



Standard Specification for Chemical Sanitizing Commercial Dishwashing Machines, Recirculated Wash, Fresh Water Rinse Type¹

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1. Scope

1.1 This specification covers manually fed, spray-type, stationary rack, automatically controlled chemical sanitizing commercial dishwashing machines.

NOTE 1—Several standards that apply generally to the product described in this specification are listed in the [Appendix X1](#).

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI units in parentheses are provided for information only.

1.3 The following precautionary caveat pertains only to the test method portion: Section 13, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards*:²

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A 554 Specification for Welded Stainless Steel Mechanical Tubing

A 582/A 582M Specification for Free-Machining Stainless Steel Bars

B 127 Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip

F 760 Specification for Food Service Equipment Manuals

2.2 *NSF International Standards*:³

NSF/ANSI 3 Commercial Warewashing Equipment

NSF/ANSI 5 Commercial Hot Water Generating Equipment

NSF/ANSI 29 Detergent/Chemical Feeders for Commercial

Spray-Type Dishwashing Machines

NSF Listings—Food Equipment

2.3 *OSHA Standard*:⁴

Title 29, Code of Federal Regulations (CFR) Chapter XVII, Part 1910

2.4 *Underwriters Laboratories, Standard*:⁵

UL 921 Commercial Electrical Dishwashers

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *chemical sanitizing commercial dishwashing machines*—machines that uniformly wash, rinse, and sanitize eating and drinking utensils. The machines shall be capable of removing physical soil from properly racked and prescraped items, and sanitizing multiple-use eating and drinking utensils. The dishwashing machines shall consist of the following principal parts: legs, wash chamber hood, tank, doors, spray assemblies, pumps, motors, controls, piping, valves, and accessories.

4. Classification

4.1 *General*—Dishwashing machines shall be of the types, styles, classes, size, and capacity group as specified in 4.2-4.4. All dishwashing machines of the same classification, model, or material list designation furnished with similar options under a specific purchase order shall be identical to the extent necessary to ensure interchangeability of component parts, assemblies, accessories, and spare parts.

4.2 *Types*:

4.2.1 *Type I (Straight-Through Model)*—This machine is used in line with the table on each side.

4.2.2 *Type II (Corner Model)*—This machine is used in corner placement forming a 90° (1.57 rad) side.

4.3 *Styles and Classes*:

4.3.1 *Style 1 (Steam Heated)*—Low pressure steam (10 to 15 psi (68.9 to 103.4 kPa)) flowing pressure at point of machine connection:

4.3.1.1 *Class A—Injector*.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Available from NSF International, P.O. Box 130140, 789 N. Dixboro Rd., Ann Arbor, MI 48113-0140.

⁴ Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401.

⁵ Available from Underwriters Laboratories (UL), Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

4.3.1.2 *Class B*—Heat exchange coil.

4.3.2 *Style 2 (Electrically Heated)*.

4.3.3 *Style 3 (Gas Heated)*:

4.3.3.1 *Class C*—Natural gas.

4.3.3.2 *Class D*—LP gas.

4.4 *Size and Capacity*—Racks of 19³/₄ in. (502 mm), nominal, at a minimum of 50 racks per hour.

5. Ordering Information

5.1 Purchasers should select the preferred options permitted in this specification and include the following information in the procurement document:

5.1.1 Title, designation, and year date of this specification,

5.1.2 Type, style, class, and size machine required (see 4.1),

5.1.3 When a service-supply valve is required (see 7.4),

5.1.4 Electrical power supply characteristics (current, voltage, phase, frequency) (see Section 8),

5.1.5 When a detergent feeder is required (see 7.13),

5.1.6 When a rinse agent feeder is required (see 7.14),

5.1.7 Sanitizing agent, feeder requirements, (see 7.15),

5.1.8 Accessory equipment, spare and maintenance parts required, as suggested by manufacturer,

5.1.9 Treatment and painting if other than specified (see Section 10),

5.1.10 When energy consumption profiles, water consumption profiles, or productivity profiles are desired (see 13.3), and

5.1.11 Manufacturer's certification, when required (see Section 14).

6. Materials and Manufacture

6.1 All materials shall be specified as follows:

6.1.1 Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components of the overall assembly. The dishwashing machines shall meet the material, design, and construction requirements of **NSF/ANSI 3**.

