be located under exposed or unprotected sewer lines, open stairwells or other sources of contamination.

The following outlines some of the equipment installation requirements and recommendations to insure proper spacing and sealing to allow for adequate and easy cleaning:

Whenever possible, equipment should be mounted on castors or wheels to facilitate easy moving, cleaning and provide a flexibility of operation. Wheeled equipment requiring utility services may be provided with easily accessible quick-disconnects or the utility service lines may be flexible and of sufficient length to permit movement of the equipment for cleaning. Local fire safety and building codes should be checked to ensure that such installations do not present a conflict.

Floor-Mounted Equipment

Floor-mounted equipment not mounted on wheels or castors should be:

- Sealed to the floor around the entire perimeter of the equipment (the sealing compound should be pliable but not gummy or sticky, non-shrinking, retain elasticity and provide a water and vermin-tight seal); or
- Elevated on legs to provide at least a 6 inch clearance between the floor and equipment; or
- Installed on a smooth, non-absorbent, masonry base. Masonry bases and curbs may be coved at the junction of the platform and the floor to facilitate easy cleaning and prevent insect harborage. Spaces between the masonry base and the equipment should be sealed.

Spacing between and behind equipment should be sufficient to permit cleaning. The following separations may prove adequate:

- When the distance to be cleaned is less than 2 feet in depth, the width of the clear unobstructed space should not be less than 6 inches;
- When the distance to be cleaned is greater than 2 feet but less than 4 feet in depth, the width of the clear unobstructed space should be at least 8 inches;
- When the distance to be cleaned is greater than 4 feet but less than 6 feet in depth, the width of the clear unobstructed space should be at least 12 inches;

- When the distance to be cleaned is greater than 6 feet in depth, the width of clear un- obstructed space should be at least 18 inches.

If the equipment butts against a wall it should be joined to the wall and sealed in a manner to prevent liquid waste, dust and debris from collecting between the wall and the equipment.

When equipment is butted together or spreader plates are used, the resultant joint should be effected in a manner to prevent the accumulation of spillage and debris therein and to facilitate cleaning.

Unobstructed aisles and working spaces should be provided of sufficient width to permit employees to perform their duties readily without contamination of food or food-contact surfaces by clothing or personal contact.

All utility and service lines and openings through the floor should be sealed adequately. Exposed vertical and horizontal pipes and lines are best kept to a minimum. The installation of exposed horizontal utility lines and pipes on the floor is not recommended. Any insulation materials used on utility pipes or lines in the food preparation or dishwashing areas must be smooth, non-absorbent and easy to clean. Switch boxes, electrical control panels, wall mounted cabinets, etc., when installed in areas subject to splash from necessary cleaning operations, food preparation, or utensil or equipment washing, should be watertight and washable.

Table Mounted Equipment

Table mounted equipment may be:

- Sealed to the table or counter; or
- Elevated on legs to provide at least a 4 inch clearance between the table or counter and equipment, and installed to facilitate cleaning; or
- Easily movable.

Hot-Holding and Reheating Equipment

Hot holding equipment must be capable of maintaining the internal temperature of potentially hazardous foods at 140°F or above during service, display or holding periods.

Reheating equipment must be capable of raising the internal temperature of potentially hazardous foods to at least 165°F within 2 hours.

Metal stem-type, numerically scaled, indicating thermometers accurate to + or –2°F are required to monitor temperatures.

Refrigeration Equipment, Sizing and Design

Refrigeration facilities should be adequate to provide for the proper storage, transportation, display, service and rapid cooling of potentially hazardous foods. Specific refrigeration needs should be based upon the menu, number of meals, frequency of delivery, and time of preparation in advance of service, a rapid cooling device capable of cooling potentially hazardous foods from 140°F to 41°F within 4 hours is recommended.

The capacity of the rapid cooling units should be sufficient to accommodate the volume of food required to be cooled to 41°F within 4 hours.

Point-of-use refrigerators should be provided at work stations for operations requiring preparation and handling of potentially hazardous foods which would otherwise be kept unrefrigerated for 2 or more hours. Refrigeration units, unless designed for such use, should not be located directly adjacent to cooking equipment or other high heat producing equipment which may tax the cooling system's operation.

