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FEDERAL SPECIFICATION

DISHWASHING MACHINES, SINGLE TANK (RACK, MANUAL AND CONVEYOR) AND DOUBLE TANK (RACK, CONVEYOR), COMMERCIAL

This specification was approved by the Assistant Adminstrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1. Scope. This specification covers single tank, manually operated, and single and double tank, automatically propelled, rack conveyor, spray-type, commercial dishwashing machines.

1.2 Classification.

1.2.1 Types, sizes, styles, and classes. Dishwashing machines shall be of the following types, sizes (nominal), styles, and classes, as specified (see 6.2):

Type I - Single tank undercounter, 16 by 16 - inch rack, manual feed
Size 35-16 - 16 by 16 inch racks at 35 racks per hour
Size 45-16 - 16 by 16 inch racks at 45 racks per hour

Type II - Single tank, 20 by 20 inch rack, manual feed
Size 50-20 - 20 by 20 inch racks at 50 racks per hour

Type III - Single tank, 20 by 20 inch rack, conveyor motor-driven
Size 50-20 - 20 by 20 inch racks at 50 racks per hour
Size 115-20 - 20 by 20 inch racks at 115 racks per hour
Size 165-20 - 20 by 20 inch racks at 165 racks per hour
Size 180-20 - 20 by 20 inch racks at 180 racks per hour
Size 220-20 - 20 by 20 inch racks at 220 racks per hour

Type IV - Double tank, 20 by 20 inch rack, conveyor, motor-driven
Size 60-20 - 20 by 20 inch racks at 60 racks per hour
Size 85-20 - 20 by 20 inch racks at 85 racks per hour

Size 115-20 - 20 by 20 inch racks at 115 racks per hour
Size 135-20 - 20 by 20 inch racks at 135 racks per hour
Size 165-20 - 20 by 20 inch racks at 165 racks per hour
Size 180-20 - 20 by 20 inch racks at 180 racks per hour
Size 185-20 - 20 by 20 inch racks at 185 racks per hour
Size 220-20 - 20 by 20 inch racks at 220 racks per hour
Size 250-20 - 20 by 20 inch racks at 250 racks per hour
Size 275-20 - 20 by 20 inch racks at 275 racks per hour

Style I - Steam heated

Class 1 - Low pressure steam (10 to 15 pounds-force per square inch gage (psig))
Class 2 - High pressure steam (16 to 50 psig)

Style II - Electrically heated

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

Federal Specifications:

P-D-1800 - Dishwashing Compound, Machine
QQ-N-281 - Nickel-Copper Alloy (Monel and R-Monel) Bars, Rods, Plates, Sheets, Strips, Wire, Forgings, and Structural and Special Shaped Sections

Federal Standards:

FED-STD-H28 - Screw Thread Standards for Federal Services
FED-STD-123 - Marking for Shipment (Civil Agencies)

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards, and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal specifications and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Philadelphia, PA; Washington, DC; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Houston, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Seattle, WA.

(Federal Government activities may obtain copies of Federal standardization documents, and the Index of Federal Specifications, Standards, and Commercial Item Descriptions from established distribution points in their agencies.)

Military Specifications

MIL-V-173 - Varnish, Moisture-and- Fungus-Resistant (for Treatment of Communications, Electronic, and Associated Equipment)
MIL-M-11495 - Meter, Detergent Concentration for Dishwashing Machines
MIL-R-24039 - Rack and Cylinder for Mechanical Dishwashing Machine.
MIL-I-43728 - Injector, Rinse, Automatic, For Commercial Dishwashing Machines
MIL-D-43729 - Dispensing Unit, Detergent Automatic For Commercial Dishwashing Machines
MIL-K-43875 - Kitchen Equipment, Including Unit Assemblies, Repair Parts and Tools, Preparation for Delivery of

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129 - Marking for Shipment and Storage
MIL-STD-461 - Electromagnetic Emission And Susceptibility Requirements For the Control Of Electromagnetic Interference
MIL-STD-462 - Electromagnetic Interference Characteristics, Measurements of

(Copies of Military specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting officer.)

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA):

Occupational Safety and Health Standards (Part 1910)

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bid or request for proposal shall apply.

American National Standards Institute Inc., (ANSI):

A112.14.1 - Backwater Valves in Plumbing Systems
B16.18 - Fitting, Pressure, Cast Copper Alloy Solder Joint
B16.22 - Fitting, Wrought Copper and Copper Alloy Solder Joint Pressure
S1.4 - Specification for Sound Level Meters
S1.13 - Methods for the Measurement of Sound Pressure Levels

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

American Society For Testing And Materials (ASTM):

A120 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses
B88 - Tube, Seamless Copper Water

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa 19103.)

National Electrical Manufacturers Association (NEMA):

ICS - 1 - General Standards for Industrial Controls and Systems
ICS - 2 - Industrial Control Devices, Controllers and Assemblies
ICS - 6 - Enclosures for Industrial Controls and Systems
MG - 1 - Motors and Generators

(Application for copies should be addressed to the National Electrical Manufacturers Association, 2101 L Street, N.W., Washington, DC 20037.)

National Fire Protection Association (NFPA):

No. 70 - National Electrical Code

(Application for copies should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.)

National Sanitation Foundation (NSF):

No. 3 - Spray-Type Dishwashing Machines
No. 5 - Hot Water Generating Equipment for Food Service Establishments Using Spray Type Dishwashing Machines.
No. 29 - Detergent and Chemical Feeders for Commercial Spray Type Dishwashing Machines
Listing of Food Service Equipment

(Application for copies should be addressed to the National Sanitation Foundation, NSF Building, 3475 Plymouth, Ann Arbor, MI 48106.)

Underwriters' Laboratories, Inc., (UL):
UL921 - Commercial Electric Dishwashers
UL Electrical Appliance and Utilization Equipment List

(Application for copies should be addressed to the Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062.)

3. REQUIREMENTS

3.1 Description. The dishwashing machine shall consist essentially of the following principal parts: base (frame), legs, wash chamber hood, tanks, spray assemblies, conveyor, pumps, motors, piping, valves, heating equipment, electrical wiring and all accessory equipment necessary for operation.

3.2 First article. When specified (see 6.2), the contractor shall furnish a complete dishwashing machine for first article inspection and approval (see 4.2.1 and 6.4).

3.3 Safety-and health requirement. The machine shall be equipped with safety devices for all parts that present safety hazards. The devices shall include cover and guards for moving parts and shockproof controls for protection from mechanical and electrical hazards to personnel. All guards shall provide easy access to guarded parts and shall not interfere with operation of the machine. The machine shall comply with standards promulgated under OSHA (part 1910) which are applicable to the machine itself. Additional requirements for safety and health shall be as specified (see 6.2 and 6.5).

3.4 Standards compliance. Dishwashing machines shall meet the requirements of the following sanitary and safety standards: ANSl A112.14.1, NSF No. 3, and UL 921.

3.4.1 Certification. As part of the first article test, if a first article is submitted, or prior to approval of the first shipment, the contractor shall submit satisfactory evidence to the contracting officer or his authorized representative that the dishwashing machine he proposes to supply under this specification meets the requirements of ANSl A112.14.1, NSF No. 3, and UL 921.

3.4.1.1 ANSI Certification. Acceptable evidence of meeting the requirements of ANSl A112.14.1 shall be a statement from the manufacturer certifying that the dishwashing machine meets the applicable requirements of ANSl A112.14.1

3.4.1.2 NSF certification. Acceptable evidence of meeting the requirements of NSF No. 3 shall be the NSF Seal on the finished dishwashing machines and inclusion in the current edition of the NSF Listing of Food Service Equipment.

3.4.1.3 UL certification. Acceptable evidence of meeting the requirements of UL 921 shall be the UL label, listing in the UL Electrical Appliance and Utilization Equipment List.

3.4.2 Alternate certification. In lieu of the certification specified in 3.4.1, acceptable evidence of meeting the requirements of the standards will be a certified test report from a nationally recognized independent testing laboratory, approved by the contracting officer, or for NSF certification acceptable to the medical department of the service for which the dishwashing machines are being acquired attesting that a dishwashing machine typical in all respects of the units to be supplied under this specification has been examined and tested, and meets all requirements of the applicable standards. When authorized in writing by the contracting officer, such examination and tests for alternate certification may be conducted by the manufacturer at the manufacturer’s plant when the cognizant inspection authority has determined that adequate facilities and instrumentation are available for conducting the required tests.

3.4.3 Applicability. The dishwashing machines shall meet the dimensional requirements, tank capacities, pumping rates, and all other requirements of this specification. The contractor shall select the machine to be offered as meeting these requirements from his models which have an NSF-approved operating capacity not less than the nominal capacity specified herein. Machines which have NSF-approved hourly dishwashing capacities complying with this specification, but which in other respects do not meet the requirements herein will not be acceptable.

3.4.3.1 Shipboard application. The type IV washing machines for shipboard application shall meet the following dimensional requirements (see 6.7).