6.1.2 *Corrosion-Resistant Steel*—Corrosion-resistant steel shall conform to the requirements of any 300 series stainless steel specified in Specifications **A 167**, **A 554**, and **A 582**.

6.1.3 *Corrosion-Resisting Material*—Corrosion-resisting material is other than corrosion-resistant steel that is equivalent in the dishwasher application.

6.1.4 *Nickel-Copper Alloy*—Nickel-copper alloys shall conform to the requirements of Specification **B 127**.

7. Construction Requirements

7.1 The dishwashing machine shall be complete so that when connected to the specified source of power, water supply, heating means (steam, electric, or gas), drainage, detergent, sanitizer and rinse agent feeder as applicable, the unit can be used for its intended function.

7.1.1 Dishwashers shall be rigid, quiet in operation, free from objectionable vibration, and so constructed as to prevent objectionable splashing of water or overflow of water to the outside of the machine. Parts requiring adjustment or service, or both shall be readily accessible.

7.1.2 The machine shall wash dishes by means of a water and detergent solution pumped from a tank, and shall final rinse

the dishes with fresh water from an outside source with sanitizer solution. Provisions shall be made to fill the wash tank either directly from the regular hot water supply with a hand valve or solenoid, or both.

7.1.3 The wash and chemical sanitizing rinse cycles shall be automatically controlled.

7.1.4 A light shall be provided to indicate when the machine is in operation.

7.1.5 Machines shall be provided with tracks of corrosion-resistant steel or other corrosion resisting material not less than 0.070 in., (1.8 mm). Dishwashers shall have an inside working height, including the door height, of not less than 16¹/₂ in. (419 mm) above the track.

7.2 *Piping, Tubing, Fittings, and Valves (Installation)*—Connections shall be readily accessible to facilitate installation and maintenance. Piping, tubing, and valves shall be located, whenever possible, on the exterior of the machine.

7.3 *Piping and Fittings*—Water, steam piping, and fittings shall be of corrosion-resisting material. Fresh water supply to the tank shall be discharged not lower than 2 in. (50.8 mm) above the maximum flood level rim, or an effective air gap or vacuum breaker shall be installed to prevent backflow in accordance with **NSF/ANSI 3**. The drain and other plumbing connections shall be standard pipe or tubing connections. Drainage piping shall be corrosion-resisting material, or suitable heat-resisting plastic material. (Drain shall have only one connection to the waste line.)

7.4 *Valves*—Steam valves shall be corrosion-resisting material designed for steam applications and for a saturated steam working pressure of 50 psi (344.6 kPa). When specified, a separately packed service supply valve shall be provided for closing the supply of water to the dishwasher. The drain valve shall be permanently marked to show “Open” and “Closed” positions and shall be lever-operated or wheel-operated, ruggedly designed for foot or hand operation except when drain valve closure is automatic. Fresh water rinse valves shall be reliable and fully automatic and suitable for 210°F (98.9°C) water. The manually operated valves, when used, shall be identified.

7.5 *Spray Assemblies*—All spray nozzles and spray arm manifolds shall be of corrosion-resisting materials. All spray assemblies shall be removable without the use of tools and shall be easy to clean.

7.6 *Tank*—The tank shall be constructed of not less than 0.055 in., (1.40 mm), thick corrosion-resistant steel, or other corrosion-resisting material.

7.7 *Overflow*—The dishwashers shall have a readily accessible overflow unit in the tank. The overflow unit, or cover, when provided, shall be removable for cleaning.

7.8 *Scrap Trays (Strainers)*—Scrap trays of corrosion-resistant steel, not less than 0.044 in. (1.12 mm) thick, or other corrosion-resisting material shall be provided to prevent insoluble matter and large pieces of food residue from passing into the tank. The ledges on which the scrap trays rest shall be so designed that surfaces beneath the ledges are easily accessible for cleaning when the trays are removed. Any opening around or between scrap trays shall be held to a minimum.

7.9 *Access Doors*—Door and door frames shall be constructed of not less than 0.044 in., (1.12 mm), thick corrosion-resistant steel, or other corrosion resisting material, and shall be rigid and stiffened as necessary. Loading and unloading door(s) shall be counterbalanced and, when in the open position, shall electrically interlock the machine so that it cannot operate. Opening the door during operation shall automatically stop the machine. Door catch(es) shall be provided on inspection door(s) not counterbalanced. Door(s) shall be splashproof and their exposed edges shall be smooth and formed to prevent canting or warping.

