

***FOOD ESTABLISHMENT GUIDE
FOR DESIGN, INSTALLATION, AND
CONSTRUCTION RECOMMENDATIONS***

STATEMENT OF PURPOSE

This technical reference is intended to provide guidance and assistance in complying with nationally recognized food safety standards. It includes design, installation and construction recommendations regarding food equipment and facilities. This document can be used by both the Regulatory Health Authority and food establishment applicant.

The goal is to promote the uniform design and construction of food facilities which are not only conducive to safe food handling and sanitary facility maintenance but which encourage both.

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SECTION 1 - FACILITIES TO MAINTAIN PRODUCT TEMPERATURE

Sufficient hot-holding and cold-holding facilities shall comply with the standards of NSF or equivalent, and shall be designed, constructed and installed in conformance with the requirements of these standards.

*REFRIGERATION FACILITIES SIZING AND DESIGN

Refrigeration facilities shall be adequate to provide for the proper storage, transportation, display, and service of potentially hazardous foods. Specific refrigeration needs will be based upon the menu, number of meals, frequency of delivery, preparation in advance of service.

If potentially hazardous foods are prepared a day or more in advance of service, a rapid cooling device(s) capable of cooling potentially hazardous foods from 140°F to 41°F within 6 hours should be provided (140°F to 70°F in 2 hrs. & 70°F to 41°F in 4 hrs.). The capacity of the rapid cooling facilities must be sufficient to accommodate the volume of food required to be cooled to 41°F within 6 hours.

Point-of-use refrigerators should be provided at work stations for operations requiring preparation and handling of potentially hazardous foods. 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.

*SIZING CONSIDERATION FOR CALCULATING TOTAL REFRIGERATED STORAGE NEEDS INCLUDING WALK-INS

To plan reserve storage, the following need to be considered: menu, type of service, number of meals per day, number of deliveries per week, adequate air ventilation in the area where refrigeration system will be located.

The following is a suggested formula to establish required reserve storage (note: only 40% of any walk-in unit actually provides usable space):

Total Interior Storage Volume Needed:

$$\frac{\text{Vol. per meal (Cu. ft.)} \times \text{number of meals}}{.40}$$

Below are typical meal volumes for each of three types of refrigerated storage:

Meat and Poultry	=	.010-.030 Cu. ft. per meal
Dairy	=	.007-.015 Cu. ft. per meal
Vegetables and fruit	=	.020-.040 Cu. ft. per meal

Thus for a restaurant serving 1000 meals between deliveries (assume a minimum of 4 day storage) the following storage capacities are needed:

$$\text{Meat refrigerated storage} = \frac{.030 \text{ cu. ft./meal} \times 1000 \text{ meals}}{.40}$$

$$= 75 \text{ Cu. Ft.}$$

$$\text{Vegetable refrigerated storage} = \frac{.040 \text{ cu. ft./meal} \times 1000 \text{ meals}}{.40}$$

$$= 100 \text{ Cu. Ft.}$$

$$\text{Dairy refrigerated storage} = \frac{.015 \text{ cu. ft./meal} \times 1000 \text{ meals}}{.40}$$

$$= 37.5 \text{ Cu. Ft.}$$

To calculate the interior storage space required for the above example in square feet, simply divide the cu. ft. (volume), in each case, by the height of the unit.

$$\text{Example for meat storage} = \frac{75 \text{ cu. ft.}}{6 \text{ ft. (height)}}$$

= 12.5 sq. ft. of interior floor area would have to be provided to accommodate storage of meat for 1000 meals. To estimate total interior volume or space, add the requirements for each type of food. To convert interior measurements to exterior floor area simply multiply by 1.25. Thus, for meat storage, in the above example an exterior floor area = 1.25 x 12.5 sq. ft., or 15.6 sq. ft. would be needed.

*ADDITIONAL RECOMMENDATIONS FOR REFRIGERATED STORAGE FACILITIES

- a. Shelving for walk-ins and reach-ins should be NSF listed or equivalent for use under Standard #7 (for refrigeration use).
- b. Interior finishes of walk-in and reach-in refrigeration units that comply with the requirements of NSF Standard #7 or equivalent would be acceptable except for galvanized metal which is not recommended because of its tendency to rust.
- c. All refrigeration units must have numerically scaled indicating thermometers accurate to $\pm 3^{\circ}\text{F}$ with the temperature sensing unit located in the unit to measure air temperature in the warmest part. All such thermometers should have an externally mounted indicator to facilitate easy reading of the temperature of the unit. Refrigerators and freezers shall be capable of maintaining appropriate temperatures when evaluated under test conditions specified under NSF Standard #7 or

equivalent. Maximum operating temperature (cabinet air) should be:

<u>Type</u>	<u>Max Temp</u>	<u>Max Compressor Operating time</u>
Rapid pull down	Food temp cooling from 140°F to 41°F within 6 hours	100%
Refrigerated buffet units	Cabinet air temp 41°F Food temp 33-41°F	70%
Storage & display refrigerators	Cabinet air temp 41°F	70%
Storage & display freezer	Cabinet air temp 0°F	80%

- d. Approved coved juncture base around the interior.
- e. Approved coved junction base around the exterior.
- f. Approved enclosure between the top of the unit and the ceiling if this space is twenty-four inches or less.
- g. Refrigeration units should not be installed exterior to the building if unpackaged foods will be transported from the unit to the food establishment. Only units listed by the National Sanitation Foundation or equivalent for outside installation will be reviewed for that specific application.
- h. If the walk-in floors are water-flushed for cleaning or receive the discharge of liquid waste or excessive melt water, the floors should be non-absorbent (i.e. quarry tile or equal) with silicone or epoxy impregnated grout, sloped to drain outside of the box to a floor drain located within 5 feet of the cooler door.
- i. Walk-in freezer doors should be equipped with pressure relief ports.
- j. All walk-in units should 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, titled "Sanitation Aspects of Food Service Facility Plan Preparation and Review" or equivalent.
- k. Walk-in units should contain incandescent vapor-proof lamps providing a minimum 20 foot candles of light.

*HOT HOLDING AND REHEATING FACILITIES

The hot holding facilities must be capable of maintaining potentially hazardous foods at an internal temperature of 140°F or above during display, service or holding periods.. In general, heating lamps have not been found effective for this purpose.

Reheating equipment must be capable of raising the internal temperature of potentially hazardous foods rapidly (within a maximum of 2 hours) to at least 165°F. Appropriate product thermometers will be required to monitor temperature.

SECTION 2 - FACILITIES TO PROTECT FOOD

*FOOD PREPARATION SINK

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. Separate areas should be designed to segregate food handling operations involving raw and finished products. It is advisable to provide a separate food preparation sink with a minimum 18" drainboard for washing raw fruits and vegetables if these items are served. Provide a separate food preparation area for handling, washing and preparing raw meat, fish and poultry if served. Where portable chopping boards are planned (must be NSF approved or equivalent) they should be coded or labeled for specific use.

