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MILITARY SPECIFICATION

WASHER-EXTRACTORS, LAUNDRY, COMMERCIAL

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This document covers electrically operated, combination washer-extractor laundry machines.

1.2 Classification The washer-extractors shall be of the following types, styles, sizes, and classes as specified (see 6.2):

Type I	-	One compartment
Style A	-	End loading
Size	-	(minimum capacities, pounds, see 3.5.2)
		25
		50
Style B	-	End or side loading
Size	-	(minimum capacity, pounds, see 3.5.2)
		100
		200
Type 11	-	Multiple compartment, end or side loading
Size	-	(minimum capacities, pounds, see 3.5.2)
		100 - 2 or 3 compartment
		200 - 2 or 3 compartment
		300 - 2 or 3 compartment
		400 - 2, 3, or 4 compartment
		600 - 2, 3, 4, or 6 compartment
		800 - 2, 3, 4, or 6 compartment

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document, or by letter.

AMSC N/A

FSC 3510

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- | | |
|----------|---|
| Type III | - Multiple compartment, pass through |
| Size | - (minimum capacities, pounds, see 3.5.2) |
| | 100 - 2 or 3 compartment |
| | 200 - 2 or 3 compartment |
| | 400 - 2, 3, or 4 compartment |
| | 600 - 2, 3, 4, or 6 compartment |
| Class 1 | - Liquid supply |
| Class 2 | - Dry supply |

2. APPLICABLE DOCUMENTS

2.1 Government documents

2.1.1 Documents. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

- | | |
|-----------|--|
| CC-M-1807 | - Motors, Alternating Current, Fractional and Integral Horsepower (500 Horsepower and Smaller) |
| WC-390 | - Copper Alloy Castings (Including Cast Bar) |
| QQ-N-281 | - Nickel-Copper-Alloy Bar, Plate, Rod, Sheet, Strip, Wire, Forgings, and Structural and Special Shaped Sectins |
| QQ-N-288 | - Nickel-Copper-Alloy and Nickel-Copper-Silicon Alloy Castings |
| DDD-S-281 | - Sheet, Bed, Cotton, and Polyester-Cotton |

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|------------|--|
| MIL-T-152 | - Treatment, Moisture and Fungus-Resistant, of Communications, Electronic, and Associated Electrical Equipment |
| MIL-P-514 | - Plates, Identification, Instruction and Marking, Blank |
| MIL-B-844 | - Blankets, Bed, Wool, Shrink Resistant and Mothproofed |
| MIL-L-3153 | - Laundry and Dry Cleaning Machinery and Equipment (For Fixed Installations), Preparation for Delivery Of |

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STANDARDS

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MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
 MIL-STD-130 - Identification Marking of U.S. Military Property
 MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic Interference
 MIL-STD-462 - Electromagnetic Interference Characteristics, Measurements Of
 MIL-STD-1474 - Noise Limits for Army Materiel

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.1.2 Other Government documents. The following other Government documents form a part of this document to the extent specified herein. Unless otherwise specified the issues shall be those in effect on the date of solicitation.

29 CFR 1910 - Occupational Safety and Health Act (OSHA) Standards

(The Code of Federal Regulations (CFR) and Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Other publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS shall be the issues of the nongovernment documents which are current on the date of the solicitation.

NATIONAL ELECTRICAL MANUFACTURERS' ASSOCIATION (NEMA)

Publication ICS Industrial Controls and Systems

(Application for copies should be addressed to the National Electrical Manufacturers' Association, 155 East 44th Street, New York, NY 10017.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

Standard No. 70 - The National Electrical Code

(Application for copies should be addressed to the National Fire Protection Association, 60 Batterymarch Street, Boston, MA 02110.)

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AMERICAN WELDING SOCIETY CODE

Standard Qualification Procedures of the American Welding Society

(application for copies should be addressed to the American Welding Society, 345 East 47th Street, New York, NY 10017.)

AMERICAN SOCIETY OF MECHANICAL ENGINEERS CODE (AWE)

Welding Qualifications of the American Society of Mechanical Engineers

(Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- A 167 - Stainless Steel and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip
- A 176 - Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI 28.1 - Safety Requirements for Commerical Laundry and Dry-Cleaning Equipment and operations

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

(Technical society and technical association documents are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence, In the event of a conflict between the text of this document and the references cited herein, the text of this document shall take precedence. Nothing in this document, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order, a sample shall be subjected to first article inspection (see 4.3, 6.2, and 6.3).

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3.2 Standard product. The washer-extractors furnished under this document shall be the manufacturer's current standard products except for those changes required in order to comply with the requirements of this document. All accessories and components that are normally offered commercially shall be furnished with each washer-extractor.

3.3 Codes and standards. The washer extractors shall conform to the applicable requirements of the codes and standards specified in 3.3.1 through 3.3.4. Satisfactory evidence that these requirements have been met shall be submitted to the contracting officer or his authorized representative for approval prior to the start of production (see 4.5).

3.3.1 NFPA. The washer-extractors shall be wired to conform to NFPA Standard No. 70.

3.3.2 NEMA. Motor controllers, switches, relays, and time delays shall conform to performance requirements of NEMA Standards Publication No. ICS.

3.3.3 ANSI. The washer-extractors shall conform to the applicable requirements ANSI 28.1.

3.3.4 OSHA. The washer-extractors shall conform to the applicable requirements of OSHA 29 CFR 1910,

3.4 Materials. Materials not definitely specified shall be of the quality normally used by the manufacturer for washer-extractors provided the completed items comply with all provisions of this document.

3.4.1 Corrosion-resistant metal. Corrosion-resistant metal used in the fabrication of the washer-extractor shall be stainless steel conforming to the requirements of ASTM A 167 or A 176, as applicable; nickel-copper-alloy conforming to QQ-N-281 or composition A of QQ-N-288; or copper alloy castings conforming to alloy numbers 951 through 960 of QQ-C-390.

3.4.2 Materials for fasteners. Threaded fasteners and rivets shall be of carbon or alloy steel, except where brass or corrosion-resistant metal is to be fastened, in which case they shall be of brass or corrosion-resistant metal respectively (see 3.4.1). Where dissimilar metals are fastened, bolts, rivets, screws, and nuts shall be of corrosion-resistant metal (see 3.4.1).

3.4.3 Pipe, tube, fittings, and valves. Pipe, tube, fittings, and valves used for water, steam, and condensate lines shall be standard commercial items designed for the intended use.

3.4.4 Conduit, fittings and electric wire. Electrical conduit shall be rigid, electrical metallic tube or liquid-tight flexible conduit. All electrical wire shall be stranded copper, heat-resistant grade, thermoplastic Insulated. Solid (nonstranded) wire shall not be used.

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3.4.5 Motors. motors shall be continuous, drip proof, splash proof, or totally enclosed type for operation in a 40°C ambient temperature. All motors shall conform to the requirements of CC-M-1807 and to the following:

(a) All motors shall have windings impregnated to resist moisture.

(b) Each motor shall have the proper starting characteristics, ample power, and adequate thermal dissipation capacity to comply with the requirements specified herein, with a reasonable factor of safety, commensurate with the application and expected duty cycle to which each motor might be subjected under normal operating conditions.

(c) Motors shall be equipped with ball or roller bearings, except that motors of 1/2 horsepower or less when used for horizontal applications may have sleeve bearings.

(d) Motor bearings shall be of the permanently lubricated type or shall have adequate and accessible means for lubrication.

(e) Each motor of 1/8 horsepower rating or larger shall be provided with manually reset thermal-overload protection Incorporated as a part of the motor or installed in the controller.

