

INCH-POUND

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SUPERSEDING

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## COMMERCIAL ITEM DESCRIPTION

## TUMBLER, DRYING, LAUNDRY (NAVAL SUBMARINE)

The General Services Administration has authorized the use of this commercial item description for all federal agencies.

## 1. SCOPE

This commercial item description (CID) covers a 16-pound (minimum) capacity laundry drying tumbler machine for Naval submarine use.

## 2. SALIENT CHARACTERISTICS

2.1 Design and construction. The tumbler-dryer shall be a nonreversing, electrically heated, open end, once through, front loading type, arranged so as not to recirculate the heated air back through the cylinder. The tumbler-dryer shall accommodate a load of not less than 16 pounds dry weight cotton clothing.

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

2.1.2 Housing. The entire unit shall be enclosed in a housing of sheet steel panels finished for corrosion resistance. The housing enclosing the tumbler-dryer shall be of tight construction except for inlet, outlet, access plate, and door openings. Door and access plates shall be tight when secured. Doors or access plates shall be provided for the purpose of maintaining and cleaning the tumbler. The lower front panel of the tumbler shall be readily removable, without tools, for cleaning lint and debris from the section of the tumbler below the tub.

2.1.3 Sweep sheets. Sweep sheets or baffles shall be installed between the cylinder and the housing. If adequate access is not provided through the lint chamber, access plates shall be provided in the front for removing lint from between the cylinder basket, sweep sheets or baffles and housing.

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

Beneficial comments, recommendations, additions, deletions, clarifications, etc., and any other data which may improve this document should be sent to: Commander, Naval Sea Systems Command, 2531 Jefferson Davis Highway, Arlington, VA 22242-5160.

AMSC N/A

FSC 3510

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2.1.5 Exhaust. An exhaust duct opening shall be provided for exhausting air after passage through the tumbler of sufficient volume to meet the requirements of 2.4.1. The opening shall be provided with fittings for connecting an exhaust air duct.

2.1.5.1 Fan. A fan of sufficient capacity to meet the drying requirements of 2.4.1 shall be provided.

2.1.6 Insulation. Except surfaces touched to operate the machine, the outer housing, door and other components contacted by the operator shall be insulated from internal heat sources so that not more than 15 percent of the surface of the outer housing exceeds a temperature of 35 °F above the ambient air temperature. Surfaces touched to operate the machine shall be not greater than 35 °F above the ambient temperature. Insulation shall be encased to hold the insulation in place and to prevent settling, crumbling, or flaking within the housing.

2.1.7 Size. The overall maximum dimensions shall be not greater than, 26 inches wide by 40 inches deep by 40 inches high. (Shipboard requirement, see 6.2)

2.1.8 Physical size limitations. The machine shall be provided with a means of disassembly so that it can pass through a 25-inch diameter submarine hatch and a door opening having dimensions of not greater than 20 inches in width by 38 inches in height with 10-inch radius corners. Parts and components shall be readily disassembled and reassembled without hotwork such as welding and brazing. (Shipboard requirement, see 6.2)

2.1.9 Lint screen. A lint screen shall be installed between the cylinder and the exhaust fan through which all exhaust air shall flow. The screen mesh size shall be number 14 and shall be accessible from the front of the machine for cleaning.

2.1.10 Timer and cooldown cycle. A timer shall monitor the length of the drying cycle, with variable settings from 0 to 80 minutes. The timer shall de-energize the heating elements for the final 5 minutes of the dryer cycle, or at timer completion, shall thermostatically control tumbler-dryer cooldown until the drying chamber drops to 135 °F before ending the drying cycle.

2.1.11 On-Off switch. A momentary contact push button switch shall be provided adjacent to the timer for initiating the drying cycle.

2.1.12 Temperature control. A thermostatic controller shall maintain the temperature of the air within the drying chamber. The controller shall have a variable setting of not greater than 80 °F  $\pm$  10 °F minimum temperature to not greater than 165 °F  $\pm$  10 °F maximum temperature.

2.1.13 Safety thermostat. In addition to the primary thermostatic control, a back up high limit safety thermostat shall be located in the lint chamber below the cylinder that will break power to the heating element should the cylinder temperature exceed 200 °F. Reset shall be accomplished automatically.

2.1.14 Fan motor interlock. An electrical interlock shall be provided between the fan motor starter and the heating unit contactor. The interlock shall prevent the heating unit from energizing unless the fan is energized.

2.1.15 Heating unit assembly. The heating unit assembly shall be configured to prevent accumulation of lint on the heating elements or provided with a guard to prevent the possibility of lint falling on the heating elements. The heating unit assembly shall be readily accessible from the front of the machine for cleaning and maintenance.

