

**INCH-POUND**

MIL-T-23581A(SH)

3 August 1992

SUPERSEDING

MIL-T-23581(SHIPS)

12 February 1963

(See 6.11)

## MILITARY SPECIFICATION

### TUMBLER, DRYING, LAUNDRY, COMMERCIAL (SUBMARINE SERVICE)

This specification is approved for use by the Naval Sea Systems Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers a 16-pound (minimum) capacity commercial laundry drying tumbler machine for Navy submarine service. Only one classification of tumbler is covered by this specification.

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 05042, 2531 National Center Bldg. 3, Washington, DC 20362-5160 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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SPECIFICATIONS

MILITARY

- MIL-S-901 - Shock Tests, H.I. (High-Impact) Shipboard Machinery, Equipment, and Systems, Requirements for.
- MIL-L-3153 - Laundry and Dry Cleaning Machinery and Equipment, Packaging of.

STANDARDS

MILITARY

- MIL-STD-167-1 - Mechanical Vibration of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).
- DOD-STD-1399, Section 300 - Interface Standard for Shipboard Systems Section 300 Electric Power, Alternating Current (Metric).

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC. (IEEE)  
45 - Recommended Practice for Electric Installations on Shipboard.

(Application for copies should be addressed to the Institute of Electrical and Electronics Engineers, Inc., 445 Hoes Brie, P.O. Box 1331, Piscataway, NJ 08855-1331.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.5) in accordance with 4.4.

3.2 Materials. Materials shall be as specified in 3.2.1 through 3.2.7 (see 6.3).

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3.2.1 Structure. Frame, base, and strength members shall be constructed of malleable iron, ductile iron, or steel hot dipped galvanized for corrosion protection. Gray cast iron or other brittle materials shall not be used for these parts. Except as otherwise specified herein, gray cast iron may be used for other components, provided a machine so equipped satisfactorily completes the shock test procedures outlined herein.

3.2.2 Housing. The housing shall be made of adequate gauge sheet steel panels. Air guide baffles shall be not less than 22-gauge galvanized sheet steel.

3.2.3 Cylinder. Galvanized steel sheet of not less than 18-gauge thickness shall be used for this purpose.

3.2.4 Resistance wire. Resistance wire for heating elements shall conform to the following requirements:

(a) Chemical composition (nominal approximate):

Nickel. . . . .	76.0 to 79.0 percent
Chromium. . . . .	19.0 to 21.0 percent
Iron. . . . .	1.0 (max.) percent
Manganese . . . . .	2.5 (max.) percent
Carbon. . . . .	0.25 (max.) percent
Silicon . . . . .	0.75 to 1.50 (max.) percent
Sulfur. . . . .	0.03 (max.) percent

(b) Mechanical properties:

Tensile strength (min.) pounds per square inch . .	100,000
Elongation in 10 inches (min.) . . . . .	15 percent

3.2.5 Insulation. Insulation shall be of the rigid type or of fibrous glass batt type suitably supported by cover panels.

3.2.6 Recovered materials. Unless otherwise specified herein, all equipment, material, and articles incorporated in the products covered by this specification shall be new and may be fabricated using materials produced from recovered materials to the maximum extent practicable without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products is allowed under this specification unless otherwise specifically specified.

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3.2.7 Asbestos or asbestos treated materials. It is mandatory that equipment supplied under the contract be completely free from asbestos or asbestos treated materials. Statements elsewhere in this specification which may permit the use of asbestos or asbestos treated materials shall be disregarded. The contractor, however, is responsible to substitute for asbestos only those materials which can perform at least as well as asbestos for the intended application.

### 3.3 Desire.

3.3.1 General design. The drying tumbler shall be non-reversing, open end, once through, end loading type arranged so as not to recirculate the heated air. The tumbler shall be electrically heated and provided with a thermostat that can be varied by the operator. Other considerations are:

- (a) The machine shall be completely assembled with controls and so constructed that it can be readily disassembled into sections or parts. Parts will be passed through a 25-inch diameter submarine hatch and a door opening having maximum dimensions of 20 inches in width by 38 inches in height, with top and bottom of opening formed on a 10-inch radius. Parts will be reassembled with a minimum of effort, in the submarine laundry space, to provide durable and efficient operation.
- (b) Cutting of parts by torch or similar means to accomplish disassembly at the site, and reassembly of parts by welding or similar method, will not be construed as meeting the disassembly requirement of this specification.