3.5 Design and construction. Materials specified hereinafter as corrosion-resistant metals shall conform to 3.4.1. The washer-extractors shall be furnished with an automatic cycle control (see 3.5.1.4) and shall be furnished complete with all motors, driving mechanisms, starters, controllers, master switches, timers, reversing mechanisms, and all other electrical equipment and accessories for the automatic operation of the washer-extractor as specified herein. These controls shall also allow for the manual operation of the machine. When specified (see 6.2), noise levels shall not exceed limits specified in MIL-STD-1474 and shall not exceed 85 decibels A weighted at the normal operation position (see 4.6.4). The washer-extractor shall have a low extraction speed and a high extraction speed except for the 25-, 50-, and 100-pound sizes which shall have one extraction speed only. An intermediate load positioning cycle (approximately double the RPM of the washing cycle) will be acceptable for the 200-pound size. Each machine shall be equipped with a provision allowing for the manual addition of soap or other chemicals. When operated without garments as specified in 4.6.1, the machine shall meet the following operational requirements.

(a) The assembly of components shall have complete and proper inter-relationship.

(b) Starting, stopping, and control devices shall operate smoothly and positively.

(c) There shall be no structural failures.

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(d) There shall be no leaks.

(e) Moving parts and bearings shall evidence no overheating.

(f) There shall be no failure of any component of the anti-vibration mount (when required, see 3.5.1.21).

The assembled machines shall meet the following functional requirements when tested as specified in 4.6.2 using cotton sheets, polyester-cotton sheets conforming to Type V of DDD-S-281, or woolen blankets conforming to Type I or II or MIL-B-844 and the applicable washing formula (see 4.6.2.1).

(1) The machines shall be capable of extracting water from saturated sheets to a maximum moisture retention of 50 percent of the normal dry weight (i.e, each 100 pounds of normal dry laundry shall be loaded into the machine, saturated with water and extracted, so that the total weight of the laundry does not weigh more than 150 pounds after 12 minutes extraction (see 4.6.2)).

(2) No water or soap solution shall back up or overflow through the supply containers or vent pipe during extract cycles.

(3) There shall be no failure of any component of the antivibration mount, if provided.

(4) There shall be no leaks during washing and extracting cycles.

(5) Moving parts and bearings shall not overheat.

(6) Supplies are injected in the correct amounts and intervals required by the formula selected (see 3.5. 1.4(g)).

(7) There shall be no structural failures.

(8) Extraction speed (as applicable) is operable.

3.5.1 Wiring and controllers.

3.5.1.1 Wiring and instructions. Wiring shall be provided between motors, controllers, txmers, pushbuttons, starter, and limit switches installed on the equipment and shall be done with materials specified in 3.4.4, as applicable, except metallic armored cable or liquid tight flexible conduit shall be used where required for belt adjustment by moving a motor. Installation shall conform to the requirements of the National Electrical Code. All wiring shall terminate in connection boxes with provisions for connections beyond the machine; each conductor shall be identified by a different color or clearly labeled. Wiring and connection diagrams shall be furnished with each unit.

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3.5.1.2 Motor control circuit. Each motor shall have a controller of the magnetic across-the-line type having a separate pole for each ungrounded conductor. In addition, timers, limit switches (except for 25- and 50-pound machines), remote control pushbutton switches, signals, and indicating lights shall be provided as necessary to perform the intended functions. The machine shall be equipped with a safety switch which shall prevent the machine from being operated in the wash or extraction cycles when the cylinder is being inched or positioned. These requirements shall be verified when the equipment is tested as specified in 4.6.1. The washer-extractor shall be equipped with inching or position control switches (except for one-compartment machines) and start and emergency stop switches of a design to prevent accidental operation.

3.5.1.3 Cylinder reversing. Motors used to perform the washing cycle shall have an electric motor-driven timing pilot control system to regulate the number of revolutions of the cylinder between reversals in such a manner that the number of revolutions in one direction will not vary more than 5 percent from those in the opposite direction. The wash motor shall reverse not less than two times per minute. The dwell between reversals shall be adjustable to provide maximum running time and allow the motor to come to a complete stop before reversing. These requirements shall be verified when the equipment is tested as specified in 4.6.1.

3.5.1.4 Automatic cycle controls. Each washer-extractor shall be equipped with automatic cycle controls, including a supply injection system (see 3.5.1.5), designed to cause the machine to perform any or all of the following operations in the washing and extracting cycle:

(a) provide automatic timing of each operation with interruption of the timing while the washer-extractor is filling with water to the water level called for by the automatic cycle control. The timing of each operation shall be infinitely adjustable. The total washing and extracting cycle time, exclusive of filling time, shall be infinitely adjustable up to a total of not less than 75 minutes.

(b) Provide automatic operation of drain valve. When specified (see 6.2), provide a water reuse valve.

(c) Provide automatic operation of hot and cold water inlet valves and to provide for all hot, all cold, or both hot and cold water valves fully opened as called for by the automatic cycle control.

(d) Control admission of water to the washer-extractor for at least three water levels. The water levels must be readily adjustable in the field within the normal range of water levels generally employed in commercial washing.

(e) Provide continuous automatic adjustment of the water level to compensate for water absorption by the load or reduction in water level for any other reason.

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(f) Provide automatic control of water temperature by steam injection in the washer-extractor. There shall be not less than two automatically controlled temperatures readily and Infinitely adjustable between the temperature of the available cold water and 210°F. The automatic temperature control shall include at least one temperature obtained by the automatic injection of steam into the washer-extractor if necessary to achieve the desired temperature; at least one temperature obtained by automatic tempering or equalization of the hot and cold water valves. The automatic cycle control shall be capable of selecting either of the two controlled temperatures for any bath or baths in the washing cycle.

(1) When specified (see 6.2), the washer-extractor shall be equipped with an automatic thermal overflow cool down feature for processing durable press garments.

(g) Provide automatic supply injection in accordance with the following for either liquid supplies or dry supplies, as specified (see 1.2).

(1) Class 1 - Liquid supplies. When a liquid supply injection system is specified, the supply injector shall consist of a minimum of four tanks or containers of the capacity specified in table I (see 3.5.1.6). The tanks or containers shall be manually filled at the beginning of the wash cycle with the desired quantity of supplies for one complete washing cycle. The automatic cycle control shall provide for withdrawing three Infinitely variable amounts of soap from the soap container. The requirements of this shall be satisfied when the third "Infinitely variable amount" consists of draining completely the remaining soap from the tank. This control shall therefore provide for the automatic injection of 3 suds, 1 bleach, 1 sour, and 1 blue. The automatic cycle control shall cause these supplies to be injected whenever desired in the washing formula.

(2) Class 2 - Dry supplies. When a supply injector for dry supplies is specified, the supply injector shall consist of not less than five compartments or containers of the size normally furnished by the supplier, which shall be manually filled at the beginning of the washing cycle with the desired quantity of supplies for one complete washing cycle. The automatic cycle control shall cause the contents of each compartment or container to be injected into the washer-extractor as called for. The containers normally used for bleach, sour, and bluing shall be suitable for either dry or liquid bleach, sour, and bluing and shall also be capable of injecting dry soap or alkali. This control shall therefore provide for not less than two automatic injections of dry soap or alkali, and not less than three dry or liquid supplies such as bleach, sour, or blue.

(h) Provide on the machine or on the control panel visual indication of the operation, water level, and temperature in the washer-extractor cylinder.

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(i) Provide automatic control of all power transmission equipment furnished with the machine including but not limited to motors, clutches, brakes, etc. The automatic cycle control shall provide for automatic entry into low speed extraction and (if applicable) automatic return from extraction to washing, rinsing, or draining, whenever desired in the washing and extracting to cycles and completely without operator attention.

