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An American National Standard

# Standard Specification for Commercial Dishwashing Machines (Stationary Rack, Dump Type) Chemical Sanitizing[1]

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## 1. Scope

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

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

## 2. Referenced Documents

2.1 *ASTM Standards:*[2]

A240 Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications

A276 Specification for Stainless Steel Bars and Shapes

A554 Specification for Welded Stainless Steel Mechanical Tubing

A582/A582M Specification for Free-Machining Stainless Steel Bars

B127 Specification for Nickel-Copper Alloy (UNS N04400) Plate, Sheet, and Strip

F760 Specification for Food Service Equipment Manuals

F1696 Test Method for Energy Performance of Single-Rack, Door-Type Commercial Dishwashing Machines

2.2 *OSHA Standard:*[3]

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

2.3 *NSF Standards:*[4]

NSF/ANSI 3 Commercial Warewashing Equipment

NSF/ANSI 29 Detergent and Chemical Feeders for Commercial Spray-Type Dishwashing Machines

NSF Listing Food Equipment

2.4 *UL Standards:*[5]

UL 921 Commercial Dishwashers

UL 969 Marking and Labeling Systems

2.5 *ASSE Standard:*[6]

Std. No. 1004 Performance Requirements for Backflow Prevention Requirements for Commercial Dishwashing Machines

## 3. Terminology

3.1 *Definitions:*

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

## 4. Classification

4.1 *Types, Styles, Classes, and Groups*—Dishwashing machines shall be of the following types, styles, classes, size, and capacity groups as specified:

4.1.1 *Type I*—Straight-through model, 34 in. (863.6 mm) nominal table height. This machine is used in line with table on each side.

4.1.1.1 *Style A*—Single rack.

4.1.1.2 *Size and Capacity,* 19-¾ by 19-¾-in. (501.6 by 501.6 mm) (nominal) racks at minimum of 36 racks per hour.

4.1.1.3 *Style B*—Double rack.

4.1.1.4 *Size and Capacity,* 19-¾ by 19-¾-in. (501.6 by 501.6 mm) (nominal) racks at minimum of 72 racks per hour.

4.1.2 *Type II*—Corner model, 34 in. (863.6 mm) nominal table height. This machine is used in corner placement forming a 90° table on each side.

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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 Superintendent of Documents, Government Printing Office, Washington, DC 20402.

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

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

[6] Available from ASSE International, 18927 Hickory Creek Drive, Suite 220 Mokena, Illinois 60448.

4.1.2.1 *Style A*—Single rack.

4.1.2.2 *Size and Capacity,* 19-¾ by 19-¾-in. (501.6 by 501.6 mm) (nominal) racks at minimum of 36 racks per hour.

4.1.2.3 *Style B*—Double rack.

4.1.2.4 *Size and Capacity,* 19-¾ by 19-¾-in. (501.6 by 501.6 mm) (nominal) racks at minimum of 72 racks per hour.

4.1.3 *Type III*—Under counter, front load. This machine may be installed under counters.

4.1.3.1 *Style A*—Single rack.

4.1.3.2 *Size and Capacity,* 19-¾ by 19-¾-in. (501.6 by 501.6 mm) (nominal) racks at minimum of 21 racks per hour.

## 5. Ordering Data

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

5.1.1 Title, number, and date of this specification.

5.1.2 Type I or II straight through, corner machine, or Type III under counter (see 4.1).

5.1.3 Noise level requirements, if other than specified (see 6.2).

5.1.4 When a service-supply valve is required (see 9.3.3).

5.1.5 Special electrical power supply characteristics. Specify current, voltage, phase, frequency (see 9.4). Standard electrical characteristics are 115 V, single phase, 60 Hz.

5.1.6 When detergent feeder is required.

5.1.7 When rinse agent feeder is required.

5.1.8 When energy consumption profiles, water consumption profiles, or productivity profiles are desired (see 7.3).

5.1.9 Manufacturer's certification, when required (see Section 10).

## 6. Performance Requirements

6.1 *Performance Standards Compliance*—Dishwashing machines shall conform to the requirements of OSHA Title 29, UL 921, and NSF/ANSI 3, and the detergent, rinse agent, and sanitizer feeders shall comply with NSF/ANSI 29.

