

**SPECIFICATION
FOR
WASHER-EXTRACTORS, LAUNDRY,
COMMERCIAL**

(This specification is released for procurement purposes until revised or rescinded.)

SCOPE

This specification covers the requirements, materials, performance, and capacities for washer-extractors of the end loading and side loading types.

The washer-extractors shall be of commercial design and capable of performing both washing and extracting operations in one loading.

I. CLASSIFICATION

The washer-extractors covered by this specification are of the following types: Size shall range from 30 lbs. to 500 lbs. Type and size shall be as specified in the Invitation For Bids.

TYPE I - END LOADING, OPEN POCKET

TYPE II - END LOADING, DIVIDED CYLINDER

TYPE III - SIDE LOADING, DIVIDED CYLINDER

II. APPLICABLE STANDARDS

The following documents of issue in effect on the date of the Invitation For Bids shall form a part of this specification:

NEMA MG-2 Motors and Generators
National Electrical Mfgs. Assoc.
155 E. 44th Street
New York, NY 10017

Occupational Safety and Health Act
N. C. Department of Labor
4 West Edenton Street
Raleigh, NC 27611

National Electrical Code
National Fire Protection Assoc.
470 Atlantic Ave.
Boston, MA 02210

III. REQUIREMENTS

A. DESIGN

The design and construction shall conform to the general and detail requirements as specified hereinafter. The equipment shall be a currently standard product of an established manufacturer, except for such deviations as called for in this specification. All accessories and components normally furnished commercially with the standard product offered under

this specification shall be in the same quantity and of the same quality as furnished commercially with the standard product. The models submitted shall have been in commercial use for at least one year. All equipment furnished under this specification shall conform to applicable standards of the National Electrical Code for construction, and the National Electrical Manufacturers' Association standards for electrical controls and motors.

B. CAPACITY

The capacity of the washer-extractor shall be based on pounds per cubic foot of cylinder volume. The ratio of rated dry weight to cylinder volume shall not exceed 6.75 lbs. per cubic foot for machines of 50 lb. dry weight capacity and over and 6.25 lbs. per cubic foot for those under 50 lb. capacity.

C. PERFORMANCE

The washer-extractors shall be capable of meeting the requirements, including the degree of extraction, when tested as specified in Section VI. When specified in the Invitation For Bids, high extract model is required. Amount of moisture retention on these models are to be approximately 50%.

D. SAFETY REQUIREMENTS

The washer-extractor shall be equipped with the following applicable safety features:

1. Shell door interlock to prevent door being opened when machine is running.
2. Door safety switch to prevent operation of machine, except for inching, when shell door is open.
3. When specified in the Invitation For Bids, a safety switch to stop the machine should a reasonably severe out-of-balance condition occur that could result in damage if the machine is not stopped.
4. When provided, inching control to require two-hand operation.
5. Provide a safety switch to prevent inching when cylinder door is open.

All exposed belts, chains, shafts, pulleys, gears, and other moving parts shall be fully enclosed or guarded. Guards shall be either expanded metal (galvanized), or galvanized sheet metal (min. 20 gauge). Guards shall be painted to match the exterior of the machine. All parts of the guard shall be rigid, suitably secured and readily removable without disassembling pipes or fittings on the machine.

E. CONTROLS

Unless otherwise specified, controls shall be fully automatic directing the machine through a complete operating cycle, including automatic control of all washing, supply injection, rinsing and extracting functions. The control shall be operated by a punch card or microprocessor and shall allow complete flexibility in controlling the following:

The control shall automatically provide for the following:

1. Predetermined water level(s) controls.
2. Manufacturers standard inlet water temperatures.
3. Timing or each step of the formula.
4. Operation of the inlet and outlet valves.
5. Adjustment of the water level, within the washwheel, to compensate for load absorption.
6. Interruption of the timing until the predetermined water

- level has been reached in the washwheel.
7. Unlimited variety of washing formulas.
 8. Control shall be arranged to provide, if desired, an intermediate extraction during each draining cycle and to automatically return to washing speed prior to filling for the next bath level.
 9. A visual and audible signal for supplies and end of cycle.
 10. Automatic supply injection form a stainless steel compartment type dispenser with manufacturers standard number of compartments.