(j) The automatic cycle control shall be actuated by an easily replaceable chart, card, or disc capable of providing any desired formula. SIX blank charts, cards, or discs shall be supplied with each machine. When the control is of the chart type utilizing replaceable mounting cylinders on which the chart must first be mounted before inserting into the control, six such mounting cylinders shall also be furnished. When specified (see 6.2), a lesser number of mounting cylinders shall be furnished.

(k) Provide automatic means for stopping the timer and an audible and visual signal at the end of any given formula, or at the end of any selected operation on the formula.

(l) A shake-out (conditioning) period shall be provided at the end of the extraction cycle.

(m) Provide means for operating the machine manually by switches or other devices to manually control the water inlet valves, drain valve, cycle timer, temperature selection, water levels, and all motors.

(n) The automatic cycle control shall have a minimum of twenty-two signal tracks for control of the machine and injection of supplies or, where a signal track performs more than one function the machine must be supplied with a minimum of eight signal tracks that are available for use with an automatic supply preparation and distribution system.

(o) When specified (see 6.2), the automatic cycle control shall be of the microprocessor type designed to operate without the need of charts, cards, or discs. The control shall utilize a solid state timing system.

(1) The cycle control shall have the capability of pre-programming a minimum of six washing formulas. Control shall be provided with the necessary circuitry to make it compatible with a Central Liquid Supply System.

(2) Control shall be housed in a watertight enclosure constructed of non-corrosive material provided with a key lock to prevent unauthorized changes of the programmed formulas.

(3) Indicating lights shall be provided on the front panel for all normal washer functions. A digital readout shall be provided to indicate the formula step or event.

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3.5.1.5 Supply system tanks and trays. When a dry supply system is specified, the material used for the tanks, trays, and containers shall be corrosion-resistant metal (see 3.4.1), molded rubber, or plastic material except for the bleach tank or tray which shall be corrosion-resisting steel or plastic. When a liquid supply system is specified the material used for the tanks, trays, and containers shall be corrosion-resistant metal (see 3.4.1). The bleach container shall be corrosion-resistant metal or plastic. The tanks, trays or containers shall be mounted on a separate stand or be attached to the washer-extractor. When specified (see 6.2), provisions shall be provided for connecting the machine to a central circulating soap supply system,

3.5.1.6 Flushing. Provisions shall be made for flushing out the tanks, trays, and containers automatically after the completion of each formula for the soap container and after each injection of supplies for the remaining containers (see 4.6.1).

TABLE I. Tank capacities for liquid supplies

Size of washer-extractor	Minimum individual tank capacity for soap (gallons)	Minimum individual tank capacities for bleach, sour, and bluing (quarts)
25	1	1/2
50	1-1/2	1
100	2-1/2	2
200	4	4
300	6	6
400	7	8
600	10	12
800	16	16

3.5.1.7 Applicability of current characteristics. The electrical parts of machines shall be designed for the voltage, frequency, and number of phases specified (see 6.2). Operational and functional testing shall be performed at the voltage, frequency, and number of phases specified.

3.5.1.8 Interlocking and safety devices. The driving arrangement of each machine shall provide clutching or other means permitting changing from washing to extracting cycle and vice versa with interlocking means to insure smooth transfer. A brake interlock switch shall be provided to prevent operation of the cylinder with brake applied (except for inching or positioning) (see 3.5.2.9). When a door is opened while the cylinder is in motion, the interlock device shall operate immediately to disconnect power to the motor or motors, apply the brake, and stop the cylinder. The drain valve shall be electrically interlocked so that the extract operation cannot commence or continue with the drain valve closed. The steam valve shall be interlocked so that steam will not

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be admitted unless there is water in the machine. These requirements shall be verified when the equipment is tested as specified in 4.6.1. Machines which do not have automatic self-balancing shall be furnished with a vibration sensing device to disconnect the power, give an audible signal, and automatically apply the brake to stop rotation of the cylinder or to return the cylinder to washing speed should excessive vibration occur during the extracting cycle. This requirement shall be verified when the equipment is tested as specified in 4.6.2. Guards shall be cast iron, sheet metal, wire mesh, or fiberglass. All parts of the guard shall be secured so as to be readily removable without disassembling pipe or fittings on the machine. Provisions shall be made in guards fitted over parts requiring frequent adjustment so as to permit easy access. Access holes so provided shall be fitted with covers.

3.S.1.9 Bases and foundation. Machine bases shall be constructed so that points of contact with the foundation shall be in the same horizontal plane. Provisions shall be included for anchoring the machine to the foundation with sufficient anchoring to prevent undue vibration and movement of the machine during full load operation. When anti-vibration protection is not required (see 3.5.1.21), special foundation construction materials (except concrete) such as channels, I-beams, and anchor bolts, and a diagram of recommended foundation details shall be furnished with each washer-extractor.

3.5.1.10 Gearing. All gears shall have machined teeth and shall operate quietly. Spiral, hypoid, bevel, and worm gears, if used, shall operate in lubricant. When run in an oil bath, both the pinion gear and the gear with which it meshes shall be of ferrous metal or bronze. Gears not run in an oil bath may be of a phenolic formaldehyde resin, condensate, micarta, or fabroil, or other noise-reducing material. When gears are of a composition material, either the motor pinion or gear with which it meshes shall be at least 1/4 inch wider than the other, except that when thrust bearings are used on the armature shaft, the gear and pinion may be of the same width.

* 3.5.1.11 Thermometer. A dial or digital type thermometer shall be installed on each machine to indicate the temperature of the water in degrees Fahrenheit.

3.5.1.12 Lubrication. lubrication fittings for force type systems shall be provided and accessibly located for lubricating bearings (except motors - see 3.4.5). Where lubricant reservoirs are required for gear drives, the reservoirs shall be provided with a threaded cap at the top, and a drain plug at the bottom.

3.5.1.13 Seals. Means shall be provided to prevent the lubricant from entering the part of the machine where clothes are handled. Means shall be provided to prevent washing solutions from entering the bearings. These requirements shall be determined when the equipment is tested as specified in 4.6.2.

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3.5.1.14 V-belts and pulleys. V-belts shall be of the types commercially known as multiple-drive or variable speed belts; except that where a single belt is furnished with a fractional-horsepower motor, a V-belt commercially known as a fractional-horsepower belt may be supplied in lieu of the multiple-drive or variable speed types. Pulleys for V-belts shall be suitable grooved.

3.5.1.15 Belt tension adjustment. Means shall be provided for adjusting belt tension.

3.5.1.16 Pipe and valves. All points of connection to the shell for water, steam, vent, overflow, and supplies shall be of brass or corrosion resisting steel not less than the thickness of the shell. All piping other than that portion directly attached to the shell may be brass, corrosion-resisting steel pipe, or galvanized pipe according to the manufacturer's commercial practice. All water connections to the machine shall be provided with siphon breakers (vacuum breaker or air gap). Automatically operated valves for hot and cold water and steam compatible with pipes specified herein shall be furnished. Pipe shall include either separate vent and overflow level connections, or one connection to serve for both vent and overflow. The overflow connection shall be located above the center line of the washer-extractor. The overflow shall be directed toward the drain trough so that the overflow will not discharge on any operating component. Steam, drain, air, and other operation valves shall be so installed that the valves shall be readily accessible for operation and maintenance. Inlet steam and air supply connections shall be supplied with manual shut off valves. The steam connection shall be Iron Pipe Size (IPS) not less than 1/2 inch for size 25 and 50, not less than 3/4 inch for size 100 and 200, not less than 1 inch for size 300 and 400, and not less than 1-1/4 inch for size 600 and 800. The steam inlet shall be in such a location as to prevent steam from entering the cylinder in direct contact with the load. This requirement shall be verified when the equipment is tested as specified in 4.6.2. A water level indicator shall be furnished on each machine, except on size 25- and 50-pound units having a glass shell door insert for clear vision of water level. Necessary integral pipe, fittings, pressure reducing valves and all other valves for air, steam, and drain shall be furnished as complete assemblies suitable for installation with unions or other standard fittings. Installation instructions shall be furnished with uninstalled assemblies. All piping shall be installed so as to comply with accepted plumbing practices.

