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An American National Standard

Standard Specification for Commercial Dishwashing Racks[1]

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

1. Scope

1.1 This specification covers racks used in commercial spray type dishwashing machines and for storage of clean tableware.

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.

1.3 The following safety hazard caveat pertains only to the test method portion, Section 8, of this specification: *This standard does not purport to address 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]

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

2.2 *American National Standard*[3]

ANSI Z1.4 Sampling Procedures and Tables for Inspection by Attributes

2.3 *NSF International*[4]

NSF/ANSI 2 Food Equipment

NSF Food Service Equipment Listing

3. Classification

3.1 Commercial dishwashing racks shall be classified as follows:

3.2 *Type I*—Compartment tray/plate rack with six compartments.

3.2.1 *Type IA*—Service tray rack with six compartments.

3.2.2 *Type IB*—Flatware rack.

3.2.3 *Type IC*—Plate rack with seven compartments (nominal 16 by 16 in. (406 by 406 mm)).

3.2.4 *Type ID*—Flatware rack (nominal 16 by 16 in. (406 by 406 mm)).

3.2.5 *Type IE*—Circular plate rack.

3.2.6 *Type IF*—Plate rack.

3.3 *Type II*—Cup/Bowl rack.

3.3.1 *Type IIA*—Tumbler rack.

3.3.2 *Type IIB*—Cup rack.

3.3.3 *Type IIC*—Compartmented cup rack.

3.3.4 *Type IID*—Cup/Bowl rack (nominal 16 by 16 in. (406 by 406 mm)).

3.3.5 *Type IIE*—Circular compartmented cup, bowl, and flatware rack.

3.4 *Type III*—Carrier cylinder.

3.4.1 *Type IV*—Flatware cylinder (plastic).

3.5 *Type V*—Flatware cylinder (corrosion-resistant steel).

3.6 *Type VI*—Special racks (see 6.7).

4. Ordering Information

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

4.1.1 Title, designation, and year of issue of this specification.

4.1.2 Type and style.

4.1.3 Material (See 5.2.1 and 5.2.2).

4.2 The overall height and the maximum diameter, excluding the handle of the cup, must be submitted when ordering racks to meet Type IIC (see 6.3).

4.3 When ordering special racks (Type VI), dimensional data of overall height and maximum diameter of ware must be

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

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

furnished. For cups, exclude handle from overall diameter measurement (see 6.3).

5. Materials and Manufacture

5.1 *Materials:*

5.1.1 *Corrosion-Resistant Steel*—Corrosion-resistant steel shall conform to requirements of any 300 series stainless steels specified in Specification A240.

5.1.2 *Molded Plastic*—Racks shall conform to NSF/ANSI 2.

5.2 *Manufacture:*

5.2.1 *Racks*—The frame or body for racks may be made of plastic material conforming to the requirements of 5.1.2. The diagonal distance between corners of finished racks shall not vary more than ±⅛ in. (3.18 mm). Outside dimension of racks shall not deviate from the nominal dimension by more than ⅛ in. (3.18 mm). Racks shall be designed for stacking.

5.2.2 *Silverware Cylinders*—Cylinders shall be made either of plastic material conforming to the requirements of 5.1.2 or may be made of corrosion-resistant steel conforming to the requirements of 5.1.1.

6. Physical Requirements

6.1 Unless otherwise specified, the dishwashing racks shall be nominal 19 ¾ by 19 ¾ in. (501.6 by 501.6 mm) overall dimensions, and shall have four-way indexing capability.

6.2 *Type I (Compartment Tray/Plate (Six compartments))*—Rack shall be suitable for holding 9 in. (229 mm) dinner plates, or trays measuring approximately 15 ½ in (394 mm) long by 11⅝ in. (295 mm) wide by ¾ in. (19 mm) deep. The rack shall be divided to hold six of these trays or 12 plates for washing and sanitizing in a commercial dishwashing machine.