3.3.2 Capacity. The machine shall adequately accommodate or hold a load of not less than 16 pounds dry weight minimum capacity preload cotton clothing (see 6.2)

### 3.4 Construction

3.4.1 Metal joints. Rivets, bolts, screws, nuts, and washers shall be of steel, except when brass or corrosion-resisting metal is fastened, in which case they shall be of brass or corrosion-resisting metal. Where dissimilar metals are fastened, rivets, bolts, screws, nuts, and washers shall be galvanically compatible with materials being joined. Electrodes or welding rods used for welding shall deposit material similar to the base metal. Nuts subject to shock or vibration shall be adequately locked.

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3.5 Details of units or parts.

3.5.1 Frame. The frame, when assembled, shall provide a rigid and durable support for housing, cylinder, heating coils, fan, motor, and driving mechanism.

3.5.2 Housing. The entire unit shall be enclosed in a housing of sheet steel panels. The housing enclosing the machine shall be of airtight construction except for inlet, outlet, access plate, and door openings. Door and access plates shall be tight when in place. Adequate doors or access plates shall be provided for the purpose of maintaining machinery and cleaning the machine. The lower front panel of the tumbler shall be so constructed and secured that it can be readily removed, without tools, for cleaning lint and debris from the section of the tumbler below the tub.

3.5.3 Tub. The tub shall, in general, be circular in shape and constructed of heavy gauge steel sheets. Suitable front access plates shall be provided, for removing lint from between the cylinder and the housing.

3.5.4 Door. A loading door concentric with the cylinder opening shall be provided at the front of the housing. The door shall be insulated and configured to act as a baffle for retaining the load within the cylinder. The door shall be durably hinged, fitted with a latching handle and an electrical interlock to prevent operation of the cylinder when the door is opened.

3.5.5 Cylinder. The cylinder shall be circular in shape and formed from perforated galvanized steel sheet. Perforations shall be staggered and not larger than 11/32-inch diameter. Back sheet of cylinder shall be solid, front sheet of cylinder shall have a circular opening to match recessed section of door in housing, and both sheets shall be made of galvanized steel. The cylinder shall have an approximate diameter of 24-1/2 inches and a length of 28 inches. Cylinder shall be driven through a steel gudgeon welded to a steel transmitter, which in turn is securely bolted to the rear cylinder head. Cylinder shall be fitted with lifting ribs of adequate number and size to properly tumble the clothing. Through tie-rods shall be installed within the lifting ribs to increase the rigidity of the cylinder.

3.5.6 Transmitter. The transmitter shall be made of steel, shall have spiders of sufficient number and length to adequately support the cylinder under full load conditions, and shall be securely bolted to back sheet of cylinder and welded to the gudgeon.

3.5.7 Gudgeon. Gudgeon shall be made of steel of suitable strength and hardness to insure safe and durable operation under full load conditions. Gudgeon shall be machined for proper fit with bearing sleeves at back of machine.

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3.5.8 Cylinder bearings. The cylinder shall be supported at the rear by two widely spaced, heavy duty, ball or roller bearings. The bearings shall be of a readily renewable type and of sufficient capacity and durability to provide vibrationless rotation of the cylinder under full load conditions for not less than 5000 hours.

3.5.9 Fan. A fan of sufficient capacity to meet the drying requirements of 3.6.1 shall be provided.

3.5.10 Air ducts. Air ducts shall be of sufficient volume to meet the requirements of 3.6.1

3.5.11 Exhaust. An exhaust duct opening of ample size shall be provided for exhausting air after passage through the tumbler. The opening shall be provided with suitable fittings for connecting an exhaust air duct.