3.5.1.17 Name and data plates. Each washer-extractor covered by this specification shall be marked for identification in accordance with MIL-STD-130 on a plate conforming to MIL-P-514.

3.5.1.18 Finish and color. Unless otherwise specified (see 6.2), the washer-extractors, except pushbuttons, shall be finished according to the manufacturers standard commercial practice. Emergency stop and normal stop pushbuttons shall be red and this color shall be limited to pushbuttons and name-plates.

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3.5.1.19 Electromagnetic compatibility. When specified (see 6.2), equipment shall be designed and equipped for electromagnetic compatibility in accordance with class IIB of MIL-STD-461 (see 4.6.3).

3.5.1.20 Moisture and fungus resistant treatment. When specified (see 6.2), electrical components of equipment covered by this specification shall be moisture and fungus resistant treated with material conforming to, and applied as specified in MIL-T-152.

3.5.1.21 Anti-vibration protection. Unless otherwise specified (see 6.2), washer-extractors over 100-pound capacity shall be supplied with a fully assembled anti-vibration mount designed to isolate and minimize vibration transmitted to the floor and surrounding environment induced during extraction. When tested as specified in 4.6.2 (see 6.2), no more than 10 percent of the unbalanced dynamic load shall be transmitted to the building during full extraction speed. The design of the anti-vibration mount shall be such that the washer-extractor is suspended in a manner that is stable for all directions of motion. The vibration isolation shall be such that special foundation construction materials except anchor bolts will not be required to offset the vibration. When tested as specified in 4.6.2, the amplitude of vibration at the base of the washer-extractors, which is in contact with the floor, shall not exceed 0.005 inches displacement (total indicator reading (T.I.R.)) using a mass vibrometer (see 6.6). When anti-vibration protection is not provided, the amplitude of vibration shall not exceed 0.010 inches displacement. The machine for this test shall be fully loaded and operated with a 5-percent unbalanced load in one pocket. Other than sensing devices and door interlock or similar limit switches necessary for the proper functioning of the machine, all electrical controls including but not limited to the automatic cycle controller and its associated relays, contractors, starters, and valves shall be attached to the stationary portion of the machine. Such components shall not be attached to the flexible isolated portion of the machine.

3.5.2 Detail requirements. The washer-extractors covered by this document shall be of the shell and cylinder type. The sizes (capacities) shall be based on 5.7 pounds of soiled linen per cubic foot of cylinder volume (gross).

3.5.2.1 Shell. The shell shall be water-tight and sufficiently rigid in construction to prevent permanent distortion, metal failure, or objectionable vibration when machine is in operation, and shall be reinforced to support all attachments thereto. These requirements shall be verified when the equipment is tested as specified in 4.6.2. A 1/8-inch square (approximately) raised, finished metal strip shall be attached completely around the door opening of the shell front plate, when a broad solid rubber door gasket is used (see 3.5.2.3.1). The heads of the shell for end loading machines shall provide for removal of the cylinder from the shell. The shell heads (vertical end plates) for side loading machines shall be constructed so the cylinder can be removed from the machine. All materials used in those portions of the shell which come in contact with wash water shall be corrosion-resistant steel except that seal

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holders and similar parts may be galvanized ferrous metal. The front and rear vertical plates for end loading machines shall be boiler plate not less than 3/8 inch for size 100; not less than 1/2 inch thick for sizes 200, 300, and 400; and not less than 5/8 inch thick for sizes 600 and 800. The shell heads (vertical end plates) for side loading machines shall be not less than 1/2 inch thick for sizes 100 and 300; not less than 3/4 inch thick for sizes 200 and 400; and not less than 7/8 inch thick for sizes 600 and 800. Removable front heads for end loading machines, that are flat (not contoured) and support only the door, shall be fabricated from heavy boiler plate, clad or lined with corrosion-resistant metal not less than 0.058 inch thick. Sizes 25 and 50 machines shall have front and rear vertical plates fabricated from boiler plate not less than 1/4 inch thick, clad or lined with corrosion-resisting metal; or in lieu of boiler plate for the front head they may be fabricated from flat sheet corrosion-resistant metal not less than 0.158 inch thick, or corrosion-resistant metal not less than 0.045 inch thick, formed and contoured, having strength and rigidity for the intended service. The shell wrap-around sheets for all machines shall be corrosion-resistant sheet metal or 3/8 inch thick plate clad with a minimum of 0.010 pure nickel.

3.5.2.2 Shell supports. The shell of all machines shall be supported by permanent legs, frames, or end plate reinforcements. An intermediate support for the shell of side loading machines may be used where necessary. Supports shall be tied together to make a rigid base. Reinforcing ribs shall be welded to the shell to effect rigid support. The heads of shells having cylinders 58 inches or more in length shall be rigidly tied together by a ferrous metal structure. The motor(s) shall be supported by the shell heads or the structural frames tied to the machine base. The motors of all machines may be supported on a bracket secured to the shell heads or frames, provided that no part of the bracket is supported by the wrap around sheet. Where the wrap around sheet is fabricated of plate not less than 3/8 inch thick (see 3.5.2.1), it will be considered part of the structural frame and in such case, the motors may be supported by a bracket welded to the plate.

3.5.2.3 Shell doors.

3.5.2.3.1 End loading machines. The shell of end loading machines shall be provided with a door, mounted on heavy hinges, rigid, and complete with latching means to insure the door being water-tight when closed or when a broad solid rubber gasket is used on the door, the rubber gasket shall contact the metal strip (see 3.5.2.1) and prevent leakage by making a water-tight connection, completely around the door. The latching requirement shall be verified when the equipment is tested as specified in 4.6.2. For all single compartment machines, the door metal in contact with the washing solution shall be of corrosion-resistant metal. On sizes 25- and 50-pound, the door shall be provided with a window of heat treated glass capable of resisting high mechanical and thermal shock. For end loading divided cylinder machines, the shell door shall be made of, or a combination of, carbon steel plate, cast iron, or corrosion-resistant metal. Castings shall be small grained and capable of resisting high mechanical

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and thermal shock. Carbon steel plate and cast iron shall be lined and protected from direct contact with the washing solution by corrosion-resistant metal (see 3.4.1).

3.5.2.3.2 Side loading machines. Side loading machines shall have one sliding shell door for each longitudinal compartment, in the cylinder. The doors shall be of the same material as the shell, shall be rigid, and shall slide in continuous guides the full length of the door track. Doors shall fit tight so as to prevent washing solution being splashed from the washer and shall have latching means, lifting handles, and close fitting guides of corrosion-resistant metal. The guides or tracks may be lined with polymerized tetrafluoroethylene (PTFE) to facilitate sliding of the doors. Interlocks on door, or doors, shall not be bypassed and permit cylinder to operate because of excessive amount of clearance at door guides, tracks, clips, or safety lugs. These requirements shall be verified when the equipment is tested as specified in 4.6.2. Renewable wearing strips may be fitted as roller tracks for safety switches where they bear on the shell door.

