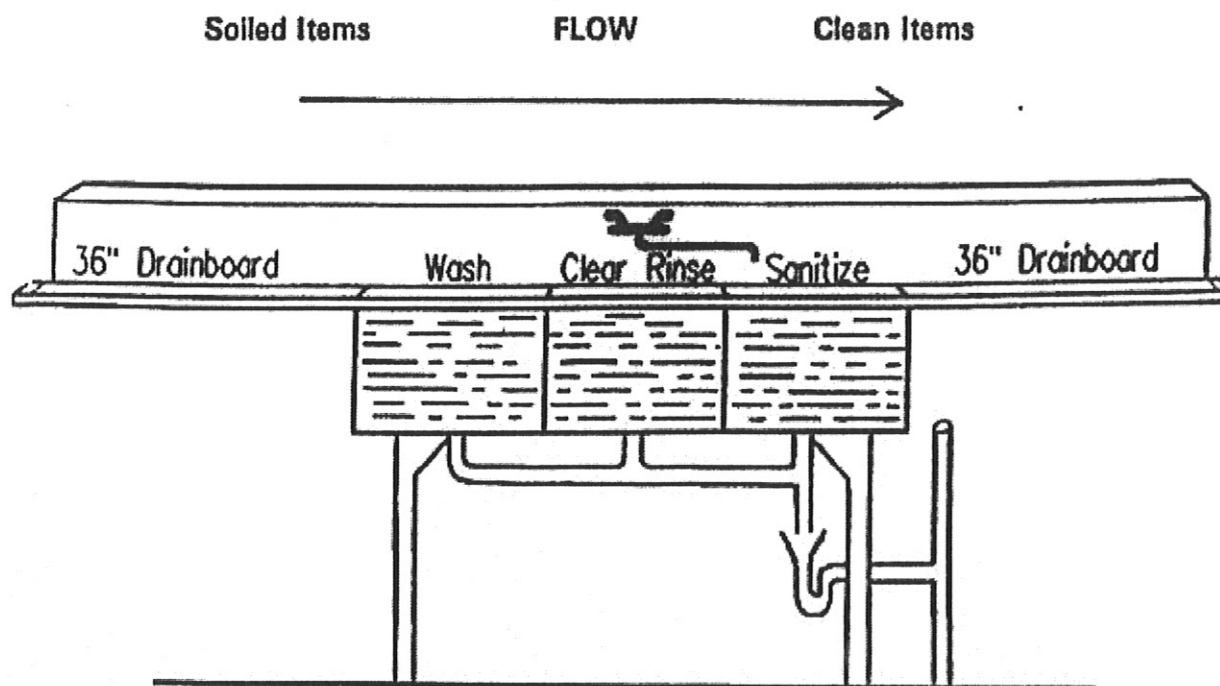


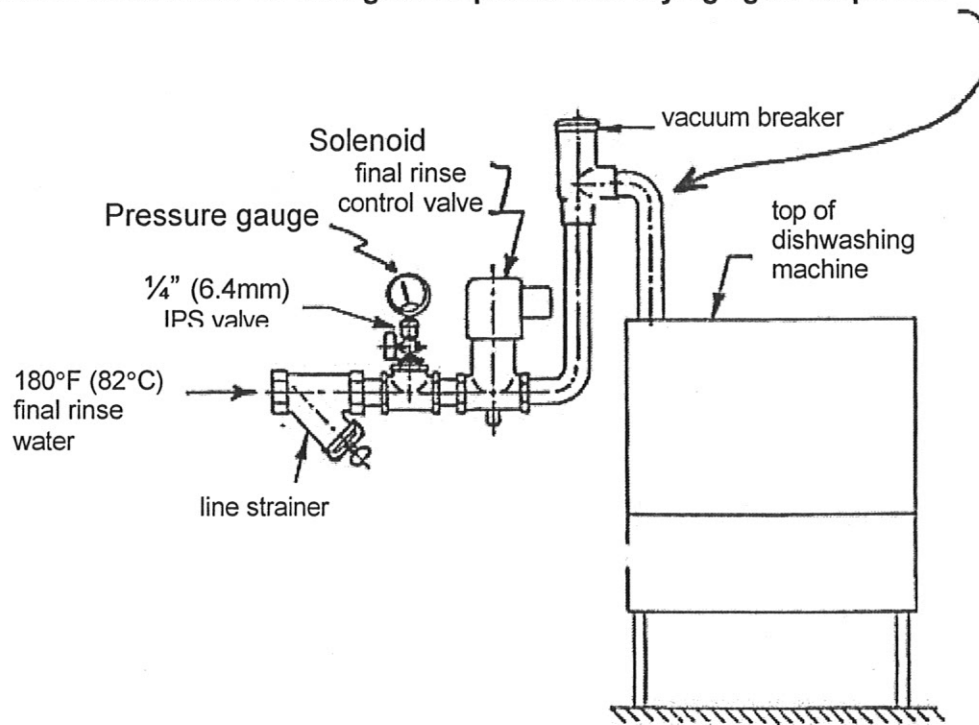


Recommended warewashing arrangement using three-compartment sink. Drainboards for soiled dishes and for cleaned utensils must be adequate. A 36" drainboard should have a pitch of  $\frac{1}{8}$ " to  $\frac{3}{8}$ " per foot toward the sink.

### Three Compartment Sink With Indirect Waste

Figure 8-1

**Point of installation for detergent dispenser and drying agent dispenser**



## **Recommended Warewashing Machine Installation**

**Figure 8-3**

One way to estimate the projected hot water demand (gallons per hour final rinse) of mechanical warewashing machines, pot and pan washers and silverware washers, is to refer to the manufacturers' specification sheet for the particular make and model of the 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 an incoming water temperature of 40°F to the food establishment unless specific data are available) for each piece of equipment. These figures can then be converted 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 calculate BTU's or KW's, use the following formulas: (1 gallon of water = 8.33lbs)

For gas heaters (in BTU's):

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

For electrical heaters (in KW):

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

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

| <u>Equipment</u> | <u>Gallons Per Hour<br/>Demand from Chart</u> | <u>Temperature<br/>Required</u> | <u>Temp. Rise</u> |
|------------------|-----------------------------------------------|---------------------------------|-------------------|
| 3 Comp't sink    | 60                                            | 140°F                           | 100°F             |