3.5.12 Drive adjustments. Suitable and adequate means shall be provided for adjusting belt or chain drives.

3.5.13 Insulation. Excepting surfaces touched to operate tumbler-dryer the outer housing, door, and other components shall be insulated from the internal heat source so that not more than 15 percent of the surface of the outer housing exceeds a temperature of 35 degrees Fahrenheit (°F) above the ambient air temperature. Surfaces touched by the operator to operate the tumbler-dryer shall not exceed 35°F above the ambient air temperature (see 4.4.3.8). Insulation shall be encased to hold the insulation in place and to prevent settling, crumbling, or flaking within the housing. The insulation material characteristics shall conform to 3 2.5.

3.5.14 Size. The overall maximum dimensions shall not exceed 40 inches deep, 26-1/2 inches wide, and 40 inches high (see 6.2).

3.5.15 Electrical requirements. Unless otherwise specified in the contract or order, all electrical equipment shall conform to the recommended practices for electrical installation on shipboard as specified by the requirements in IEEE 45. Electrical equipment shall be designed for operation on a type I electrical system as required in DOD-STD-1399, section 300. The control panel shall be drip-proof. Pushbuttons and switches shall be arranged for safe and convenient operation. Wiring shall be arranged, protected, or insulated so that temperatures within the tumbler will not result in deterioration of the insulation and cause short circuits to occur.

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3.5.15.1 Heating unit. Heating unit shall be electric and of sufficient capacity to durably and efficiently accomplish the drying requirements of 3.6.1. Heating elements shall be of the enclosed conduction type securely fastened in place to withstand vibration. The elements shall be embedded in a refractory material, preferably magnesium oxide. The resistance wire and the refractory material shall be enclosed in a seamless tubular corrosion-resisting metal sheath which shall firmly hold the wire and refractory material in place. The sheath material may be a nickel-chromium-iron alloy. The refractory material shall be tightly packed to prevent the wire from grounding to the sheath when subjected to bending, forming, shock, or vibration at points where connections are made. A length shall be left unheated to prevent damage to the connections and wire by overheating. The ends of the heating elements shall be effectively sealed and protected to prevent the entrance of moisture. Connections to the elements shall have locknuts and lockwashers or, if plug-in type elements are used, they shall be firmly secured in such a manner that they will not break loose because of heat expansion and contraction. The heating unit assembly shall be designed with a guard to prevent the possibility of lint falling on the heating elements.

3.5.15.1.1 Heater voltage. Unless otherwise specified (see 6.2), heater elements shall be suitable for operation on 440 volt, 3-phase, 60 hertz alternating current. Elements capable of operation on 220 volt, are permissible if two elements of equal resistance are wired in series. The use of a transformer to obtain necessary voltage shall be avoided. Heater elements shall be balanced on all three phases at rated voltage; watts input shall be within 5 percent of the heater's nominal rated capacity.

3.5.15.2 Motors. Motors shall be of dripproof construction and of such design and capacity to operate the equipment continuously at required speeds, under load, without exceeding allowable motor insulation temperature requirements.

3.5.15.2.1 Motor voltage. Unless otherwise specified (see 6.2) motors shall be suitable for operation on 440 volts, 3-phase, 60 hertz alternating current.

3.5.15.3 Controls. Controls shall be conveniently located for the operator and shall be of not less than dripproof construction. Conductors and contractors shall be of a size and design to adequately handle current loads to which subjected and provide durable service. Switching components shall break all power lines when in the off position. Overload and low voltage protection shall be provided.

3.5.15.3.1 Temperature control. A temperature controller shall control the temperature of the air within the drying chamber. The controller shall be variable from a minimum setting of approximately 130°F to a maximum setting of 185°F. A temperature indicator shall be provided for observation of the actual drying temperature.

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3.5.15.3.2 Timer. A timer shall control the length of the drying cycle. The timer shall have a variable setting from 0 to 80 minutes. The timer shall be designed to de-energize the heating elements for the last 5 minutes of the dryer cycle or at timer completion, thermostatically control tumbler-dryer cooldown until the drying chamber drops to 135°F before ending the drying cycle.