3.5.2.3.3 Door openings. The shell door opening for end loading machines shall be no more than 40 inches high for the 100-pound capacity machine; not more than 42 inches high for the 200-pound capacity machine; and not more than 44 inches high for the 300-, 400-, 600-, and 800-pound capacity machines. The shell door opening for side loading machines shall be not more than 41 inches high with the shell door in a closed position. The measurement shall be from the bottom of the door opening to the laundry floor surface without recessing the machine into the floor.

3.5.2.4 Shell apron (side loading machines only). A hinged apron of the same material as the shell shall be provided at each shell door of side loading machines for bridging the space between the shell and cylinder.

3.5.2.5 Discharge outlet. A discharge outlet(s) with a quick-opening valve or valves, shall be fitted at the bottom of the shell of all machines so as to drain all water from the shell. The quick opening valves shall be of the open design type. In the event of electrical or pneumatic failure, the quick opening valves shall open automatically. These requirements shall be verified when the equipment is tested as specified in 4.6.2. Working metallic parts of the valve that come in contact with waste materials shall be of brass or corrosion-resistant metal (see 3.4.1) and shall have a replaceable seat, diaphragm, or gasket. In addition, the discharge outlet shall be non-splashing type or shall be equipped with a splash guard which shall extend from the bottom of the shell to within 2 inches of the bottom of the base mounting.

3.5.2.5.1 Drain valve sizes. The minimum drain valve sizes shall be as follows: 2 inches for 25-pound capacity machine; 3 inches for the 50- and 100-pound capacity machines; 5 inches for the 200-pound capacity machine; 8 inches for the 400- and 600-pound capacity machines; and two 8 inch or one 10 inch for the 800-pound capacity machines. The pipe sizes and connections shall be compatible with the drain valve sizes for the capacity specified.

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3.5.2.6 Cylinder. The cylinders construction shall be either welded or welded and riveted corrosion-resistant metal specified in 3.4.1, except that the driving shaft or trunion and spider shall be of stainless steel or ferrous metal protected by a corrosion-resistant coating. The thickness of the metal sheets shall be not less than 0.078 inch for the size 25-pound machine and not less than 0.100 inches for the remaining machines except for size 25- and 50-pound machines, the use of embossed or band reinforced sheets not less than 0.057 inch will be permitted. The cylinder construction shall be such as to prevent distortion or failure due to stresses created when operating during the extraction cycle at rated capacity. This requirement shall be verified when the equipment is tested as specified in 4.6.2. Cylinder sheets shall be perforated so as to allow free flow of water through the sheet.

3.5.2.6.1 Lifting ribs. Cylinders of one compartment machines shall contain three or more lifting ribs not less than 3 inches high for the size 25-pound machine and not less than 4 inches high for the size 50-pound machine. Lifting ribs of single compartment machines in excess of 50-pound capacity shall be in the quantity and size as the manufacturers standard commercial item for the size equipment specified. The lifting ribs shall be of the same type of material as the cylinder side sheets.

3.5.2.6.2 Partitions (divided cylinder machines only). The cylinders of divided cylinder machines shall be provided with partitions of corrosion-resistant metal not less than 0.086 inch thick and suitably reinforced.

3.5.2.7 Cylinder doors.

3.5.2.7.1 Cylinder doors (end-loading only). The cylinder of divided cylinder end-loading washer-extractors shall be provided with a minimum of one hinged door for each compartment. The doors shall be of corrosion-resistant metal and shall form a part of the front cylinder head. Door and door hinge construction shall not be affected by stresses during operating cycles. Means shall be provided to prevent garments from falling between the cylinder and shell during loading and unloading.

3.5.2.7.2 Cylinder doors (side-loading machines only). The cylinder of divided cylinder side-loading washer-extractors shall be provided with one, two or three hinged doors or one sliding door for each compartment. The doors shall be of corrosion-resistant metal and designed to withstand the high stresses encountered during extraction under full load. This requirement shall be verified when the equipment is tested as specified in 4.6.2. Each door shall be provided with a locking device that can be opened by hand without a special tool, wrench, or bar. Safety devices shall be provided to prevent the doors from opening while the machine is running. These requirements shall be verified when the equipment is tested as specified in 4.6.1. Hinges and locking and safety devices shall be of corrosion-resisting metal and readily replaceable.

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3.5.2.8 Cylinder drive. The cylinder of each washer-extractor shall be electrically driven through V-belts or a combination of gearing with V-belts to provide proper cylinder speeds for the washing and extracting cycles. A low speed pre-extract cycle, except for 25-, 50-, and 100-pound size, shall be provided. An intermediate load positioning cycle (approximately double the rpm of the washing cycle) will be acceptable for the 200-pound size in lieu of a low speed pre-extract cycle. This cycle shall be accomplished through a change in the drive ratio, by changing the speed of the washer or extractor motor, or by a separate motor. A low speed pre-extract cycle shall be accomplished with the quick-opening drain valve or valves in the open position. These requirements shall be verified when the equipment is tested as specified in 4.6.1 and 4.6.2.

3.5.2.9 Inching or positioning. The divided cylinder washer-extractors shall have provisions for two-way inching in both the up and down directions for positioning the cylinder doors in the loading and unloading position for each compartment and securing the cylinder in these positions, including gravity loading by sling or chute when the shell door is open. Inching or positioning means shall require the operator to use both hands on pushbuttons to inch or position the cylinder. These requirements shall be verified when the equipment is tested as specified in 4.6.1.

3.5.2.9.1 Automatic inching or positioning (divided cylinder machines only). When specified (see 6.2), divided cylinder washer-extractors shall be provided with automatic inching or positioning of the cylinder doors to each loading and unloading position for each compartment in addition to manual inching specified in 3.5.2.9.

3.5.2.10 Cylinder bearings. Each machine shall have a replaceable type bearing, or bearings, supporting the cylinder. Cylinder trunion bearings for divided cylinder machines shall be self-aligning, antifriction type.

3.5.2.11 Braking. The braking system on all washer-extractors shall be of the electro-mechanical, electro-magnetic, hydraulic, or pneumatically operated, heavy duty type that will stop the cylinder, when loaded to full capacity, from extracting speed in less than 60 seconds and (except for one compartment machines) hold the cylinder in a steady position for loading and unloading. This requirement shall be verified when the equipment is tested as specified in 4.6.2. A break interlock switch shall be provided and shall prevent operation of the cylinder when the brake is applied (except for inching or positioning - see 3.5.2.9). This requirement shall be verified when the equipment is tested as specified in 4.6.1. Brake linings shall be replaceable.

3.5.3 Type III - pass through (loading and unloading isolated). The type III washer-extractor shall be designed for installation in partition walls. The machine shall be equipped with a loading door on the pre-wash side of the machine and partition and an unloading door on the post wash and extract side of the machine and partition. Except as specified hereinafter, the machine shall conform to 3.1 through 3.5.1.7 and 3.5.1.9 through 3.6.7.

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3.5.3.1 Interlocking and safety devices. When tested as specified in 4.6.1, and 4.6.2 the shell doors (loading and unloading) shall be so interlocked, mechanically and electrically that conformance to the following will be accomplished.

- (a) Both outer doors may not be opened simultaneously.
- (b) The post-wash and extract side door shall not open until the entire formula cycle has been completed.
- (c) The prewash side door shall not open until the post-wash and extract side operation has unloaded and/or released the machine.
- (d) Once the machine is released by the post-wash and extract side operator, the door on the post-wash and extract side shall not open until another formula cycle has completed its cycle.
- (e) Neither operator will be able to "inch" or "spot" the cylinder unless the door on the opposite side is closed.
- (f) When the post-wash and extract door is open, there shall be no openings (including the drain valve) between the inside of the machine and the pre-wash side of the loading area that would permit air to pass from the pre-wash side to the post-wash and extract side.
- (g) All interlock arrangements shall be so designed that they will remain in effect both during a power or service outage and after restoration of the service.

