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An American National Standard

Standard Specification for Pneumatic Rotary Descaling Machines[1]

This standard is issued under the fixed designation F 1348/F1348M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers requirements for pneumatic rotary descaling machines for removal of paint, rust, scale, nonskid deck covering, and other coatings from steel and aluminum structures. These portable machines are intended for use in a marine environment, subject to salt air and spray during use and high humidity during storage.

1.2 The values stated in either inch-pound units or SI units are to be regarded separately as standard. The values stated in each system are not exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the specification.

1.3 The following precautionary statement pertains to the test method portion only, Section 12, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in 17.2.1.

2. Referenced Documents

2.1 *ASTM Standards:*

B 209 Specification for Aluminum and Aluminum-Alloy Sheet and Plate[2]

D 4417 Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel[3]

F 1166 Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities[4]

2.2 *Federal Standard:*

Fed. Std. No. 123 Marking for Shipment (Civil Agencies)[5]

2.3 *Federal Specifications:*

PPP-B-566 Boxes, Folding, Paperboard[5]

PPP-B-601 Boxes, Wood, Cleated-Plywood[5]

PPP-B-621 Boxes, Wood, Nailed and Lock-Corner[5]

PPP-B-636 Boxes, Shipping, Fiberboard[5]

PPP-B-640 Boxes, Fiberboard, Corrugated, Triple Wall[5]

PPP-B-676 Boxes, Setup[5]

2.4 *Military Standards:*

MIL-STD-129 Marking for Shipment and Storage[6]

MIL-STD-147 Palletized Unit Loads[6]

2.5 *Military Specifications:*

MIL-B-117 Bags, Sleeves and Tubing[6]

MIL-H-775 Hose, Hose Assemblies; Rubber, Plastic, Fabric or Metal (Including Tubing); and Associated Hardware: Packaging of[6]

MIL-L-17331 Lubricating Oil, Steam Turbine, Noncorrosive[6]

DOD-G-24508 Grease, High Performance, Ball Roller Bearing, Continuous Run to 300°F[6]

2.6 *ABS Publication:*

ABS Rules for Building and Classing Steel Vessels[7]

3. Classification

3.1 Descaling machines are available in two types and two classes, as follows:

3.1.1 *Type 1, Hand-Held*:

3.1.1.1 *Class A*—Inch-pound design, and

3.1.1.2 *Class B*—SI metric design.

3.1.2 *Type 2, Deck-Supported*:

3.1.2.1 *Class A*—Inch-pound design, and

3.1.2.2 *Class B*—SI metric design.

3.2 Hubs for use with descaling machines are available in four classes, as follows:

3.2.1 *Class A*—Nonmetallic, nonwoven, noncontaminating,

3.2.2 *Class B*—Peening hub for aluminum surfaces,

3.2.3 *Class C*—Metallic hammer type for steel surfaces, and

3.2.4 *Class D*—Metallic cutter type for steel surfaces.

4. Ordering Information

4.1 Orders for material under this specification shall include the following:

4.1.1 Title, number, and date of this specification,

4.1.2 Quantity,

4.1.3 Type and class required (see Section 3),

4.1.4 Test and inspection certification requirements, if applicable (see Section 15),

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[1] This specification is under the jurisdiction of ASTM Committee F-25 on Ships and Marine Technology and is the direct responsibility of Subcommittee F25.07 on General Requirements.

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[2] *Annual Book of ASTM Standards*, Vol 02.02.

[3] *Annual Book of ASTM Standards*, Vol 06.02.

[4] *Annual Book of ASTM Standards*, Vol 01.07.

[5] Available from Standardization Documents Order Desk, Bldg 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[6] Available from American Bureau of Shipping, ABS Plaza, 16855 Northchase Dr., Houston, TX 77060.

[7] Available from Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 S. Riverside Plaza, Chicago, IL 60606.

4.1.5 Test report requirements (see Section 15),
4.1.6 Technical manual requirements (see Section 16),
4.1.7 Special marking required (see 18.3),
4.1.8 Level of preservation, packaging, packing, and marking required (see Section 17 and Supplementary Requirements), and
4.1.9 Lubrication requirements of Supplementary Requirements, if applicable (see Section S3).

5. Materials and Manufacture

5.1 *Asbestos and Cadmium*:
5.1.1 Material used in the machines, or in any components, accessories, repair parts, tools, and packing and packaging shall be free of asbestos and cadmium.
5.2 *Metal Parts*—Metal parts shall be corrosion resistant or treated to resist corrosion.