All food on display, during service or while being held must be adequately protected from contamination by the use of: packaging; serving line, storage or salad bar protector devices; display cases or by other effective means including dispensers.

Salad bars and sneeze guards shall comply with the standards of NSF or equivalent.

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

SECTION 3 - HANDWASHING

*HANDWASHING FACILITY

Provide a separate handwashing sink; hand drying device, or disposable towels; supply of hand cleaning agent; nail brush; and waste receptacle for each food preparation area, utensil washing area, and toilet room (required number based on law). Sinks used for food preparation or for washing equipment or utensils shall not be used for handwashing.

Each handwashing sink shall be provided with hot and cold water tempered by means of a mixing valve or a combination faucet. Any self-closing, slow-closing or metering faucet shall be designed to provide a flow of water for at least 15 seconds without the need to reactivate the faucet.

Handwashing sinks shall be of sufficient number and conveniently located for use by all employees in food preparation and utensil washing areas.

It is suggested that a handwash sink be located within 25 feet of a work station. Splashguard protection is suggested if adequate spacing to adjoining food, food preparation, food contact surfaces, and utensil washing area surfaces (drainboards) is insufficient.

SECTION 4 - WATER SUPPLY AND SEWAGE DISPOSAL

Where a non-municipal water supply and sewage disposal are utilized, the location of these facilities shall be noted on the plans and certification provided that state and local regulations are to be complied with.

*WATER SUPPLY

Enough potable water for the needs of the food service establishment shall be provided from a source constructed and operated according to law.

Potable water from a municipal water supply is appropriate for the needs of a food service establishment. The pumping capacity, frequency and storage from a non-municipal water supply must be specified.

*WATER USE DATA GUIDE (Suggested Formula)

-Pot sink = 49.399 gals. for a total fill
49.399 x 4 fills per day = 197.596 gals. per day

-Floor wash = 35 gals.
35 x 2 fills per day = 70 gals. per day

-General sanitation = 30 gals. per day

-Prep sink = 15 gals
15 x 2 fills per day = 30 gals. per day

-3 Full time employees
3 x 30 gals. = 90 gals per day

-Dishmachine
46.2 x 2 meal periods = 92.4 gals. per day

Total Daily Usage = 510 gals. per day

*SEWAGE DISPOSAL

All sewage including liquid waste shall be disposed of by a public sewage system or by a sewage disposal system constructed and operated according to law.

An outdoor grease interceptor must be installed. An inside grease trap is no longer approved.

SEPTIC SYSTEM: Tank Size _____
Length of leach field _____

GREASE INTERCEPTOR: Size _____

SECTION 5 - EQUIPMENT AND INSTALLATION

All equipment in food establishments should comply with the design and construction standards of the National Sanitation Foundation (NSF) or equivalent.

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

Equipment should be installed in accordance with the NSF "Manual On Sanitation Aspects Of Installation Of Food Service Equipment" or equivalent and must conform to the requirements of applicable codes.

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

*FLOOR MOUNTED EQUIPMENT

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

Floor-mounted equipment not mounted on wheels or castors with the above utility connections should be:

1. 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
2. Installed on a solid smooth non-absorbent masonry base. Masonry bases and curbs should have a minimum height of 2" and be coved at the junction of the platform and the floor with at least a 1/4" radius. The equipment should overhang the base by at least 1" but not more than 4". Spaces between the masonry base and the equipment must be sealed; or
3. Elevated on legs to provide at least a 6" clearance between the floor and equipment. The legs shall comply with the standards of NSF or equivalent with no hollow open ends.
4. Display shelving units, display refrigeration units and display freezers may be exempt from the above.
5. Minimum every other piece of equipment under hood must be easily movable for ease of cleaning

For equipment not readily moveable by one person, spacing between and behind equipment must be sufficient to permit cleaning. The following separation should be provided:

- a. When the distance to be cleaned is less than 2 feet in length, the width of the clear unobstructed space must not be less than 6".
- b. When the distance to be cleaned is greater than 2 feet but less than 4 feet, the width of the clear unobstructed space must be at least 8".
- c. When the distance to be cleaned is greater than 4 feet but less than 6 feet in length, the width of the clear unobstructed space must be at least 12".
- d. When the distance to be cleaned is greater than 6 feet, the width of clear unobstructed space should be 18".

If all the equipment butts against a wall it must be joined to it and/or 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 must be effected in a manner to prevent the accumulation of spillage and debris therein and to facilitate cleaning.

Aisle and working spaces between units of equipment and walls shall be unobstructed and at least 30".

All utility and service lines and openings through the floor must be sealed adequately. Exposed vertical and horizontal pipes and lines must be kept to a minimum. The installation of exposed horizontal utility lines and pipes on the floor is prohibited. 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. It is desirable that switch boxes, electrical control panels, wall mounted cabinets, etc. be installed out of the cooking and dishwashing areas. Where installed in areas subject to splash from necessary cleaning operations or food preparation or utensil or equipment washing, the electrical units should be water-tight and washable.

*TABLE MOUNTED EQUIPMENT

All table mounted equipment shall be:

- a. Sealed to the table or counter; or
- b. Elevated on legs to provide at least a 4" clearance between the table or counter and equipment and installed to facilitate cleaning; or
- c. Portable: 25 pounds or less, no dimensions exceeding 36", no fixed utility connections.

Equipment open underneath such as drainboards, dish tables, and other tables should be installed 4" away from the wall or sealed to the wall.

SECTION 6 - DRY STORAGE CONSIDERATIONS

The dry storage space required depends upon the menu, number of meals, quantities purchased and frequency of delivery. The location of the storeroom should be adjacent to the food preparation area and convenient to receiving. Adequate ventilation should be provided. Ideally the storeroom should be free of uninsulated steam and water pipes, water heaters, transformers, refrigeration condensing units, steam generators or other heat producing equipment. Temperatures of 50°F to 70°F are recommended.

A suggested formula used in estimating required storage space is as follows:

$$\text{Required Storage Area (sq ft)} = \frac{\text{Volume per meal} \times \text{number of meals}}{\text{Average height} \times \text{fraction of usable storeroom floor area}}$$

- (1) Volume per meal = .025 to .050 cu. ft. per meal served
- (2) Useful storeroom height = 4 to 7 feet
- (3) Storage time between deliveries = 3 to 14 days
- (4) Fraction of useable storeroom floor area = .3 to .6

For example assume 100 meals per day and a 10 day storage between deliveries = 1000 meals for which to provide storage:

$$\text{Required Storage Area} = \frac{.05 \text{ cu. ft.} \times 1000 \text{ meals}}{5 \text{ ft.} \times .3}$$

Required Storage Area = 33 square feet

Shelving can be constructed of suitably finished hard wood, durable plastic or preferably of metal. The highest shelf for practical use is 7' and the lowest one should be 36" from the floor if bulk items are stored below. Clearance between the shelves should be at least 15". Sufficient moveable dunnage racks and dollies (with smooth surfaces, cleanable in case of food spillage or package breakage) should be provided to store all food containers at least 6" above the floor.

