Recommended Field Evaluation Procedures for Commercial Warewashing Machines

Dishwashing machines belong to one of two categories: the hot water sanitizing type or the chemical sanitizing type. The evaluation procedures described here depend on the type of machine to be checked. For specific machine information, consult the current NSF Food Service Equipment Listing at www.nsf.org

Study the Data Plate of the Machine

Close adherence to the manufacturer's specifications as listed on the data plate ensures proper evaluation. Check to assure that the following conditions exist:

1. Scrap trays are clear of soil.
2. Dishes properly prescraped and racked.
3. On conveyor – type machines, curtains intact and in proper position.
4. Conveyor speed according to manufacturer's specifications.
5. Overflow standpipe in place and not blocked or leaking.
6. Wash and rinse pump inlet unobstructed. Tank interior clear of buildup of lime, food soils, etc.
7. Wash and rinse nozzles clear of obstructions and lime deposits.
8. End caps in place on wash and rinse arms.
9. Rinse arm nozzle alignment correct.
10. Rinse line strainer clear.
11. Wash and rinse thermometers accurate or properly calibrated.
12. Pressure regulator functioning properly.
13. Flow pressure 20 ± 5psi (where required).

Checking Temperatures In Dishwashing Machines

1. Heat accumulation on dishes over a period of time in hot water sanitizing machines, not merely a single temperature, achieves proper sanitization. Therefore, each of the wash, power rinse (on some machines), and final rise cycles must be operating at its proper temperature. For hot water sanitizing machines, the following should be determined:
   a. No deposits (e.g., lime, napkins, etc,) on the heating elements.
   b. On gas-heated machines, tank gas heater jets not obstructed.
   c. No excessive ventilation in the removal of steam and condensation.
2. Unless the machine has been used just prior to testing, it should be run through at least two complete wash and final rise cycles before temperature readings are taken. On conveyor machines, this is done by running a rack through the machine twice.
3. Temperatures of wash water and pumped rinse water are taken directly from the tanks of the machines. As standard practice, the temperature of the water during the final rinse cycle should be taken at the inlet manifold.
4. Maximum-registering thermometers or thermo-labels (paper thermometers that change color when reaching specified temperatures) may be used to confirm the effectiveness of heat sanitization. For hot water sanitizing machines, a reading of 160°F at the dish level, measured using a maximum registering or paper thermometer, is an indication of satisfactory sanitization.
5. To give accurate reading, the maximum registering thermometer should be attached in a vertical position to the machine. Rubber bands or clips may be used to hold the thermometer in place. The thermometer should also be removed from any case or guard when used. Thermo-labels are attached by pressure-sensitive adhesive tape to a clean, dry china plate.
6. Although absolute accuracy cannot be expected from thermometers, a variation of from 1 to 2°F in either direction is acceptable.

NSF Specifications for Various Types of Warewashing Machines

The accompanying charts summarize the requirements detailed in NSF Standard No. 3 for commercial warewashing machines (See reverse side of this guide).

1. The figures on the table represent minimum requirements. NSF testes the final rinse flow pressure at 20 psi as optimum pressure, but allowable flow pressures range from 15 to 25 psi.
2. If the manufacturer's data plate indicates a flow pressure, the machine must carry a gauge valve to measure it. If the data plate does not state a flow pressure, the machine is not required to carry a gauge valve.
3. Temperatures stated on the dish machine data plate are minimums. Except for chemical sanitizing machines, the machine should not heat to more than 15°F about its minimum temperatures.

Hot Water Sanitizing Specifications

	Minimum wash temp.	Minimum pumped rinse temp.	Minimum sanitizing rinse temp.	Maximum sanitizing rinse temp.	Sanitizing rinse pressure (range)
stationary rack/single temp.	165 °F (74 °C)	N/A	165 °F (74 °C)	195 °F (90 °C)	20 ± 5 psi (138 ± 34kPa)
stationary rack/dual temp.	150 °F (66 °C)	N/A	180 °F (82 °C)	195 °F (90 °C)	20 ± 5 psi (138 ± 34kPa)
single tank conveyor	160 °F (71 °C)	N/A	180 °F (82 °C)	195 °F (90 °C)	20 ± 5 psi (138 ± 34kPa)
multiple tank conveyor	150 °F (66 °C)	160 °F (71 °C)	180 °F (82 °C)	195 °F (90 °C)	20 ± 5 psi (138 ± 34kPa)

Chemical Sanitizing Specifications

Sanitizing solution type	Final rinse temperature	Concentration
chlorine solution	min: 120 °F (49 °C)[1]	min: 50 ppm (as NaOCl)
iodine solution	min: 75 °F (24 °C)	min:12.5 ppm - max: 25 ppm
quaternary ammonium solution	min: 75 °F (24 °C)	min: 150 ppm - max: 400 ppm

[1] For glasswashing machines that use a chlorine sanitizing solution, the minimum final rinse temperature specified by the manufacturer shall be at least 75 °F (24 °C).

Some Chemical and Physical Factors Affecting the Dishwashing Process		
Symptoms	Possible Cause	Suggested Solution
Dishes Soiled	Insufficient Detergents	Use enough detergent in wash water to ensure complete soil suspension
	Wash Water temperature too low	Keep water temperature within recommended ranges to dissolve food residues and to further facilitate heat accumulation (for sanitization)
	Inadequate wash and rinse times	Allow sufficient time for wash and rinse operation to be effective. (Time should be automatically controlled by timer or by conveyor speed. The timer may need to be reset or the conveyor speed adjusted.)
	Insufficient prescribing	Do a better job of water-scraping dishes prior to washing.
	Improper racking or placing	Rack dishes according to size and type in appropriate rack
Films	Water Hardness	Use an external softening process. Use more detergent to provide internal conditioning. Use a chlorinated cleaner. Check temperature of wash and rinse water. Water maintained above recommended ranges may cause filming.
	Detergent carryover	Maintain adequate pressure and volume of rinse water.
	Improperly cleaned or rinsed equipment	Prevent scale buildup in equipment by adopting frequent and adequate cleaning practices. Maintain adequate water pressure and volume.
Greasy Films	Low pH Insufficient detergent Low Water temperatures	Maintain adequate alkalinity to saponify greases. Check amount of detergent, water temperature.
	Improperly cleaned	Unclog all wash and rinse nozzles to proved proper equipment spray action. Clogged rinse nozzles may also interfere with wash tank overflow.
Streaking	Alkalinity in the water	Use an external treatment method to reduce alkalinity
Spotting	Rinse water hardness	Provide external or internal softening
	Rinse water temperature too high or too low	Check rinse water temperature. Dishes may be flash drying, or water may be drying on dishes rather than drying off.
	Inadequate time between rinsing and storages	Allow sufficient time for air drying.
Foaming	Detergent	Change to a low sudsing product
	Water too soft or too hard	Use an appropriate treatment method to adjust the condition of the water.
	Food Soil	Adequately remove gross soil before washing. The decomposition of carbohydrates, proteins, or fats may cause foaming during the wash cycle
	Wash temperature too low	Increase wash temperature.

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