



Standard Specification for Washing Machines—Pot, Pan, and Utensil, Heat Sanitizing, Commercial Rotary Conveyor Type¹

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1. Scope

1.1 This specification covers manually fed, motor-driven rotary conveyor type, automatically controlled, commercial pot, pan, and utensil washing machines, hereinafter referred to as “the washer.”

1.2 The following precautionary statement pertains only to the test methods portion, Section 9 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:

- A 120 Specification for Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses²
- A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip³
- A 276 Specification for Stainless and Heat-Resisting Steel Bars and Shapes³
- A 436 Specification for Austenitic Gray Iron Castings⁴
- A 554 Specification for Welded Stainless Steel Mechanical Tubing⁵
- B 43 Specification for Seamless Red Brass Pipe, Standard Sizes⁶
- B 75 Specification for Seamless Copper Tube⁶
- B 127 Specification for Nickel-Copper Alloy (UNS NO4400) Plate, Sheet, and Strip⁷
- D 3951 Practice for Commercial Packaging⁸
- F 760 Specification for Food Service Equipment Manuals⁹

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² Discontinued 1987; Replaced by A53.

³ Annual Book of ASTM Standards, Vol 01.03.

⁴ Annual Book of ASTM Standards, Vol 01.02.

⁵ Annual Book of ASTM Standards, Vol 01.01.

⁶ Annual Book of ASTM Standards, Vol 02.01.

⁷ Annual Book of ASTM Standards, Vol 02.04.

⁸ Annual Book of ASTM Standards, Vol 15.09.

⁹ Annual Book of ASTM Standards, Vol 15.07.

F 1021 Specification for Feeders, Detergent, Rinse Agent, and Sanitizing Agent for Commercial Dishwashing and Glasswashing Machines⁹

2.2 Federal Regulations:¹⁰

OSHA Title 29

2.3 American National Standards:¹¹

ANSI SI.4 Specification for Sound Level Meters

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

2.4 National Electrical Manufacturers Association Standards:¹²

NEMA ICS Industrial Controls and Systems

NEMA MG-I Motors and Generators

2.5 National Fire Protection Association Standard:¹³

NFPA No. 70 National Electrical Code

2.6 National Sanitation Foundation Standards:¹⁴

NSF No. 5 Commercial Hot Water Generating Equipment

NSF No. 14 Plastic Piping System Components and Related Materials

NSF No. 26 Spray Type Pot, Pan and Utensil Washing Machines

NSF No. 29 Detergent/Chemical Feeders for Commercial Spray-Type Dishwashing Machines

NSF No. 51 Plastic Materials and Components Used in Food Equipment

NSF Criteria C-2 Special Equipment and/or Devices

NSF Food Service Equipment Listing

2.7 Underwriters Laboratories Standard:¹⁵

UL 921 Commercial Electric Dishwashers

2.8 American Society of Sanitary Engineering Standards:¹⁶

ASSE 1001 Pipe Applied Atmospheric Vacuum Breakers

ASSE 1004 Dishwashers

¹⁰ Available from the Superintendent of Documents, Government Printing Office, Washington, DC 20401.

¹¹ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

¹² Available from National Electrical Manufacturers Association, 2101 L St. N.W., Washington, DC 20037.

¹³ Available from National Fire Protection Assoc., Batterymarch Park, Quincy, MA 02269.

¹⁴ Available from NSF International, P.O. Box 130140, Ann Arbor, MI 48113-0140.

¹⁵ Available from Underwriters Laboratories, Inc., 333 Pfingsten Rd., Northbrook, IL 60062.

¹⁶ Available from American Society of Sanitary Engineering, P.O. Box 9712, Bay Village, OH 44140.

3. Terminology

3.1 Definition:

3.1.1 *commercial pot, pan, and utensil washing machines*—machines that uniformly wash, rinse and heat sanitize food preparation utensils. The machines shall be capable of removing physical soil and sanitizing properly racked and pre-scraped multiple pots, pans, and utensils. The machines shall consist of the following principal parts: legs, wash chamber, hood tank, doors, spray assemblies, pumps, motors, controls, piping, valves, heating equipment and accessories.

4. Classification

4.1 *General*—The washer shall be of the following type, size, and class as specified.

4.2 Types:

4.2.1 *Motor-Driven Continuous Rotary Conveyor*:

4.2.1.1 *Type I*—One door (front loading).

4.2.1.2 *Type II*—One or two door (pass-through corner operation).

4.2.1.3 *Type III*—One or two door (pass-through straight line operation).

4.2.1.4 *Size 1*—Nominal 42-in. diameter.

4.2.1.5 *Size 2*—Nominal 60-in. diameter.

4.2.1.6 *Size 3*—Nominal 74-in. diameter.

4.2.1.7 *Size 4*—Nominal 86-in. diameter.