3.5.15.3.3 Safety thermostat. A safety thermostat shall be installed immediately downstream of the heating elements to sense the temperature of the air leaving the heating elements. The thermostat shall be wired such that it will break power to the heating elements to prevent the heated air from exceeding a temperature that prevents the tumbler-dryer from meeting the criteria specified in 4.4.3.10. The thermostat shall automatically restore power to the heating elements when the tumbler-dryer temperature conditions are safe.

3.5.15.3.4 Airflow sensor. An airflow sensor shall be installed to interrupt electrical power to the heating elements when airflow through the tumbler-dryer is not sufficient to prevent garment scorching with the thermostat set at its maximum setting (see 4.4.3.9). The airflow sensor shall be designed to prevent intermittent actuation when the tumbler-dryer is exposed to shipboard motion and vibration.

3.5.16 Machine mounting. The machine shall be anchored solidly to the deck. Resilient mountings or springs shall not be used.

3.5.16.1 Machine mounting holes Bolt holes for machine mounting shall be as follows:

- (a) Deck mounting bolt holes shall be suitable for bolts designed to keep the machine secured when subjected to MIL-S-901 shock test requirements. Bolt holes shall be located on the machine base.
- (b) For other than end loading machine designs, four bolt holes of the same size as base mounting holes shall be located at the top of the machine. These holes, to be used for connecting steadying brackets, shall be located in nonobstructive areas; two on the front side of the machine and two on the rear side.



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3.5.17 Lint box and screen. A lint box shall be designed with a corrosion resistant lint screen. The screen mesh size shall be approximately no. 14. The screen shall be installed between the air exhaust flow from the drying cylinder and the fan. The screen shall be accessible and cleanable from the front of the tumbler-dryer.

3.6 Performance characteristics.

3.6.1 Drying efficiency. The tumbler-dryer shall remove moisture from the maximum load capacity soaked with water to a wet weight of 150 percent of the maximum bone-dry weight at a temperature of  $70 \pm 2^{\circ}\text{F}$ . The tumbler-dryer shall remove  $95 \pm 1\%$  of the water from the load with a drying rate of 0.4 pounds of water per minute (see 4.4.3.4).

3.6.2 Inclined operation. The machine shall be capable of normal operation up to and including 30 degrees of inclination.

3.6.3 Vibration. The machine shall be capable of normal operation while being subjected to normal vibration levels, both internally and externally excited.

3.7 Finish and color. Exposed surfaces of drying tumbler shall be painted with a good quality heat resistant paint of a color normally furnished on the manufacturer's commercial machines.

3.8 Identification plate. An identification plate shall be made of commercial corrosion-resisting steel or brass. All markings shall be legible.

3.8.1 Mounting. The identification plate shall be securely affixed to each machine in a conspicuous place.

3.8.2 Identification plate data. Data marked on the identification plate shall include the following:

- (a) Manufacturer's type or model number, serial number, contract or order number, and date of manufacture.
- (b) Salient design features including size, speed, voltage, current, and capacity in pounds - dry weight per load.
- (c) Name of machine and stock number (the stock number will be furnished to the contractor).
- (d) Component identification number. The component identification number entry shall consist of the letters "CID", followed by a nine (9) digit number, which will be furnished upon receipt of provisioning technical documentation (PTD). No equipment shall be shipped without the CID number for the drying tumbler, and its associated components shall also be recorded on the packing list.

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3.9 Safety. All exposed parts, such as belts or chains, that may cause injury to personnel shall be suitably covered with adequate guards or shields. Such guards shall be readily removable where maintenance is required.