	Maximum Length of hood inches
Size 60-20	74
Size 85-20	74
Size 135-20	74
Size 185-20	74
Size 250-20	104

3.5 Standard commercial product. The dishwashing machine shall, as a minimum, be in accordance with the requirements of this specification and shall be the manufacturer's standard commercial product. Additional or better features which are not specifically prohibited by this specification but which are a part of the manufacturer's standard commercial product shall be included in the dishwashing machine being furnished. A standard commercial product is a product which has been or is currently being offered for sale on the commercial market through advertisements or manufacturer's catalogs, or brochures, and represents the latest production model(s).

3.6 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.7 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.7.1 Corrosion-resisting steel. corrosion-resisting steel shall be any of the austenetic grades, except parts requiring heat-treatment which shall be of the martesitc grades.

3.7.2 Nickel-copper alloy. Nickel-copper alloy shall conform to QQ-N-281, and shall have a satin finish.

3.7.3 Dissimilar metals. In fabricating the dishwashing machine, the use of dissimilar metals in intimate contact with each other shall be avoided wherever possible to minimize galvanic corrosion. When use of dissimilar metals cannot be avoided, the joints or contact areas shall be protected against galvanic corrosion by plating, coating, gasketing, or other interposing material unless protection is inherently provided by area relationships of the anodic and cathodic materials.

3.7.4 Nonmagnetic materials. When specified (see 3.9.10, 6.2, and 6.7), nonmagnetic materials shall be employed. For dissimilar metals, an insulation

barrier capable of militing galvanic current to (1 percent or less) of the short circuit current in a corresponding bimetallic joint.

3.7.5 Galvanized steel. Galvanized steel shall conform to the requirement of ASTM A120.

3.7.6 Copper and Bronze. Copper tubing shall conform to the requirements of ASTM B88 type L, hard drawn. Fittings shall conform to ANSI B16.18 cast bronze or ANSI B16.22 wrought copper.

3.8 Performance. When operated as prescribed by the manufacturer, the dishwashing machine shall be capable of effectively washing and sanitizing dishes (multi-use eating and drinking utensils) by means of the spray wash and rinse cycles, and when applicable, the prewash cycle. Compliance with this requirement shall be evidenced by sanitation certification (see 3.4). The operating capacity for the dishwashing machine shall be not less than that indicated in 1.2.1 for the applicable size. The dishwashing machine shall meet the requirements of the operational test of 4.5.1 and the performance test of 4.5.2.

3.8.1 Noise level. Unless otherwise specified (see 6.2 and 6.5), dishwasher noise level shall not exceed 80 decibels (A-weighted) at the operator position(s). The operator position(s) are 1-1/2 feet from the loading end of the dishwasher, 1-1/2 feet from the unloading end, and 5 feet above the floor. Compliance with the noise level limits shall be verified in accordance with 4.5.4.

3.9 Design and construction. The dishwashing machine shall meet the design and construction requirements of NSF No. 3 and the performance requirements of this specification. Unless otherwise specified (see 6.2 and 6.7), the inside working height shall be:

Type I	- Not less than 10 inches above the tracks.
Type II	- Not less than 16 inches above the tracks.
Type III & IV	- Not less than 18 inches measured above the chains or rack quide.

Type I machines are under-counter feed only thru a front door opening.

Type II machines are uprights and feed from left, right or front.

Type I, II and III machines shall wash dishes by means of a water-and-detergent solution pumped from a tank. The dishes shall then be rinsed and then final rinsed from an outside source of fresh water.

Type III and IV machines shall wash dishes in racks propelled through the machine from the right or left side as specified (see 6.2). The conveyor shall be propelled from the pump motor or by a separate motor (see 3.9.16). When separately driven, the motor shall be a continuous duty motor of not less than 1/4 horsepower (hp). Type II and IV machines shall wash dishes by means of water-and-detergent solution pumped from a separate tank, and then the dishes shall be final rinsed from an outside source of fresh water. The machines shall be designed and equipped to automatically maintain the following water temperatures during wash and rinse operations, where applicable:

a. Prewash	110 deg 140 deg Fahrenheit (F).
b. Pumped wash	150 deg to deg 160 F.
c. Pumped rinse	160 deg to 180 deg F.
d. Final rinse	180 deg to 195 deg F.

Shut-off valve shall be provided in the hot water and cold water inlet lines at the interface of the washing machine to provide fill and replenishing water for the system. The machine shall be so designed that water will not overflow or splash to the outside of the machine. Where boosters are provided, the manufacturer shall provide interconnecting piping. All internal joints and seams resulting from fabrication of tanks, hoods, rails, and guides shall be sealed and smooth to prevent entrapment of food particles or fluids. All exposed metal shall be smooth, free from dents, burrs, and sharp edges. Pumps and motors shall not interfere with loading and unloading operations. When specified (see 6.2), pumps and conveyor motor shall not extend beyond the limits of the loading and unloading sections.

3.9.1 Prewash. When specified (see 6.2), a pumped water automatic prewash device of the recirculating type shall be fitted to or shall be a part of the dishwashing machine, and shall be designed and equipped to remove food particles and grease from dishes prior to the machine wash. Materials and construction shall be as specified for the basic machine. Makeup water to the prewash tank shall be supplied primarily from the wash tank to provide some degree of detergent in the prewash tank. Additional makeup water shall be supplied from the wash tank or rinse tank or combination of these sources. Flow rate of makeup water to the prewash tank shall be at least 2 gallons per minute. When specified (see 6.2 and 6.6), the prewash device shall be equipped with an automatic tempering valve designed to provide cold water makeup to maintain prewash water temperature in the range 110 deg to 140 deg F, except when scrapping is directly into food waste disposer. Prewash water used in conjunction with a food waste disposer shall be at a temperature not greater than 80 deg F, and of sufficient volume to assure proper operation of the disposer.

3.9.2 Pumped wash. The pumped wash shall meet the applicable performance requirements of NSF No. 3 with respect to pressure, cycle time, spray patterns, and spray volumes. The wash section shall be designed to remove physical soil from all portions of the racked dishes. The wash water temperature shall be maintained between 150 and 160 F. Heating shall be as specified in 3.9.5.

3.9.3 Pumped rinse. Type IV machines shall be provided with a rinse tank and pump system to effectively spray from above and below with rinse water at 160 to 180 F. The rinse section shall meet or exceed the requirements of NSF No. 3. Baffles shall be provided to prevent intermingling of wash and rinse water. For dishwashers used on board ships, baffles should be designed to prevent water overflow or intermingling of wash and rinse water when the dishwasher is tilted 15 deg (see 6.7). Make up water shall be provided from the fresh water system.

3.9.4 Final rinse. The final rinse shall provide spray from above and below the rack to effectively rinse all dishes and utensils with fresh water. Rinse water shall be 180 deg to 195 deg F. The final rinse shall meet the applicable requirements of NSF No. 3. For shipboard use (see 6.7), final rinse consumption for type III and IV dishwashers shall not exceed 360 gallons per hour. A rinse water temperature booster conforming to 3.9.6 or 3.9.7, shall be furnished.

3.9.5 Heating. The dishwashing machines shall be steam or electrically heated in accordance with the style specified (see 1.2 and 6.2). Style I steam heated machines and style II electrically heated machines shall be provided with a booster heater for the final rinse water. Style I machines shall be equipped with thermostatically controlled steam coils for wash and rinse tank heating except for Veterans Administration (VA) use. When specified for VA use only (see 6.2), steam injectors shall be provided. The steam injectors shall be stainless steel or nickel bearing iron. Steam coils shall be corrosion-resisting steel. Booster heaters are required for the final rinse water for style I machines, the booster shall be steam heated (see 3.9.6). Style II electrically heated machines shall be equipped with immersion heaters for tank heating. Booster heaters are required for the final rinse water for style lI machines, the booster shall be electrically heated (see 3.9.7). All tank heaters shall be of the applicable size, and thermostatically controlled to maintain the tank water temperatures specified in 3.9. Electric immersion heaters shall be sheathed in ANSl 300 series stainless steel. The circuits for electric immersion heaters shall include a magnetic contactor and an automatic positive low water cutoff (see 6.7). The heat exchanger shall be securely mounted as an integral part of the machine. If separately mounted, the heat exchanger shall be connected into the final rinse in a position that does not interfere with operation of the machine, and does not prevent attachment of tables or counters to the machine.

3.9.6 Heat exchanger (steam boosters). When specified (see 6.2), steam boosters shall be provided to increase the temperature of the final rinse water. Except as specified for VA use the boosters shall raise the temperature of the final rinse water from 130 deg F to within the range of 180 deg to 195 deg F. Steam boosters required for VA use shall be capable of raising the final rinse water having a temperature between 110 deg and 120 deg F by 70 deg to 80 deg F. The heat exchanger shall automatically maintain the required final rinse water temperature to the machine by an automatic thermostat operating a steam valve controlling the input of steam to the heat exchanger booster. The booster shall not produce steam in the water supply piping or in the heat exchanger. The heat exchanger shall be provided with, but not limited to, controls and safety equipment as follows: Line strainers in the steam line and the hot water line, steam traps, relief valve, hot water pressure regulator, pressure and temperature gages, and a thermostatically controlled, valve. Unless otherwise specified (see 6.2), required valves and regulators shall be accessible and adjustable from the front of the machine. Valves and pipe unions shall be installed on the heat exchanger where steam and water lines enter the unit. Sensing unit control wires shall be protected by corrosion-resisting armored flexible tubing or the equivalent. The heat exchanger shall have means for complete drainage of the steam jacket and water tubes. Where internal cleaning is required heads, jackets, and cover plates shall be removable. Heat exchanger exterior surfaces shall be insulated and jacketed as required to limit exterior surfaces to 150 deg F.