Additional Recommendations for Refrigerated Storage Units

All walk-in units may be constructed and installed in accordance with NSF standards, the NSF *Manual on Sanitation Aspects of Installation of Food Service Equipment* and the NSF reference guide, entitled "Sanitation Aspects of Food Service facility Plan Preparation and Review."

- Shelving for walk-ins that are approved by NSF for use under standard #7 (for refrigeration use) is acceptable. In units used to rapidly cool potentially hazardous foods, the recommended vertical space between shelves is a minimum of 6 inches.
- Interior finishes approved by NSF for use in walk-in and reach-in refrigeration units would be acceptable except for

galvanized metal which is not recommended because of its tendency to rust.

- All refrigeration units should have numerically scaled thermometers accurate to + or –2°F with the temperatures sensing unit located to measure air temperature in the warmest part of the unit.
- If the walk-in floors are water-flushed for cleaning, or receive the discharge of liquid waste or excessive water from melted ice, the floors should be quarry tile or its equivalent with silicone or epoxy impregnated grout, have an integrally coved base, and be sloped to a suitably trapped floor drain.
- Walk-in units should contain candescent vapor-proof lamps providing a minimum 20 ft. candles of light.
- Walk-in units should have condensate waste draining into the sewage system via an air break located outside the unit.

HYGIENE

Hand Washing Facilities

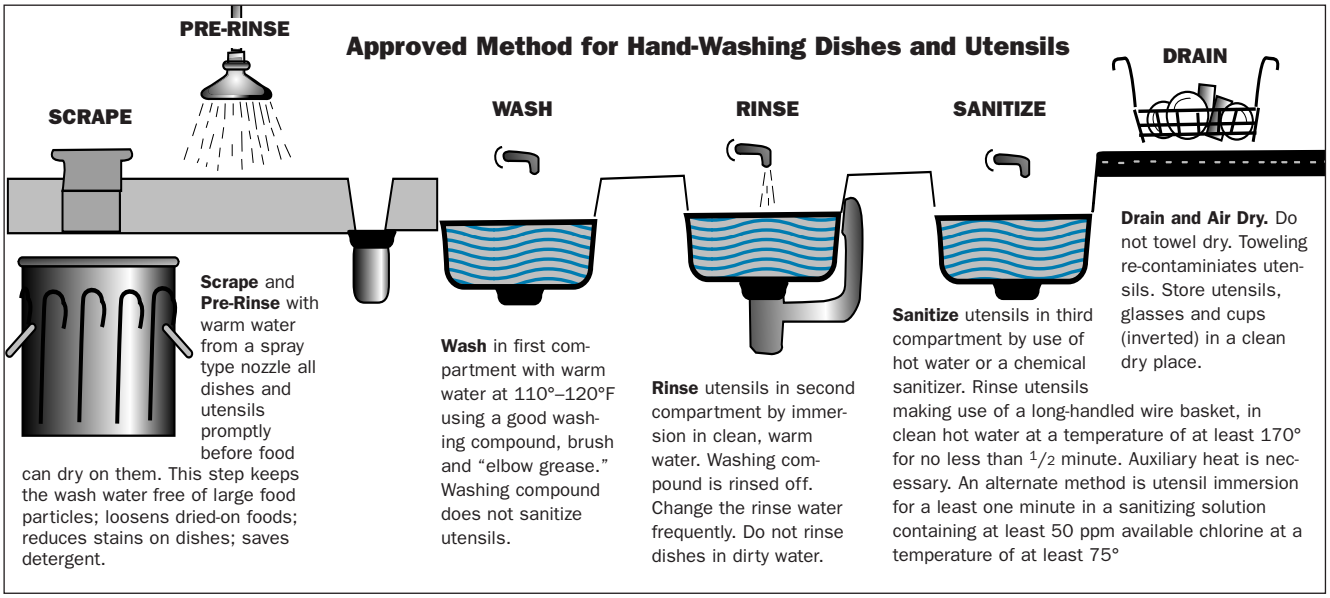
Provide a separate hand washing sink, dispensed hand soap, hand drying device or disposable towels, and waste receptacle for each food preparation area, utensil washing area and toilet room. The use of a common sink for food preparation or for washing equipment and/or utensils as well for hand washing is not a recommended practice.