2.1.16 Machine mounting holes. The tumbler-dryer shall be suitable for securing to the deck. Deck mounting bolt holes shall be suitable for bolts that will keep the machine secured when subjected to MIL-S-901 shock test requirements (see 2.4.4). Bolt holes shall be located on the machine base. For other than front 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. (Shipboard requirement, see 6.2)

## 2.2 Materials.

2.2.1 General. The 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 specified in 2.4.4. (Shipboard requirement, see 6.2)

2.2.2 Housing. The housing shall be made of heavy gauge sheet steel panels. Air guide baffles shall have a thickness of not less than 22-gauge galvanized sheet steel.

2.2.3 Cylinder. The cylinder shall be circular in shape, formed from perforated galvanized steel sheet. The cylinder shall have a thickness of not less than 18-gauge galvanized stainless sheet steel. Perforations shall be staggered and shall be not greater than 11/32 inch diameter. The back sheet of the cylinder shall be solid. The front sheet of the cylinder shall have a circular opening to match the recessed section of door in the housing, and both sheets shall be constructed of galvanized steel. The cylinder shall have a diameter of 24-1/2 inches and a length of 28 inches. The cylinder shall be driven through a steel gudgeon welded to a steel transmitter, which in turn is bolted securely to the rear cylinder head. The cylinder shall be provided with lifting ribs to tumble the clothing.

2.2.3.1 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 shall provide vibrationless rotation of the cylinder under full load conditions for not less than 5000 hours.

2.2.3.2 Transmitter. The transmitter shall be constructed of steel, shall have spiders to adequately support the cylinder under full load conditions, and shall be bolted securely to the back sheet of the cylinder and welded to the gudgeon.

2.2.3.3 Gudgeon. The gudgeon shall be strong enough to insure safe and durable operation under full load conditions. The gudgeon shall be machined to fit the bearing sleeves at the back of the machine.

2.2.3.4 Drive adjustments. Means shall be provided for adjusting the belt or chain drives.

2.2.4 Resistance wire. Resistance wire for heating elements shall be in accordance with the following requirements.

### (a) Chemical composition:

Nickel	76.0 to 79.0 percent
Chromium	19.0 to 21.0 percent
Iron	1.0 percent, maximum
Manganese	2.5 percent, maximum
Carbon	0.25 percent, maximum
Silicon	0.75 to 1.50 percent
Sulfur	0.03 percent, maximum

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## (b) Mechanical properties:

Tensile strength - 100,000 psi, minimum  
 Elongation in 10 inches - 15 percent, minimum

2.2.5 Lint screen. The lint screen shall be constructed of corrosion resistant material.

2.2.6 Metal joints. Rivets, bolts, screws, nuts, and washers shall be constructed of steel, except when brass or corrosion-resisting metal is fastened, in which case they shall be constructed of brass or corrosion-resistant 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.

2.3 Electrical requirements. The unit shall operate on 440 VAC, 60 Hz, three-phase power, as defined in MIL-STD-1399, Section 300, and shall have provisions for making direct (hardwired) connections for electric power (3 conductors) and for equipment grounding (1 conductor). All outermost metallic surfaces shall be grounded via the equipment grounding connection. The grounding resistance between any exposed metallic surfaces and the common ground point shall be not greater than 0.1 ohm. Electrical components, other than the hermetically sealed motor, shall be provided in accordance with NEMA 250, Type 13 or equivalent enclosure protection. Metal parts of electrical components and enclosures shall be inherently corrosion resistant or shall be treated and processed for corrosion resistance in accordance with IEEE Standard 45. (Shipboard requirement, see 6.2)

2.3.1 Heating unit. The heating unit shall be electric and of sufficient capacity to efficiently accomplish the drying requirements of 2.4.1. The 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-resistant metal sheath that firmly holds the wire and refractory material in place. The sheath material shall be a nickel-chromium-iron alloy. The refractory material shall be tightly packed to prevent the wire from grounding 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 secured in such a manner that they will not break loose from heat expansion and contraction. The heating unit assembly shall be constructed with a guard to prevent lint from falling on the heating elements. Unless otherwise specified, the heater elements shall be suitable for operation on 440 Vac, 60 Hz, three-phase power. Elements capable of operation on 220 Vac are permissible if two heating elements of equal resistance are wired in series. The use of a transformer to obtain necessary voltage shall be avoided. The heater elements shall be balanced on all three phases at rated voltage; power input shall be within approximately 5 percent of the heater's nominal rated capacity.

2.3.2 Electric motors. Electric motors shall be dripproof and shall have the capacity to operate the equipment continuously at required speeds, under load, without exceeding allowable motor insulation temperature requirements in accordance with NEMA MG 1.

2.3.3 Controls. Controls shall be conveniently located for the operator and shall be dripproof. Conductors and contactors shall adequately handle the operating current loads and provide durable service. Switching components shall break all power lines when in the off position. Overload and low voltage protection shall be provided.