3.9.7 Electric booster style II. When specified (see 6.2), electric boosters shall be provided with all necessary controls for automatic operation to raise the temperature of final rinse water from the range of 120 deg to 140 deg F to within the range of 180 deg to 195 deg F. When specified for Army use, electric boosters shall be provided. The electric booster shall be designed to operate with the electric power characteristics specified (see 6.2). Electric hot water generating equipment shall conform to the requirements of NSF No. 5. All electrical components shall be UL approved. Heater surfaces in contact with the rinse water shall be corrosion-resisting steel. The heat exchanger shall be provided with, but not limited to, controls and safety equipment as

follows: water line strainer with cleanout, temperature gage, pressure gage, pressure relief valve, high temperature limit switch, low water cutoff, electric thermostat and solenoid valve, pressure regulator and electrical contactors as required to provide control. Valves and pipe unions shall be installed on the heat exchanger where water supply lines connect to the unit. Sensing unit control wires shall be protected by corrosion-resisting armored flexible tubing or equivalent. The heat exchanger shall provide means for complete drainage of water tubes. Where internal cleaning is required heads, jackets, and cover plates shall be removable. Heat exchanger exterior surfaces shall be insulated and jacketed as required to limit exterior surfaces to 150 deg F.

3.9.8 Detergent control. Unless otherwise specified (see 6.2), the dishwashing machine shall be fitted with an electric or electronic automatic detergent dispenser conforming to MIL-D-43729. Detergent dispensers shall be installed to provide adequate protection against back siphonage of compounds into the water lines in accordance with ANSI A112.14.1 Detergent dispensers and detergent concentration meters shall meet the requirements of NSF No. 29. For shipboard use, suitable mechanical and electrical connection shall be provided to permit use of detergent controls when the controls are not installed by the dishwasher manufacturer.

3.9.8.1 Automatic detergent dispenser. The detergent dispenser shall conform to the requirements of MIL-D-43729, style I or style II. The style I and style II dispensing units shall consist of an electrical control unit, a low voltage water inlet solenoid valve, detergent dispensing reservoir with syphon breaker, and wash tank sensing electrodes. Dispensing units shall be designed for dispensing dishwashing compound conforming to P-D-1800. The units shall have an adjustable minimum range of 0.15 percent to 0.40 percent concentration by weight and shall automatically feed and maintain a constant detergent concentration of the wash water between 0.2 and 0.3 percent by weight when water temperature is between 150 deg and 160 deg F. Automatic feeding shall be determined by conductance at tank electrodes to achieve proper concentration. A control unit shall operate a solenoid valve and shall have an "ON"-"OFF" switch and a light to indicate when detergent replenishment is necessary. The control unit shall be designed for mounting on a dishwashing machine or adjacent wall. When specified (see 6.2), the unit shall be mounted on the machine. The detergent dispensing reservoir and back syphoning breaker shall be wall or machine mounted as specified (see 6.2), and independent of the location of the dispenser unit. Voltage of electrical components of the dispenser shall be compatible with the specified voltage for the dishwashing machine such that the dispenser supply leads may be wired through the motor control circuits.

3.9.8.2 Detergent concentration meter. When specified (see 6.2), a detergent concentration meter conforming to MIL-M-11495 and all accessories necessary for proper operation shall be supplied with each machine but not wash tank and mounting the meter on top of the machine, as illustrated in remote installation sites where service support for automatic detergent dispensers would not be available and manual addition of washing compounds is anticipated.

3.9.9 Rinse agent injector. Unless otherwise specified (see 6.2), dishwashing machines shall be fitted with a mechanism for injecting a liquid rinse agent into the final rinse water. The injector shall conform to MIL-I-43728. When specified (see 6.2), the injector unit shall be supplied separately for wall mounting. For shipboard use, suitable mechanical and electrical connection shall be provided when controls are not installed by the dishwasher manufacturer. Rinse agent injectors shall meet the requirements of NSF No. 29.

3.9.10 Pumps. Each wash, rinse, and prewash section, as applicable, shall be equipped with a separate electrical-motor-driven, centrifugal, recirculating pump of sufficient capacity and pressure to meet requirements of NSF No. 3. Pumps shall be of the close-coupled type and shall be furnished with removable inspection and cleanout plates. Pumps and associated piping shall be self-draining, or else the recirculation piping of each pump shall be equipped with means to complete drainage of the pump casing and connected piping. Impellers shall be of the semi-open, nonclogging type, corrosion-resisting steel, nickel bearing cast iron, nickel bearing copper alloy, cast iron, or high impact plastic. Impellers shall be resistant to corrosive chemicals and shall withstand temperatures of over 180 deg F. Impellers shall be statically and dynamically balanced. The pump shafts shall be corrosion-resisting steel or nickel copper alloy. The pump casing shall be nickel bearing cast iron, corrosion-resisting steel, nickel copper alloy, cast iron, or high impact plastic. The casing shall be resistant to corrosive chemicals and shall withstand temperatures of over 180 deg F. Mechanical seals shall be provided for pump shafts. The pump shall be marked to indicate correct direction of rotation. Each pump and motor assembly shall be equipped with at least two anti-friction bearings. The pump suction intake in the tank shall be equipped with a stainless steel strainer. When specified (see 6.2 and 6.7), pumps shall be constructed of nonmagnetic materials.

3.9.11 Thermometers. Dishwashing machines shall be fitted with easily replaceable, sealed, nonfogging, 1-3/4-inch diameter or larger dial-type thermometers conforming to the requirements of NSF No. 3, and readily visible at eye level from the front of the machine and positioned to prevent breakage. Thermometers shall be graduated to at least 212 F and shall be accurate within +/-3 deg F within the operating range. Thermometers shall be furnished on the machines to indicate the temperature of both the wash and final rinse water in type I, II, and III machines, and the temperature of prewash, wash, rinse, and final rinse water in type IV machines. The words "PUMPED" or "POWER WASH", "PUMPED", "POWER RINSE", and "FINAL RINSE" or manufacturers standard designation shall be etched, stamped, or engraved on corrosion-resisting steel or chrome plated brass plates, or suitable material accepted as permanent marking or labeling under UL 921. The face of each thermometer plate shall be clearly marked to indicate correct operating temperature range.

3.9.12 Pressure gages. All pressure gages shall be 2 inches in diameter or larger, nonfogging, dial-type, pulsation damper type, easily replaceable and readily visible from the front of the machine. A pressure gage shall be mounted on the discharge side of the pressure-reducing valve in the final rinse water supply line. When specified (see 6.2), two additional gages shall be installed on the machines to indicate pumped wash and pumped rinse water pressures. The pumped washed and pumped rinse water pressure gages shall

register the pressures at the top spraying manifolds. Pumped wash and pumped rinse gage dials shall be colored red below and above markings indicating range of the operating pressure.

3.9.13 Piping, tubing, fittings and valves. All piping, tubing, fittings, and valves for the control of water, drainage, overflow, and steam shall be installed by the supplier and be so arranged that a minimum of pipeline connections will be necessary. Valves shall be located, whenever possible, on the exterior of the machine. Water lines, drain lines, steam piping, and fittings shall be standard pipe or tubing of corrosion-resisting steel, copper, brass, or nickel-copper alloy. Fresh water supply to the tanks shall be discharged not lower than 2 inches above the maximum flood level rim. An effective vacuum breaker shall be installed on the final rinse line to prevent backflow in accordance with ANSI A112.14.1 The water and steam distribution tubing or piping on the machine shall be of sufficient nominal tubing or pipe size to meet the flow requirements of NSF No. 3 but in no case shall the nominal size of the tubing or pipe be less than 1/2 inch for water and 3/4 inch for steam. Unless otherwise specified (see 6.2 and 6.8), all individual tank drains shall be connected with a 2-inch nominal tubing or pipe size main trunk drain located longitudinally under the machine or arranged to permit individual indirect waste connections to the waste line. Steam valves shall be bronze, full-bore-plug type, having seat and disk of corrosion-resisting steel with a minimum Brinell "B" scale hardness of 500, and designed for a saturated steam working pressure of 125 psig. Hot and cold water ball, gate or butterfly valves shall be provided for filling each tank. Drain valves shall be permanently marked to show open and closed position and shall be lever-operated and ruggedly designed for foot or hand operation. A Y line piep or tube inserted strainer with stainless steel mesh strainer, and a pressure-reducing valve when specified (see 6.2) , shall be factory-set at 20 psig flowing, shall be furnished and properly installed in the hot water supply line to the final rinse. Fresh water rinse valves shall be fully automatic, packless piston-pilot-operated, or diaphragm solenoid valves, normally in the closed position and suitable for 212 deg F water at 125 psig working pressure. Numbered metal, plastic or cardboard tags shall be attached to the valves for easy identification.