3.5.3.2 Operator signals.

3.5.3.2.1 Unload side. The unload side shall be provided with signals (audible, visual, or both audible and visual). When tested as specified in 4.6.1, the following shall be accomplished.

- a. A visual signal shall indicate when the machine is being loaded.
- b. A visual signal shall indicate when the machine is washing or extracting.
- c. Audible and visual signals shall indicate when the machine is ready for unloading and whenever the machine requires the operator's attention at the unloading side.

3.5.3.2.2 Loading side. The loading side shall be provided with signals, (audible, visual, or both audible and visual). When tested as specified in 4.6.1, the following shall be accomplished.

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- a. A visual signal shall indicate when the machine is being unloaded.
- b. A visual signal shall indicate when the machine is running.
- c. Audible and visual signals shall indicate when the supplies are to be added from the loading side.
- d. The audible and visual signals shall indicate whenever the machine requires the pre-wash side operators attention and when the machine is ready for reloading.

3.5.3.3 Shell. The shell shall be provided with two or more separate outer doors, arranged so that one or more doors may be used exclusively for loading soiled laundry into the machine from the pre-wash side; and one or more doors may be used exclusively for unloading clean laundry from the machine on the post-wash and extract side.

3.5.3.4 Shell doors. The shell door shall be separate for loading and unloading (see 3.5.3.3).

3.5.3.5 Cylinder doors. Means shall be provided so that loading of soiled laundry will be done separately from that of unloading clean laundry.

3.5.3.6 Installation in isolation partitioning The machine shall be constructed so as to permit its installation in a partitioning wall so as to isolate loading side from unloading side (see 6.5). The partitioning shall form a tight air seal to prevent any air passage from loading side to unloading side.

3.5.3.7 Air supply and discharge. The machine shall be equipped with a single air supply and discharge outlet located on the top of the machine and on the loading side of the partitioning. The opening shall be of a size to prevent vacuum or back-up pressures during operation and shall be not less than 3 inches in diameter for machines sizes 400 and up and not less than 2 inches in diameter for machine sizes 300 and less. The outlet shall incorporate a flexible connection for attachment to rigid overhead external duct work.

3.5.3.8 Automatic controls. In addition to controls specified herein the controls shall be capable of providing a final hot rinse before extraction.

3.5.4 Type II - multiple compartments, end or side loading. When specified (see 6.2), the type II washer-extractor, in sizes 400 through 800, shall be specifically designed for sling loading. The cylinder in the loading position shall be loaded by gravity to a minimum of 80 percent of its rated capacity with a manual redirect of the overhead sling not to exceed 32 degrees from vertical. The sling, for loading purposes, shall have a minimum diameter of 19 inches, shall be loaded with sheets, and shall be located directly over the cylinder door or in a location ideally situated when the cylinder is in the loading position. In addition the cylinder shall have shelves or partitions dividing the

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cylinder into compartments so that when positioned for unloading the shelf or partition shall be level with or below the transverse axis. These requirements shall be verified when the washer-extractor is tested as specified in 4.6.2,

3.5.4.1 Cylinder door area, open for loading. For the size 400, each door area shall be a minimum of 500 square inches; and for sizes 600 and 800 each door area shall be a minimum of 600 square inches. This requirement shall be verified when the washer-extractor is tested as specified in 4.6.1.

3.6 Workmanship. Washer-extractors shall be free from defects such as fractures, splits, punctures, tears, dents, creases, deteriorations, or malformation. There shall be no sharp edges, slivers, burrs, projections, or other defects. The inside of the cylinder shall be smooth and free of burrs, sharp edges, or other imperfections.

3.6.1 Application of finish. The finish applied to the end item shall be continuous (when required), smooth, adherent, without discoloration or foreign material imbedded, and free from sags, runs, drips, creeps, laps, bubbles, streaks, wrinkles, blisters, cracks, scratches, pours, pits, lumps, flux, or orange peel. No rust, rough grinds, or toolmarks shall show through the coating.

3.6.2 Welders. The welders performing the welding on subassemblies, on assemblies, and on the end item shall be certified welders and have passed the qualification test as prescribed by either the "Standard Qualification Procedures of the American-Welding Society" or "Welding Qualification of the American Society of Mechanical Engineers" code. The contractor shall furnish the government with a list of names of his welders who are certified and have passed the test of either referenced codes and he shall certify that the welding of this equipment was performed by the welders listed.

3.6.3 Welding. The surface of parts to be welded shall be free from oxide, scale, paint, grease, and other foreign matter. Welds shall be continuous (on structural supports), sound, smooth, and free from porosity, cracks, incomplete fusion, and deformation of material. All scale and flux (when flux is used) shall be removed from the finished welds.

3.6.4 Soldering. Soldering shall be complete and adherent with all flux and residue removed and shall contain no pin holes.

3.6.5 Threaded fasteners. Threaded fasteners shall not be broken, stripped, fractured, or loose.

3.6.6 Rivets. Rivets shall be driven to completely fill the holes, with full size heads neatly finished and in full contact with the surface of the riveted members.

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3.6.7 Electrical wiring Wiring shall not be cut, abraded, or have excessive insulation stripped, and shall be properly and tightly joined at terminals. Wire nuts shall not be used and solderless connectors shall have insulation grip. Wiring shall have adequate slack to provide strain relief.

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 herein. 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 this document where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of sections 3 and 5. The inspection set forth in this document shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the document shall not relieve the contractor of the responsibility of assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for assuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to assure compliance with all dimensional requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article. When a first article is required (see 6.2), it shall be examined for defects specified in table II and tested in accordance with 4.6.1, 4.6.2, 4.6.3 and 4.6.4 (when applicable). The presence of any visual defects or dimensions not as specified or failure to pass any test shall be cause for rejection of the first article.

4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

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4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this document or applicable purchase document.

4.4.2 In-process inspection. Inspection of sub-assemblies shall be made to ascertain that construction details which cannot be examined in the finished product are in accordance with specified requirements. The Government reserves the right to exclude from consideration for acceptance, any material or service for which In-process inspection has indicated nonconformance.

4.4.3 End item visual examination. The end item shall be examined for the defects listed in table II. The lot size shall be expressed in units of washer-extractors of one type, style, and size only. The sample unit shall be one completely fabricated washer-extractor. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects.

TABLE II. End item visual defects

Examine	Defect	Classification	
		Major	Minor
Finish	Finish not in accordance with the manufacturer's standard commercial practice	X	
	Color not as specified		X
	Not continuous, smooth, and adherent	X	
	Foreign material embedded in finish, sags, runs, drips, creeps, laps, bubbles, streaks, wrinkles, blisters, cracks, scratches, pours, pits, lumps, flux, or orange peel		
	Rust, rough grinds, or toolmarks showing through the coating	X	
Construction and workmanship (applicable to all components and assemblies)	Part missing	X	
	Any component fractured, split, punctured, torn, dented, creased, or malformed	X	
	Any burr, sharp edge, or sliver	X	
Welding and brazing	Missing, incomplete, burn holes, cracked, fractured, or not fused	X	
	Slag inclusion, undercut, not smooth and uniform, scale or flux deposits not removed		X