6.2 *Noise Level*—Unless otherwise specified, the noise level of the dishwasher, when operating, exclusive of loading, unloading, and servicing, shall not exceed 80 dBa at loading and unloading stations, measured at 5 ft above floor level, and 2 ft from the machine.

6.3 *Performance Testing*—When specified in the contract or purchase order, performance testing shall be performed in accordance with Test Method F1696.

## 7. Test Methods

7.1 *Operational*—Each machine shall be thoroughly tested in accordance with the manufacturer's instructions to determine compliance with the requirements of NSF/ANSI 3 and UL 921.

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

7.3 *Performance Profiles*—See Test Method F1696.

## 8. Quality Assurance

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

## 9. Physical Requirements

9.1 *Materials*—All materials shall be specified herein. Whenever specific materials are referenced, it is understood that the use of materials and material thickness demonstrated to be equally satisfactory for their intended purpose are acceptable. 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 requirements of NSF/ANSI 3.

9.1.1 *Corrosion-Resistant Steel*—Corrosion-resistant steel shall conform to requirements of any 300 series stainless steels specified in 2.1.

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

9.1.3 *Nickel-Copper Alloy*—Nickel-copper alloys shall conform to the requirements of Specifications B127, A582/A582M, A554, A276, and A240.

9.2 *Construction*—The dishwasher shall conform to the design and construction requirements of NSF/ANSI 3. The dishwashing machine shall be complete so that when connected to the specified source of power, water supply, drain and detergent, sanitizer, and rinse agent feeders, as applicable, the unit can be used for its intended function. 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. The machine shall wash dishes by means of a water and detergent solution pumped from the tank, and shall rinse the dishes with a pumped, recirculated fresh water sanitizer solution. Provisions shall be made to automatically fill the tank directly from the regular hot water supply. The wash, dwell, and sanitizing rinse cycles shall be automatically controlled. A light shall be provided to indicate when the machine is in operation. Machines shall be provided with tracks of corrosion-resistant steel or other corrosion-resisting material not less than 14 gage (0.070 in. (1.78 mm)). Dishwashers shall have an inside working height, including the door height, of not less than 16 in. (406.4 mm) above the track.

9.3 *Operation Cycle*—At the beginning of the wash cycle, a detergent dispenser shall be activated to supply a measured amount of detergent into the tank. The machine will automatically start the wash cycle, after which, the drain automatically opens to "dump" the wash water to a holding tank or to a drain. Before the drain closes, the water fill solenoid is actuated, creating a flush cycle, after which the drain closes. At this time, water, rinse additive, if applicable, and sanitizing solution are supplied to the tank. The machine automatically completes the

rinse cycle and then shuts down. The rinse tank fill then becomes the water for the next wash cycle or automatically fills the machine with water at the start of the next cycle.

9.3.1 *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.

9.3.2 *Piping and Fittings*—Water 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. Backflow prevention shall be in accordance with ASSE Standard No. 1004. 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. Drains may be joined into a single trunk line requiring only one connection or arranged to permit individual connections to the waste line.

9.3.3 *Valves*—When specified, a separately packed, hot water service supply valve shall be provided for closing the supply of water to the dishwasher. Fresh water fill valve shall be reliable and fully automatic and suitable for 160°F (70°C) water. The drain or dump valve shall be automatically operated.

9.3.4 *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.

9.3.5 *Tank*—The tank and chamber shall be constructed of a corrosion-resistant or corrosion-resisting material and shall have a rigidity equal to, or better than, 0.055-in. (1.4-mm) steel.

9.3.6 *Overflow*—The dishwashers shall have a readily accessible and cleanable overflow or suitable drain in the tank.

