

# Warewashing Machines

Their Impact on Food Safety

FOOD PROTECTION CONNECTION



## TIPS TO ENSURE THAT DISHMACHINES ARE WORKING PROPERLY AT ALL TIMES

One of the most forgotten and abused pieces of equipment in a foodservice facility is the dishwasher, yet the dishmachine has the critical job of cleaning dishware and reducing potential pathogens to safe levels by correctly sanitizing them. If dishes are not properly cleaned and sanitized, pathogens could persist. Not only can pathogens be dangerous, but your customers will not be happy when presented with 'dirty' dishware. This could hurt your reputation and brand.

It is the responsibility of the facilities management to ensure that the dishmachine is working properly at all times. Unfortunately, too many managers rely on service

companies to 'check' their machines once a month. Machines must be monitored and verified *daily*.

You may come across the terms "warewashing," "warewashing machine," "warewashing equipment," etc. So, what is warewashing and how does it differ from dishwashing? The two terms are completely interchangeable. A warewasher is simply another word for a dishwasher, getting its name from dinnerware, flatware, glassware, and other 'wares' that are commonly cleaned in the machine. Which terms are used comes down to personal preference, but the meanings are the same.



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There are two broad categories of warewashing machines in the food industry: high temperature and low temperature.

### What are high temp and low temp machines?

These two terms refer to the sanitation cycle of the machine. High temp commercial machines use an internal heater to heat water to 180°F in order to kill any microorganisms and effectively remove grease from dishes. Low temp commercial machines rely on a chemical bath, such as chlorine, to sanitize dishes.

### HIGH TEMPERATURE MACHINES

- Use heat to sanitize dishes and glassware.
- Must achieve 180°F at the manifold to meet NSF standards (165°F for stationary rack machines).
- Must achieve 160°F on the plate to be considered sanitized.
- Must have a thermometer installed to measure the temperature of the water at the manifold, where it sprays into the machine.
- Must have a working pressure measuring device and when operational pressure ranging from 5 pounds per square inch to not more than 30 pounds per square inch.

- Facility must have an irreversible registering temperature indicator provided and accessible to measure sanitizing temperature.
- Use slightly more energy than a low temp dishwasher.
- Do not require the regular purchase of chemicals.
- Do not damage flatware and plastics, unless excessive heat is used.
- Flash dry dishes at the end of the wash cycle and shorten air drying time.
- Generally wash dishes faster.
- Occasionally need a booster heater to reach the required sanitizing temperatures.

### LOW TEMPERATURE MACHINES

- Use a chemical bath, usually chlorine, to sanitize dishes and glassware.
- Are less effective at removing grease.
- Are slightly more energy efficient than high temp models.
- Can damage flatware and plastics if chemicals are used at elevated concentrations.
- Require you to purchase chemicals regularly.

- Require the use of proper chemical test strips to measure the chemical concentration.
- Decrease the chance of employee burns or scalding due to lower temperatures.
- Wash water is cooler, but not below 120°F.
- Rinse water should be between 75°F and 120°F.

Within these two types of dishwashers—high temp and low temp—are various styles of dishmachine. Generally, in the foodservice industry we see conveyor type machines and rack type machines. There may be an undercounter unit in facilities with very limited space or behind bars.

### Conveyor machines

are large, cumbersome, powerful, and able to process 350 to 1000 racks every day. These commercial warewashing machines are made of stainless steel and designed for heavy use in cafeterias, hospitals, and other high-volume operations. Many come with microprocessors and easy controls to set washing conditions. There are also ENERGY STAR models to cut down on electricity consumption. They are made in both high temp and low temp models.

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### SANITATION WEBINAR

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**Door type or rack dishwashers** are smaller and designed to connect to a clean dish table or dirty dish table that are attached to each side of the machine. There is no conveyor belt, only a stationary rack. The idea is to fill a compatible rack full of dishes, push it inside the dishwasher, close the door, and run the cleaning cycle. This type of commercial warewasher can typically process 30 to 350 racks every day, making them great for localized operations like mom-and-pop restaurants or those with limited space. You can find these with high and low temp designs.

### WHAT THE FDA FOOD CODE SAYS ABOUT WAREWASHING MACHINES

- There must be a data plate affixed to the machine indicating the operational specifications, such as temperature for washing, rinsing and sanitizing, pressure required for heat sanitizing machines, and conveyor speed or cycle time.
- Must have mounted temperature measuring device that measures wash, rinse, and final rinse temperatures.
- Must automatically dispense detergents and sanitizers.
- Must incorporate a visual means (or alarm) to verify that detergents and sanitizers are delivered.
- Have side tables/drainboards.
- Machines should be self-draining.
- Warewashing equipment must be maintained clean.
- Wash water temperature must range from 150°F – 165°F.
- Hot water sanitizing in a mechanical operation, the temperature of the hot water sanitizing rinse as it enters the manifold may not be more than 194°F, or less than:
  - > For a stationary rack, single temperature machine, 165°F; or
  - > For all other machines, 180°F.
- Low temperature machines using chlorine as a chemical sanitizer should have a concentration between 50ppm and 100ppm and be measured using the appropriate chemical test kits.