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TABLE II. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Soldering (where applicable)	Missing, incomplete, or not adherent	X	
	Not clean (flux or residue not removed) or contain pinholes		X
Threaded fasteners	Broken, stripped, fractured, e.g., seal or packing nut stripped or loose	X	
	Not specified material	X	
	Threaded fasteners loose	X	
Rivets (when applicable)	Broken, not peened, or not peened sufficiently	X	
	Not specified material	X	
	Rivets loose	X	
Electrical apparatus, wiring	Wiring cut, abraded, insulation stripped not properly jointed or loose at terminal	X	
	Not enclosed in specified conduit, incomplete, or not approved type (when applicable)	X	
	Adequate slack not provided, strain relief or support clip missing		X
	Not as specified	X	
Construction (detailed)	Switches in motor control circuit not of a type to prevent accidental operation	X	
	Guards not readily removable		X
	Access holes not provided for parts requiring frequent adjustment	X	
	Holes not fitted with covers	X	
	Provisions not made for anchoring machine to the foundation	X	
	Diagram of recommended foundation details missing		X
	Thermometer not specified type	X	
	Lubrication fitting for bearings not accessible	X	
	Lubricant reservoirs for gear drive not provided with a thread cap at top and drain plug at bottom	X	
	Adjustment not provided for belt tension	X	
	Belts not as specified	X	
	Installation instruction for installed pipe, valve and fitting assemblies missing		X

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TABLE II. End item visual defects (cont'd)

Examine	Defect	Classification	
		Major	Minor
Construction (detailed) (cont'd)	Valves not readily accessible for operation and maintenance	X	
	Type III machine shell and cylinder doors not as specified	X	
	Shell door (for end loading machine) not hinged	X	
	Lifting ribs in the quantities and sizes, for open pocket machines in excess of 50-pound capacity, not in accordance with manufacturers standard practice	X	
	Less than three or four lifting ribs provided for the 25 and 50-pound capacity open pocket machines respectively	X	
	Cylinder doors not hinged (divided cylinder and loading machine)	X	
	Cylinder doors not hinged sliding (divided pocket side loading machines)	X	
	Hinges and locking and safety devices for cylinder doors not readily replaceable (divided cylinder side loading machine)	X	
	Cylinder bearings not replaceable type	X	
	Motors and/or brackets are supported by wrap-around sheet (except when wrap-around is 3/8 inch or more thick)	X	
	Brake lining not renewable	X	
	Machine does not tilt to unload (when applicable)	X	
	Type III machine air supply and outlet not as specified	X	
Identification marking	Missing, incomplete, illegible		X

4.4.4 End item testing. Each unit of production shall be tested as specified in 4.6.1. Any nonconformance shall be cause for rejection of the unit. When a first article is not required, the initial unit of production shall be tested as specified in 4.6.2 and when applicable 4.6.3 and 4.6.4. Any nonconformance shall be cause for rejection of the lot. The functional test in 4.6.2 shall be performed and shall be witnessed by a representative of the Government prior to acceptance unless satisfactory evidence is produced that this item has previously satisfactorily passed this test either in the manufacturer's plant or in a commercial application (see 6.4). The Government reserves the right to check-test such items to determine validity of the evidence produced.

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4.4.5 Treatment of electrical components. When moisture and fungus resistant treatment is required, the contractor shall furnish certification that electrical components have been treated in accordance with 3.5.1.20.

4.4.6 Packaging examination. Preservation, packaging, packing, and marking shall be inspected in accordance with the quality assurance provisions in MIL-L-3153.

4.5 Code and standard compliance. Certifications, certified test reports, or listing marks for standards submitted in accordance with 3.3 shall be examined and validated as proof of compliance. Prior to government approval of first shipment, the contractor shall submit to the contracting officer or his authorized representative for approval, certification that the washer-extractors he proposed to furnish under this document, meet the applicable requirements specified in 3.3.1 through 3.3.4 as follows:

4.5.2 NEMA. Acceptable evidence of meeting the requirements of NEMA shall be the manufacturer's certified statement that the motor controllers, switches, relays, and time delays, conform to NEMA Standard Publication No. ICS. A tag or label attached to these items stating these components conform to this standard is acceptable evidence.

4.5.3 ANSI. Acceptable evidence of meeting requirements of ANSI shall be the manufacturer's certified statement that the washer-extractors conform to the applicable requirements of ANSI 28.1.

4.5.4 OSHA. Acceptable evidence of meeting the requirements of OSHA shall be the manufacturer's certified statement that the washer-extractors conform to the applicable requirements of OSHA 29 CFR 1910.

4.6 Methods of inspection.

4.6.1 Operational testing. Each washer-extractor to be furnished under this document shall be connected to an electric power supply, water, steam, or compressed air, and operationally tested without garments. The following items and operations shall be checked:

(a) The assembly of components; starting, stopping, and control devices; moving parts and bearings; noise level (see 4.6.4); for compliance with the requirements of 3.5.

(b) The assembled washer-extractor for compliance with the leakage; overheating of parts; injection of supplies; and structural failures for compliance with the requirements of 3.5.

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(c) Low extraction speed inoperative or intermediate positioning cycle inoperative (when applicable) (see 3.5 and 3.5.2.8).

(d) The operation of the safety switch, timers, limit switches, remote control pushbutton switches, signals and indicating lights, in the motor control circuit for compliance with the requirements of 3.5.1.2.

(e) Reversal of cylinder rotation for compliance with the requirements of 3.5.1.3.

(f) The machine, including the shell, door, discharge valve, water inlet valves, supply injection valves, for leaks or improper operation.

(g) Functioning of automatic controls for compliance with the requirements of 3.5.1.4, (a) through (m) and 3.5 through 3.5.3.8 (as applicable).

(h) Operation of flushing system and tank capacities for compliance with the requirements of 3.5.1.6.

(i) Operation of shell door, steam valve, and drain valve interlocking devices for compliance with the requirements of 3.5.1.8.

(j) Operation of the shell door(s) and brake interlocking devices for compliance with the requirements of 3.5.1.8 and 3.5.3.1.

(k) Operation of the cylinder doors for compliance with the requirements of 3.5.2.7.2 (side loading machines only), and 3.5.3.1 (when applicable).

(l) Cylinder speeds for compliance with the requirements of 3.5.2.8,

(m) Inching or positioning of the cylinder for compliance with the requirements of 3.5.2.9 (divided cylinder machines only), and 3.5.3.1 (when applicable).

(n) Operation of the brake interlock switch for compliance with the requirements of 3.5.2.11.

(o) Operation of visual and audible signals for compliance with 3.5.3.2.

(p) Measurement of each cylinder door cross sectional area for compliance with the requirements of 3.5.4.1.

Failure to pass any of the above tests shall be cause for rejection.

4.6.2 Functional testing The washer-extractor shall be tested by making the necessary connections such as electric power, compressed air, steam, hot and cold water, and operated under full service load as established in the applicable paragraphs of this document. The following items and operations shall be checked:

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(a) The extraction of water from saturated sheets for compliance with 3.5. For this test, sheets shall be placed in a laundry drying tumbler air heated to 190°F ; 5°F and tumbled for not less than 15 minutes to establish normal dry weight. The sheets, immediately after being tumbled and weighed, shall be placed in the washer-extractor being tested to the amount of its minimum capacity as specified. The sheets in the machine being tested shall be run through the operations using Formula A (see 3.5 and 4.6.2.1), extracted for not more than 12 minutes, removed from the machine, and weighed to determine compliance with the extraction requirements specified in 3.5. The machine shall meet the functional requirements for washing woolen blankets using Formula F (see 4.6.2.1).

(b) water or soap solution shall not back up or overflow through supply containers or vent pipe during extract cycles (see 3.5).

(c) Anti-vibration mount components failure (see 3.5).

(d) No leaks during washing and extracting cycles (see 3.5).

(e) Moving parts and bearings shall not overheat (see 3.5).

(f) No structural failures (see 3.5).