$$\frac{60 \text{ (gph)} \times 100 \text{ degree temp. rise} \times 8.33}{.70 \text{ (operating efficiency)}} = 71,400 \text{ BTU's}$$

OR

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

Assume an incoming water temperature of 40°F into the food establishment.

For mechanical warewashing, 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 rinse 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                    | =        | 4,165 BTU or 0.85 KW          |
| <u>1 Mechanical warewasher</u> | <u>=</u> | <u>76,160 BTU or 15.62 KW</u> |
| TOTAL DEMAND                   | =        | 151,725 BTU or 31.12 KW       |

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

All hot water generating equipment should conform to nationally recognized standards and be certified or classified by an ANSI certification program. The manufacturers' specification sheets (cut sheets) should be consulted for hot water supply requirements

The above provides one method of approximation. Other suitably developed calculations may be submitted for consideration. See the Guidelines from the California Directors of Environmental Health as an example of other suitable calculations, also attached are other example calculations from North Carolina's Department of Environmental Health, Food, Lodging, and Institutional Sanitation Branch.

V. **GENERAL REQUIREMENTS**

- A. A water heater shall be provided which is **capable** of generating an adequate supply of hot water, at a temperature of at least 120° Fahrenheit, to all sinks, janitorial facilities, and other equipment and fixtures that use hot water, at all times.
- B. Water heaters and their installation must be in compliance with all local building code requirements.
- C. Water heaters that use reclaimed heat from equipment to heat water must be evaluated on a case by case basis.