Dunnage racks, pallets, etc. should be spaced from walls sufficiently to allow for vermin monitoring and inspection. Food containers shall not be stored under exposed or unprotected sewer lines or leaking water lines. Approved food containers with tight-fitting covers and dollies should be used for storing broken lots of such items as flour, cornmeal, sugar, dried beans, rice and similar foods. Scoops are needed for each food storage container in use.

Wooden shelving and pallets require a higher level of maintenance and are more conducive to insect infestation.

SECTION 7 - DISHWASHING FACILITIES

*MANUAL DISHWASHING

For manual washing and sanitizing of utensils, a stainless steel sink with no fewer than 3 compartments shall be provided. The sink compartments shall be large enough to permit the accommodation of the equipment and utensils and each compartment shall be supplied with adequate hot and cold potable running water. Drainboards or easily moveable dish tables of adequate size and separate for cleaned and soiled utensils shall be provided. The stainless steel sinks and moveable dish tables shall comply with the standards of NSF or equivalent.

The drainboards and dish tables shall be pitched a minimum of 1/8" per foot and drainage directed so as to prevent contamination of other areas of the dish table or drainboard, i.e. into the sink. Drainboards should generally be at least 36-48" long and 30" wide.

A floor drain should be located in the immediate vicinity of the sink. In areas where wet pots, utensils and equipment are air-drying on approved racks or dish tables away from the sink, adequate floor drains should also be provided at those locations.

Adequate facilities shall be provided for preflushing or prescrapping equipment and utensils, and shall comply with the standards of NSF or equivalent.

*MECHANICAL DISHWASHING

For mechanical dishwashing utilizing hot water for sanitization, a commercial dishwashing machine shall be provided that is in compliance with the standards of NSF or equivalent. The installation and required appurtenances shall be in conformance with local applicable plumbing codes.

The capacity of the dishwashing machines should be based on the peak number and type of dishes, utensils, flatware, etc. that must be washed per hour. One way to find the capacity in racks per hour for each make and model of machine is to refer to the NSF listing under standard #3. To determine the required capacity refer to the following guide:

Each 20" x 20" dishrack will accommodate:

- 16 - 9" dinner plates
- 25 - water glasses
- 16 - coffee cups
- 100 - pieces of flatware

Only 70% of the NSF listed capacity (in racks per hour) should be considered as an average capacity. Consult the manufacturers'

specification sheets ("cut sheets") for optimum capacity.

A suggested formula to determine the number of dishracks required per hour for a restaurant serving 200 meals at lunch is as follows:

200 plates	=	$\frac{200 \text{ plates}}{16 \text{ plates/rack}} = 13 \text{ racks}$
200 water glasses	=	$\frac{200 \text{ glasses}}{25 \text{ glasses/rack}} = 8 \text{ racks}$
200 coffee cups	=	$\frac{200 \text{ coffee cups}}{16 \text{ cups/rack}} = 13 \text{ racks}$
200 pieces of flatware	=	$\frac{200 \text{ pieces}}{100 \text{ pieces/rack}} = 2 \text{ racks}$

Required total working capacity = 36 racks/hour

Since this figure is 70% of the listed capacity, a mechanical dishwasher with a minimum listed capacity of:

$$\frac{36}{.70 \text{ (70\%)}} = 51 \text{ racks/hour would be recommended}$$

An adequate facility for preflushing or prescrapping shall be provided on the soiled dish side of the dishwashing machine. The facility shall comply with the standards of NSF or equivalent.

Drainboards fabricated in conformance with NSF standards or equivalent shall be provided and shall be of adequate size for the proper handling of utensils and located so as not to interfere with the proper use of the dishwashing facilities. NSF listed or equivalent mobile dish tables may be acceptable for use in lieu of drainboards.

*CHEMICAL DISHWASHING

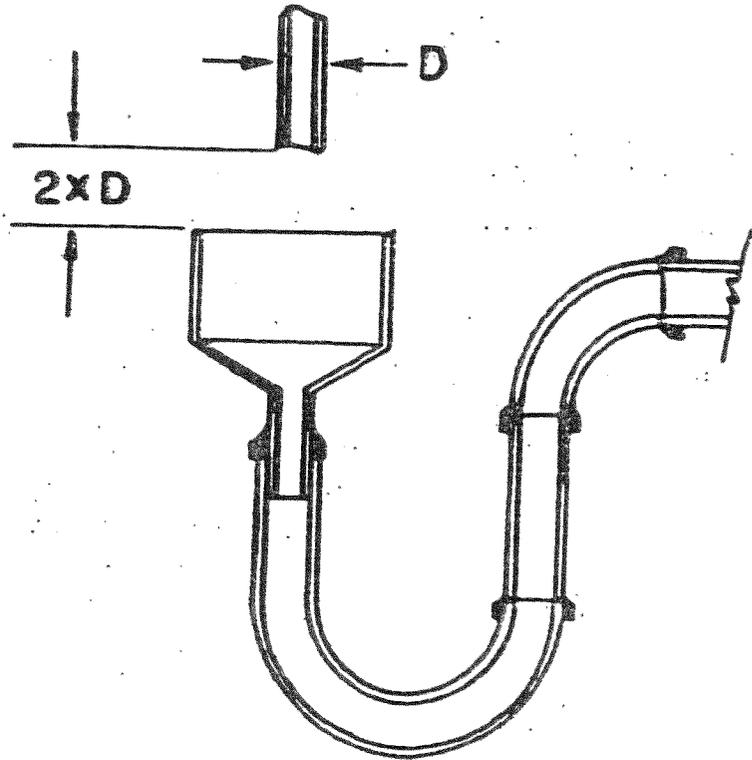
Chemical dishwashing machines shall comply with NSF standard #3 or equivalent. The installation must conform to NSF standards or equivalent and applicable code requirements. Among the specific requirements for the installation of an approved chemical dishwashing machine are the following:

1. The chemical sanitizing feeder must be listed by NSF or equivalent and be compatible with the specific make and model of machine in question.
2. An approved chemical test kit shall be available and used.
3. A visual flow indicator must be provided to monitor the