Automatic injection of live steam into washer shall be optional. Cooldown feature to automatically cool down rinse water shall be optional. Visual indication of the operation, water level, and water temperature shall be provided on the wash unit or control panel. The hot and cold water inlet valves shall be individually and separately operated. The drain valve shall be electrically interlocked to prevent extract motor from starting with the drain valve closed. Except for Type I, Open Pocket, the machine shall be equipped with controls to position the cylinder for loading and unloading.

F. ELECTRICAL SYSTEM AND CONTROLS

The electrical installation shall be in accordance with the applicable portions of the National Electrical Code and the National Electrical Manufacturers' Association Standards. All motors to be protected by thermal overloads. Starters and relays shall be heavy duty, industrial type and sized to NEMA standards. All wiring to be run in galvanized or sherardized electrical conduit. Conduit shall be either rigid steel, flexible conduit, or electrical metallic tubing.

G. SHELL

The shell or frame shall be welded steel construction, adequately reinforced to support all attachments thereto. A removable end-head shall be provided for side loading machines so that the cylinder can be removed from the machine. All those portions of the shell which come in contact with wash water shall be corrosion-resisting metal. The shell heads or end plates shall be suitably formed and contoured and have necessary strength and rigidity for the intended service. The shell wrap-around sheets for all machines shall be of corrosion-resisting sheet metal, or boiler plate suitably clad or lined with corrosion-resisting metal. The shell of all machines shall be supported by permanent legs, frames, or end sheet reinforcements, of such height that the doors will be convenient loading and unloading position.

H. SHELL DOORS

1. End Loading Machines

The shell of end loading machines shall be provided with hinged, swinging-type doors. Each door shall be mounted on heavy-duty hinges, and shall be of convenient height, rigid, and complete with latching device to insure the door being water-tight when closed. Doors on open pocket machines shall be of corrosion-resisting metal of suitable thickness, and when provided with a window, it shall be of heat treated glass or plastic which shall be capable of resisting high mechanical and thermal shock. Divided cylinder end loading machines shall have a suitable shell door of sufficient strength for the purpose and lined with stainless steel so that all parts that come in contact with the washing solution will be corrosion resistant material.

2. Side Loading Machines

Side loading machines shall have one shell door for each longitudinal compartment in the cylinder. The doors shall be of the same material as the shell, rigid, and of convenient height. Sliding-type doors shall slide in continuous guides of the full length of the door track. Doors shall be tight-fitting, with suitable latching means and lifting handles.

Sliding doors shall have guides of corrosion-resisting metal. The guides or tracks may be Teflon lined. Renewable wearing strips may be fitted as roller tracks for safety switches where they bear on the shell door. A hinged apron, of the same material as the shell, shall be attached at each shell door.

I. CYLINDER

The cylinder shall be welded construction, of corrosion-resisting metal, and reinforced with adequately corrosion-resisting metal bands or hoops around the periphery of the cylinder. Cylinders of corrosion-resisting metal, without reinforcing rings, will be acceptable providing the manufacturer submits, upon request, satisfactory engineering calculations proving the adequacy of his design. The vertical plates (on end loading machines) and heads (on side loading machines) shall be either corrosion-resisting metal or hot rolled steel plate with interior side lined with corrosion-resisting metal. The driving trunnion and spider may be of ferrous metal protected by hot dip galvanizing or corrosion-resistant coating. The cylinder sheets to be fully perforated so as to freely discharge the water extracted. Necessary lifting ribs shall be provided in the cylinder of open pocket machines.

Divided cylinders shall have a means for providing mechanical action to the load in accordance with the manufacturer's standard design. The lifting ribs shall be of the same material as the side sheets. Corrosion-resisting metal partitions where required shall be provided in the cylinders. The partitions shall be of proper thickness and adequately reinforced. Unless otherwise specified in the Invitation For Bids, the manufacturer's standard cylinder configuration shall be furnished.

J. CYLINDER DOORS

1. Divided Cylinder End Loading Machines

A hinged door for each compartment, of corrosion-resisting metal, shall be provided. Suitable means shall be provided to prevent garments falling between the cylinder and shell while loading and unloading.

2. Side Loading Machines

Unless otherwise specified in the Invitation For Bids, one or two hinged or sliding doors for each compartment, of corrosion-resisting metal, shall be furnished on side loading machines. The doors to be positive locking, and easily opened by hand (no tools or bars required). A safety device shall be installed to prevent doors opening while machine is running.