6. Mechanical Properties

6.1 The machines shall be powered by an air motor and shall accept each of the rotary hubs (see 6.9).
6.1.1 *Type 1*—The Type 1 machine shall be a hand-held unit having a minimum of two handles, one of which shall house the trigger mechanism. The trigger mechanism shall be of the spring-loaded "dead man" type and shall immediately shut off air flow to the motor when released. The arrangement of the handles and trigger mechanism shall permit right- or left-handed operation with equal ease. The direction of rotation of the hubs shall tend to propel the machine in the forward direction, away from the operator. The Type 1 machine shall remove coatings to within ¼ in. [6 mm] of bulkheads, coamings, decks, and other immovable objects.
6.1.2 *Type 2*—The Type 2 machine shall be a deck supported unit with a T-shaped operating handle. The operating handle shall be adjustable for height, rigid and strong enough to operate the machine without bending, and long enough to allow any operator with the percentile body dimensions specified herein (see 6.2) to operate the machine while walking behind it in a natural walking position. The air hose connection and trigger mechanism shall be located on the T-handle. The trigger mechanism shall be of the spring-loaded "dead man" type and shall immediately shut off air flow to the motor when released. The handle shall detach or be adjustable to and lockable in the vertical position for storage. The machine shall be provided with at least two wheels used to move the machine. With the handle, air hose and each of the abrasive hubs attached, the machine shall sit level on the deck with the abrasive hubs in contact with the deck and not interfere with deck coating removal process. The machine shall easily propel itself or be propelled by the operator across the deck without overstressing the operator (see 6.2). The Type 2 machine shall remove deck coating to within 1½ in. [40 mm] of the bulkheads, coamings, and other immovable objects.
6.2 *Human Engineering*—The machines shall be in accordance with the human engineering criteria of Practice F 1166 except where such requirements conflict with the requirements of this specification. The machines shall incorporate the maintainability requirements of Practice F 1166 and shall permit safe and efficient performance of operation and maintenance by the fifth percentile female to the ninety-fifth percentile male, as defined in Practice F 1166. Clearance shall be provided around each component, part or control so that an individual with aforementioned percentile body dimensions and physical capabilities can safely operate, maintain, remove, or replace any item using normally available tools and test equipment. The controls required for operation and maintenance shall be in accordance with Practice F 1166 and shall not require operator forces to exceed the strength limitations listed therein.
6.3 *Interchangeability*—Component parts and assemblies peculiar to each type and class of machine from any one manufacturer shall be fully interchangeable. Such interchangeability shall not require any alterations or modifications.
6.4 *Dimensions and Weight*—The machines, fully assembled with guards; debris collector attachment (less hoses and collection container); and with operating handles (Type 2) locked in its operating position; fully lubricated and ready in all aspects for operation (less air hose and filter, evaporator and lubricator attachments) shall not exceed the maximum dimensions and weight shown in Table 1.
6.5 *Air Motor*—The machines shall be driven by air motors that operate on the minimum air supplies as shown in Table 2.
6.6 *Guards*—Machines of both Type 1 and Type 2 shall be provided with guards that protect the operator from inadvertent contact with moving parts and prevent uncontrolled scattering of chips or scale removed by the machine. These guards shall not interfere with the performance of the machine throughout the machine's useful life, unduly decrease any of the hub's physical dimensions or wear, or interfere with changing of the hubs. The guards/rotary hub containment shall be constructed to accommodate a debris collection system.
6.7 *Air Connections*—Air connections for both Type 1 and Type 2 machines shall be of the quick disconnect type. The locations of the air connection shall be such that the hose does not interfere with operation of the machine or the operator. The inside diameter of the connections shall be in accordance with Table 3.
6.8 *Lubrication*—Lubrication fittings shall be installed so that lubrication can be accomplished without disassembly of the machine (see 6.2). Lubrication materials shall be high-temperature lubricating oil or high-performance grease.
6.9 *Hubs*:
6.9.1 Hubs for each type and class of machine shall clean a path of width not less than that shown in Table 4. Hubs for each type, class, and manufacture of machine shall be interchangeable with hubs of any other machine of the same type, class, and manufacture, using only the normally available tools (see 8.1.2) for the interchange.
6.9.2 Hubs shall be of the following classes, classified by intended composition, function, and service life, as follows:

TABLE 1 Maximum Dimensions and Weights

	Type 1 Class A	Type 1 Class B	Type 2 Class A	Type 2 Class B
Length	16 in.	410 mm	36 in.	915 mm
Width	6 in.	155 mm	16 in.	410 mm
Height	12 in.	306 mm	48 in.	1220 mm
Weight	5 lb	2.3 kg	110 lb	50 kg

TABLE 2 Air Supplies

	Type 1 Class A	Type 1 Class B	Type 2 Class A	Type 2 Class B
Air pressure	80 lb/in.^{2}	550 kPa	80 lb/in.^{2}	550 kPa
Air volume	18 ft^3/min	0.51 m^3/min	125 ft^3/min	3.54 m^3/min

TABLE 3 Air Connections

Type 1 Class A	Type 1 Class B	Type 2 Class A	Type 2 Class B
¼ in.	6.3 mm	½ in.	12.7 mm

TABLE 4 Minimum Path Width

Hub for:	Minimum Path Width
Type 1 Class A machine	2 in.
Type 1 Class B machine	50 mm
Type 2 Class A machine	5 in.
Type 2 Class B machine	125 mm

6.9.2.1 *Class A Hub*—The Class A hub shall be nonmetallic, nonwoven, noncontaminating and shall remove paint, rust, or scale. The Class A hub shall feather the edge of a painted surface in a smooth taper from the painted aluminum surface to bare metal, and shall not remove, erode, or groove metal surfaces. The Class A hub shall have a minimum service life of 8 h.

6.9.2.2 *Class B Hub*—The Class B hub shall remove paint, rust, or scale and shall peen the aluminum surface to a profile of 1.0 to 3.0 mils [0.0025 to 0.0076 mm]. The Class B hub shall have a minimum service life of 50 h.

6.9.2.3 *Class C Hub*—The Class C hub shall be a metallic hammer type assembly and shall remove paint and nonskid covering on steel surfaces. The Class C hub shall operate over protrusions or obstructions on the deck surface, such as bolts or padeyes, up to a height of 1 in. [25 mm], without damage to the hub or machine. The Class C hub shall have a minimum service life of 100 h.

6.9.2.4 *Class D Hub*—The Class D hub shall be a metallic type cutter assembly that removes paint, rust, scale, and nonskid deck coverings on steel surfaces. The Class D hub shall have a minimum service life of 30 h.

7. Performance Requirements

7.1 *Removal Rate*—The minimum removal rate when tested in accordance with Section 12 shall be as specified in Table 5 and Table 6.

TABLE 5 Removal Rate; ft^2/h (m^2/h)

Hub Class	Paint		Rust/Scale		Nonskid	
	Class A Machine	Class B Machine	Class A Machine	Class B Machine	Class A Machine	Class B Machine
A	50	4.5	25	2.3	. . .	. . .
B	65	6.0	35	3.3	. . .	. . .
C	85	8.0	. . .	. . .	20	1.9
D	85	8.0	25	2.3	25	2.3

TABLE 6 Removal Rate; ft^2/h (m^2/h)

Hub Class	Paint		Rust/Scale		Nonskid	
	Class A Machine	Class B Machine	Class A Machine	Class B Machine	Class A Machine	Class B Machine
A	200	18.5	150	13.9	. . .	. . .
B	300	27.9	200	18.5	. . .	. . .
C	350	32.5	. . .	. . .	80	7.4
D	350	32.5	200	18.5	100	9.3

7.1.1 *Type 1 Machine*—See Table 5.

7.1.2 *Type 2 Machine*—See Table 6.

7.2 *Stability*:

7.2.1 *Type 1 Machine*—The assembled Type 1 machine shall operate at nay angle from the horizontal to vertical (including the overhead) without loss of power or descaling efficiency.

7.2.2 *Type 2 Machine*—The assembled Type 2 machine shall operate without loss of power and descaling efficiency and without tipping when inclined at an angle of 15° from the horizontal in any direction.