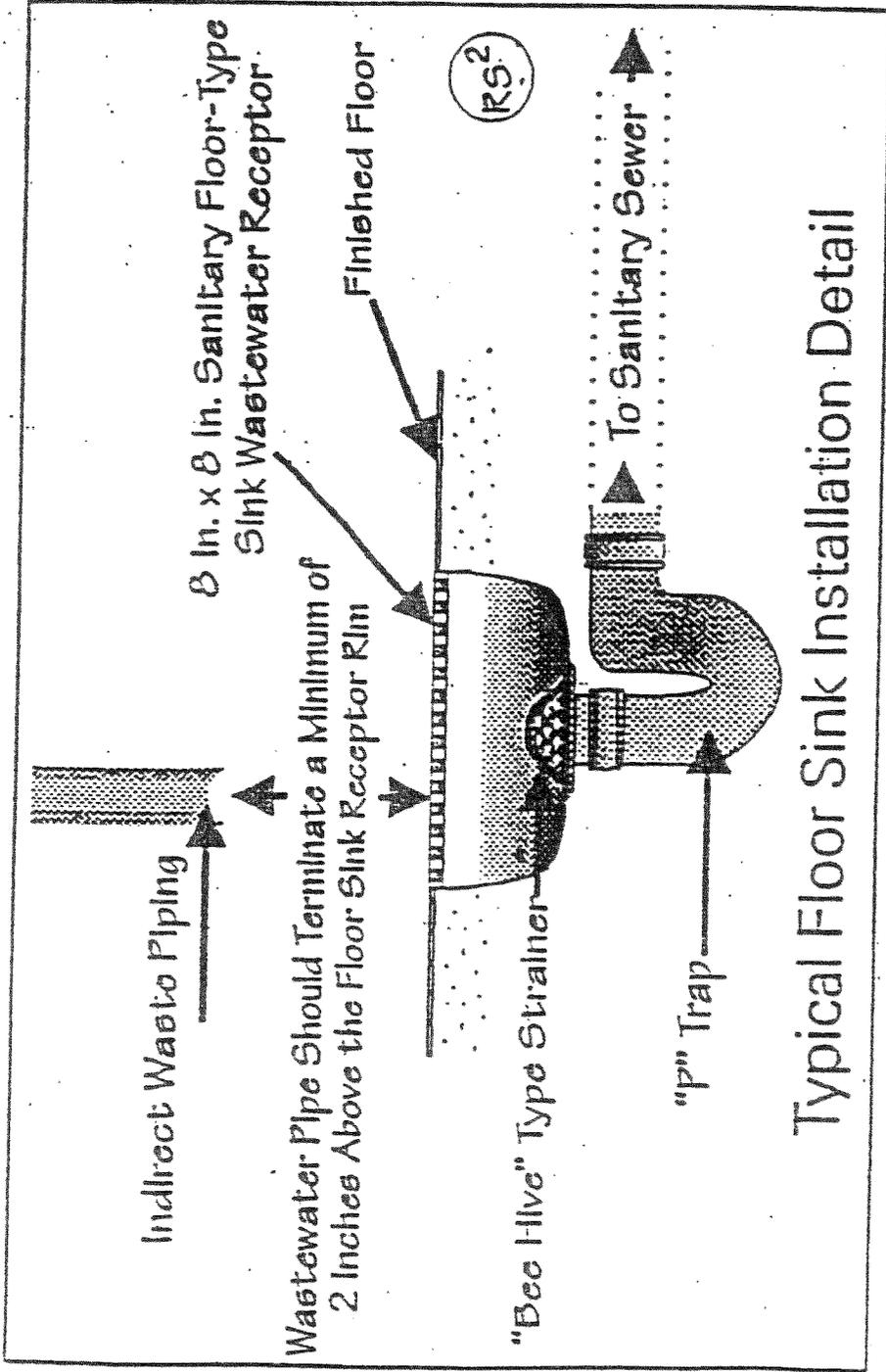
operation of the sanitizing agent feeder. Other indication devices such as audible alarms may also be used. The flow indication devices must be installed so as to be conspicuous to the operator.

For all mechanical dishwashing machines, the waste line must not be directly connected to the sewer line. Except that it may be connected directly on the inlet side of a properly vented floor drain when the floor drain is within 5' and the drain line from the machine is properly trapped and vented.

Adequate facilities shall be provided to air dry washed utensils and equipment. Storage facilities shall be provided to store cleaned and sanitized utensils and equipment at least 12" above the floor protected from splash, dust, overhead plumbing or other contamination, on fixed shelves or in enclosed cabinets. The plan must specify location and facilities used for storing all utensils and equipment.



AIR GAP



Typical Floor Sink Installation Detail

SECTION 8 - DETERMINING HOT WATER SUPPLY REQUIREMENTS

The hot water supply shall be sufficient to satisfy the continuous and peak hot water demands of the establishment. Hot water for handwashing shall be of a temperature of at least 110°F. Hot water for mechanical dishwashing must be 150°F-165°F for washing and 165°F-180°F for sanitizing. The temperature of the wash solution in spray-type warewashers that use chemicals to sanitize may not be less than 120°F. The water temperature for manual hot water sanitization must be at least 171°F. For purposes of sizing the hot water generating capability, assume a supply temperature requirement of 140°F to each fixture and to the mechanical dishwashing machines.

In the absence of specific hot water usage figures for the equipment, the following chart may be used to provide an approximation:

<u>Equipment Type</u>	<u>Gallons Per Hour</u>	
	<u>High</u>	<u>Low</u>
Vegetable sink	15	15
Single pot sink	20	15
Double pot sink	40	30
Triple pot sink	60	45
Pre-rinse for dishes-shower head type	45	45
Bar sink-three compartment	20	
Bar sink-four compartment	25	
Chemical sanitizing glasswasher	60	
Lavatory	5	5
Cook sink	10	10
Hot water filling faucet	15	15
Bain Marie	10	10
Coffee urn	5	5
Kettle stand	5	5
Garbage can washer	50	50
Nine and twelve pound clothes washer	45	45
Sixteen pound clothes washer	60	60
Employee shower	20	20

High - To be used when multi-use eating utensils are utilized
 Low - To be used in carry-out food operations where single service eating utensils are utilized.

One way to estimate the projected hot water demand (gallons per hour final rinse) of mechanical dishwashing machines, pot and pan washers and silverware washers, is to refer to the NSF standard #3 or equivalent for the particular make and model of machine.

In order to determine the required capacity and recuperative rate of the hot water generating equipment it will be necessary to calculate both the demand in gallons per hour (gph) and temperature

rise required (assume 40°F temperature of incoming water unless specific data are available) for each piece of equipment and convert that to BTU's (for gas fired heaters) or KW (for electrical heaters). The required BTU or KW capacity of the heater will then be determined by adding up the individual BTU or KW requirements for each piece of equipment.