(g) Low speed extraction or intermediate load positioning cycle (as applicable) is operable (see 3.5 and 3.5.2.8).

(h) Operation of the vibration limiting device, or automatic self-Balancing where applicable, for compliance with the requirements of 3.5.1.8.

(i) Foundation equipment, except concrete, for compliance with the requirements of 3.5.1.9 (when applicable).

(J) Seal leakage for compliance with the requirements of 3.5.1.13.

(k) Operation of the steam connection for compliance with the requirements of 3.5.1.16 (steam not in direct contact with the load).

(l) Amplitude of vibration is greater than 0.005 inches displacement for machines with anti-vibration protection, or is greater than 0.010 inches displacement for machines without anti-vibration protection (see 3.5.1.21).

(m) Machine does not absorb 90 percent of the dynamic load (see 6.2 and 3.5.1.21).

(n) Shell for compliance with the water-tightness, distortion, and vibration requirements of 3.5.2.1.

(o) Shell doors on end loading machines for compliance with the latching requirements of 3.5.2.3.1.

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(p) Operation of shell doors for compliance with the requirements of 3.5.2.3.2 (side loading machines only) and 3.5.3.1.

(q) Cylinder for compliance with the structural requirements of 3.5.2.6.

(r) Operation of discharge quick-opening valve for compliance with the requirements of 3.5.2.5.

(s) Cylinder door for compliance with the structural requirements of 3.5.2.7.2 (side loading machines only).

(t) Braking system for compliance with the requirements of 3.5.2.11.

(u) Operation of audible and visual signals for compliance with 3.5.3.2.

(v) Loading and unloading for compliance with requirements of 3.5.4.

Nonconformance to any of the above shall constitute failure of the test.

4.6.2.1 Formulas. The formulas to be used for test in 4.6.2 shall be as follows:

Formula A

		<u>Sheets</u>			<u>Supplies</u>
		<u>Water level (inches)</u>	<u>Time (minuted)</u>	<u>Temperature (degrees)</u>	
1.	Suds	5	8	160	*Soap solution bleach
2.	Intermediate extraction	---	2	---	---
3.	Rinse	12	3	160	None
4.	Rinse	12	3	160	None

* Soap stock solution shall be prepared based on a ratio of 2 pounds of soap to 1 pound of alkali. The proportion of soap and alkali to quantity of water shall be 1 pound of supplies per 3 gallons of water.

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Formula FWool blankets

	<u>Water level</u> <u>(inches)</u>	<u>Time</u> <u>(minutes)</u>	<u>Temperature</u> <u>(degrees)</u>	<u>Supplies</u>
1. Suds	14	5	90	**Soap (very heavy suds)
2. suds	14	5	90	Soap (very heavy suds)
3. Intermediate extraction	--	2	—	—
4. Rinse	14	3	90	None
5. Rinse	14	3	90	None

** Very heavy suds shall be prepared based on a ratio of 1 pound of soap to 3 gallons of water.

4.6.3 Electromagnetic compatibility. When electromagnetic compatibility is required, the first article or initial unit of production, as applicable, shall be tested by the contractors in accordance with test methods CE03 and RE02 of MIL-STD-462. The Government reserves the right to witness tests performed by the contractor or an independent testing agency. The contractor shall furnish the contracting officer written certification that the Interference Control Plan, the EMI/EMC Test Plan, the electromagnetic compatibility test report and the requirements meet MIL-STD-461.

4.6.4 Noise levels. When required, noise level testing shall be accomplished in accordance with MIL-STD-1474 and the applicable referenced standards therein, to determine conformance with 3.5. Test microphones shall be located at the operators position, 2 feet in front of the control panel and at a height of 5 feet above the floor plane.

5. PACKAGING

5.1 Levels A, B, or C. Washer-extractors shall be preserved, packed and marked for each level of protection in accordance with the applicable requirements of MIL-L-3153 (see 6.2). Washer-extractors shall be shipped fully assembled, unless disassembly is necessary to protect certain components during transit, or unless disassembly results in lower transportation cost to the Government or to the contractor.

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6. NOTES

6.1 Intended use. The washer-extractors are intended for use in fixed installations.

6.2 Ordering data. Acquisition documents should specify the following as applicable.

- (a) Title, number and date of this specification.
- (b) Type, style, size, number of compartments and class of supply system required (see 1.2 and 3.5.1.5).
- (c) When a first article is required (see 3.1, 4.3, and 6.3).
- (d) When a water reuse valve is required (see 3.5.1.4 (b)).
- (e) When the automatic thermal overflow cool down feature is required (see 3.5.1.4 (f) (1)).
- (f) When noise level limits apply (see 3.5).
- (g) When a lesser number of mounting cylinders is required (see 3.5.1.4 (j)).
- (h) When the automatic cycle control is required to be of the microprocessor type (see 3.5.1.4 (0)).
- (i) When pipe and connections are to be furnished for utilizing a central circulating soap supply system (see 3.5.1.5).
- (j) Power characteristics (voltage, frequency, and number of phases) (see 3.5.1.7).
- (k) Finish when other than as specified (see 3.5.1.18).
- (l) When electromagnetic compatibility is required (see 3.5.1.19),
- (m) When moisture and fungus-resistant treatment is required (see 3.5.1.20).
- (n) When anti-vibration protection is not required (see 3.5.1.21).
- (o) When machine is to be tested for 90-percent load absorption (see 3.5.1.21).
- (p) When divided cylinder machines are to be provided with automatic inching or positioning in addition to manual inching provisions (see 3.5.2.9.1).
- (q) When the type II washer-extractors are to be specifically designed for sling loading (see 3.5,4).
- (r) Selection of applicable levels of preservation and packing (see 5.1).
- (s) When drawings are required for installation purposes, the successful bidder shall furnish drawings showing the exact dimension of the item, overall floor space requirements, foundation requirements location and size of hold-down bolts, location and size of all inlet and outlet lines; the size wire and point where electrical connection is to be made and electrical characteristics of the motor(s) of the equipment. When purchases are for the Air Force, drawings are required within 10 days after award to the successful bidder.

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- (t) Whether the successful bidder is to furnish supervision of installation or demonstration services of the equipment. If required, the location, approximate date, the person or office to report to, and any accommodations or services to be supplied by the installation or agency, will be stated.

6.2.1 Contract data requirements. Any requirements for equipment manuals for the items covered by this document should be included in DD Form 1423 Contract Data Requirements List and cited in the contract.

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contacting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in all acquisition instruments regarding arrangements for selection, inspection, and approval of the first article.

6.4 Successful commercial operation. Invitation for bids shall specify that no item of equipment will be acceptable unless the manufacturer has had equipment of approximately the same type, capacity (plus or minus 50 pound capacity) and class as that offered which shall have operated successfully in a commercial or institutional laundry for at least one year. Equipment installed for test purposes in a manufacturer's plant or laboratory will not be considered as complying with this requirement.

6.5 Pass through machine wall partitioning. The partitioning wall may at the manufacturer's option be separated from the machine by not less than 3 linear inches of a tough, flexible, plasticized material. When the manufacturer employs the separation method, the material shall be furnished with the machine.

6.6 Mass vibrometer. A Starret 192 vibrometer has been found acceptable as a test instrument when measuring vibrations.

6.7 Subject term (key word) listing

Laundry
Washer

6.8 Changes from previous issue. The margins of this document have been marked with an asterisk (*) to indicate where changes (additions, modification, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

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Custodians:

Army - GL
Navy - YD
Air Force - 84

Preparing activity:

Army - GL
Project No 3510-0302

Review activities:

Army - MD
DLA - GS

User activities:

Army - CE
Navy - MC

Civil Agencies Coordinating Activities:

VA - OSS

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