3.10 Workmanship. In general, workmanship shall be equivalent to the best in the industry and shall conform in detail to the following:

- (a) Welds are cleaned and ground to present a uniform and smooth finish.
- (b) All parts are tight and of rigid construction, including housing panels, so that the machine does not vibrate during operation.
- (c) Cylinder, with load and without, does not wobble during operation.
- (d) Access plates and doors are provided as necessary for proper maintenance, cleaning, and lubrication, and are of suitable size and properly located.
- (e) Controls and door handle are suitably located and hazard free to operator.
- (f) All surfaces, including interior of cylinder, are free of burrs and sharp edges.
- (g) Safety guards are adequate and suitably located.
- (h) Chain and belt drive adjustment mechanisms are suitable for the purpose intended.
- (i) Bearings, gears, and shafts are properly designed, aligned, and fitted for durable operation.
- (j) Lubrication fittings are fitted where necessary and are adequate for purpose intended.
- (k) Fastenings are adequate and accomplish the purpose for which intended.

#### 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 (examinations and tests) 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 specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1,1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

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

- (a) First article inspection (see 4.4).
- (b) Quality conformance inspection (see 4.5).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in applicable paragraphs in this specification.

4.4 First article inspection. First article inspection shall consist of the examinations specified in table I and tests specified in 4.4.2 and 4.4.3.

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TABLE I Classification of defects.

Examine	Defect (requirement)	Classification	
		Major	Minor
Material	Construction materials not as specified (see 3.2)		X
Design, general	Design not as specified (see 3.3.1 and 3.3.2).		X
Temperature control	Not as specified (see 3.5.15.3.1).		X
Time drying	Not provided, not as specified (see 3.5.15.3.2).		X
Door interlock	Not provided, not as specified (see 3.5.4)		X
Timed cooldown	Not provided, not as specified (see 3.5.15.3.2).		X
Capacity and size	Machine not designed for 16 pounds dry weight capacity (see 3.3.2)		X
	Machine exceeds dimensions (see 3.5.14).		X
Construction/mechanical	Frame not as specified (see 3.5.1)		X
	Housing not as specified (see 3.5.2)		X
	Tub not as specified (see 3.5.3).		X
	Door not as specified (see 3.5.4).		X
	Cylinder not as specified (see 3.5.5).		X
	Transmitter not as specified (see 3.5.6).		X
	Gudgeon not as specified (see 3.5.7).		X
	Cylinder bearings not as specified (see 3.5.8).		X
	Fan not as specified (see 3.5.9).		X
	Air ducts not as specified (see 3.5.10).		X

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TABLE I. Classification of defects - Continued.

Examine	Defect (requirement )	Major	Classification	
			Minor	
Construction/ electrical	Exhaust not as specified (see 3.5.11).		X	
	Drive adjustments not as specified (see 3.5.12).		X	
	Insulation not as specified (see 3.5.13).		X	
	Heating assembly not provided as specified (see 3.5.15.1 and 3.5.15.1.1),		X	
	Lint box and screen not provided as specified (see 3.5.17).		X	
	Electrical requirements are not as specified (see 3.5.15).		X	
Safety features	Motor not as specified (see 3.5.15.2 and 3.5.15.2.1).		X	
	Safety thermostat not as specified (see 3.5.15.3.3).		X	
Identification	Airflow sensor not provided as specified (see 3.5.15.3.4).		X	
	Identification plate not of specified material (see 3.8).			
	Marking illegible (see 3.8).		X	
Workmanship	Identification plate not provided, as specified (see 3.8).		X	
	Surfaces of cylinder are not free of burrs and sharp edges (see 3.10).		X	
	Welds not buffed (see 3.10).		X	
	Surfaces are not free from burrs, sharp edges (see 3.10).		X	

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4.4.1 First article sample. Prior to the start of production and within 30 days after the date of award of the contract or order, one machine of each design and size shall be made ready for approval of the contracting officer or his authorized representative for tests and examinations specified in table I and 4.4.2 and 4.4.3 (see 6.2 and 6.7). Approval of the sample by the contracting officer or his authorized representative shall not relieve the supplier of the responsibility of compliance with the requirements of this specification. Disposition of first article sample shall be in writing at the direction of the contracting officer or designated representative (see 6.2).

4.4.2 Contractor tests. Prior to the submission of the first article sample for inspection, the manufacturer shall subject the machine to the test of 4.4.3 7 (see 6.3).