The newest addition to the FDA Food Code, as it relates to warewashing machines, is the need to have an 'irreversible registering temperature indicator' provided and accessible. What is this? It's a thermometer that will take the maximum temperature reached and will hold that temperature for viewing even when removed from the

heat source. According to the Food Code, effective mechanical hot water sanitation occurs when the surface temperatures of utensils passing through the warewashing machine meet or exceed the required 160°F. Parameters such as water temperature, rinse pressure, and time determine whether the appropriate surface temperature is achieved. Although the Food Code requires integral temperature measuring devices and a pressure gauge for hot water mechanical warewashers, the measurements displayed by these devices may not always be sufficient to determine that the surface temperatures of utensils are actually reaching 160°F. These gauges are often not working properly on older machines. The regular use of irreversible registering temperature indicators provides a simple method to verify that the hot water mechanical sanitizing operation is effective in achieving a utensil surface temperature of 160°F.

Several options exist in the irreversible registering thermometer world. You can have a waterproof digital or dial thermometer that you put through the machine or utilize thermal paper or thermal stickers. Digital and dial

thermometers must be calibrated. Waterproofness is also questionable. Thermal labels/stickers are becoming very popular; however, these types of temperature indicating devices are often misunderstood. Let's understand this technology better.

Sanitarians, health departments, and restaurant owners often ask how thermometer test strips are used to test dishwasher sanitation. One of the most common questions asked is why a 160°F temp label/sticker did not change to black when the dishwasher rinse water was set to 180°F. What is important to note in these instances is that the test strip—which is affixed to your plate, glass, or other dishware—tests the temperature of the surface it is on. The temperature of a surface is not necessarily equal to the ambient temperature. The rinse water temperature needs to increase the surface temperature of the dishware to 160°F and hold it at or above







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that temperature for at least a few seconds in order for the dishwasher label to indicate that 160°F has been reached. One spray of 180°F water does not guarantee that everything sprayed is instantly brought to 180°F or even to 160°F. It takes time for the temperature to rise to this level. The previous temperature of the dishware and its composition (material, thickness, etc.) affects how rapidly this temperature change occurs. When the temperature sensitive element in a test strip changes to black at its edges only, this indicates that the surface reached 160°F, but for too short of a period for the label to react completely.

Another common question addresses the proper placement of temperature indicators. Placement is important. The label/sticker must be affixed to the surface that is being sanitized. Placing a label on the dishwasher rack would only serve to verify that the rack was sanitized, clearly not the purpose of the test. Affix the label to a clean dish or glass to verify that your dishware is being sanitized. Press firmly and ensure that no air is trapped beneath the label. Make sure that the surface is clean; food debris beneath the label can alter its effectiveness. Do not place the label loose in the dishwasher because the result will not accurately indicate whether or not the dishware has been sanitized. The temperature label must be affixed to a surface.

Sometimes a sanitarian tells a facility owner that they need to use 180°F

test strips in their warewasher. This is incorrect. When someone requests 180°F temperature labels it almost always ends up being a miscommunication between the owner/manager and the sanitarian. The FDA Food Code specifically states that "achieving a utensil surface temperature of 160°F as measured by an irreversible registering temperature indicator" is required. Other Food Code temperature regulations can apply, for instance in dishwashers that operate with chemical sanitation but the general required temperature is 160°F. Chemical sanitation typically requires a thermal test strip of a lower temperature, such as 110°F (43.3°C) or 140°F (60°C).

Take time to review the cleanliness and operation of your warewashing machine daily. Never rely on monthly checks to do that for you. At the start of the day ask yourself: Is the machine and the area around it clean? Is the machine reaching the proper temperatures to clean and sanitize properly? If sanitizer is used, is it at the proper concentration? Is my staff today trained to work the dish room in a manner to achieve proper sanitation with no cross-contamination?

The dishmachine, dish room, and yes, even the dishwasher are very important contributors to the sanitary operation of your facility. Failure to control this area could result in a foodborne illness. ■

## SOURCES

1. *2013 FDA Food Code*
2. *Food Safety: Cleaning and Sanitizing*. Department of Family and Consumer Sciences. NC State University, Raleigh, NC

## FOOD PROTECTION CONNECTION

Reading *Warewashing Machines and Their Impact on Food Safety* and successfully completing these questions online has been approved for 1 hour of Sanitation continuing education for CDM, CFPPs. CE credit is available ONLINE ONLY. To earn 1 SAN CE hour, purchase the online CE quiz in the ANFP Marketplace. Visit [www.ANFPonline.org/market](http://www.ANFPonline.org/market), select “**Publication**,” then select “**CE article**” at left, then search the title “*Warewashing Machines and Their Impact on Food Safety*” and purchase the article.

- What are the two general types of warewashing machines?
  - High temp and medium temp
  - High temp and low temp
  - High temp and sanitizer
- The plate temperature that must be reached on heat sanitizing machines should be
  - 180°F
  - 160°F
  - 120°F
- There are generally two styles of machines found in foodservice operations. They include
  - Conveyor rack machines
  - Stationary conveyor machines
  - Conveyor machines
- The most common chemical used as a sanitizer in low temp machines is
  - Chlorine @ 50-100 ppm
  - Quaternary ammonia @ 200 ppm
  - Iodine @ 25 ppm
- Warewashing machines should be checked at least \_\_\_\_\_ to ensure proper functioning
  - Weekly
  - Monthly
  - Daily
- For a low temperature machine, the wash water should not be below
  - 110°F
  - 120°F
  - 160°F
- Any facility with a heat sanitizing machine must have a
  - Digital thermometer
  - Reversible registering thermometer
  - Irreversible registering temperature indicator

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