6.2.1 *Type IA, (Service Tray (Six Compartments))*—Rack shall be suitable for holding cafeteria-type service trays measuring approximately 15 × 20 in. (381 × 508 mm). The rack shall be divided to hold no less than six such trays for washing and sanitizing in a commercial dishwashing machine.

6.2.2 *Type IB (Flatware)*—Rack shall be suitable for horizontal racking of flatware for washing and sanitizing in a commercial dishwashing machine. Bottom of rack shall be of a design to permit free flow of water and prevent loss of flatware through the bottom, or bottom of rack shall be fitted with a flat insert. Rack shall be of a design to discourage overloading of flatware.

6.2.3 *Type IC (Nominal 16 by 16 in. (406 by 406 mm) Plate (7 compartments))*—Rack shall be suitable for holding 9-in. (229-mm) dinner plates. The rack shall be divided to hold seven of these plates for washing and sanitizing in a single tank commercial dishwashing machine.

6.2.4 *Type ID (Nominal 16 by 16 in. (406 by 406 mm), Flatware)*—Rack shall be suitable for horizontal racking of flatware for washing and sanitizing in a single tank commercial dishwashing machine. Bottom of rack shall be of a design to prevent flatware from protruding and to permit a free flow of water, or bottom of rack shall be fitted with a flat insert. Rack shall be of a design to discourage overloading of flatware.

6.2.5 *Type IE ((Circular), Plate)*—Rack shall be suitable for holding 9-in. (229-mm) dinner plates. The rack shall be divided to hold no less than eight plates for washing and sanitizing in a single tank commercial dishwashing machine of circular shape.

6.2.6 *Type IF (Plate)*—Rack shall be suitable for holding 9-in. (229-mm) dinner plates. The rack shall be divided to hold no less than sixteen plates for washing and sanitizing in a commercial dishwashing machine.

6.3 *Type II (Rack, Cup/Bowl)*—Rack shall be suitable for holding 10 ½ oz (311 mL) or 5 ¾-in. (146-mm) diameter bowls. Rack shall hold not less than sixteen bowls for washing and sanitizing in a commercial dishwashing machine. The rack shall also be suitable for conveying a Type III carrier through a dishwashing machine. The frame or body of the rack should have an inside height of not less than 3 $^{11}/_{16}$ in. (937 mm).

6.3.1 *Type IIA (Tumbler)*—Rack shall be divided into not less than 36 compartments suitable for washing and storing tumblers having maximum dimensions of 4 in. (102 mm) high by 2 ¾ in. (70 mm) diameter. Inside height of rack shall not be less than 4 in. (102 mm) nor more than 5 ⅛ in. (130 mm).

6.3.2 *Type IIB (Cup)*—Rack shall be suitable for holding 10½ ounce (311 mL) cups. Rack shall hold not less than 18 cups for washing and sanitizing in a commercial dishwashing machine. Rack shall be designed to provide for individual spacing or positioning of cups.

6.3.3 *Type IIC (Compartmented, Cup)*—Rack shall be suitable for holding cups and mugs for washing and sanitizing in a commercial dishwashing machine. Cups and mugs shall be supported at an angle to facilitate drainage. One full rack shall be able to stack on top of another full rack without the ware in the bottom rack touching the bottom of the top rack (See 4.3). Separation between compartments shall prevent contact between individual cups or mugs in accordance with the following styles:

6.3.3.1 *Style A*—16 compartments.

6.3.3.2 *Style B*—24 compartments.

6.3.3.3 *Style C*—25 compartments.

6.3.4 *Type IID (Nominal 16 by 16 in. (406 by 406 mm), Cup/Bowl)*—Rack shall be suitable for holding cups and bowls. Rack shall hold not less than fifteen 10½ oz (311-mL) cups or five 5¾ in. (146 mm) diameter bowls for washing and sanitizing in a single tank commercial dishwashing machine.