Each hand washing sink should be provided with hot and cold running water preferably tempered by means of a mixing valve or a combination faucet. It is recommended that any self-closing or metering faucet should be designed to provide a flow of water for at least 15 seconds without the need to reactivate the faucet.

Ware Washing

Manual Facilities

For manual washing and sanitizing of utensils, a stainless steel sink with no fewer than three compartments should be provided. A two compartment sink may find application in the washing and sanitizing of bar glassware. In these cases an electrical brush device should be used in conjunction with a combination detergent-sanitizer in the sink compartment used for washing utensils. The sink compartments must be large enough to accommodate the largest piece of equipment or utensil to be cleaned and each compartment should be supplied with adequate hot and cold potable running water.



In the case of equipment too large to be sanitized by immersion, but in which steam can be confined, treatment with culinary quality steam is acceptable to achieve sanitization. The swabbing of fixed equipment with a solution of at least twice the concentration required for that sanitizing solution when used for immersion is also acceptable.

Mechanical Facilities

A commercial dishwashing machine approved by NSF under Standard #3 should be provided. The installation and required appurtenances should be in conformance with NSF Standard #34, the NSF *Manual on Sanitation Aspects of installation of Food Service Equipment,* and applicable code requirements.

Among the specific requirements for installation of machines that use chemicals to achieve sanitization are the following:

- The chemical sanitizing feeder should be approved for use with the specific make and model of the machine in question.
- A visual flow indicator is suggested to facilitate monitoring of the operation of the sanitizing agent feeder. Other indicating devices such as audible alarms may also be used. The flow indicating devices should be installed so as to be easily viewed by the operator.

General

Adequate facilities should be provided for pre-flushing or pre-scraping equipment and utensils.

A floor drain is recommended in the immediate vicinity of the washing area and any area where wet pots, utensils and equipment are air drying.

Thermometers and appropriate chemical test kits should be available and used to monitor water temperatures and chemical concentrations.

Drying Facilities

Adequate facilities must be provided to air dry washed utensils and equipment.

Adequately sized drain boards, or easily moveable dish tables, fabricated in conformance with NSF standards and separate for soiled and cleaned utensils should be provided.

The drain boards and dish tables should be pitched a minimum of 1/8 inch per foot and drainage directed into a sink so as to prevent contamination of other areas of the dish table or drain board. Drain boards may generally be at least 36 inches to 48 inches long and 30 inches wide.

Determining Hot Water Supply Requirements

The hot water supply should be sufficient to satisfy the continuous and peak hot water demands of the establishment. For purposes of estimating the hot water generating capability, assume a supply temperature requirement of 115°F to each fixture and 180°F to mechanical dishwashing machines.

Hot water for hand washing should not exceed 115°F.

Hot water for mechanical dishwashers should be 140°F–165°F for washing and 180°F for sanitizing.

The water temperature for manual hot water sanitization should be at least 170°F.

Toilet Facilities

Toilet facilities should be installed according to local plumbing ordinances. They should be conveniently located and should be accessible to employees and/or patrons at all times.

All food service establishments with a seating capacity of 20 or more except those in operation on or before December 5, 1977 *must* provide appropriately identified and maintained toilet facilities for their patrons. Suitable public notice of any such alternate facility must be conspicuously posted within the food establishment.

Employee toilet facilities may be used by patrons only if they do not pass through a food preparation or utensil washing area to access them and there are separate facilities for each sex.

Toilet rooms should be completely enclosed and have tight fitting, self-closing, solid doors. They should be vented to the outside by an operable, screened window or mechanical device. Fixtures should be designed to be easily cleanable.

SURFACE FINISHES

Finish Schedule

The table on the following page provides some acceptable finishes for floors, walls and ceiling, by area.