3.9.14 Pumped spray assembly. All spray arm manifolds, and when applicable, spray boxes, shall be corrosion-resisting steel, slotted or fitted with corrosion-resisting steel or plastic nozzles. All spray assemblies shall be readily removable without the use of tools and easily cleanable.

3.9.15 Tanks. Tanks shall be constructed of not less than 16-gage (0.0625 +/- 0.005 inch), corrosion-resisting steel, shall be watertight, and shall be welded or deep drawn construction. Readily visible water level indicators shall be installed to show the level of water in each tank. Each tank shall have an easily accessible overflow. Not less than 10 inches of skimming surface in each overflow unit shall be provided to free the water from scum. Each overflow unit shall be readily removable for cleaning and shall have a protective cover attached to the overflow pipe. The overflow unit shall be not less than 1 inch below the bottom of the scrap tray.

3.9.16 Conveyors. Type III and IV dishwashing machines shall have a conveyor for handling the specified number of racks (see 1.2.1). Unless otherwise specified (see 6.2), the design shall be such that racks cannot be pushed through the machine faster than the conveyor speed. Means shall be

provided for automatically releasing or disconnecting the driving power, or the drive, in case of jamming. Shear pins or other mechanisms requiring replacement of any part are not acceptable. Conveyors shall be driven by the pump motor or by a separate motor (see 3.9). Separately driven conveyors shall be driven by a separate motor-driven gear reduction unit with a minimum of 1/4 hp. Conveyors shall be roller-chain type, reciprocating pawl-bar type, or cradle type, as specified (see 6.2 and 6.7). Pawl drive conveyors shall not be used for dishwashers on shipboard. Pawl-bars and lugs shall be made of corrosion-resisting steel or nickel-copper alloy. Chain-type conveyors for type III and IV machines shall be so designed that the racks ride on the chains. Chains and sprockets shall be of corrosion-resisting steel (see 3.7.1) or nickel-copper alloy (see 3.7.2). Chains shall operate over sprockets keyed to the shafts, except that one sprocket on the idler shall not be keyed, but shall be provided with a suitable bearing. The chains shall be bushed standard 3/4-inch pitch or 3/4-inch double pitch chain with not less than 0.468-inch diameter rollers. One conveyor chain shall be equipped with lugs extending 1/2-inch +/- 1/16-inch above the conveyor or track guide. The lugs shall be spaced not more than 10 inches on center. Machines may be furnished with single chain drives having the characteristics described, except for Naval shipboard use where two chains are required (see 6.7). Conveyor guides shall be constructed of corrosion-resisting steel not less than 14-gage and so arranged that the racks are prevented from leaving the conveyors. Suitable drain holes or slots shall be provided to prevent carryover of water from one section of the machine to another.

3.9.17 Scrap trays (strainer pans). Scrap trays of corrosion-resisting steel not less than 16-gage (0.0625 inch) shall be provided to prevent insoluble matter and large pieces of food residue from passing into the tanks. No opening around or between the scrap trays shall be wider than the diameter of the openings in the scrap trays. 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.

3.9.18 Splash curtain. All type III and IV machines shall be provided with splash curtains at the entrance and exit of the hood. Type IV machines shall also be provided with splash curtains and baffles to prevent excessive carryover from the wash to the rinse section or vice versa (see 6.7). When trays projecting 15 inches above the conveyor are washed, the curtains shall not mask any of the wash or rinse spray. All flexible-type curtains shall be nylon, nonwoven vinyl, synthetic flexible strip curtains, or plastic of a quality to withstand heat and wear.

3.9.19 Hoods, vents, and doors. Unless otherwise specified (see 6.2), hoods, vents, and door frames shall be constructed of not less than 16-gage corrosion-resisting steel. Doors shall be constructed of not less than 18-gage corrosion-resisting steel, be rigid, and shall be stiffened as required. When specified (see 6.2), vapor-control exhaust vent (inside) connections with built-in drip shields and locking type control dampers shall be installed on the loading and unloading ends of the hood for connection to exhaust system ducts. The front of the machines shall be provided with suitable doors to permit all interior sections to be readily inspected and cleaned. Automatic door catches shall be provided on all inspection and cleaning doors. Doors shall be splash proof and their exposed edges shall be smooth and formed to prevent canting or warping.

3.9.20 Legs (feet). The machine shall be rigidly constructed and have four or more legs made of corrosion-resisting steel. When specified for shipboard use or for use in seismic areas (see 6.2 and 6.7), the legs shall be adequately constructed to permit secure attachment to the galley deck or to the floor. A minimum 6-inch unobstructed clearance shall be provided between the floor and the lowest horizontal member, except when the drain pipe, drain valve, and the steam return line (see 3.9.13) are located under the machine. Except for shipboard use, legs shall be adjustable so that the height or the conveyor may be varied from 34 to 35 inches above the floor.

3.9.21 Gears and sprockets. Gears and sprockets exposed to water and detergent shall be corrosion-resisting steel, copper-nickel alloy, or bronze. Reduction gear assemblies shall be run in an oil bath.

3.9.22 Bearings and clutches. Bearings shall be properly aligned and fitted to the machine, and be easily replaceable. Clutches shall be provided where required. Shear pins are not acceptable.

3.9.23 Guards. All gears, shafts, chains, and belts which extend beyond the face of the machine or which operating personnel may come in contact shall be enclosed by metal guards. Guards shall be fabricated to present a neat appearance, be adequately stiffened, and firmly supported although they shall be easily removable for maintenance. Guards visible from the front or ends of machines shall be of the same material as the hood.

3.9.24 Fastening devices. All screws, pins, rivets, nuts, washers and similar parts shall be installed with means for preventing loss of tightness. When subject to removal or adjustment, such parts shall not be swaged, peened, staked, or otherwise permanently deformed. Corrosion-resisting steel fasteners shall be used except when members have been fabricated of metals other than corrosion-resisting steel, in which case the fasteners shall be of the same material as the fastened members.

3.10 Electrical equipment. Unless otherwise specified herein, all electrical equipment shall meet the requirements of UL 921. The dishwasher shall operate on the power characteristics (current, voltage, phase, frequency) specified (see 6.2).

3.10.1 Motors. Unless otherwise specified (see 6.2), motors shall be splashproof except when the motor is protected by a watertight compartment a dripproof motor is permitted. Motors shall conform to NEMA-MG1. Alternating current motors shall be squirrel cage induction type. Motors shall be of adequate size to operate continuously without overheating and shall be rated not less than 120 percent of actual load. Motors shall have adequate motor starter and overload protection in accordance with NFPA No. 70. When specified (see 6.2 and 6.7), a single motor drive shall be provided for pumps and conveyor on type III and IV dishwashers.

3.10.2 Controls. Unless otherwise specified (see 6.2), each dishwashing machine shall be equipped with integrally mounted switches and controls mounted in NEMA type 12 enclosures conforming to NEMA-ICS 6, located for convenient use by the operator. Unless otherwise specified (see 6.2 and 6.7), the control center or designated components thereof shall be furnished separate from the machine for remote wall-mounting at the site of instal-lation. Magnetic controllers shall be of the across-the-line type with thermal overload and low voltage protection. Actuation of the on-off switch

shall energize all pump motors. All control equipment shall be designed and rated in accordance with NEMA-ICS 1 and NEMA-ICS 2 for operation in an ambient temperature of 122 deg F. When specified (see 6.2), low water cutoff switches shall be provided to prevent pump burnout. Type I and II machines shall have a door interlock and safety switch to automatically turn off wash and rinse water if the door is open, and switches for control of tank immersion heaters. Unless otherwise specified (see 6.2), suitable controls shall be installed to prevent operation of the machine unless final rinse water temperature is 180 deg F or higher. When specified (see 6.2), an audible signal shall be installed for low temperature rinse water.

3.10.3 Electrical wiring and components. The washer and accessory equipment shall be completely wired for operation when connected to the electrical source of supply as specified (see 6.2). Wiring and electrical components such as controllers and switches shall conform to the applicable requirements of NFPA No. 70. Controls and switches shall be so wired that all line leads will be open when the controls and switches are in the "off" position. All wires shall be color coded or identified at each terminal or junction. All wiring shall be enclosed in a rigid metal tubing or watertight conduit. A wiring diagram shall be furnished with each machine.

3.11 Equipment

3.11.1 Standard equipment. Unless otherwise specified (see 6.2 and 6.7), each dishwashing machine shall be furnished with the applicable number of racks and cylinders shown in table I. For type I dishwashers, use 16 by 16 inch racks, and for type II, III, and IV dishwashers use 20 by 20-inch racks. Racks and cylinders shall conform to the requirements of MIL-R-24039. Manufacturer shall furnish a standard list of recommended spare parts. Unless otherwise specified (see 6.2), each dishwasher shall be provided with three brushes of suitable size and type for cleaning spray assemblies.

Table I. Dishwashing machine racks and cylinders.