4.3 *Tank Heat*:

4.3.1 *Style 1*—Steam heated.

4.3.1.1 *Class A*—Injection.

4.3.1.2 *Class B*—Heat exchange coil.

4.3.2 *Style 2*—Electric heat.

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, number, and date of this standard; type, style, and class of machine required.

5.1.2 A pressure-reducing valve, if required (see section 7.4). Incoming water pressure must be specified when ordering a pressure reduction valve.

5.1.3 A standard 40°F (22°C) temperature rise steam, or electric booster if required. If the required temperature rise is more than 40°F (22°C) (see 7.11), it should be specified.

5.1.4 Electrical power supply characteristics (voltage, phase, frequency) (see section 7.9.3).

5.1.5 A detergent feeder, if required (see 7.12).

5.1.6 Accessory equipment, spare and maintenance parts required, selected options.

5.1.7 Treatment and painting if other than specified (see 7.16).

5.1.8 When energy consumption profiles, water consumption profiles, or productivity profiles are desired.

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

6. Materials

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 indi-

vidual components of the overall assembly. The pot, pan, and utensil washing machines shall meet the material, design, and construction requirements of NSF No. 26 or Criteria C-2.

6.1.2 *Corrosion-Resistant Steel*—Corrosion-resistant steel shall conform to the requirements of any 300 series stainless steel specified in 2.1 (see Specification A 167).

6.1.3 *Corrosion-Resisting Material*—Corrosion-resisting material is other than corrosion-resistant steel that is equivalent in the pot, pan, and utensil washer application.

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

6.1.5 *Plastics*—All plastic materials and components used in the pot, pan, and utensil machine rinse system shall conform to NSF No. 14 and NSF No. 51.

7. Design and Construction

7.1 The pot, pan, and utensil washing machine shall be complete so that when connected to the specified source of power, water supply, heating means (steam or electric), drainage, detergent feeder as applicable, the unit can be used for its intended function. Machines shall be rigid and quiet in operation. Parts requiring adjustment or service, or both, shall be readily accessible. The machine shall wash pots, pans, and utensils by means of a water and detergent solution pumped from a tank, and shall final rinse the pots, pans, and utensils with fresh water from an outside source at 15 to 25 psi (20 psi nominal) flow pressure. Provisions shall be made to fill the wash tank, either directly from the regular hot water supply with a hand valve, or through the booster or solenoid, or both. The wash, dwell, and rinse cycles shall be automatically controlled. A light shall be provided to indicate when the machine is in operation. Machines shall be provided with a motor-driven rotary table, constructed of corrosion-resistant steel or other corrosion-resisting material. They shall have an inside working height, including the door height, of not less than 27 in. (685.8 mm).

7.2 *Piping, Tubing, Fittings, and Valves (Installation)*—Connections shall be readily accessible to facilitate installation and maintenance. (See Specifications B 43, B 75, A 554, and A 120.)

7.3 *Piping and Fittings*—Water, steam piping, and fittings shall be of corrosion-resisting material or suitable heat-resisting plastic 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. Vacuum breakers shall comply with ASSE No. 1001 and be installed in accordance with ASSE No. 1004. The drain and other plumbing connections shall be standard pipe or tubing connections. Drains may be joined into a single trunk line requiring only one connection or arranged to permit individual connections 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). The drain valve, when used, shall be permanently marked to show "open" and "closed" positions, and shall be lever-operated 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. When specified, a water pressure reducing valve shall be provided for reducing water pressure to 15 to 25 psi (20 psi nominal). (See ANSI SI.4 and SI.13.)

7.5 *Spray Assemblies*—All spray nozzles and spray manifolds shall be rigid spray pipe, easily cleanable, and shall be of corrosion-resisting materials. The main spray assembly shall include separate wash and rinse pipes located above, below, and on the side of the work.

7.6 *Tank and Housing*—The tank and housing shall be constructed of not less than 0.070-in. (1.778-mm) corrosion-resistant steel, or other corrosion-resisting material.

7.7 *Overflow*—The washer shall have a readily accessible overflow drain 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. (1.118 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 the perimeter of the tank where the scrap trays are installed shall be held to a minimum, and in no case will the space be more than $\frac{3}{8}$ in. (0.953 cm).

7.9 *Access Door*—Door and door frames shall be constructed of not less than 0.059 in. (1.499 mm) corrosion-resistant steel, or other corrosion-resisting material, and shall be rigid and stiffened as necessary. The loading and unloading door shall be counter-balanced 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. The door shall be splash-proof and its exposed edges shall be smooth and formed to prevent canting or warping.

7.10 *Legs (Feet)*—The washer 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 table height may be varied from 34 to 35 in. (863.6 to 889 mm) above the floor for the pass-through model and 39 to 40 in. (990.6 to 1016 mm) for the front-load model.