Floors

- All floor coverings in food preparation, food storage, utensil-washing areas and walk-in refrigeration units, dressing rooms, toilet rooms and vestibules must be smooth, non-absorbent, easily cleanable and durable. Approved anti-slip floor covering may be used in high traffic areas only.
- Coving at base junctures should be compatible to both wall and floor covering and provide at least 1/4 inch radius.
- Properly installed, trapped floor drains should be provided in floors that are water flushed for cleaning or that receive discharges of water or other fluid waste from equipment or in areas where pressure spray methods for cleaning equipment are used. Floors should be sloped to drain at least 1/8 inch per foot.
- Grouting should be non-absorbent and may be impregnated with epoxy, silicone or polyurethane.
- All walk-in refrigeration units, both with prefabricated floors and without, should be installed according to the NSF "Special Consideration regarding Instal-lation of Walk-in Refrigerators and Storage Freezers."

Walls

- The walls—including non-support partitions, wall coverings and ceilings of walk-in refrigerating units, food preparation areas, equipment washing and utensil-washing areas, toilet rooms and vestibules—should be light-colored, smooth, non-absorbent and easily cleanable. Studs, joists and rafters should not be exposed in walk-in refrigerating units, food preparation areas, equipment-washing areas, toilet rooms and vestibules. Where permitted they must be finished to provide an easily cleanable surface.

Acceptable Finishes

AREA	*FLOOR*	*WALL*	*CEILING*
Kitchen	Quarry tile; poured seamless concrete	Stainless steel, aluminum, FRP Board, tile with approved grout	Fiberboard plastic coated, metal clad, drywall with epoxy surface, plastic laminated panels
Food Prep and Ware-washing	Same as above, plus approved wall panels, drywall taped epoxy, blocked filled and epoxy paint glazed surface	Same as above	Same as above
Dry storage	Same as above, plus sealed concrete, commercial grade vinyl tiles	Same as above	Same as above
Serving	Same as above	Same as above	Same as above
Toilet Room	Quarry tile, poured seamless concrete	Same as above	Same as above
Janitor Closet	Quarry tile, poured seamless concrete	Same as above	Same as above
Walk-ins	Quarry tile, aluminum, stainless steel	Aluminum, stainless steel, tile with approved grout	Aluminum, stainless steel

- Glazed surfaces could be of glazed block, brick or ceramic tile. If these surfaces are to be used, they should be applied with epoxy, silicone or a polyurethane grouting. Concrete block, if used, should be rendered non-porous and smooth by the application of an approved block, if used, should be rendered non-porous and smooth by the application of an approved block filler followed by the application of an epoxy-type covering. All mortar joints should be only slightly tooled and suitably finished to render them easily cleanable.
- Plastic laminated panels may find applications. Joint finishes should be compatible with the wall structure. Voids should be eliminated at joints.

Ceilings

- Finishes should be light-colored, smooth, non-absorbent and easily cleanable. Acoustical material free of porous perforations, smooth and durable enough to be washed with a cloth or sponge may be used, provided ventilation is adequate to minimize soiling.

PLUMBING CONNECTIONS

Plumbing and Cross Connections

Plumbing must be sized and installed according to applicable codes. There should be no cross connection between the potable water supply and any non-potable or questionable water supply. Where non-potable water systems are permitted for purposes such as air conditioning and fire protection, the non-potable water must not contact food, potable water or equipment that contacts food or utensils directly or indirectly. The piping of any non-potable water system should be clearly identified so that it is readily distinguishable from piping that carries potable water.

Submerged Inlet Protection

The potable water system must be installed to preclude the possibility of back-flow. Devices should be installed and maintained to protect against back-flow and back siphonage at all fixtures and equipment unless an air gap is provided.

The air gap, when used, must be at least twice the diameter of the water supply inlet, but not less than 1 inch, and exist between the water supply inlet and the fixture's flood-level rim.