7.10 *Legs (Feet)*—The machine shall be rigidly constructed and have four or more legs (feet) made of corrosion-resistant steel, or other corrosion-resisting material. Legs shall be adjustable, so that the height of the track may be varied from 34 to 35 in. (863.6 to 889 mm) above the floor.

7.11 *Pump and Motor Assemblies:*

7.11.1 *Assemblies*—The pump and motor assembly shall be mounted on the tank or on a rigid steel base. Rotary seals shall be provided for pump shafts and shall be removable for servicing.

7.11.2 *Pump*—Pump casings shall be cast iron or corrosion-resisting material and shall have a removable cover or inspection plate, or be of such a design as to permit ease of accessibility for inspection and removal of foreign items from the impeller and interior. The pump shall either be self-draining or equipped with means for draining. The shaft shall be of corrosion-resistant steel, properly aligned and supported. The impeller shall be corrosion-resisting material or iron alloy and shall be in dynamic balance. The pump shall have at least two ball or roller bearings, except that when the pump and motor are mounted on the same shaft, at least two ball or roller bearings shall be provided for the motor and pump. The pump suction intake shall be provided with a corrosion-resistant strainer or shroud.

7.12 *Heating*—Style 1, 2, and 3 machines shall be capable of maintaining required temperature levels in the tank.

7.12.1 *Style 1*—Style 1 machines shall be suitable for operation with a steam supply flow pressure of from 10 to 15 psi (68.9 to 103.4 kPa). Temperature regulators (thermostats) shall be provided for maintaining the proper water temperature in the tank. Low water protection shall be provided. Steam heat will be provided by tube-type heat exchangers, steam injectors, or a combination of both. Check valves or vacuum breakers must be used on all injector type heating units to prevent back siphoning. The minimum operating pressure shall be specified by the manufacturer and the maximum operating pressure shall not exceed 15 psi (103.4 kPa).

7.12.2 *Style 2*—Style 2 machines shall be equipped with electric heater elements and sheaths of 300 series corrosion-resistant steel or other corrosion-resisting material. They shall be provided with temperature regulators (thermostats) for maintaining the proper water temperature in the tank. Low water protection shall be provided.

7.12.3 *Style 3*—Style 3 machines shall be equipped with a gas burner assembly including safety pilot or electronic ignition, shut-off valves, and flue suitable for operation with type of gas specified. They shall be provided with temperature

regulators (thermostats) for maintaining the proper water temperature in the tank. Low water protection shall be provided.

7.13 *Detergent Feeder*—When specified, an electric or electronic automatic detergent feeder conforming to **NSF/ANSI 29** shall be separately packed with the dishwasher. The reservoir of the feeder shall be capable of holding a supply of dishwashing detergent adequate in normal dishwashing operation for one meal period.

7.14 *Rinse Agent Feeder*—When specified, a separately packed rinse agent feeder conforming to the requirements or **NSF/ANSI 29** shall be supplied with the dishwasher.

7.15 *Sanitizing Agent Feeder*—Specify a separately packed sanitizing agent feeder conforming to the requirements of **NSF/ANSI 29** for the dishwasher.

8. Electrical, Steam, and Gas Equipment Requirements

8.1 The electrical, steam, and gas equipment shall meet the requirements of **UL 921**. The dishwasher shall operate on the power characteristics (current, voltage, phase, frequency) specified.

8.2 *Motors*—Motors shall comply with the applicable requirements of **UL 921**. The horsepower ratings of the motors shall be adequate to meet the pump requirements of **NSF/ANSI 3**.

8.3 *Controls*—All control equipment shall conform to **UL 921** and be capable of operation in an ambient room temperature of $115 \pm 9^\circ\text{F}$ ($46 \pm 5^\circ\text{C}$).

8.4 *Wiring and Circuit Safety Devices*— All wiring and circuit safety devices shall be in conformance with **UL 921**. All wiring between the dishwashing machine components shall have provisions for connection at a recognized junction on the machine, except electric heaters and booster heaters requiring connections to the main electrical power supply.

9. Lubrication Requirements

9.1 Means for effective and adequate lubrication shall be provided when required. Lubrication points shall be readily accessible, and the dishwasher shall be lubricated with the proper amount of lubricant prior to delivery.

10. Treatment and Painting Requirements

10.1 Unless otherwise specified, the dishwasher shall be treated and painted in accordance with the manufacturer's standard practice. All surfaces of the machine, other than corrosion resisting materials, shall be protected against corrosion in the use environment and shall present a neat appearance.