6.3.5 *Type IIE (Compartmented (Circular), Cup, Bowl, and Flatware)*—Rack shall be suitable for holding cups, bowls, and flatware for washing and sanitizing in a single tank commercial dishwashing machine of circular shape. The rack shall have a capacity of fourteen 10½ oz (311-mL) cups or seven 5 ¾ in. (146 mm) diameter bowls. Bottom of rack shall be of a design to prevent flatware from protruding and to permit a free flow of water, or bottom of rack shall be fitted with a flat insert.

6.4 *Type III (Carrier Cylinder)*—Carrier shall be of the basket type, designed for transporting six Type IV or Type V cylinders to, through, and from dishwashing machines. The carrier shall be made of corrosion-resistant steel or plastic and shall have a body and a suitable handle. Overall dimensions of the body shall be 10 to 11 in. (254 to 279 mm) wide by 14 to 15 in. (356 to 381 mm) long. Corners of the body shall be rounded to a minimum radius of ½ in. (13 mm). The carrier, when lifted and carried by the handle, shall support without

distortion, 6 fully loaded Type IV or Type V cylinders by their flanges. The handle shall have its axis along the length of the basket and shall be fastened securely to the basket at the ends. The grip of the handle shall be of a height to clear by 1 in. (25.4 mm) the protruding end of an 8 ½ in. (216 mm) long knife resting in any position within any of the six cylinders. When in the carrying position with the handle fully extended, the handle shall have provision to prevent the carrier with cylinders from tipping to either side because of unbalanced loading.

6.5 *Type IV (Cylinder (Plastic), Flatware)*—The wall and bottom thickness, exclusive of reinforcement ribs, shall be not less than 0.105 in. (2.67 mm). The overall height of the cylinder shall be 5 ⅝ in. ± ¼ in. (143 ± 6.35 mm). The top of the cylinder shall have a molded flange extending outward approximately ½ in. (6.35 mm). The thickness of the flange shall not be less than the thickness of the body. The outside diameter of the cylinder at the top, directly under the flange, shall be 3 13⁄16 ± 1⁄16 in. (96.8 ± 1.59 mm). The body of the cylinder may be tapered to an outside diameter of not less than 3 ¼ in. (83 mm) at the bottom. The cylinder wall and bottom shall be perforated or slotted to permit free flow of water from the cylinder. Perforations or slots shall be of a size to prohibit the flatware from falling out of the cylinder. All holes or slots shall be so located as not to affect adversely the durability of the cylinder.

6.6 *Type V (Cylinder, Flatware (Corrosion-Resistant Steel))*—Cylinders shall have a finished thickness of not less than 0.0375 in. (0.95 mm) nor more than 0.0437 in. (1.11 mm). The overall height of the cylinder shall be 5 ⅝ ± ¼ in. (143 ± 6.35 mm). The top of the cylinder shall be flanged out from the body at an approximate 90° angle for not less than ¼ in. (6.35 mm) nor more than ⅜ inch (9.53 mm). The outside diameter, directly under the flange, shall be 3 13⁄16 ± 1⁄16 in. (96.8 ± 1.59 mm). The body of the cylinder may be tapered to an outside diameter of not less than 3 ¼ in. (83 mm) at the bottom. The cylinder wall and bottom shall be perforated to permit free flow of water from the cylinder. Perforations shall be of a size to prohibit flatware from falling out of the cylinder. All holes shall be so located as not to affect adversely the durability of the cylinder.

6.7 *Type VI (Special Racks)*—Racks designed for ware requiring internal dimensions other than those previously specified, may be permitted, provided the racks otherwise meet requirements of the standard. Glass, cup, and bowl racks shall be able to stack on top of another full rack without the ware in the bottom rack touching the bottom of the top rack (see 4.3).

7. Performance Requirement

7.1 *Structural Performance*—Racks, after testing, shall show no distortion or breakage to an extent that would impair or prohibit the use of racks as tested in Section 8.