## 2.4 Performance characteristics.

2.4.1 Drying efficiency. The tumbler-dryer shall remove moisture from a load of maximum capacity soaked with water to a weight of 150 percent of the maximum dry weight at a temperature of  $70 \pm 2$  °F. The tumbler-dryer shall remove  $95 \pm 1\%$  of the moisture from the load with a drying rate of 0.4 pounds of water per minute.

2.4.2 Inclined operation. The unit shall operate satisfactorily in accordance with the requirements of this CID (such as door remaining closed to prevent loss of contents) when test-operated for 30 seconds inclined at angles of 15° to each side of two vertical planes at right angles to each other. (Shipboard requirement, see 7.2)

2.4.3 Environmental suitability. The unit shall be capable of withstanding ship's vibration and motion. Controls, switches, moving parts, and electrical circuits shall operate under shipboard conditions without malfunction, binding, excessive looseness, or damage, when tested in accordance with MIL-STD-167-1, type I equipment. The unit shall be secured to the test machine in the same manner that it will be secured on shipboard. (Shipboard requirement, see 6.2)

2.4.4 Shock. The dryer shall meet the shock requirements of MIL-S-901. The following terms and conditions apply. (Shipboard requirement, see 6.2)

- Shockproof grade - shall be B
- Required classes - shall be 1
- Test classification - shall be medium weight
- Test type - shall be A
- Failure definition - any part of the tumbler dryer coming adrift or separating from tumbler constitutes failure of test
- Mounting - tumbler dryer shall be tested on test fixture shown on figure 10-1 of MIL-S-901
- Mode - equipment shall not be energized or operated during test

2.5 Label plates. The unit shall be provided with a data nameplate and an instruction plate, both attached to the front of the unit. They shall be readily visible during normal operating use and shall not adversely affect the life and utility of the unit.

2.5.1 Data nameplate. The data nameplate shall contain the manufacturer's name, model, serial number, date manufactured, and any other information needed to uniquely identify the unit.

2.5.2 Instruction plate. The instruction plate shall provide instructions for start-up, operation, and shut-down.

2.6 Shock hazard labels. A label reading "Danger-Shock Hazard" shall be affixed to the outer case assembly, on or adjacent to each service access cover near one of the fasteners securing the cover. In addition, a warning label in accordance with UL 969 shall be placed near the high voltage components inside the equipment. This label shall include, but not be limited to the following texts:

- Danger - Shock Hazard.
- Power supply must be disconnected before servicing.
- Access covers must be in place before use.
- Service should be performed by authorized personnel only.

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### 3. REGULATORY REQUIREMENTS

The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation.

### 4. QUALITY ASSURANCE PROVISIONS

4.1 Product conformance. The product provided shall meet the salient characteristics of this CID, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial market, or the same product that has been delivered to the Government for shipboard use on a previous procurement. The Government reserves the right to require proof of such compliance.

### 5. PACKAGING

Preservation, packing, and marking shall be as specified in the contract or purchase order.

### 6. NOTES

#### 6.1 Ordering data.

- Title, number, and date of this CID
- When required, shock testing in accordance with MIL-S-901
- When required, manuals shall be in accordance with ASTM F760

6.2 Shipboard requirement. Whenever a "(Shipboard requirement)" is included in a paragraph under SALIENT CHARACTERISTICS, it is meant that the requirement is something that is not normally offered to the commercial market by the manufacturer.

#### 6.3 Sources of documents.

6.3.1 Military documents. Copies of documents required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.

MIL-STD-167-1	-	Mechanical Vibrations of Shipboard Equipment
MIL-S-901	-	Shock Tests, H.I. (High Impact) Shipboard Machinery, Equipment, and Systems
MIL-STD-1399	-	Interface Standard for Shipboard Systems Section 300A Electric Power, Alternating

6.3.2 ASTM Standards. ASTM Standards are available from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM A480	-	General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM F760	-	Food Service Equipment Manuals

6.3.3 National Electrical Manufacturers Association (NEMA) Standards. NEMA Standards are available from the National Electrical Manufacturers Association, 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209.

NEMA MG1	-	Motors and Generators
NEMA 250	-	Enclosures for Electrical Equipment (1000 Volts Maximum)

6.3.4 The Institute of Electrical and Electronic Engineers (IEEE) Standards. IEEE Standards are available from The Institute of Electrical and Electronic Engineers, 445 Hoes Lane, P.O. Box 1331, Piscataway, NJ 08855-1331.

IEEE 45 - IEEE Recommended Practice for Electric Installations on Shipboard

6.4 Suggested sources of supply. One manufacturer of products known to meet the requirements of this CID is listed below. However, source of supply is not limited to this company, if others are found to meet the requirements of this CID.

Hoyt Corporation  
251 Forge Road  
Westport, MA 02790-1141

MILITARY INTERESTS:

Custodian:  
Navy - SH

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA - FSS

Preparing activity:  
Navy - SH  
(Project 3510-0373)