11. Performance Requirements

11.1 *Performance Standards Compliance*— Dishwashing machines shall conform to the requirements of OSHA, **UL 921**, and **NSF/ANSI 3**. Detergent and rinse feeders, when specified, shall comply with **NSF/ANSI 29**. Electric and gas booster heaters, when specified, shall conform to **NSF/ANSI 5**.

11.2 *Noise Level*—Unless otherwise specified, the noise level of the dishwasher when operating, exclusive of loading, unloading, and servicing, shall not exceed 80 dB at loading or

unloading stations, measured at 5 ft (1.5 m) above the floor and 2 ft (0.61 m) away from the dishwasher.

12. Quality Assurance

12.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all requirements as specified in this specification. Except as otherwise specified in the contract or order, the manufacturer may use his own or any other facility suitable for testing of the machine requirements specified herein.

13. Test Methods

13.1 *Operational*—Test each machine thoroughly in accordance with manufacturer's instructions to determine compliance with the requirements of **NSF/ANSI 3** and **UL 921**.

13.2 *Leakage*—No leakage shall occur when tested at pressures up to 125 % of the manufacturer's recommended supply line pressure.

13.3 *Performance Profiles*—A new standard is to be developed for energy consumption, water consumption, and productivity profiles.

14. Certification

14.1 Certification of compliance with the standards cited in this specification shall be provided to the purchaser if required in the purchase document.

14.2 *UL Listing*—Acceptable evidence of meeting the requirements of **UL 921** shall be UL listing, or UL label, or certification by an independent nationally recognized testing laboratory, acceptable to the user, to the UL standard.

14.3 *NSF Listing*—Acceptable evidence of meeting the requirements of **NSF/ANSI 3** and **NSF/ANSI 29** shall be the **NSF Certification Mark on the finished dishwashing machine and sanitizing agent feeder and listing in the NSF Listings—Food Equipment**, or certification by an independent nationally

recognized testing laboratory, acceptable to the user, to the NSF/ANSI standards. Certification specified under **11.1** will be acceptable as evidence of compliance.

15. Product Marking

15.1 *Machine Identification*—Identification shall be permanently and legibly marked directly on the dishwashing machine or on a corrosion-resistant material securely attached to the machine at the source of manufacture. Identification shall include the manufacturer's model, serial number, name, and trademark to be readily identifiable. In addition, information required by **NSF/ANSI 3** and **UL 921** shall be included on the dishwasher or on the data plate.

15.2 *Instruction Plate*—An instruction plate of corrosion-resisting material shall be attached to each machine at a height readily visible to the operator. The instruction plate shall list the required time and water temperatures for wash and final rinse.

16. Machine Manuals

16.1 The following information shall be supplied in the manuals:

- 16.1.1 Installation instructions,
- 16.1.2 Operating guide,
- 16.1.3 Maintenance and service procedures, and
- 16.1.4 Service parts list

16.2 Manuals shall be in accordance with Specification **F 760**.

17. Quality Assurance

17.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all requirements as specified in this specification.

18. Keywords

- 18.1 chemical sanitizing; stationary rack; warewasher

APPENDIX

(Nonmandatory Information)

X1. APPLICABLE DOCUMENTS

X1.1 The following standards apply generally to the product described in this specification:

X1.1.1 *ASTM Standards*.²

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

A 120 Specification for Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

A 276 Specification for Stainless Steel Bars and Shapes

A 436 Specification for Austenitic Gray Iron Castings

A 681 Specification for Tool Steels Alloy

B 43 Specification for Seamless Red Brass Pipe, Standard Sizes

B 75 Specification for Seamless Copper Tube

F 861 Specification for Commercial Dishwashing Racks

X1.1.2 *American National Standards*.⁶

ANSI S1.4 Specifications for Sound Level Meters

ANSI S1.13 Methods for the Measurement of Sound Pressure Levels

X1.1.3 *National Electrical Manufacturers Association Standards*.⁷

NEMA ICS Industrial Controls and Systems

NEMA MG-1 Motors and Generators

X1.1.4 *National Fire Protection Association Standards*.⁸

NFPA 70 National Electrical Code

⁶ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

⁷ Available from National Electrical Manufacturers Association (NEMA), 1300 N. 17th St., Suite 1847, Rosslyn, VA 22209.

⁸ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

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