Nominal***	Rack type												Cylinder type	
Size (inches)	I	IA	IC	ID	IE	IG	II	IIA	IIC	IID	III	IIIB	V	VI
35-16	3	--	--	2	2	--	--	--	--	2	--	--	8	8
45-16	3	--	--	2	2	--	--	--	--	2	--	--	8	8
50-20	3	--	--	--	--	--	3	--	--	--	2	--	12	12
50-20	4*	6	2	--	--	4	6	8	4**	--	--	2	12	12
60-20	5						7				1		12	12
85-20	6						10				2		12	12
(Army only)														
(Shipboard)														

Nominal***	Rack type												Cylinder type	
Size (inches)	I	IA	IC	ID	IE	IG	II	IIA	IIC	IID	III	IIIB	V	VI
115-20	3	--	--	--	--	--	8	5	--	--	2	--	12	12
135-20	9						14				2		12	12
(Shipboard)														
165-20	10	--	--	--	--	--	9	10	--	--	3	--	18	18
165-20	10*	10	2			10	8	14	6**	--	--	3	18	18
(Army Only)														
180-20	10	--	--	--	--	--	9	10	--	--	3	--	18	18
185-20	9						14				2		12	12
							15							

Table I. Dishwashing machine racks and cylinders - continued.

(Shipboard)														
250-20	12	--	--	--	--	--	11	14	--	--	3	-	-	18	18
275-20	12	--	--	--	--	--	11	14	--	--	3	--		18	18
275-20	12	14	3	--	--	12	12	21	8**	--	--	3		24	24
(Army only)															

* - For confinement and training dining facilities.
** - (24 or 25 compartments).
***- Nominal sixes show capacity and rack sizes, example: 35-16 is 35 racks per hour, 16 by 16-inch rack. Capacities shown are minimum. Table requirements apply to capacity shown up to the next size.

3.11.2 Spare and maintenance parts. Spare and maintenance parts shall be furnished (see 6.2 and 6.7).

3.12 Lubrication. Means for effective and adequate lubrication shall be provided. Lubricating points shall be easily visible and readily accessible, and the dishwasher shall be lubricated with the proper amount of lubricant prior to delivery. Pressure lubrication shall not be used for motor bearings. A lubrication chart (metal or decal) shall be affixed to each machine indicating all points requiring lubrication (including gear-reduction unit), grade of lubricant required, and time interval for lubrication.

3.13 Treatment and painting. Unless otherwise specified (see 6.2), the dishwashers shall be treated and painted in accordance with the manufacturer's standard practice. All surfaces of the machine other than corrosion-resisting steel shall be protected against corrosion and present a neat appearance.

3.14 Fungus resistance. When specified (see 6.2), electrical components and circuit elements, including terminal and circuit connections, shall be coated with varnish conforming to MlL-V-173, except that:

a. Components and elements inherently inert to fungi or in hermetically sealed enclosures need not be coated.
b. Current-carrying contact surfaces, such as relay contact points, shall not be coated.

3.15 Identification marking. Identification shall be permanently and legibly marked directly on the dishwashing machine or on a corrosion-resisting metal plate securely attached to the machine at the source of manufacture. Identification shall include the manufacturer's model and serial number, name, and trademark to be readily identifiable to the manufacturer. In addition, information required by UL 921 shall be included on the dishwasher or on the plate.

3.16 Electromagnetic interference suppression. When specified (see 6.2), equipment procured under this specification shall be designed and equipped to meet the electromagnetic interference control requirements and test limits for group 3 equipment as specified in MlL-STD-461.

3.17 Instruction plate. When specified (see 6.2), an instruction plate of corrosion-resisting steel, chrome-plated brass, or other suitable material acceptable as permanent marking or labeling under UL 921 shall be attached to each machine at a height readily visible to the operator. The plate shall provide numbered step-by-step instructions for operating and cleaning the

dishwasher. Numbers corresponding to those on the instruction plate shall be attached to the machine at a location adjacent to the operating positions. The instruction plate shall list the required water temperatures for each section (wash, pumped rinse, final rinse), and the tank capacities, as applicable.

3.18 Commercial publication. Manufacturer's standard commercial publications shall be furnished (see 6.3 and 6.7).

3.19 Workmanship.

3.19.1 Fabrication. Metal used shall be free from fractures, splits, punctures, dents, deterioration and shall not be bowed, or malformed. The metal shall have no sharp burrs, slivers, or splinters.

3.19.2 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease, or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

3.19.3 Solder. All surfaces to be soldered (when applicable) shall be thoroughly cleaned prior to soldering. Solder joints shall be smooth with no pin holes.

3.19.4 Threaded fasteners. Threaded fasteners shall not be loose or missing. Threads shall not be missing, stripped, or broken.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herin. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Standard compliance. The contractor shall make available to the contracting officer or his authorized representative evidence of compliance with the applicable standard(s) cited in 4.1.2

4.2 Classification of inspection. The inspection requirements specified herein shall be classified as follows:

(a) First article inspection (see 4.2.1).
(b) Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. First article inspection shall be performed on one dishwashing machine when a first article sample is required (see 3.2 and 6.2). This inspection shall include the examination of 4.4 and the tests of 4.5.1 through 4.5.4 and when applicable, 4.5.5. The first

article may be a standard production item from the contractor's current inventory provided the dishwashing machine meets the requirements of this specification and is representative of the design, construction, and manufacturing technique applicable to the remaining dishwashing machines to be furnished under the contract.

4.2.2 Quality conformance inspection. Quality conformance inspection shall be performed on sample dishwashers selected in accordance with 4.3. This inspection shall include the examination of 4.4, the tests of 4.5.1 and 4.5.2, and the preparation for delivery inspection of 4.8.

4.3 Sampling. Sampling and inspection procedures shall be in accordance with MIL-STD-105. All dishwashing machines of the same type, size, style and class offered for delivery at one time shall be considered a lot for the purpose of inspection. If an inspection lot is rejected, the contractor may rework it to correct the defects, or screen out the defective units, and resubmit for a complete reinspection. Resubmitted lots shall be reinspected using tightened inspection. If the rejected lot was screened, reinspection shall be limited to the defect causing rejection. If the lot was reprocessed, reinspection shall be performed for all defects. Rejected lots shall be separate from new lots, and shall be clearly identified as reinspected lots.

4.3.1 Sampling for examination. Inspection level shall be II Acceptance Quality Level (AQL) of 1.5 for major defects and 4.0 for minor defects expressed in terms of defects per hundred units.

4.3.2 Sampling for tests. Except those dishwashing machines requiring 100 percent operational testing (see 4.6.1), samples shall be elected from each lot based on inspection level S-2, and an AQL of 4.0 defects per hundred units.

4.4 Examination. Each dishwashing machine selected shall be examined for defects listed in table lI.

TABLE II. Classification of defects.

Classification	Defects	Requirement paragraph
Critical:	None defined.	
Major:		
101	Type, size, style, and class not as specified; capacity not as specified.	1.2.1 and 3.8
102	Parts, components and assemblies not identical to permit interchangeability.	3.6
103	Material not as specified.	3.7
104	Noise level not as specified.	3.8.1
105	Design and construction not as specified; inside working height not as specified; water-and-detergent solution not pumped from tank; dishes not rinsed as specified; racks not manually fed to type I and II machines as specified; racks not propelled through type III and IV dishwashers as specified; prewash, wash, rinse, and final rinse temperatures not maintained; shut-off valve in hot-and cold-water lines missing or not operating; when booster are provided, interconnecting	

TABLE II. Classification of defects - continued.

Classi-fication	Defects	Requirement paragraph
	piping missing; internal joints and seams of tanks, hoods, rails and guides not sealed smooth pumps and conveyor motors not within specified limits.	3.9
106	Prewash device not automatic recirculating type, and not as otherwise specified; makeup water not as specified; tempering valve missing, does not operate as required to maintain water temperature.	3.9.1
107	Pumped wash does not meet requirements of NSF No. 3; specified wash water temperature not maintained; heating not provided as specified.	3.9.2
108	Pumped rinse for type III and IV dishwashers does not maintain specified temperature; does not meet NSF No. 3 requirements, and otherwise not as specified; baffles missing, do not prevent mixing of wash and rinse water at shore installations, or mixing or overflow on board ship when the dishwasher is tilted 15 deg.	3.9.3
109	Final rinse does not spray water from above and below rack at specified temperature; does not meet NSF No. 3 requirements.	
110	Heaters for final rinse water not as specified heaters not thermostatically controlled, not sized to maintain water temperature; electric immersion heaters not sheathed as specified, and circuits not as specified; heat exchanger not mounted as specified.	3.9.5
111	Steam heaters do not raise and maintain tempera ture of final rinse water as specified; safety equipment and controls not provided as required; valves and regulators not accessible and adjust-able as specified; valves and pipe unions not installed as required; sensing unit control wires not adequately protected; steam jacket and water tubes not provided with means for complete drainage; access for internal cleaning of heat exchanger not provided; exterior surfaces of heat exchanger not insulated and jacketed.	3.9.6

112	Controls for electric boosters not provided; boosters not adequate to provide final rinse water temperature; generating equipment does not meet requirements of NSF No. 5: electrical components not UL approved; controls and safety equipment not provided; valves and pipe not installed where required; control wires for sensing unit not protected as required; provision not made for complete drainage of water tubes; access for internal cleaning not provided; exterior surfaces not insulated and jacketed; booster does not operate on electric power specified.	3.9.7

TABLE II. Classification of defects - continued.