8. Attachments

8.1 The machine shall be furnished in kit form, with each kit containing the following items besides the basic machine:

8.1.1 One Class A hub,

8.1.2 One Class B hub,

8.1.3 One Class C hub,

8.1.4 One Class D hub,

8.1.5 One air hose with fittings,

8.1.6 One hub-changing tool (or tool set),

8.1.7 One debris collector,

8.1.8 One carrying case, and

8.1.9 One in-line filter/evaporator/lubricator.

8.1.10 *Air Hose*—Air hoses shall be ⅜ in. [10 mm] for Type 1 machine and ¾ in. [19 mm] for Type 2 machine with quick-disconnect connections and an air shutoff valve that shall immediately shut off the air when the hose is disconnected. The hose for the Type 1 machine shall be 50 ft [15 m] long and the hose for the Type 2 machine shall be 100 ft [30 m] long.

8.1.11 *Hub Changing Tool*—A standard commercially available tool for changing hubs shall be provided. The tools shall not be unique to a specific supplier.

8.1.12 *Carrying Case*—The carrying cases for Type 1 and Type 2 machines shall be corrosion-resistant, fire-resistant, high-impact material, strong and rigid enough to transport the machine and its accessories. The carrying case shall rigidly hold all accessories with the exception of hoses, without deformation or breakage, and shall be less than 24 in. [610 mm] wide. The carrying case shall also hold the machine's handle when the handle is disconnected.

8.1.13 *Debris Collector*—Both Type 1 and Type 2 machines shall be capable of attaching a debris collecting device that will collect a minimum of 95 % of the debris created.

8.1.14 *In-Line Filter/Evaporator/Lubricator*—A filter to remove air system debris, an evaporator to remove moisture, and a lubricator to continually lubricate the machine or a combination unit shall be installed to ensure satisfactory long-term use in a marine environment. These units shall not hinder the operator's ability to handle and use the machine.

9. Number of Tests

9.1 A first unit shall satisfactorily pass the tests in Section 12 before production units are offered for delivery.

10. Specimen Preparation

10.1 *Test Plates*—Steel test plates shall be in accordance with the American Bureau of Shipping ABS Rules for Building and Classing Steel Vessels. Aluminum test plates shall be in accordance with Specification B 209, Alloy 5086. Test plates shall be at least ¼in. [6 mm] thick. Area of plates used in performance tests shall be at least equal to the area that would be cleaned in 10 min at the minimum hourly removal rate for the machine and hub being tested.

10.2 *Test Surface Preparation*:

10.2.1 Test plates shall be prepared for the performance tests as specified herein. Coatings shall be prepared for application in accordance with manufacturer's instructions.

10.2.1.1 *Painted Surfaces*—The steel or aluminum surface shall be cleaned to a uniform white appearance with a minimum surface profile of 1.0 to 3.0 mils [0.025 to 0.075 mm]. The surface shall be dry and free of all contaminants. Two coats of an epoxy-polyamide primer followed by two coats of epoxy paint shall be applied, each coat approximately 3 mils [0.075 mm] thick. Minimum time between coats and between application of last coat and commencement of test shall be 24 h each.

10.2.1.2 *Rusted Steel Surfaces*—The steel surface shall be wet and exposed to air until it exhibits a complete, uniform coating of rust. A saline solution may be applied to speed rusting. The rusted surface shall be allowed to air dry before testing.

10.2.1.3 *Surface with Nonskid Coating*—The surface shall be cleaned to a uniform white appearance with a minimum surface profile of 1.0 to 3.0 mils [0.025 to 0.075 mm]. The surface shall be dry and free of all contaminants. One coat of an epoxy-polyamide primer approximately 3 mils [0.075 mm] thick and one coat of a nonskid coating compound shall be evenly applied. The nonskid compound shall be a two part synthetic resin compound, consisting of the basic resin plus aggregate and hardener. The nonskid after curing shall have a minimum average thickness of 30 mils [0.75 mm]. Minimum time between coats and between application and drying/curing of last coat and commencement of test shall be 24 h.

11. Responsibility for Tests and Inspections

11.1 Unless otherwise specified in the contract or purchase order, the manufacturer is responsible for the performance of all inspection and test requirements specified in this specification. Except as otherwise specified in the contract or purchase order, the manufacturer may use his own or any other suitable facilities for the performance of the inspection and test requirements unless disapproved by the purchaser at the time the order is placed. The purchaser shall have the right to perform any of the inspections and tests set forth in this specification when such inspections and tests are deemed necessary to ensure that the material conforms to prescribed requirements. Each party has the right to witness tests performed by the other party.