Note: To convert to BTU's or KW's, use the following formulas:

For gas heaters (in BTU's):

$$\text{Required BTU} = \frac{\text{Gallons per hour of water} \times \text{Temp. rise} \times 8.33}{.70}$$

For electrical heaters (in KW):

$$\text{Required KW} = \frac{\text{Gallons per hour of water} \times \text{Temp. rise} \times 8.33}{3412}$$

The following example will illustrate use of the above method in approximating the size of the hot water heater needed for specified equipment:

<u>Equipment</u>	<u>Gallons Per Hour Demand from Chart</u>	<u>Temperature Required</u>	<u>Temp. Rise*</u>
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3 Comp't sink	60	140	100
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$$\frac{60 \text{ (gph)} \times 100 \text{ degree temp. rise} \times 8.33}{.70} = 71,4000 \text{ BTU's}$$

OR

$$\frac{60 \text{ (gph)} \times 100 \text{ degree temp rise} \times 8.33}{3412} = 14.65 \text{ KW}$$

Hand sink	5	140	100
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$$\frac{5 \text{ (gph)} \times 100 \text{ degree temp rise} \times 8.33}{.70} = 5,950 \text{ BTU's}$$

OR

$$\frac{5 \text{ (gph)} \times 100 \text{ degree temp rise} \times 8.33}{3412} = 1.22$$

<u>Equipment</u>	<u>Gallons Per Hour Demand from Chart</u>	<u>Temperature Required</u>	<u>Temp Rise*</u>
**Mechanical dishwasher	64	140	100
$\frac{64 \text{ (gph)} \times 100 \text{ degree temp rise} \times 8.33}{.70}$			= 76,160 BTU's
OR			
$\frac{64 \text{ (gph)} \times 100 \text{ degree temp rise} \times 8.33}{3412}$			= 15.62 KW

**Mechanical dishwasher booster heater	64	180	40
$\frac{64 \text{ (gph)} \times 40 \text{ degree temp rise} \times 8.33}{.70}$			= 30,464 BTU's
$\frac{64 \text{ (gph)} \times 40 \text{ degree temp rise} \times 8.33}{3412}$			= 6.2 KW

Note:

- * Assume an incoming water temperature of 40°F
- ** For mechanical dishwashing, assume a hot water demand based on a primary rise in temperature to 140°F. A booster heater must then be provided to boost the required gph demand an additional 40°F to attain the required 180°F final temperature.

For the above example, the total demand in BTU's or KW for the primary hot water heater would be:

3 Compartment sink	=	71,400 BTU or 14.65 KW
1 Hand sink	=	5,950 BTU or 1.22 KW
1 Mechanical dishwasher	=	76,160 BTU or 15.62 KW
TOTAL DEMAND	=	153,510 BTU or 31.49 KW

Plus a booster heater for the dishwasher must be provided and sized to supply an additional 30,464 BTU or 6.2 KW.

The above provides one method of approximation. Other suitably developed calculations may be submitted for consideration.

All hot water generating equipment should conform to NSF Standard #5 or equivalent. The NSF standard #5 listing or equivalent may be used to determine the actual capacity of any listed heater. Consult the manufacturers' "cut sheets" for hot water supply requirements.

SECTION 9 - FINISH SCHEDULE

The following chart and footnotes provide acceptable finishes for floors, walls and ceilings, by area:

	<u>FLOOR</u>	<u>WALL</u>	<u>CEILING</u>
*KITCHEN Cooking	Quarry tile, poured seamless, sealed concrete	Stainless steel, aluminum	Fiberboard plastic coated, metal clad, dry- wall with epoxy, glazed surface, plastic laminate
Food prep & warewashing	Same as above	Same plus approved wall panels, drywall taped epoxy, block filled & epoxy paint, glazed surface	Same as above
*DRY STORAGE	Same plus sealed concrete, commercial grade vinyl tile	Same as above	Same as above
*SERVING	Same as above	Same as above	Same as above
*TOILET ROOM	Quarry tile, poured sealed concrete	Same as above	Same as above
*JANITOR CLOSET	Quarry tile, poured sealed concrete	Same as above	Same as above
*WALK-INS	Quarry tile, aluminum, stainless steel, poured sealed concrete	Aluminum, stainless steel	Aluminum stainless steel

Notes:

FLOORS

1. All floor coverings in food preparation, food storage, utensil-washing areas, walk-in refrigeration units, dressing rooms, locker rooms, toilet rooms and vestibules must be smooth, non-absorbent, easily cleanable and durable. Anti-slip floor covering may be used in high traffic areas only.

2. Any alternate materials not listed in the above chart must be submitted for evaluation.
3. Coving at base junctures must be compatible to both wall and floor coverings and provide at least 1/4 inch radius.
4. Properly installed, trapped floor drains shall 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 must be sloped to drain, at least 1/8" per foot.
5. Grouting must be non-absorbent and impregnated with epoxy, silicone or polyurethane.
6. All walk-in refrigeration units both with prefabricated floors and without, should be installed according to the NSF guide "Special Consideration Regarding Installation of Walk-In Refrigerators and Storage Freezers" or equivalent.