Classification	Defects	Requirement paragraph
113	Detergent dispenser not provides as specified; dispenser and concentration meter do not meet requirements of NSF No. 29; mechanical and electrical connection not provided as specified; protection against back siphonage not provided as specified.	3.9.8
114	Detergent dispenser does not meet requirements of MIL-D-43729; adjustable minimum range of percent detergent concentration, constant concentration, and automatic feeding not maintained; control unit does not operate and not mounted as required; "ON"-"OFF" switch and detergent indicator not operating, missing; dispensing reservoir and back syphoning breaker missing, not mounted as specified.	3.9.8.1
115	Detergent concentration meter does not conform to MIL-M-11495, missing, accessories not furnished; dishwasher not provided with holes for mounting meter and electrodes.	3.9.8.2
116	Rinse agent injector not furnished as specified; not in accordance with requirements of MIL-I-43728; mounting not as specified; mechanical and electrical connection not provided; injector does not meet NSF No. 29.	3.9.9
117	Pump not centrifugal, recirculating type of required capacity and pressure; not equipped with motor; does not meet NSF No. 3; does not drain as required; pump, inpellers, and shaft not constructed of required material; pump impeller not resistant to corrosive chemicals do not withstand 180 deg F temperature; pump shaft seal missing; pump rotation direction not indicated; strainer not provided.	3.9.10
118	Thermometers do not conform to NSR No. 3, UL 921, and otherwise as specified; not sized, accurate readily visible, and located, as specified; incorrect marking.	3.9.11
119	Pressure gages not type, size, readily visible, and located, as specified; not marked as required; quantity not as specified.	
120	Piping, tubing, fittings, and valves not constructed of materials specified; not installed and arranged as required to minimize the number of connections; fresh water supply not a specified; vacuum breaker does not prevent backflow as specified in ANSI A112.14.1; water and steam piping not of proper size, do not meet NSF No. 3; valves not correctly identified.	3.9.12 3.9.13

TABLE II. Classification of defects - continued.

Classification	Defects	Requirement paragraph
121	Spray assemblies not as specified; nozzles, manifolds not constructed of materials specified; assemblies not readily removable, and easily cleanable; end caps not removable.	3.9.14
122	Tanks not constructed of correct gage, material; not watertight; water level indicator missing; overflow not easily accessible, not located as required, contains less than minimum skimming surface.	3.9.15
123	Conveyors, chains, sprockets, guides not constructed of materials specified; means not provided to prevent racks from being pushed faster than conveyor speed, and to prevent jamming; drive and type not as specified; one idler sprocket not left unkeyed, and provided with bearing; chain pitch not as specified; rollers not diameter specified; one chain not equipped with lugs as specified; guides not of specified gage; drain holes, slots not provided.	3.9.16
124	Scrap trays not correct gage or material specified; opening too wide; ledges not accessible for cleaning.	3.9.17
125	Splash curtains missing or not provided; baffles missing; curtains mask wash or rinse spray; curtains not of material specified.	3.9.18
126	Hoods, vents, doors, door frames not of specified gage; exhaust vent connections not installed on loading and unloading ends of hood as specified; inspection doors and automatic door catches not provided; doors not splashproof; edges not as specified.	3.9.19
127	Legs not construction of corrosion-resisting steel; not constructed for shipboard or for use shipboard or for use in seismic areas; 6-inch clearance not provided; legs not adjustable.	3.9.20
128	Gears and sprockets not constructed of material specified.	3.9.21
129	Bearings not properly aligned and fitted; clutches not provided.	3.9.22
130	Guards not provided, fabricated as required, and not material specified.	3.9.23
131	Fasteners not installed properly; not constructed of material specified.	3.9.24
132	Electrical equipment does not meet UL 921; electrical motors to not conform to NEMA-MG1 power characteristics not as specified.	3.10
133	Motor not type specified; not protected as specified; not adequate size.	3.10.1

TABLE II. Classification of defects - continued.

Classification	Defects	Requirement paragraph
105	Switches and controls missing; not mounted as specified, and not conveniently located; control center or components not furnished for remote wall-mounting when required; magnetic controllers not as specified; control equipment not in accordance with NEMA-ICS 1 and 2; low water cut-off switch missing; door interlock and safety switch for type I and II dishwashers missing, not operating as required; control switch for tank immersion heater missing, not operating; malfunction of control permit operation of washer with final rinse water temperature less than 180 F; audible signal not provided.	3.10.2
135	Wiring not complete, not color coded, not enclosed in tubing or conduit; wiring and components do not conform to NFPA No. 70; line leads not open when controls and switches are off; wiring diagram missing.	3.10.3
136	Racks and cylinders not as specified, do not conform to MIL-R-24039; quantity not as required; brushes missing, or not of size and type specified.	3.11.1
137	Spare and maintenance parts missing.	3.11.2
138	Lubrication points not marked; dishwasher not lubricated; chart missing; instructions not complete.	3.12
139	Treatment and painting not as specified.	3.13
140	Electrical components and circuit elements not protected against fungus as specified.	3.14
141	Electromagnetic interference suppression not provided when specified.	3.16
142	Instruction plate not in accordance with UL 921, not complete, or missing.	3.17
143	Workmanship not as specified.	3.19
144	Welding not in accordance with code acceptable to the preparing activity.	3.19.2
145	Threaded fasteners loose or missing; threads missing, stripped, or broken.	3.19.4
Minor:		
201	Identification marking not as specified; information not conforming to UL 921; plate not securely attached to dishwasher.	3.15
202	Commercial publications missing.	3.18

4.5 Tests.

4.5.1 Operational test. The first article and each item of production shall be completely assembled and connected to the applicable water, electric, steam, and drainage service. The machine shall be leveled and adjusted in accordance with the manufacturer's standard practice. The wash water tank,

rinse water tank, and the detergent reservoir shall be filled in accordance with the manufacturer's standard practice. The machine shall be operated for not less than 1 hour without dishes or racks. The machine and accessories shall operate quietly, smoothly, and without undue vibration. There shall be no evidence of failure, overheating of bearings, or leaks, and all controls shall operate in a positive, smooth, and efficient manner. The wash and rinse water temperatures shall be maintained as specified in 3.9 and in accordance with NSF No. 3.

4.5.2 Performance test. The first article and the samples selected in 4.3.2 shall be tested in accordance with the manufacturer's instructions to determine compliance with 3.8. The washing machine shall be loaded to capacity with soiled and baked-in dishes (see 4.5.3), and operated for 10 consecutive cycles. The wash and rinse water temperatures, pressures, and flow rates, and the wash water detergent concentration shall be determined with use of the furnished thermometers, pressure gages, and detergent control meter, and with calibrated instruments. The test data shall be recorded and the average calibrated water temperature, pressure and consumption, and the detergent concentration shall be used to determine compliance with the applicable requirements of 3.9, 3.9.8.1, and when applicable, 3.9.9. The capacity of dishwashers shall be measured to determine compliance with the requirements of 3.8.

4.5.3 Soil removal test. The washing machine shall be tested to determine that the machine will satisfactorily and uniformly wash one rack each of compartment mess trays, dinner plates, bowls, and cups, and when the food holding surface of the respective items have been coated with a mixture composed of the following:

a. 8 ounces of peanut butter.
b. 8 ounces of salad oil.
c. 1/4 ounce of food coloring.
d. 9 ounces of flour.
e. 17 ounces of water.

Mix the ingredients for 3 minutes at low speed in a blender. Brush mixture on mess gear items and let stand for approximately 30 minutes. When the washing operation is complete, the mess gear shall be removed from the washing machine and visually examined. There shall be no visible evidence of soil. An ultra violet light shall be used to detect traces of soil invisible to the eye.

4.5.4 Noise level test. Compliance with the noise level limits of 3.8.1 shall be verified by measurement. Noise levels shall be measured using a sound level meter in accordance with ANSI S1.4, type 1. The meter shall be set for the A-weighting "slow" mode of operation. The noise level test shall be set up and conducted in accordance with the guidelines specified in ANSI S1.13 FOR THE "Field" measurement method. The washing machine shall be operated with loaded racks. The noise level measurements shall be made at the loading end and at the unloading end of the washer and at the operator's position. Failure to meet the noise level requirements of 3.8.1 shall be cause for rejection. This test may be performed concurrently with the test of 4.5.2.

4.5.5 Electromagnetic interference (EMI) control test. When EMI control is required, the first article equipped for the reduction of EMI in accordance with 3.16 shall be tested by the supplier in accordance with test methods UM05

OF MIL-STD-462. The supplier shall furnish the contracting officer, for approval, the interference control plan, the EMI-EMC test plan and the test report as required in MIL-STD-461. Upon approval of the test report by the contracting officer and provided all other requirements of the specification are met, the first article sample shall be used as a model for all other units.

4.6 Adjustments. Adjustments and calibration of the washer and accessory equipment will be permitted prior to testing.

4.7 Repairs and retests. Repairs and retests will be permitted only upon approval by the contracting activity.

4.8 Preparation for delivery inspection. The inspection of the preservation, packing, and marking shall be in accordance with the requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, and packing. The preservation, packaging, and packing shall be in accordance with MIL-K-43875. The level of preservation and packaging, and level of packing shall be as specified (see 6.2).