VI. **SIZING REQUIREMENTS FOR STORAGE WATER HEATERS**

- A. For food facilities that utilize multiservice eating and drinking utensils, the water heater shall have a recovery rate equal to or greater than 100% of the computed hourly hot water demand, in gallons per hour (GPH).
- B. For food facilities that use only single-service eating and drinking utensils, or don't use utensils at all, the water heater shall have a recovery rate equal to or greater than 80% of the computed hourly hot water demand, in GPH.
- C. For food facilities that handle and sell **only** prepackaged foods, a water heater with a minimum storage capacity of ten gallons must be provided.
- D. The hourly hot water demand for the food facility, in GPH, is calculated by adding together the estimated hot water demands for all sinks and other equipment, such as dishmachines, which utilize hot water. The estimated hot water demands for sinks and other equipment that utilize hot water are listed in Appendix I. The hot water demands for automatic warewashers, such as dishmachines, glasswashers, and potwashers are found in NSF International listings or listings established by other nationally recognized testing laboratories.
- E. The following examples are provided to explain how to calculate the total hourly hot water demand:

- 1. Food facility that utilizes only single service eating and drinking utensils:

Assume:

|                                    |                                      |
|------------------------------------|--------------------------------------|
| 1 18" X 18" three compartment sink | 42 GPH                               |
| 2 hand lavatories                  | 10 GPH (5 GPH each)                  |
| 1 janitorial sink                  | 15 GPH                               |
|                                    | 67 GPH total hourly hot water demand |

67 GPH X 80% allowance for single service utensils = 54 GPH

For the food facility in this example, a water heater would be required which will recover 54 GPH.

- 2. Food facility that utilizes multiservice eating and drinking utensils:

Assume:

|                                       |        |
|---------------------------------------|--------|
| 1 18" X 18" three compartment sink    | 42 GPH |
| automatic dishmachine                 | 80 GPH |
| hand spray pre-rinse                  | 45 GPH |
| one compartment food preparation sink | 5 GPH  |

determine their requirements.

- B. Instantaneous water heaters must be sized to provide hot water of at least 120° Fahrenheit, and at a rate of at least two gallons per minute (GPM), to each sink and fixture that utilizes hot water. (Note: Hand lavatories must receive at least 1/2 GPM.) The following example is provided to explain how this sizing criteria is applied:

Assume:

|                                    |                      |
|------------------------------------|----------------------|
| 1 18" X 18" three compartment sink | 2 GPM                |
| 2 hand lavatories                  | 1 GPM (1/2 GPM each) |
| 1 janitorial sink                  | <u>2 GPM</u>         |
|                                    | 5 GPM                |

- C. In the example given above, one or more instantaneous water heaters would have to be provided in order to supply a total of at least 5 GPM.
- D. Food facilities that install an automatic warewashing machine that utilizes a large quantity of hot water may be required to provide an instantaneous water heater exclusively for the warewashing machine. NSF International listings or listings established by other nationally recognized testing laboratories are used to determine the minimum GPM hot water demand for automatic warewashing machines.

#### **VIII. REQUIREMENTS FOR BOOSTER HEATERS**

- A. When a hot water sanitizing warewashing machine is used, a booster heater must be provided that will raise the incoming general purpose hot water up to at least 180° Fahrenheit for the final sanitizing rinse cycle.
- B. When sizing a booster heater, the hot water demand for the warewashing final sanitizing rinse cycle should be obtained from the NSF International listings or listings established by other nationally recognized testing laboratories.
- C. The formulas for calculating BTU or KW input listed in section VI.F. should be used when determining the minimum required size for a booster heater.
- D. When a booster heater is installed below a drainboard, it shall be installed at least six inches above the floor and away from the wall, and in a manner that will allow accessibility for proper cleaning and servicing.

#### **IX. RECIRCULATION PUMPS**

- A. Where fixtures are located more than sixty feet from the water heater, a recirculation pump must be installed, in order to ensure that water reaches the fixture at a temperature of at least 120° Fahrenheit.
- B. In some cases it may be more practical to install a separate, smaller water heater for remote fixtures, such as for restroom handsinks.

#### **X. INSTALLATION REQUIREMENTS**

- A. Where feasible, water heaters should be located in an area of the food facility separated from all food and utensil handling areas.
- B. The Uniform Building Code prohibits the installation of gas water heaters in restrooms or change rooms.