WALLS

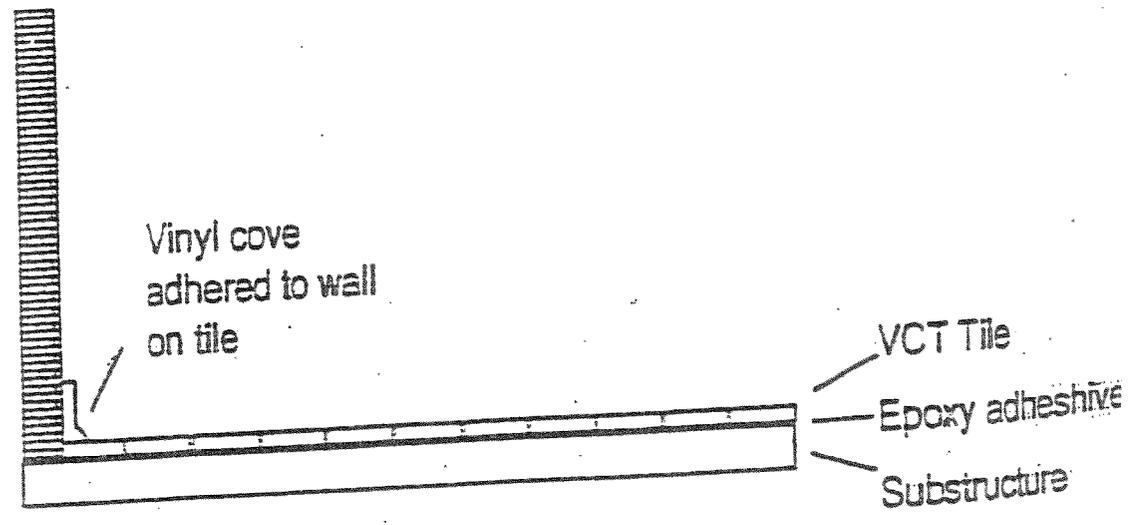
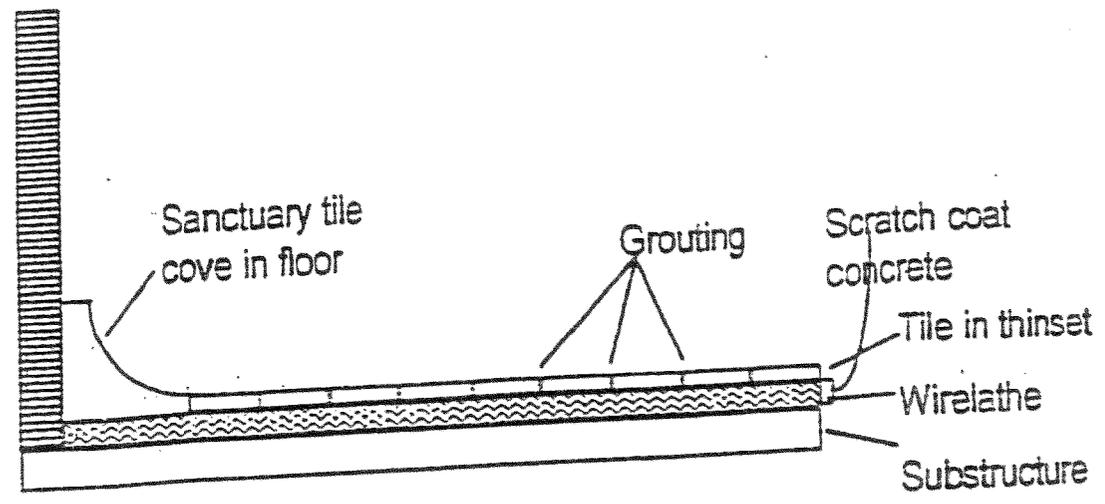
1. The walls, including non-supporting partitions, wall coverings and ceilings of walk-in refrigerating units, food preparation areas, equipment washing and utensil washing areas, toilet rooms and vestibules shall be smooth, non-absorbent and easily cleanable. Light colors are recommended for walls and ceilings. Studs, joists and rafters shall not be exposed in walk-in refrigerating units, food preparation areas, equipment washing and utensil washing areas, toilet rooms and vestibules. Where permitted they must be finished to provide an easily cleanable surface.
2. All alternate materials not listed in the above chart must be submitted for evaluation.
3. Glazed surfaces could be glazed block or brick or ceramic tile. Grouting must be non-absorbent and impregnated with epoxy, silicone, polyurethane or an equivalent compound. Concrete block if used must be rendered non-porous and smooth by the application of an approved block filler followed by the application of an epoxy-type covering or equivalent. All mortar joints shall be only slightly tooled and suitably finished to render them easily cleanable.
4. Plastic laminated panels may find applications. Joint finishes should be compatible with the wall structure. Voids should be eliminated at joints.

CEILINGS

Finishes shall 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.

Floors

*Wander board
concrete
US
gypsum board*



SECTION 10 - TOILET FACILITIES

Toilet facilities shall be installed according to law and shall be the number required by law. They shall be conveniently located and shall be accessible to employees at all times.

Toilets and urinals shall be designed to be easily cleanable.

Toilet rooms shall be completely enclosed and shall have tight fitting, self-closing, doors and shall be vented to the outside. Doors shall not contain openings to permit the entrance of insects or rodents.

Toilet facilities shall be of adequate number for customers, workers and the handicapped.

SECTION 11 - PLUMBING AND CROSS CONNECTION CONTROL

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

*SUBMERGED INLET PROTECTION

The potable water system shall be installed to preclude the possibility of backflow. Devices shall be installed to protect against backflow and backsiphonage at all fixtures and equipment unless an air gap is provided. The air gap must be at least twice the diameter of the water supply inlet, but not less than 1", between the water supply inlet and the fixture's flood level rim.

The following provides an example of some of the types of equipment with potentially submerged inlets and required backflow/backsiphonage protection:

<u>Equipment</u>	<u>Backflow/Backsiphonage Preventer Required in Lieu of Air Gap</u>
1. Boiler with chemicals added	Reduced pressure device
2. Boiler with no chemicals added	Air vent type backflow preventer
3. Carbonators for beverage dispensers	Approved backflow preventer (in agreement with local plumbing codes)
4. Lawn sprinkler system with no chemicals added	Atmospheric or pressure vacuum breaker
5. Flush valve toilets	Atmospheric or pressure vacuum breaker
6. Threaded faucets inside & outside of establishments	Hose bib-type vacuum breaker
7. Preflush hose with a nozzle head that may be submerged	Pressure vacuum breaker
8. Inlets which are or may become submerged:	
a. Supply inlet to garbage grinder	Atmospheric vacuum breaker*

b. Supply inlet to dish table trough	"	"	"
c. Fill line for steam kettle	"	"	"
d. Supply line for mechanical dishwashing machine	"	"	"
e. Supply line to soap dispenser or mechanical dishwashing machine	"	"	"
f. Garbage can washer	"	"	"
g. Soap portioner on faucet			Soap portioner must contain an internal air gap
h. Water wash system for exhaust hood			Air vent type backflow preventer

*Atmospheric vacuum breakers shall be located beyond the last control valve prior to the first outlet and at an elevation higher than any outlet and shall be install so not to be subjected to backpressure or continuous operating pressure of more than 12 hours duration.

DRAINS

A direct connection may not exist between the sewerage system and any drains originating from equipment in which food, portable equipment, or utensils are placed, except if otherwise required by state plumbing codes. When a dishwashing machine is located within 5 feet of a trapped floor drain, the dishwasher waste outlet may be connected directly on the inlet side of a properly vented floor drain trap.

Other examples of required drain line connections are:

<u>Equipment</u>	<u>Drain Line Connection Required to Sewer Line</u>
1. Water-cooled condenser for ice machine or other refrigeration system	Indirect connection
2. Ice bin	Indirect connection

A cross connection is defined as any connection or structural arrangement between a potable water system and a non-potable source, liquid or otherwise, through which backflow can occur.

Backflow is defined as the flow of water or other liquids, mixtures, or substances into a potable water system from any source, other than the intended source.

A connection to a sewer line may be direct or indirect:

* A direct connection is a solid physical joining to a waste

or soil line;

- * An indirect connection is other than a solid physical joining to a waste or soil line (such as a submerged inlet).

An indirect connection may be one of two types:

- * An air gap is the unobstructed vertical distance through the free atmosphere between the lowest opening from any pipe or faucet supplying potable water to a tank or plumbing fixture.
- * A connection that does not provide an unobstructed vertical distance and is not solidly connected but precludes the possibility of backflow to a potable water source.