4.4.3 Inspection tests.

4.4.3.1 Disassembly. Prior to conducting the inspection tests the sample machine shall be disassembled, component parts passed through a 25-inch diameter opening, and an opening having maximum dimensions of 20 inches wide by 38 inches high with top and bottom of opening formed on a 10-inch radius. Machine shall then be reassembled for testing.

4.4.3.2 Inclination. The machine shall be inclined at an angle of 30 degrees to each side of two vertical planes at right angles to each other and shall operate satisfactorily in each of the four positions.

4.4.3.3 Vibration tests. The machine shall be tested without packaging or crating. The machine tested shall be capable of performing its principal functions after testing.

4.4.3.3.1 Vibration testing. The drying tumbler, under full conditions, shall be tested in accordance with MIL-STD-167-1, type I, except for the variable frequency tests which are not required.

4.4.3.3.2 Impact testing. The drying tumbler shall be tested in accordance with MIL-S-901 shock test requirements. Following terms and conditions apply:

- (a) Shockproof grade - shall be B.
- (b) Required classes - shall be 1.
- (c) Test classification - shall be medium weight.
- (d) Test type shall be A.
- (e) Failure definition - any part of drying tumbler coming adrift or separating from tumbler constitutes failure of test.
- (f) Mounting drying tumbler shall be tested on test fixture shown on figure 10-1 of MIL-S-901.

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- (g) Mode - equipment shall not be energized or operating during test.
- (h) Disposition - equipment to be disposed by contractor, and not delivered as part of this contract.
- (i) Quantity for test - 1 each.

4.4.3.4 Drying efficiency. Test cloths shall be prepared from a white cotton fabric of uniform texture and permanent finish, having a warp of 48, a weft of 48, and weighing not less than 0.33 pound per square yard. Permanent finish, sanforized, white cotton cloth, known as Indianhead cloth may be used. The test cloths shall be cut 24 by 36 inches and be double-hemmed to a finished size of 22 by 34 inches. An average of 10 runs shall be used to evaluate the drying efficiency of the machine (see 3.6.1). The ambient conditions where the tests are to be conducted shall be  $75 \pm 10^{\circ}\text{F}$  and  $60 \pm 20$  percent relative humidity.

4.4.3.5 Overall construction and Performance. The tumbler-dryer shall be tested to determine conformance to the following requirements:

- (a) Timer . . . . . 0 to 80 minutes operation  
(see 3.5.15.3.2).
- (b) Cooldown . . . . . Automatic to  $135^{\circ}\text{F}$  (see 3.5.15.3.2)  
or  
Last 5 minutes of timer operation  
(see 3.5.15.3.2).
- (c) Thermostat . . . . . 130 to  $185^{\circ}\text{F}$  operation  
(see 3.5.15.3.1).
- (d) Temperature gauge . . . Operation (see 3.5.15.3.1).
- (e) Door interlock . . . . De-energizes cylinder drive  
motor when loading door  
is opened (see 3.5.4).
- (f) Door . . . . . Configuration adequate to  
retain clothing within  
the cylinder (see 3.5.4).

4,4.3.6 Power input. Motors shall not draw in excess of rated current after accelerating to full speed.

4.4.3.7 Insulation. The insulation resistance of each motor, electric component and connecting cable shall be measured by a 500-volt direct current insulation resistance tester. Insulation resistance of each component shall be not less than 10 megohms.

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4.4.3.8 Surface and handle temperature test. Each exterior surface of the tumbler-dryer shall be divided into 6- by 6-inch equal areas on each panel. Areas less than 18 inches squared should be combined with the adjoining 6- by 6-inch area. Areas equal or greater than 18 inches squared shall be treated as a full 6- by 6-inch area. Surface temperatures shall be measured at the center of each area, and the areas explored for the maximum temperature. The temperatures of all exterior surfaces contacted by the operator shall also be measured; for example handles, latches, controls, and so forth. Temperature measurements shall be taken by a calibrated indicator potentiometer connected to a J or K type thermocouple. The tumbler-dryer shall be loaded with test loads as specified in 4.4.3.4 and 3.6.1. Each load shall be dried at the maximum temperature and the maximum time. Just before the thermostat functions off for the third load, temperature readings shall be taken. The ambient air temperature for the test shall be between 65 to 75°F (see 3.5.13).