5.2 Marking.

5.2.1 Civil agencies. Shipments to civil agencies shall be marked in accordance with MIL-STD-129.

5.2.2 Military agencies. In addition to any special marking required by the contract or order, packages and shipping containers shall be marked in accordance with MIL-STD-129.

6. NOTES

6.1 Intended use. The dishwashing machines covered by this specification are intended to be used to uniformly wash and rinse eating and drinking utensils in installations requiring large scale service of food to governmental employees (Federal and Military).

6.2 Ordering data. Purchasers should exercise any desired options offered herein and acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. Type, size, style, and class machine required (see 1.2.1).
c. When a first article is required for inspection and approval (3.2, 4.2.1, and 6.4).
d. When safety and health requirements are different, specify and fully describe (see 3.3 and 6.5).
e. When nonmagnetic materials are required (see 3.7.4 and 3.9.10).
f. Noise level requirements, if other than specified (see 3.8.1).

g. When the inside working height shall be not less than 10 inches above The tracks for type I; not less than 16 inches above the tracks for type II; not less than 18 inches measured above the chains or rack guide for type II and IV dishwashing machine; whether washers shall operate left-to-right or right-to-left; whether pumps and conveyor motors shall extend outside loading and unloading sections (see 3.9).
h. When a prewash device is required; when an automatic tempering valve is required (see 3.9.1).
i. Steam or electrically heated dishwasher (see 3.9.5).
j. When steam injectors are required for VA use (see 3.9.5).
k. When steam boosters are required; whether valves and regulators shall be accessible and regulated other than from the front of the dishwasher (see 3.9.6).
l. When electric boosters with controls are required; electric power characteristics (see 3.9.7).
m. When an automatic detergent dispenser is not required (see 3.9.8).
n. When detergent dispenser is to be machine mounted; wall or machine mounting of dispensing reservoir and back syphoning breaker (see 3.9.8.1).
o. When detergent concentration meter is required (see 3.9.8.2).
p. When rinse agent injector is not required for dishwashers; when unit shall be wall mounted (see 3.9.9).
q. When 2 additional pressure gages for pumped wash and rinse water are required (see 3.9.12).
r. Whether tank drains shall be connected differently (see 3.9.13).
s. Whether pushing of racks through washer faster than speed of conveyor is permitted; conveyor type (see 3.9.16).
t. Whether gage of hood, vent, and door frame shall be different; when vapor-control exhaust vent is required (see 3.9.19).
u. When legs shall be constructed for use on board ship or in seismic areas (see 3.9.20).
v. Whether electrical equipment requirements shall be different from UL 92; electrical power characteristics (see 3.10, and 3.10.3).
w. Whether motors shall be other than splash-proof; when a single motor drive is required for pumps and conveyors on type III and IV washers (see 3.10.1)
x. Whether controls shall be furnished and mounted as specified; when controls shall be supplied separate from the washer for wall-mounting; when controls shall permit operation of the washer when the rinse water is less than 180 deg F; when an audible alarm is required (see 3.10.2).
y. Whether number of racks, cylinders, and brushes shall be different (see 3.11.1)
z. Spare and maintenance parts required (see 3.11.2).
aa. Whether treatment and painting shall be different (see 3.13).
bb. When fungus resistance treatment is required (see 3.14).
cc. When electromagnetic interference suppression is required (see 3.16).
dd. When instruction plate is required (see 3.17).
ee. Level of preservation and packaging and level of packing required (see 5.1).
ff. When dishwasher is for naval shipboard use (see 6.7).

6.3 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL) and invokes the provisions of paragraph 7-104.9(n) of the Defense Acquisition Regulations (DAR), the data requirements will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with

the approved CDRL (DD Form 1423) incorporated into the contract. When the provisions of DAR 7-104.9(n) are not invoked, the data shall be delivered in accordance with the contract requirements.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one dishwashing machine. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test, and approval of the first article.

6.5 Safety and health determinations. In order that equipment integrated into the user's operational environment will comply with the standards promulgated under the Occupational Safety and Health Act of emission, noxious vapors, heat, etc., as applicable, specific requirements concerning guarding the points of operation, and other safety and health requirements should be specified.

6.6 Tempering valve. NSF No. 3 recommends that the temperature of water for prewashing be not less than 110 F nor more than 140 F except where scrapping is directly into a food waste disposer in which case an 80 F maximum temperature is recommended. A tempering valve will provide the cooling water necessary to reduce the 150 F to 160 F wash tank overflow to the required 80 F in the prewash tank. It is also contended that prewash water exceeding 120 F tends to set (bake) some food soils, especially calcium base types, thereby making it difficult or impossible to effect removal in subsequent sections of the machine. A tempering valve serves to eliminate this problem by maintaining the recommended 80 or 120 prewash temperature. Manufactures shall supply recommended tempering valve for the dishwashing to be supplied.

6.7 Shipboard operation. The Navy has specific design criteria for shipboard operation to compensate for pitch and roll, conserve potable water for extended periods, provide onboard spare items, use direct current electric supply onboard some ships, and use nonmagnetic equipment for special applications, avoid any necessity for cutting through the hull or internal structures for access in replacing the dishwashing machines when required. The provisions for shipboard operation are as indicated herein.

a. The dishwasher shall be capable of satisfactory performance when inclined 15 from the horizontal in any direction. When electric heat is specified, a positive low water cutoff shall be provided in each tank. The cutoff shall be designed to prevent interruption of electric power to the dishwasher during pitch and roll.
b. Adequate baffles shall be provided to prevent water from splashing out of the entrance and exit of dishwahsers, and intermingling of wash and rinse spray in type IV washers during pitch and roll.
c. A single motor drive may be provided for pumps and conveyors on type III and IV dishwashers. Commutation type motors may be used on direct current motors.
d. Conveyors shall be roller chain type with positive lug.
e. Pumps and other components of dishwashing machines shall be constructed of nonmagnetic materials when specified. The contractor shall submit a design for approval prior to furnishing the equipment.

f. Feet and legs shall be constructed of welded steel plate. Feet shall be securely attached to the deck. Feet, legs, and frame shall be adequately constructed to withstand a horizontal force equivalent to 20 times the acceleration due to gravity (20 g's) without permanent distortion.
g. Due to a limited supply of potable water on board ship, the final rinse consumption for type III and IV dishwashers shall not exceed 360 gallons per hour.
h. Control center may be furnished separate from the dishwasher for mounting on the bulkhead.
i. Manufacturer's publication shall include an approved drawing containing a complete layout of the dishwasher, dimensions, weight, capacity, conveyor speed, material listing, method of deck mounting, and a list of recommended spare and maintenance parts.
j. When hood length dimensional requirements for type IV washing machines are specified.
k. Machines shall be furnished with two conveyor chains.
l. Type I, size 45-16 dishwashing machines for shipboard use shall be the under a counter type for installation under a 36-inch high dresser and shall be the front loading type. All preventive and corrective maintenance actions including required lubrication shall be capable of being performed from the front of the machine and shall not require demounting the machine. For surface ship use, the dimensional design shall be such that the machine will pass through an 26 inch X 66 inch hatch opening. For submarine use the dimensional design shall be such that the machine will pass through a 25 inch diameter hatch and 20"X38" door without disassembly of major components. After initial tank filling, maximum potable water used per dishwashing cycle shall not exceed 1.3 gallons.
m. Type IV, sizes 60-20, 85-20, 135-20, 185-20 and 250-20 dishwashing machines for shipboard use shall be designed and constructed so that all preventive and corrective maintenance actions, including required lubrication, can be performed from the front of the machine and shall not require demounting the machine. For surface ship use the dimensional design shall be such that the machine will pass through an opening 26 inch X 66 inch hatch opening without disassembly of major components. In addition; each machine shall be capable of field disassembly and self-alining reassembly such that the overall length of any module shall not exceed 46 inches.
n. When number of racks, cylinders, and brushes shall be different.

6.8 Drain connections. A main trunk drain is specified herein to minimize plumbing connections at the site when the dishwasher is provided with more than one tank, and with a prewash section. The wash tank drain and the prewash tank drain is exempted from this provision, unless otherwise specified, to permit direct connection to a food waste disposer or to a grease trap or grease disposal system.

MILITARY INTEREST:

Custodians

ARMY - G
NAVY - YD
AIR FORCE - 99

Review activities

ARMY - TS, MD
NAVY - SA, MC, MS

User activity

NAVY - CG

CIVIL AGENCY COORDINATING ACTIVITIES:

VA-DNS
GSA-FSS
EPA

PREPARING ACTIVITY:

NAVY - YD

Project No. 7320-0734

Orders for this publication are to be placed with General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein.

FEDERAL SPECIFICATION

DISHWASHING MACHINES, SINGLE TANK (RACK, MANUAL AND CONVEYOR) AND DOUBLE TANK (RACK, CONVEYOR), COMMERCIAL

This amendment, which forms a part of Federal Specification OO-D-1390B, is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

PAGE 13

3.9.16, Line 25: Delete "corrosion-resisting steel not less than 14-gage" and substitute: Stainless steel not less than 16 gage".