SECTION 12 - INSECT AND RODENT CONTROL

Openings to the outside shall be effectively protected against the entrance of rodents. Outside openings shall be protected against the entrance of insects by the installation of tight fitting self-closing doors, closed windows, self-closing serving windows at drive-throughs, screening, controlled air currents, vestibules or other means approved by the regulatory health authority. Screen doors shall be self-closing and screens for windows, doors, skylights, transoms, intake air ducts and other openings to the outside shall be tight fitting and free of breaks. Screening material shall not be less than sixteen mesh to the inch.

Loading docks and delivery doors must be provided with effective air curtains or vestibules with self-closing doors to preclude the entrance of insects. It is recommended that outside lighting around loading areas and entrances be sodium vapor rather than mercury vapor to decrease insect attraction.

All foundations shall be rodent proof. Openings between the floor and bottom of outer doors, shall be adequately flashed with rodent proof material to eliminate any opening.

SECTION 13 - LIGHTING

Permanently fixed artificial light sources shall be installed to provide a light intensity of at least 50 foot candles (540 lux) at a surface where a food employee is working with unpackaged potentially hazardous food or with food, utensils, and equipment such as knives, slicers, grinders, or saws where employee safety is a factor. Areas where fresh produce or packaged foods are sold or offered for consumption; areas used for handwashing, warewashing, and equipment and utensil storage; and in toilet rooms shall be provided with at least 20 foot candles (220 lux) of light (measured at a distance of 30" from the floor). A light intensity of at least 10 foot candles (110 lux) shall be provided in all areas and rooms during periods of cleaning (measured at a distance of 30" from the floor).

Shielding such as plastic shields, plastic sleeves with end caps, shatterproof bulbs and/or other approved devices shall be provided for all artificial lighting fixtures located in areas where there is exposed food; clean equipment, utensils, and linens; or unwrapped single-service and single-use articles.

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

SECTION 14 - VENTILATION

All rooms shall have sufficient ventilation to keep them free of excessive heat, steam, condensation, vapors, obnoxious odors, smoke and fumes. Ventilation systems shall be designed and installed according to law.

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

All hoods shall comply with NSF Standard #2 or equivalent and be designed, constructed and installed in conformance with the National Fire Protection Association Bulletin #96 and other applicable fire safety codes.

Make up air intakes must 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 must be tempered. A make up air system will be required if the exhaust is greater than 1500 cfm. Tempering of makeup air may be necessary in certain climates.

The installation of fire suppression system piping in the unfiltered air space in exhaust hoods should be limited to vertical runs as much as physically possible to minimize grease collection. Exposed piping must be cleanable.

Hot water sanitizing dishwashing machines must be provided with adequate ventilation sized according to the dishwashing machine manufacturer's specifications.

All hoods should be tested prior to use.

Lighting may be required to comply with state or local code requirements.

SECTION 15 - UTILITY FACILITY

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

Mop sinks are acceptable; the water supply must be properly protected against backsiphonage.

A properly sized mop and broom rack shall be provided.

SECTION 16 - DRESSING ROOMS 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 will routinely change clothes within the establishment.

Lockers or other suitable storage facilities shall be located in dressing areas.

If dressing rooms are not required, separate facilities should be provided for coats, sweaters and other personal belongings.

SECTION 17 - GARBAGE AND REFUSE STORAGE

Garbage or refuse storage rooms shall be constructed of easily cleanable nonabsorbent washable materials and shall be insect proof and rodent proof. Garbage and refuse containers, dumpsters and compactor systems located outside shall be stored on or above a smooth surface of nonabsorbent material such as 4" sealed concrete or sealed road grade asphalt.

GILA COUNTY HEALTH DEPARTMENT

GREASE INTERCEPTORS

RECOMMENDED PROCEDURES FOR SIZING COMMERCIAL KITCHEN GREASE INTERCEPTORS

Waste Discharge Requirements

1. Waste discharge from fixtures and equipment in establishments which may contain grease, including but not limited to, scullery sinks, pot and pan sinks, dishwashing machines, soup kettles and floor drains located in areas where grease-containing material may exist may be drained into the sanitary waste through the interceptor when approved by the Administrative Authority.
2. Toilets, urinals, and other similar fixtures shall not waste through the interceptor.
3. All waste shall enter the interceptor through the inlet pipe only.

Design

1. Interceptors shall be constructed in accordance with the design approved by the Administrative Authority and shall have a minimum of two compartments with fittings designed for grease retention.
2. There shall be an adequate number of manholes to provide access for cleaning all areas of an interceptor, a minimum of one (1) per ten (10) feet (3.0 m) of interceptor length. Manhole covers shall be gastight in construction having a minimum opening dimension of twenty (20) inches (0.5m).
3. In areas where traffic may exist the interceptor shall be designed to have adequate reinforcement and cover.

Location

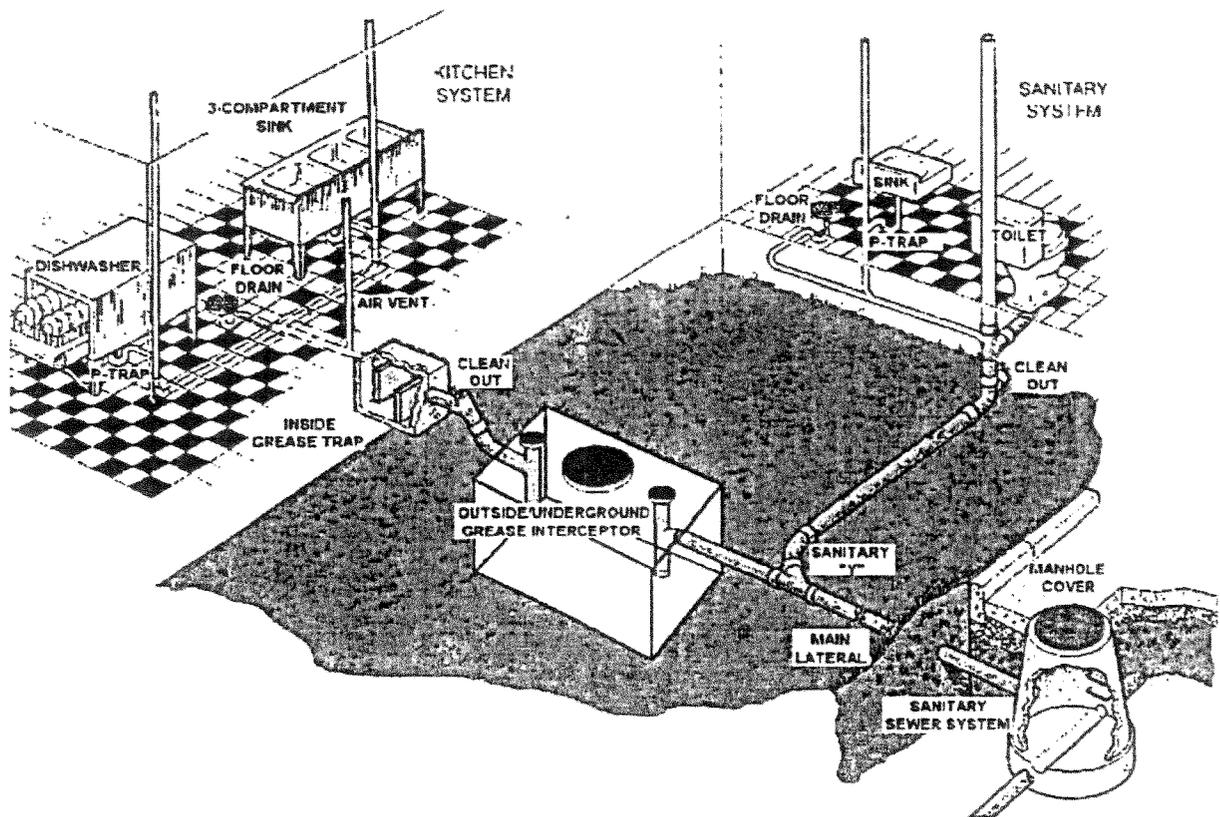
1. Each grease interceptor shall be so installed and connected that it shall be at all times easily accessible for inspection, cleaning, and removal of the intercepted grease. A grease interceptor may not be installed in any part of a building where food is handled. Location of the grease interceptor shall meet the approval of the Administrative Authority.
2. Interceptors shall be placed as close as practical to the fixtures it serves.
3. Each business establishment for which a grease interceptor is required shall have an interceptor which shall serve only that establishment.