Fixtures and equipment requiring back siphonage protection include:

Dipper wells	Hose connections
Sinks	Dishwashers
Steam tables	Ice machines
Water closets	Urinals
Potato peelers	Garbage grinders

Drains–Indirect Waste

There should be no direct connection between the sewage system and any drains originating from equipment in which food or food utensils are placed. An unobstructed vertical air space between the lowest opening of the fixture drain and the flood-level rim of the receiving receptacle or drain opening must be provided. The air break for the indirect waste shall be provided by terminating the open end of the pipe at least 1 inch above the flood rim level of the receiving fixture or receptacle.

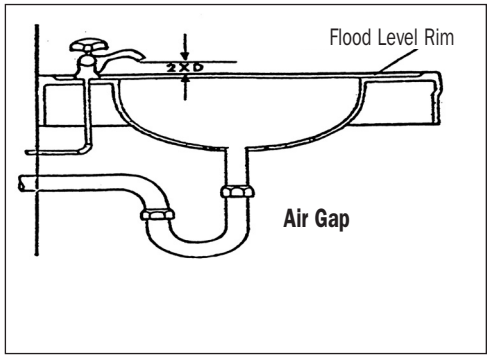
Unidirectional check valves or equivalent devices are not acceptable for this purpose.

Indirect sewer connections should be located within 2 feet of the equipment which it is intended to protect and on the inlet side of the grease interceptor and "p" trap.

Fixtures and equipment requiring indirect waste connections include:

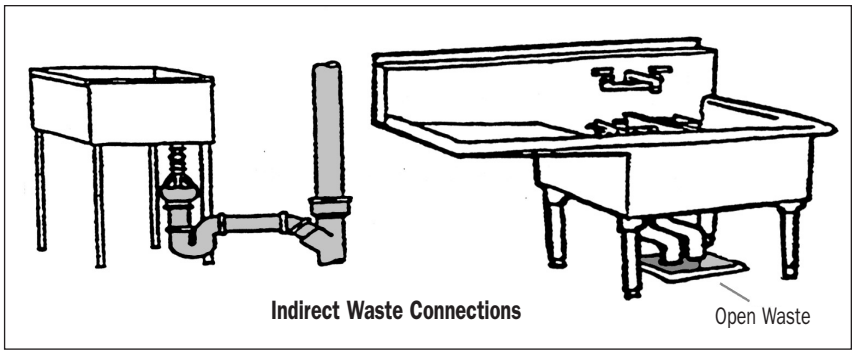
Food preparation and ware-washing sinks;
Refrigerators and freezers;
Ice makers and storage bins;

Steam tables and kettles;
Dipper wells.



A grease interceptor should be installed in the waste line leading from pot sinks, floor drains receiving waste from soup or stock kettles, food scrap sinks, scullery sinks and the scraper section of commercial dishwashers to prevent grease from entering the drainage system.

Interceptors should remove an average of at least 90% of the grease or other extractable matter in the waste water and should conform to the requirements of the New York City Department of Environmental Protection, Industrial Waste Control Section.



Indirect Waste Connections

OTHER CONSIDERATIONS

Insect and Rodent Control

Openings to the outside should be effectively protected against the entrance of rodents. Outside openings should be protected against the entrance of insects by the installation of tight-fitting self-closing doors, windows, self-closing serving windows at drive-throughs, screening, controlled air currents, vestibules or by other means.

Screen doors should be self-closing and screens for windows, doors, sky-lights, transoms, intake and exhaust air ducts and other openings to the outside should be tight-fitting and free of breaks. Screening material should not be less than sixteen mesh to the inch.

Loading docks and delivery doors should be provided with effective air curtains or vestibules with self-closing doors to preclude the entrance of insects.

Any opening between the floor and bottom of outer doors should be protected with rodent-proof material.

Lighting

Permanently fixed artificial light sources should be installed to provide at least 30 foot candles of light on all food preparation surfaces and at equipment or utensil-washing work levels. All other areas, including dining areas during cleaning operations, should be provided with at least 20 foot candles at 30 inches from the floor.