PAGE 27

6.7, add "O": Type II, size 50-20 dishwashing machines for shipboard use shall be so constructed to have an overall width of not more than 25-3/4" and height of not more than 65-1/2" designed so as to pass through a 26" X 66" hatch opening without disassembly of any components.

Custodians:
Army - GL
Navy - YD
Air Force - 99

Civil Agency Coordinating Activities
VA - OSS
GSA - FSS
EPA

Review Activities:

Army - TS, MD
Navy - SA, MC, MS
Air Force - 84
DLA - GS

Preparing Activity:

Navy - YD

Project No. 7320-00748

User Activity:

Navy - YD

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* INCH-POUND *

OO-D-1390B
AMENDMENT-2
November 30, 1992
SUPERSEDING
Amendment-1
4 October 1984

FEDERAL SPECIFICATION

DISHWASHING MACHINES, SINGLE TANK (RACK, MANUAL AND CONVEYOR) AND DOUBLE TANK (RACK, CONVEYOR), COMMERCIAL

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* 1.2.1, Delete: "16 by 16 - inch rack," from Type I description.

Add the following sizes to Type I:

"Size 35-20 - 20 by 20 inch racks at 35 racks per hour
Size 45-20 - 20 by 20 inch racks at 45 racks per hour"

PAGE 2

* 2.1, Federal Specification, delete the following:

"P-D-1800 - Dishwashing Compound, Machine"

PAGE 3

* 2.1, Military Specifications, delete the following:

"MIL-M-11495 - Meter, Detergent Concentration for Dishwashing Machines
MIL-R-24039 - Rack and Cylinder for Mechanical Dishwashing Machine"

Military Standards, add the following:

"MIL-STD-167/1 - Mechanical Vibration of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited)
MIL-STD-1472 - Human Engineering Design Criteria for Military Systems, Equipment and Facilities"

PAGE 4

* 2.2, ASTM, Delete:

"A120 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless for Ordinary Uses"

ASTM, Add:

"ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless
ASTM F861 - Commercial Dishwashing Racks"

PAGE 7

* 3.7.5, line 2, Delete: "ASTM A120", and substitute: "ASTM A53".

*Add the following paragraphs:

"3.8.2 Inclined operation. The dishwashing machine shall operate satisfactorily when inclined at an angle of 15 degrees each side of the vertical in each of two vertical planes at right angles to each other, with no spillage of fluid or product when tested as specified in 4.5.6.

3.8.3 Environmental suitability. When specified for shipboard use (see 6.2), the dishwashing machine shall be capable of withstanding ship's vibration and motion. Controls, switches, moving parts and electrical circuits shall operate under shipboard conditions without malfunction, binding, excessive looseness, or damage when tested as specified in 4.5.7."

* 3.9, line 5, Type I, Delete: "Not less than 10 inches above the tracks." and substitute: "Not less than 12-1/2 inches above the tracks."

PAGE 9

* 3.9.6, Delete the second and third sentences, and substitute: "The steam boosters shall raise the final rinse water temperature to within the range of 180o to 195oF."

* 3.9.7, line 3, Delete: "from the range of 120o to 140oF".

PAGE 10

* 3.9.8.1, line 6, Delete: "conforming to P-D-1800".

PAGE 11

* 3.9.11, after the last sentence, add the following: "For Navy use, thermometer faceplate marking is not required."

PAGE 12

* 3.9.13, line 7, Delete: "or nickel-copper alloy", and substitute: "or suitable corrosion-resisting material."

PAGE 13

3.9.16, line 25: Delete "corrosion-resisting steel not less than 14-gage" and substitute "stainless steel not less than 16 gage."

PAGE 15

* 3.10.3.1, add the following new paragraph:

"3.10.3.1 High voltage labels. When specified for shipboard use (see 6.2), a Danger High Voltage label shall be affixed to the equipment's outer case assembly, on or adjacent to each service access cover and adjacent to one of the fasteners which secures the cover. A high voltage warning label shall also be placed near the high voltage components inside the equipment. The label shall include but is not limited to the following warnings:

a. A warning of high voltage
b. Power supply must be disconnected before using
c. Access covers must be in place during use
d. Servicing should be done by authorized individuals"

* 3.11.1, Delete the second and third sentences, and substitute: "For type I dishwashers, (sizes 35-16 and 45-16) use 16-inch by 16-inch racks; for types I (sizes 35-20 and 45-20), II, III, and IV dishwashers, use 20-inch by 20-inch racks. Racks and cylinders shall conform to the requirements of ASTM F861."

*Table I, add to the table under nominal size: "35-20" and "45-20", and under rack and cylinder type, add:

	I	IA	IC	ID	IE	IG	II	IIA	IIC	IID	III	IIIB	V	VI
"35-20	3	--	--	--	--	--	3	--	--	--	2	--	12	12
45-20	3	--	--	--	--	--	3	--	--	--	2	--	12	12"

PAGE 16

* 3.16, after the last sentence add the following: "When specified for shipboard use, requirements and test limits of class A4 for surface ships and class A5 for submarines of MIL-STD-461 apply. Shipboard equipment shall meet the emission and susceptibility requirements for CE01, CE02, and RE02."

PAGE 17

*Add the following paragraph:

"3.20 Human factors criteria. Human factors engineering criteria, principles, and practices, as defined in MIL-STD-1472, shall be incorporated into the design of the dishwashing machine. The equipment shall be designed such that all maintenance and operation shall permit safe and efficient performance by the 5th percentile female to the 95th percentile male as defined in sections 5.6 and 5.9 of MIL-STD-1472. Controls, switches and gages shall be selected and integrated into the design of the dishwashing machine so as to meet the applicable requirements of sections 5.2 and 5.4 of MIL-STD-1472 and they shall be clearly and appropriately labeled to identify function. The clearance or free area required around an item shall permit an individual with applicable body dimensions and physical capabilities to safely operate, maintain, remove, or replace that item. When establishing accessibility requirements, both physical and visual access must be provided along with access for the use of any tools, test equipment, or replacement parts needed. When inspecting for defects and performing tests (see section 4), the equipment shall conform to the human factors engineering considerations listed herein."

PAGE 23

* 4.5.1, add to the seventh sentence: "except for type I machines, the pumped wash temperature of 150o to 160oF need not be maintained during the one hour operational test."

PAGE 24

* 4.5.5, after the last sentence, add: "When required for shipboard use, the unit shall be tested by the contractor in accordance with test methods CE01, and RE02 of MIL-STD-462."

*Add the following paragraphs:

"4.5.6 Inclined operational test. Position the dishwasher with the base set at an angle of 15 degrees, then operate the dishwasher for 30 seconds at each side of the vertical in each of two vertical planes at right angles to each other. At each of these positions observe for conformance with specified requirements in 3.8.2. For the test, the tanks of the dishwasher shall be filled with the required amount of water.

4.5.7 Shipboard environmental test. The dishwasher under normal operating conditions, shall be tested in accordance with MIL-STD-167/1, type I equipment. The dishwasher shall be secured to the test machine in the same manner that it will be secured on shipboard (see 3.9.20). Failure of the dishwasher to perform its function during and after testing, or to meet requirements of 3.8.3, shall constitute failure of this test."

PAGE 25

* 6.2 (ff), Delete: "(see 6.7)." and substitute: "(see 3.8.2, 3.8.3, and 6.7)."

6.7, Add:

"o. Type II, size 50-20 dishwashing machines for shipboard use shall be so constructed to have an overall width of not more than 25-3/4 inches and height of not more than 65-1/2 inches designed so as to pass through a 26-inch by 66-inch hatch opening without disassembly of any components.

* p. Due to pitch and roll of dishwashing machines aboard ship, electric heaters, when furnished, will require special immersion heaters and a heater control package designed to permit operation of electric immersion heaters efficiently during normal service as well as under adverse conditions when the heating elements may become exposed to air during pitch and roll conditions.

* q. Steam boosters, when required, will be furnished mounted on a stainless steel supporting stand for remote installation."

*Add the following paragraph:

"6.9 Technical manuals. The requirement for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, military specifications and standards that have been cleared and listed in DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under separate contract line item in the contract."

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Custodians

Army - GL
Navy - YD
Air Force - 99

Review Activities

Army - MD
Navy - MC, MS, SA, SH
Air Force - 84
DLA - GS

CIVIL AGENCY COORDINATING ACTIVITIES:

VA - OSS
GSA - FSS
EPA

PREPARING ACTIVITY:

Navy - YD

(Project 7320-0848)

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* INCH-POUND *

OO-D-1390B
AMENDMENT 3
November 30, 1992

SUPERSEDING
INT. AMENDMENT 2(SH)
6 April 1992

SUPERSEDING
AMENDMENT 1
4 October 1984

FEDERAL SPECIFICATION

DISHWASHING MACHINES, SINGLE TANK (RACK, MANUAL AND CONVEYOR) AND DOUBLE TANK (RACK, CONVEYOR), COMMERCIAL

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Navy - YD

(Project 7320-0848)