GREASE INTERCEPTORS & ONSITE SEPTIC SYSTEMS

PROCEDURES FOR SIZING COMMERCIAL KITCHEN GREASE INTERCEPTORS

applicant in the Notice of Intent to Discharge submitted to the Department for the on-site wastewater treatment facility.

D. The Department may require installation of a sampling box if the volume or characteristics of the waste will impair the performance of the on-site wastewater treatment facility.



For onsite septic systems the main lateral would tie into the septic tank.

GREASE INTERCEPTORS

RECOMMENDED PROCEDURES FOR SIZING COMMERCIAL KITCHEN GREASE INTERCEPTORS

SIZING CRITERIA

1. Parameters. The parameters for sizing a grease interceptor are hydraulic loading and grease storage capacity, for one or more fixtures.
2. Sizing Formula. The size of the interceptor shall be determined by the following formula:

$$\begin{array}{ccccccccc} \text{NUMBER OF MEALS} & & \text{WASTE FLOW} & & \text{RETENTION} & & \text{STORAGE} & = & \text{INTERCEPTOR SIZE} \\ \text{PER PEAK HOUR}^1 & & \text{RATE}^2 & & \text{TIME}^3 & & \text{FACTOR}^4 & & \text{(LIQUID CAPACITY)} \\ & & \text{X} & & \text{X} & & \text{X} & & \end{array}$$

1. MEALS SERVED AT PEAK HOUR
2. WASTE FLOW RATE
 - a. WITH DISHWASHING MACHINE 6 GALLON (22.7L) FLOW
 - b. WITHOUT DISHWASHING MACHINE..... 5 GALLON (18.9L) FLOW
 - c. SINGLE SERVICE KITCHEN..... 2 GALLON (7.6 L) FLOW
 - d. FOOD WASTE DISPOSER 1 GALLON (3.8L) FLOW
3. RETENTION TIMES
 - COMMERCIAL KITCHEN WASTE DISHWASHER.....2.5 HOURS
 - SINGLE SERVICE KITCHEN / SINGLE SERVING..... 1,5 HOURS
4. STORAGE FACTORS
 - FULLY EQUIPPED COMMERCIAL KITCHEN..... 8 HOUR OPERATION: 1
..... 16 HOUR OPERATION: 2
..... 24 HOUR OPERATION: 3
 - SINGLE SERVICE KITCHEN1.5

EFFLUENT SAMPLING

AN EFFLUENT SAMPLING BOX ON GREASE INTERCEPTORS MAY BE REQUIRED BY THE ADMINISTRATIVE AUTHORITY.

ABANDONED GREASE INTERCEPTORS

ABANDONED GREASE INTERCEPTORS SHALL BE PUMPED AND FILLED AS REQUIRED FOR ADANDONED SEWERS AND SEWAGE DISOPOSAL FACILITIES

GREASE INTERCEPTORS & ONSITE SEPTIC SYSTEMS

PROCEDURES FOR SIZING COMMERCIAL KITCHEN GREASE INTERCEPTORS

- R18-9-A315. Interceptor Design, Manufacturing, and Installation for On-site Wastewater Treatment Facilities**
- A. Interceptor requirement. An applicant shall ensure that an interceptor as required by R18-9-A309(A)(7)(c) or necessary due to excessive amounts of grease, garbage, sand, or other wastes in the sewage is installed between the sewage source and the on-site wastewater treatment facility.
- B. Interceptor design. An applicant shall ensure that:
1. An interceptor has not less than two compartments with fittings designed for grease retention and capable of removing excessive amounts of grease, garbage, sand, or other wastes. Applicable structural and materials requirements prescribed in R18-9-A314 apply;
 2. Interceptors are located as close to the source as possible and are accessible for servicing. The applicant shall ensure that access openings for servicing are at grade level and gas-tight;
 3. The interceptor size for grease and garbage from non-residential kitchens is calculated using the following equation: Interceptor Size (in gallons) = $M \times F \times T \times S$.
 - a. "M" is the number of meals per peak hour;
 - b. "F" is the waste flow rate from Table 1, Unit Design Flows.
 - c. "T" is the estimated retention time:
 - i. Commercial kitchen waste, dishwasher or disposal: 2.5 hours; or
 - ii. Single service kitchen with utensil wash disposal: 1.5 hours;
 - d. "S" is the estimated storage factor:
 - i. Fully equipped commercial kitchen, 8-hour operation: 1.0;
 - ii. Fully equipped commercial kitchen, 16-hour operation: 2.0;
 - iii. Fully equipped commercial kitchen, 24-hour operation: 3.0; or
 - iv. Single service kitchen, 1.5; and
 4. The interceptor size for silt and grease from laundries and laundromats is calculated using the following equation: Interceptor Size (in gallons) = $M \times C \times F \times T \times S$.
 - a. "M" is the number of machines;
 - b. "C" is the machine cycles per hour (assume 2);
 - c. "F" is the waste flow rate from Table 1, Unit Design Flows;
 - d. "T" is the estimated retention time (assume 2); and
 - e. "S" is the estimated storage factor (assume 1.5 that allows for rock filter).
- C. The applicant may calculate the size of an interceptor using different factor values than those given in subsections (B)(3) and (4) based on the values justified by the