



# Standard Specification for Hot Water Sanitizing Commercial Dishwashing Machines, Multiple Tank, Rackless Conveyor Type<sup>1</sup>

This standard is issued under the fixed designation F 860; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This specification covers multiple tank, automatic rackless conveyor type, commercial dishwashing machines.

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

## 2. Referenced Documents

### 2.1 ASTM Standards:

A 29 Specification for Steel Bars, Carbon and Alloy, Hot-Wrought and Cold-Finished, General Requirements for<sup>2</sup>

A 120 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses<sup>3</sup>

A 167 Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip<sup>4</sup>

A 276 Specification for Stainless and Heat-Resisting Steel Bars and Shapes<sup>2</sup>

A 436 Specification for Austenitic Gray Iron Castings<sup>5</sup>

A 554 Specification for Welded Stainless Steel Mechanical Tubing<sup>6</sup>

A 582 Specification for Free-Machining Stainless and Heat-Resisting Steel Bars, Hot-Rolled or Cold-Finished<sup>2</sup>

B 43 Specification for Seamless Red Brass Pipe, Standard Sizes<sup>7</sup>

B 75 Specification for Seamless Copper Tube<sup>7</sup>

B 127 Specification for Nickel-Copper Alloy (UNS NO 4400) Plate, Sheet, and Strip<sup>8</sup>

F 760 Specification for Food Service Equipment Manuals<sup>9</sup>

2.2 *Federal Regulation:*

OSHA Title 29<sup>10</sup>

2.3 *American National Standards:*

ANSI S1.4 Specification for Sound Level Meters<sup>11</sup>

ANSI S1.13 Methods for the Measurement of Sound Pressure Levels<sup>11</sup>

2.4 *National Electrical Manufacturers Association Standards:*

NEMA ICS Industrial Controls and Systems<sup>12</sup>

NEMA MG-1 Motor and Generators<sup>12</sup>

2.5 *National Fire Protection Association Standard:*

NFPA No. 70 National Electrical Code<sup>13</sup>

2.6 *NSF International Standards, Criteria, and Listings:*

NSF 3 Spray Type Dishwashing Machines<sup>14</sup>

NSF 5 Commercial Hot Water Generating Equipment<sup>14</sup>

NSF 29 Detergent/Chemical Feeders For Commercial Spray Type Dishwashing Machines<sup>14</sup>

NSF 51 Plastic Materials and Components Used in Food Equipment<sup>14</sup>

NSF Criteria C-2 Special Equipment and/or Devices<sup>14</sup>

NSF Food Equipment and Related Products, Components, and Materials<sup>14</sup>

2.7 *Underwriters Laboratories Standard:*

UL 921 Commercial Electric Dishwashers<sup>15</sup>

2.8 *American Society of Sanitary Engineering Standards:*<sup>16</sup>

ASSE S1001 Pipe Applied Atmospheric Vacuum Breakers

ASSE S1004 Dishwashers

<sup>9</sup> *Annual Book of ASTM Standards*, Vol 15.07.

<sup>10</sup> Code of Federal Regulations, Chapter XVII, Part 1910, available from Superintendent of Documents, Government Printing Office, Washington, DC 20402.

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

<sup>12</sup> Available from National Electrical Manufacturers Assn., 2101 "L" Street, N.W., Washington, DC 20037.

<sup>13</sup> Available from National Fire Protection Assn., Batterymarch Park, Quincy, MA 02269.

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

<sup>15</sup> Available from Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.

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

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F-26 on Food Service Equipment and is the direct responsibility of Subcommittee F26.01 on Cleaning and Sanitation Equipment.

Current edition approved May 10, 1996. Published August 1996. Originally published as F 860 – 84. Last previous edition F 860 – 90.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 01.05.

<sup>3</sup> Discontinued, see 1986 *Annual Book of ASTM Standards*, Vol 01.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 01.03.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 01.02.

<sup>6</sup> *Annual Book of ASTM Standards*, Vol 01.01.

<sup>7</sup> *Annual Book of ASTM Standards*, Vol 02.01.

<sup>8</sup> *Annual Book of ASTM Standards*, Vol 02.04.

### 3. Terminology

#### 3.1 Definition:

3.1.1 *commercial dishwashing machines*—machines that uniformly wash, rinse, and hot water-sanitize eating and drinking utensils. The machines shall be capable of removing physical soil from properly pre-scraped items, and sanitizing multiple use eating and drinking utensils. These machines shall automatically convey soiled dishes through the treatment stages of the machine, conveying them out at the clean end of the machine. The dishwashing machines shall consist of the following principal parts: legs, wash chamber, rinse chamber, tank, door, spray assemblies, pump motors, controls, piping, valves, conveying mechanism, heating equipment, and accessories.

### 4. Classification

4.1 *General*—Dishwashing machines shall be of the following types, styles, classes, and groups, as specified.

#### 4.2 Types:

4.2.1 *Type I*—This machine shall be designed and supplied to accept the feeding of soiled tableware from the right side, when facing the front of the machine.

4.2.2 *Type II*—This machine shall be designed and supplied to accept the feeding of soiled tableware from the left side, when facing the front of the machine.

#### 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—Injectors.

4.3.1.2 Class B—Heat exchange coils.

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* (see Specification F 861):

4.4.1 *Group A*—Minimum conveyor width 22.5 in. (571.5 mm) with an operating capacity of 5000 dishes per hour minimum.

4.4.2 *Group B*—Minimum conveyor width 26.5 in. (673.1 mm) with an operating capacity of 8700 dishes per hour minimum.

4.4.3 *Group C*—Minimum conveyor width 31 in. (787 mm) with an operating capacity of 11800 dishes per hour minimum.

4.5 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.

### 5. Ordering Information

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

5.1.1 Title, number, and date of this standard,

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

5.1.3 Length of load and unload sections (see 4.4),

5.1.4 Noise level requirements, if other than specified (see 11.2),

5.1.5 When a service-supply valve is required (see 7.5),

5.1.6 When a standard 40°F (22°C) temperature rise steam or electric, or gas booster is required, or stipulate if the required temperature rise is more than 40°F (22°C) (see 7.14),

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

5.1.8 When a detergent feeder is required (see 7.15),

5.1.9 When a rinse agent feeder is required (see 7.16),

5.1.10 Accessory equipment, such as end cowls with vent opening, or spare and maintenance parts required, as suggested by manufacturer,

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

5.1.12 When energy consumption profiles, water consumption profiles, or productivity profiles are desired (see 12.3), and

5.1.13 Manufacturing certification when required (see Section 13).

### 6. Materials and Design

6.1 All materials shall be specified as follows:

6.1.1 Materials used shall be free from defects which would adversely affect performance or maintainability of individual component of the overall assembly. The dishwashing machines shall meet the material design and construction requirements of NSF 3, and Criteria C-2, where applicable.

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

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.

6.1.5 *Plastics*—All plastic materials and components used in the dishmachine rinse system shall conform to NSF 3 and 51.

### 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, and rinse agent feeder 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 to the outside of the machine. The machine shall be equipped with splash curtains to prevent excessive splash and spray carryover. Parts requiring adjustment or service, or both, shall be readily accessible from the front and side of the machine. The machine shall be furnished with a loading and unloading section. The machine shall wash dishes by means of a water and detergent solution pumped from a tank and shall pump rinse the dishes under pump pressure prior to the final rinse of fresh water from an outside source. Provisions shall be made to fill the wash and rinse tank either directly from the regular hot water supply with a hand valve or through the booster or solenoid, or both. The dishwashing machine shall have a conveyor belt suitable for