All hinges, locking and safety devices shall be of corrosion-resisting metal and easily replaced. A suitable means shall be provided to prevent garments falling between the cylinder and shell while loading and unloading.

K. DRAIN VALVE

Machines of over 50 lb. capacity shall have a quick-opening valve, or valves, attached to the bottom of the shell to drain all free water from the shell. A manual control of the valve(s) shall be provided for, unless they are of the normally open type. Working parts of the valve that come in contact with waste materials shall be of brass or corrosion-resisting metal. The valves to have a removable seat, diaphragm, or gasket. The discharge outlet to be of the non-splashing type or have a splash guard extending from the bottom of the shell to within 2" of the bottom of the base mounting. Machines of 50 lbs. and under capacity may use "squeeze" type valves.

L. CYLINDER BEARINGS AND SEALS

Divided cylinder machines shall be supported at each end by self-aligning, antifriction, heavy duty roller bearings. Open pocket machines shall be equipped with suitable heavy duty antifriction ball or roller bearings. The bearings shall have suitable seals on the water side to prevent water from entering the bearings and to prevent lubricant entering water side. Bearings shall be of adequate capacity for the intended service.

M. CYLINDER DRIVE

The cylinder of each washer-extractor shall be electrically driven through V-belts, or a combination of gearing with chain or V-belts providing proper cylinder speeds for the washing cycle and extracting cycle. Means shall be provided for reversing the cylinder during the washing cycle.

N. MOTORS AND CONTROLS

Motors shall be drip-proof, splash-proof, or totally enclosed type and shall have a 40°C ambient temperature rating. Motors shall conform to the applicable requirements of the National Electrical Manufacturers' Association's Standard, and to the following requirements:

1. All motors shall have windings impregnated to resist moisture.
2. Motors shall have the proper starting characteristics and ample power with a reasonable factor of safety for their intended operation under full-load conditions without exceeding the permissible temperature rise.
3. Motors shall be equipped with ball bearings, except that motors of less than ½ horsepower when used for horizontal applications may have sleeve bearings.
4. Motor bearings shall be of the permanently lubricated type or shall have adequate and accessible means for lubrication.
5. Each motor shall be provided with suitable manually reset magnetic starter with thermal-overload protection. A circuit breaker may be furnished as thermal overload protection.

O. BRAKES

On machines with over 50 lb. capacity, the brake system shall be designed to bring the cylinder to a complete stop from extraction speed, when fully loaded, within 90 seconds or less. The cylinder, except for open pocket machines, shall hold in locked position for loading and unloading. Brake lining shall be replaceable. A brake interlock switch shall be provided so as to prevent operation of the cylinder when the brake is applied (except for inching or positioning).

Q. WIRING DIAGRAM

Wiring and connection diagrams, including instructions for connecting controllers, shall be furnished with each unit. Wiring beyond the machine or unit will be furnished by the owner.

R. PIPING DIAGRAM

A diagram showing the location and size of all pipe connections to the unit shall be furnished. Piping beyond the machine or unit will be furnished by the owner.

Pipe, tubing, fittings, and valves mounted on or integral to the machine shall be sized in accordance with good engineering practice based on steam being supplied at 100 psig and water being supplied with a pressure range of 40-60 psig. Water pipe or tubing mounted on or integral to the machine shall be sized to permit filling of the cylinder to normal wash level exclusive of initial fill within 30 seconds.

S. BASES

Bases shall be constructed so that points of contact with foundation shall be in the same plane. Provisions for anchoring to the foundation shall be provided.

T. ANTIVIBRATION MOUNTING

When specified in the Invitation For Bids, the unit shall be set upon or supported from, a vibration isolating device which shall prevent not less than 90% of all vibration from reaching the machine foundation floor slab during the extract cycle. The suspension system shall be statically and dynamically stable and shall include a sufficient damper assembly to serve as a mechanical stop.

System shall be sufficiently protected by cut-off switches designed to shut off the motors in the event of excessive machine movement due to out of balance loads or other factors. Means shall be provided for properly leveling the suspension system.