4.4.3.9 Airflow switch test. The tumbler-dryer shall be loaded with a test load as specified in 4.4.3.4 and 3.6.1. The load shall be dried at the maximum temperature and the maximum time. The load shall then be dried for an additional 30 minutes with the exhaust airflow restricted just before the airflow switch deactivates the heating elements. The airflow switch shall be by-passed to prevent intermittent heating element de-energization during the last 30 minutes of drying time (see 3.5.15.3.4). After the 30 minute drying time, the load shall be inspected for scorching damage. Scorching damage to the load indicates test failure.

4.4.3.10 Limiting devices. One no. 24 AWG bead type thermocouple shall be mounted in the exhaust outlet, drying cylinder of the tumbler-dryer and another on the top center row of the heating elements. The heating elements shall not exceed their maximum operating temperature. The exhaust or cylinder temperature shall not exceed 250°F during the test runs. After one full operation at the high temperature setting, the tumbler-dryers shall be placed into operation at the maximum temperature setting with a full load, as specified in 4.4.3.4 and 3.6.1. The tumbler-dryer shall be placed into the following operational conditions until automatic shutdown:

- (a) Failure of blower motor.
- (b) Failure of drum rotation.
- (c) Failure of drying thermostat.
- (d) Failure of drum rotation and blower motor.
- (e) Failure of drum rotation, blower motor, and airflow station.

The time of tumbler-dryer shutdown and the temperature of the thermocouples shall be recorded. Upon conclusion of each failure mode, a visual inspection of the test load shall be conducted. The test load shall be free of any scorching damage (see 3.5.15.3.3 and 3.5.15.3.4).

4.5 Quality conformance inspection. Quality conformance inspection shall consist of the examinations of 4.5.2 and the tests of 4.5.3 (see 6.3 and 6.6).

4.5.1 Lot. For the purpose of quality conformance inspection and test sampling, a lot is defined as all the machines of one type, produced in one facility, using the same material and production processes, and being offered for delivery at one time.



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4.5.2 Sampling for visual and mechanical examination. A random sample of machines shall be selected in accordance with table II and examined in accordance with table I. If one or more major defects are found in any sample, the entire lot shall be rejected. The contractor has the option of screening the lot 100% for the defective characteristic(s) or providing a new lot which shall be inspected in accordance with the sampling plan contained herein. The contractor shall maintain for a period of three years after contract completion all records of inspections, tests, and any resulting rejections,

Table II. Sampling for visual and mechanical examination and operational tests.

Lot Size	Sample Size
2 to 8	All
9 to 90	8
91 to 150	12
151 to 280	19
281 to 500	21
501 to 1200	27

4.5.3 Sampling for operational tests. A random sample of machines shall be selected in accordance with table II and tested in accordance with paragraph 4.5.3.1. If any machine fails any of the tests specified in paragraph 4.5.3.1, the entire lot shall be rejected. The contractor has the option of screening the lot 100% for the defective characteristic(s) or providing a new lot which shall be inspected in accordance with the sampling plan contained herein. The contractor shall maintain for a period of three years after contract completion all records of inspections, tests, and any resulting rejections.

4.5.3.1 Operational testing. Each tumbler furnished under this specification shall be connected to power and operationally tested without garments or laundry. The following items and operations shall be checked:

- (a) Manual selection of temperatures in accordance with requirements of 3.5.15.3.1.
- (b) Selection of drying times in accordance with requirements of 3.5.15.3.2.

4.5.3.2 Insulation testing. Insulation resistance test shall be conducted on each machine. Insulation resistance of motor, controller, and connecting cable shall be measured by a 500-volt direct current insulation resistance tester. Insulation resistance for each component shall be not less than 10 megohms (see 4.4.3.7). Failure to pass the insulation resistance test is cause for rejection of the entire lot.