9.3.7 *Access Door(s)*—Door and door frames shall be constructed of a corrosion resistant or corrosion-resisting material and shall have a rigidity equal to or better than 0.043-in. (1.09-mm) steel. 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. A means shall be provided to hold the door(s) open that are not counterbalanced. Door(s) shall be splashproof and their exposed edges shall be smooth and formed to prevent canting or warping.

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

9.3.9 *Pump and Motor Assemblies:*

9.3.9.1 *Assemblies*—The pump motor 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.

9.3.9.2 *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 gray iron alloy and shall be in dynamic balance. The motor and pump shall have at least two ball or roller bearings. The pump suction intake shall be provided with a corrosion-resistant strainer or shroud.

9.3.9.3 *Detergent Feeder*—When specified, an electric 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 a one meal period.

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

9.3.9.5 *Sanitizing Agent Feeder*—An automatic sanitizer feeder shall be supplied with the machine and conform with NSF/ANSI 29.

9.4 *Electrical Equipment*—The electrical equipment shall meet the requirements of UL 921. The dishwasher shall operate on the power characteristics (current, voltage, phase, frequency) specified.

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

9.4.2 *Controls*—All control equipment shall conform to UL 921 and be capable of operation in an ambient temperature of 115 ± 9°F (46 ± 5°C) min.

9.4.3 *Wiring and Circuit Safety Devices*— All wiring and circuit safety devices shall be in conformance with UL 921. All wiring of the dishwashing machine components shall provide for a single connection at a recognized junction on the machine.

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

9.6 *Treatment and Coating*—Unless otherwise specified, the dishwashers shall be treated and coated 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.

## 10. Certification

10.1 Certification of compliance with the standards cited in this specification shall be provided to the purchaser if required in the purchase document. Certification specified under 6.1 will be accepted as evidence of compliance. Acceptable evidence of meeting the requirements of UL 921 shall be UL listing, or UL label, or a certified test report from a recognized independent

testing laboratory acceptable to the user. Acceptable evidence of meeting the requirements of NSF/ANSI 3 shall be the NSF mark on the finished dishwashing machine and listing in the NSF Official Listing of Food Service Equipment, or a certified test report from a recognized independent testing laboratory acceptable to the user.

## 11. Product Marking

11.1 Each dishwashing machine shall be provided with an identification plate(s) securely affixed to the item. The marking(s) should be molded, die-stamped, or etched on metal, or indelibly stamped on pressure-sensitive labels secured by adhesives. If pressure sensitive labels are used, the requirements of UL 969 or equivalent shall be met. The marking(s) shall be durable and should be plain, legible, and readily visible after the item is installed in the intended manner. The identification plate(s) should include the name, brand, or trademark of the manufacturer of such known characters to be readily traceable. The manufacturer shall state the power supply characteristics of the equipment. The plate(s) shall also bear a distinctive number, letter, or number and letter code that shall identify an individual item or production lot of a limited group of items. Each non-energy consuming end item of equipment shall be plainly and permanently marked with the manufacturer's name, tradename, or trademark of such known character that the source of manufacture may be determined. Capacities if applicable, shall be legibly and permanently marked on each end item.

11.2 *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 include the cycle times, water temperatures, and sanitizer requirements.

## 12. Machine Manuals

12.1 The following information shall be supplied in the manuals:

12.1.1 Installation instructions,

12.1.2 Operating guide,

12.1.3 Maintenance and service procedures, and

12.1.4 Service parts list.

12.2 Manuals shall be in accordance with Specification F760.

## 13. Interchangeability of Items

13.1 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.

## 14. Supplementary Requirements

14.1 Unless otherwise specified in the purchase order, supplementary requirements shall apply when this specification is used in government procurement of chemical sanitizing commercial dishwashing machines.

## 15. Packaging Requirements

15.1 Unless otherwise specified, packaging shall be for manufacturer's standard commercial packaging as meets interstate shipping requirements.

## 16. Keywords

16.1 chemical; commercial; dishwasher; dishwashing; door; dump type; fill and dump; low temp; pumped rinse; rack ; stationary rack