U. FOUNDATION AND MOUNTING

The contractor shall provide the owner with mounting drawings. The drawings shall identify mounting members included in the contract (channels, I-beams, anchor bolts, et cetera). Unless otherwise specified in the Invitation For Bids, foundation construction will be the responsibility of the owner. Prior to placing a bid, all prospective bidders are urged to make an on-the-site inspection of the installation location. The owner will make available to the prospective bidder at this time, information regarding the building structural design, floor loadings, and construction details. However, it will be the responsibility of the prospective bidder to make necessary measurements, determine type of construction materials of construction, soil conditions, et cetera, and make his own determination of loadings and design the proper foundation. The contractor will be required to submit to the owner, detailed working drawings covering the foundation and mounting. These drawings shall identify the dividing line of foundation construction responsibility between the contractor and the owner.

V. INSTALLATION

The contractor shall provide a qualified engineer to supervise the installation of the equipment. Unless otherwise specified in the Invitation For Bids, installation of the equipment will be by the owner.

IV. WARRANTY

The contractor warrants to the owner that all equipment furnished under this specification will be new, of good material and workmanship and agrees to replace promptly any part or parts which by reason of defective material or workmanship shall fail under normal use, free of negligence or accident, for a minimum period of 12 months from date of acceptance. Such replacement shall be free of any charge to the owner or his representative.

The contractor shall further warrant the equipment against excessive or harmful vibration, and failure of the foundation or mounting caused by the equipment after it has been installed and the foundation constructed in accordance with his plans and specifications, for a minimum period of one year. The warranty period shall be from the date the equipment is put into operation.

V. SERVICE, PARTS, AND MANUALS

The contractor shall guarantee the owner promptly available spare parts and technical assistance. The services of a qualified representative of the contractor shall be available to the owner within 48-hours after requesting this service.

At least one copy of an operating and parts manual shall be furnished with each machine.

VI. ACCEPTANCE EVALUATION AND QUALITY ASSURANCE

Unless otherwise specified in the Invitation For Bids, the contractor shall conduct the following tests of his equipment in the presence of designated personnel and also give instructions in the operation of the equipment to key laundry personnel. An adequate working period shall be devoted to testing and instructions.

1. Extraction Test

The washer-extractor shall be tested to determine moisture retention as follows. Non-resin filled cotton sheets shall be run through one complete rinse cycle, in water not more than 110°F, then extracted for 12 minutes and removed from the machine and weighed. Then finish by running through a flat work ironer until bone dry. Weigh the cotton sheets after finishing. Calculate the percent moisture retention as follows:

- a) Subtract dry weight from extracted weight.
- b) Divide the difference (pounds) by dry weight pounds.
- c) Multiply results of Step 2 by 100 to obtain percent of moisture retention.
- d) Moisture retention shall not exceed 56% on standard models.

2. Operational Testing

The washer-extractor shall be connected to power and operational tested without garments by the contractor. When so tested, the powered equipment shall show that the assembly of components have:

- a) Complete and proper relationship.
- b) No leaks.
- c) No undue vibrations or noise.
- d) No over heating of parts, such as bearings, et cetera.
- e) Starting and stopping devices operating smoothly and positively.
- f) No structural failures.

3. Functional Testing

The washer-extractor shall be tested by making the necessary connections such as electric power, and compressed air, and operated under full service load as established for it in the applicable sections of this specification.

VII. DELIVERY AND PAYMENT

Delivery of and payment for the equipment under this specification shall be in accordance with the terms and conditions of the Invitation For Bids. The contractor shall be responsible for any packing, packaging, or protection required to insure delivery in an undamaged condition.

VIII. ORDERING DATA

Purchasers should exercise any desired option offered herein and should specify the following in the Requisition and Invitation For Bids:

1. Title, number, and date of this specification.
2. The Type and Size of desired washer-extractor.
3. If controls other than fully automatic are required.
4. If foundation and/or channels, I-beams, anchor bolts, et cetera, are to be included.
5. If installation is to be included.
6. If required, indicate number of cylinder compartments.
7. Date and place of delivery.
8. Power characteristics desired.
9. If antivibration mounting is required.
10. Number of cylinder doors for side loading machines, more than one is required.
11. If automatic cool down feature to cool down rinse water is required.
12. If automatic live steam injection to maintain water temperature is required.
13. If minimum number of predetermined water levels is required.
14. If minimum number of water temperatures is required.
15. If minimum number of supply compartments is required.
16. Is acceptance inspection required?
17. If out-of-balance safety switch is required.
18. If high extract model is required.
19. If agency requires inspection by Quality Assurance Representative.
20. If warranty is desired different than specified.