7.11 *Pump and Motor Assemblies:*

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

7.11.2 *Pump*—Pump casings shall be cast iron or corrosion-resisting material and shall be of such a design as to permit ease of accessibility for inspection and removal of foreign items from the impeller and interior (see Specification A 436). The pump shall either be self-draining or equipped with a means for draining. The pump suction intake shall be provided with a strainer or shroud made of corrosion-resisting materials (see Specification A 276).

7.11.3 *Motor*—The rotary conveyor table assembly shall be motor driven (see NEMA ICS, NEMA MG-1, and NEPA No. 70). The drive shall be outfitted with a safety slip clutch.

7.12 *Heating*—Style 1 and 2 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. Check valves or vacuum breakers must be used on all injector-type heating units to prevent back siphoning.

7.12.2 *Style 2*—Style 2 machines shall be equipped with electric heater elements and sheets 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.

7.13 *Final Rinse Booster*—Final rinse booster heater will not be furnished as part of the machine unless specified.

7.13.1 *Steam Booster*—When specified meeting NSF Std. No. 5 (see 5.1.3), the washer shall be provided with an adjustable automatic steam booster to raise the temperature of the final rinse water from 140°F (60°C) to at least 180°F (82.22°C). The steam booster shall automatically maintain the required final rinse water temperature without producing steam within either the steam booster or the water supply piping from steam booster to the machine. The steam booster may be securely mounted as an integral part of the machine in a position that does not interfere with operation and permits attachment of tables or counters. Otherwise, the steam booster may be furnished separately mounted on its own legs and equipped with suitable fittings for connection into the final rinse water lines. Valve and pipe unions shall be installed on the steam booster where the steam and water lines enter the unit. The final rinse water temperature shall be controlled by an automatic thermostat controlling the input of steam to the steam booster.

7.13.2 *Electric Booster*—When specified meeting NSF Std. No. 5 (see 5.1.3), the washer shall be provided with an electric booster having all necessary controls for operation to raise and maintain the temperature of the final rinse water from 140°F (60°C) to at least 180°F (82.22°C) during the rinse cycle. The booster shall be designed to operate with the electric power characteristics specified. The electric booster may be securely mounted as an integral part of the machine in a position that does not interfere with operation and permits attachment of tables or counters. Otherwise, the electric booster may be furnished separately, mounted on its own legs and equipped with suitable fittings for connection into the final rinse water lines.

7.14 *Detergent Feeder*—When specified (see 5.1.5), an electric or electronic automatic detergent feeder conforming to NSF No. 29 (also see Specification F 1021) shall be separately packed with the pot, pan, and utensil washer. The reservoir of the feeder shall be capable of holding a supply of pot and pan washing detergent adequate in normal pot and pan washing operation for one meal period.

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

7.16 Means for effective and adequate lubrication shall be provided when required. Lubricating points shall be readily

accessible, and the machine shall be lubricated with the proper amount of lubricant prior to delivery.

7.17 Unless otherwise specified (see 5.1.7), the washer 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.

8. Performance Requirements

8.1 *Performance Standard Compliance*—Pot, pan, and utensil washing machines shall conform to the requirements of OSHA Title 29, UL 921, and NSF No. 26 or Criteria C-2. Detergent feeders, when specified, shall comply with NSF No. 29. Electric booster heaters, when specified, shall conform to NSF No. 5.

8.2 *Noise Level*—The noise level of the washer only, when operating, exclusive of loading, unloading, and servicing shall not exceed 80 dB at loading and unloading stations, measured at nominal 5 ft above the floor and 2 ft away from the machine.

9. Test Methods

9.1 *Operational*—Each washer shall be thoroughly tested in accordance with the manufacturer's instructions to determine compliance with requirements of NSF No. 26 or Criteria C-2 and UL 921.

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

9.3 *Energy and Productivity*—A new standard is to be developed for energy consumption, water consumption, and productivity profiles.

10. Certification

10.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

10.2 *Listing*—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.

10.3 *NSF Listing*—Acceptable evidence of meeting the requirements of NSF No. 26 or Criteria C-2 shall be the NSF Seal or Logo on the finished 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. Certification specified under 8.1 will be accepted as evidence of compliance.

11. Product Marking

11.1 *Machine Identification*—Identification shall be permanently and legibly marked directly on the machine or on a corrosion-resisting material securely attached to the machine at the point of manufacture. Identification shall include the manufacturer's model, serial number, name, and trademark to be readily identifiable. In addition, information required by NSF No. 26 and UL 921 shall be included on the machine on the data plate.

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.

12. Manuals

12.1 Manuals shall be in accordance with Specification F 760.

13. Packaging and Packing Material

13.1 The washer should be packaged and packed in accordance with Practice D 3951.

14. Quality Assurance

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

15. Keywords

15.1 commercial rotary conveyor type; pot washer; utensil washer

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