8. Structural Test Methods

8.1 *Impact Test (Racks, Types I and II only):*

8.1.1 *Significance*—This test measures durability of the racks.

8.1.2 *Apparatus:*

8.1.2.1 *Two Complete Racks of Each Type* (Types I and II only).

8.1.2.2 *Concrete Floor Surface.*

8.1.3 *Procedure:*

8.1.3.1 Perform tests at a room temperature of 70 ± 10°F (21 ± 5.5°C).

8.1.3.2 Drop each rack from a height of 4 ft (1219 mm) measured from the bottom of the rack to the floor.

8.1.3.3 Subject each rack to four impacts to each side, top surface, bottom surface, and each corner.

8.2 *Bow Test:*

8.2.1 *Significance*—This test measures deformation of the racks.

8.2.2 *Apparatus:*

8.2.2.1 *One Complete Rack of Each Type to Be Supplied.*

8.2.2.2 *Door-Type or Simulated Dishwashing Machine Configuration.*

8.2.3 *Procedure:*

8.2.3.1 Load rack with an evenly distributed weight of 32 lb (14.5 kg).

8.2.3.2 Expose rack to a 180°F (82°C)-rinse spray of 10 g/min for a period of 3 min or immerse at 180°F (82°C) for 3 min.

8.2.3.3 Remove weight from rack immediately after rinse spray cycle. Allow rack to return to room temperature.

8.2.3.4 Determine total bow by measuring deflection beyond the rack base plane with rack inverted on a flat surface. Maximum bow shall not exceed ⅛ in. (3.18 mm) beyond the base plane.

9. Inspection

9.1 *Visual Examination*—Examination of the end item shall be in accordance with Table 1. The lot shall be expressed in units of racks or cylinders, as applicable, for the purpose of determining the sample size in accordance with ANSI Z1.4. The sample unit shall be one completely fabricated rack or cylinder of the same type as applicable. The inspection level shall be Level II with an acceptable quality level of 2.5 for major defects and 6.5 for total defects, expressed in defects per hundred units.

9.2 *Dimensional Examination*—Examination shall be made of the end item to determine compliance with dimensional requirements. Any dimension that exceeds the specific tolerance shall be classified as a defect. The inspection level shall be S-2 with an acceptable quality level of 6.5 defects, expressed in defects per hundred units.

10. Product Marking

10.1 Each rack or cylinder shall be provided with a permanent means of identification. Information shall include the name, brand, or trademark of the manufacturer of such known character as to be readily traceable to the manufacturer. Label information shall also include a distinctive number, letter, or code which will identify an individual item.

11. Quality Assurance

11.1 When specified in the contract or purchase order, 1.1 or 9.2 shall apply.

TABLE 1 Classification of Visible Defects

Major Categories Defects	Minor Categories Defects
Plastic Coating	*Finish*
Not as specified	Corrosion-resisting steel not equivalent to 2B, not electro polished
Not uniform and securely bonded to metal	
Not coated where required	*Welding and Brazing*
Metallic Plating	Slag inclusion, slight undercut, not smooth and uniform, scale of flux deposits not removed
Coating blistered, peeled, chipped, or area of thin or incomplete coating	*Marking for Identification*
Design	Missing, incomplete, not legible
Characteristics not in accordance with requirements	
Part missing or not specified type, size or material	
Construction and Workmanship	
Fractured, split, punctured, dented, deteriorated, bowed, or malformed, or otherwise impaired	
Misplaced, loose or not in proper alignment	
Sharp burr, sliver, or splinter that may be injurious to personnel	
Not connected or joined as specified or poorly accomplished.	
Molded Plastic	
Not uniform, sound or smooth	
Not free from flashings, cracks, blowholes or airholes	
Welding and Brazing	
Not type required, incomplete, burnholes, cracked, fractured or otherwise not fused.	
Assembly	
Unit perceptibly out of square or alignment	
Incapable of stacking securely	