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4.6 Inspection of packaging. Sample packages and packs, and the inspection of the preservation, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein

## 5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition For the extent of applicability of the packaging requirements of referenced documents listed in section 2, see 6.7.)

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

5.2 Packing. Packing shall be accomplished in a manner which will ensure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the using activity for early installation. The shipping containers or method of packing shall conform to carrier regulations as applicable to the mode of transportation and may conform to the supplier's commercial practice.

5.3 Marking. Shipment marking information shall be provided on interior packages and exterior shipping containers in accordance with the contractor's commercial practice. The information shall include nomenclature, national stock number or manufacturer's part number, contract or order number, and contractor's name and destination.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. Commercial laundry drying tumblers acquired under this specification are intended for submarine service. Therefore, commercial machines offered to the Government may require alteration to meet specification requirements, such as, mounting provisions, electrical power, and materials.

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6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents-referenced (see 2.1.1 and 2.2).
- (c) First article requirements (see 3.1).
- (d) Capacity, size, and weight of machine required (see 3.3.2 and 3.5.14).
- (e) Electrical characteristics (see 3.5.15).
- (f) First article preparation schedule (see 4.4.1).
- (g) Disposition of first articles (see 4.4.1).
- (h) Levels of preservation, packing, and marking (see 5.1).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

<u>Reference Paragraph</u>	<u>DID Number</u>	<u>DID Title</u>	<u>Suggested Tailoring</u>
3.2, 4.4.2, and 4.5	DI-MISC-80678	Certification/data report	10.3.1 does not apply
4.5	DI-NDTI-80809	Test/inspection reports	----

The above DID's were those cleared as of the date of this specification. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

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

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6.5 First article. When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a preproduction sample, a first article sample, a first production item, a sample selected from the first production items, a standard production item from the contractor's current inventory (see 3.1), and the number of items to be tested as specified in 4.4. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for examinations, approval of first article test results, and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.6 NAVSEA approval and direction. Deviations from specified materials, procedures, and requirements and selection of specific alternative materials and procedures require NAVSEA approval or direction. Requests should include supporting documentation.

6.7 Sub-contracted material and parts. The packaging requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

6.8 Provisioning. Provisioning Technical Documentation (PTD), spare parts, and repair parts should be furnished as specified in the contract.

6.8.1 Provisioning Quality Assurance. When ordering spare parts or repair parts for the equipment covered by this specification, the contract should state that such spare parts and repair parts should meet the same requirements and quality assurance provisions as the parts used in the manufacture of the equipment. Packaging for such parts should also be specified.

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6.9 Subject term (key word) listing.

Clothes dryer  
End loading  
Resistance wire  
Temperature control

6.10 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Preparing activity:  
Navy - SH  
(Project 3510-N321)

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

**NOTE:** This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

<b>RECOMMEND A CHANGE:</b>	1. DOCUMENT NUMBER MIL-T-23581A(SH)	2. DOCUMENT DATE (YYMMDD) 3 AUGUST 1992
3. DOCUMENT TITLE TUMBLER, DRYING, LAUNDRY, COMMERCIAL (SUBMARINE SERVICE)		
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)		
5. REASON FOR RECOMMENDATION		
6. PREVIOUS EDITION (Include File Code)		
7. ORGANIZATION		
8. TELEPHONE (Include Area Code)		
(1) Commercial		
(2) AUTOVON (If applicable)		
9. DATE SUBMITTED (YYMMDD)		
8. PREPARING ACTIVITY		
a. NAME COMMANDER NAVAL SEA SYSTEMS COMMAND (SEA 05Q42)	b. TELEPHONE (Include Area Code) (1) Commercial (703) 602-6020	(2) AUTOVON (AV) 332-6020
c. ADDRESS (Include Zip Code) 2513 NATIONAL CENTER BLDG 3 WASHINGTON, DC 20362-5160	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	