Shielding such as plastic shields, plastic sleeves with end caps, shatterproof bulbs and/or other approved devices should be provided for all artificial lighting fixtures located over, by, or within food storage, preparation, service and display facilities. Sheilding should also be provided where utensils and equipment are cleaned and stored, particularly where they may be exposed to extremes in temperature variation.

Heat lamps, where used, should be protected against breakage by a shield surrounding and extending beyond the bulb, leaving only the face of the bulb exposed.

Ventilation

All establishments shall be adequately ventilated to prevent excessive heat, steam, condensation, vapors, odors, smoke and fumes. Ventilation to the outside air must comply with applicable law and regulation and must not create a nuisance or unlawful emission. Intake and exhaust ducts must be constructed and maintained to prevent dust, dirt or other contaminants from entering the establishment. Mechanical ventilation must be installed in rooms where odors, vapors or fumes originate. Ventilation hoods and devices must be constructed and installed to prevent grease or condensation from collecting on walls or ceilings and from dripping into food or onto food-contact surfaces.

All hoods should meet NSF Standard #2 requirements and be designed, constructed and installed in conformance with the *National Fire Protection Association Bulletin* #96.

☛ **NOTE:** The installation and operation of ventilation systems is regulated by the NYC Department of Buildings, the NYC Fire Department and the NYC Department of Environmental Protection. For additional information regarding these installations and other requirements, including ventilation hoods, ducts and fire suppression systems (ANSUL), you should contact these agencies.

Cooking equipment ventilation hoods and devices should be designed and installed to prevent grease or condensation from collecting on walls, ceilings, and fire suppression supply piping, and from dripping onto food or food contact surfaces.

Make-up air intakes should be screened (bird screen) and filtered to prevent the entrance of dust, dirt, insects and other contaminating material. Where the introduction of make-up air will cause condensation, drafting or interfere with the exhaust or vapor capture efficiency of the hood, the make-up air should be tempered. A tempered make-up air system may be required if the exhaust is greater than 1,500 cfm.

The installation of fire suppression system supply piping in the unfiltered air space in exhaust hoods should be limited to vertical runs to minimize

grease collection. Exposed piping must be cleanable.

Hot water sanitizing dishwashing machines should be provided with adequate ventilation that is sized according to the manufacturer's specifications.

Utility Facility

At least one utility sink or curbed cleaning facility with a floor drain should be provided for cleaning mops and for the disposal of mop water or similar liquid wastes.

Storage

The dry storage space required depends upon the menu, number of meals, quantities purchased and frequency of delivery. Storerooms should be located adjacent to food preparation areas and convenient to receiving.

Ideally, the storeroom should be free of un-insulated steam and water pipes, water heaters, transformers, refrigeration condensing units, steam generators or other heat producing equipment. The area should be well ventilated and maintained at 50°F to 70°F.

Shelving may be constructed of suitably finished wood but preferably of non-corrosive metal or plastic. Approved food containers with tight fitting covers and scoops should be used for storing and dispensing bulk items or broken lots. Food containers should not be stored under exposed or unprotected sewer lines. Items should be spaced from walls sufficiently and raised at least 6 inches above the floor to allow for adequate maintenance and inspection of the facility.

Storage facilities should be provided to store cleaned and sanitized utensils and equipment at adequate heights above the floor protected from splash, dust, overhead plumbing or other contamination, on fixed shelves or in enclosed cabinets.

Poisonous and toxic materials should be stored in areas designated for such use and for no other purpose, or in a storage area outside the food, equipment and utensil storage area. Bactericides and cleaning compounds should never be stored with insecticides, rodenticides, or other poisonous materials. Insecticides and rodenticides should be kept in their original containers.

Dressing Room and Lockers

Rooms or areas separate from food preparation, storage or service areas, and separate from utensil washing or storage areas, should be provided if employees routinely change clothes within the establishment.

Lockers or other suitable storage facilities should be located in dressing areas for employees to store their personal belongings.

Garbage Storage

Garbage and waste grease should be placed in durable, easily cleanable, watertight, nonabsorbent, rodent- and insect-proof containers with tight fitting lids. An area for storage of these containers and facilities for their cleaning should also be provided.