12. Test Methods

12.1 *Service Life Test*—Conduct service life tests on an uncoated steel test plate (see 11.1). Operate the machine and each hub in full contact with the test plate for the minimum service life specified herein for the particular hub being tested. The test may be continuous or may consist of shorter time periods adding up to the applicable service life. Breaks between the shorter test periods are limited to 1 h followed by 1 h or more of operation (simulation of daily usage). Fracture, bending, or other failures affecting useability of any component of the machine or hub constitutes a defect. The service life test precedes the performance tests for each hub.

12.2 *Performance Tests*:

12.2.1 Test each hub on the test surfaces required in Table 7. Use the machine for 10 min. Measure the area of the surface that is cleaned to bare metal in 10 min and multiply by six to determine the hourly removal rate. Failure to attain an hourly removal rate at least equal to the minimum removal rate stated in Section 7 constitutes a defect.

12.2.1.1 *Class A Hub*—After each performance test with the Class A hub, examine the metal surface for scoring, gouging, or erosion of metal. Presence of any of these conditions constitutes a defect.

12.2.1.2 *Class B Hub*—After each performance test with the Class B hub, test the metal surface in accordance with Test Method D 4417 to determine its surface profile. Failure to produce a surface profile between 1.0 to 3.0 mils [0.0025 to 0.0076 mm] constitutes a defect.

12.3 *Stability*—Test the Type 1 machine on horizontal (including the overhead) and vertical surfaces at no load and full load. Conduct stability operation test on the Type 2 machine inclined at an angle of 15° in any direction from the normal horizontal position and at both no load and full load. For the Type 2 machine, loss of power or tipping constitutes a defect.

12.4 *Precision and Bias*—No statement is made about either the precision or bias of these test methods since the result merely states whether there is conformance to specified operating requirements.

13. Inspection

13.1 *Visual Inspection*—A visual inspection shall be made of each machine for the following defects:

13.1.1 Any part or component not as specified, missing, or damaged,

13.1.2 Hubs not interchangeable, and

13.1.3 Air hose failing to connect to machine.

14. Rejection

14.1 Any defect shall be cause for rejection.

TABLE 7 Required Performance Tests

Surface	Class A Hub	Class B Hub	Class C Hub	Class D Hub
Painted steel	X	X	X	X
Painted aluminum	X	X	. . .	. . .
Rusted steel	X	X	X	X
Steel with nonskid	. . .	. . .	X	X

15. Certification

15.1 When specified in the purchase order or contract, the purchaser shall be furnished certification that samples representing each lot have been either tested or inspected as directed in this specification and the requirements have been met. When specified in the purchase order or contract, a report of the test results shall be furnished.

16. Technical Manuals

16.1 Unless otherwise specified in the purchase order or contract (see 4.1.6), the manufacturer's standard operation and maintenance manual shall be provided with each unit. As a minimum, the technical manual shall contain information regarding unpacking, inspection, assembly, operation, controls, lubrication, routine maintenance, replacement of parts, and a parts listing.

17. Product Marking and Labeling

17.1 *Identification Marking*—Each machine shall bear a manufacturer's nameplate securely attached to the outside of the housing citing the manufacturer's name, contract number, and model number of the machine.

17.2 *Warning Label*:

17.2.1 The machine shall be provided with a warning label, firmly affixed in a prominent location. The characters shall be not less than ⅜ in. [9.5 mm] high and in accordance with Practice F 1166. The label shall state.

WARNING
DO NOT OPERATE WITHOUT HEARING
AND EYE PROTECTION
EAR AND EYE DAMAGE MAY RESULT

17.2.2 The word **"WARNING"** shall be printed in yellow on a black background. The message below it shall consist of black letters on a yellow background. Similar warning or caution label plates shall be affixed for other situations that would create a personnel hazard or equipment damage.

18. Packaging and Package Marking

18.1 *Preservation and Packaging*—Preservation and packaging shall provide adequate protection against corrosion, deterioration, and physical damage during shipment and, unless otherwise specified, may conform to the supplier's commercial practice when such meets these requirements. Each machine shall be complete, fully lubricated, and ready to operate upon delivery (some assembly is allowed). Technical manuals furnished with basic equipment shall be packaged in sealed, waterproof wrapping.

18.2 *Packing*—Packing shall be accomplished in a manner that will ensure acceptance by common carrier at the lowest rate and will afford protection against physical or mechanical damage during shipment. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation and unless otherwise specified, may conform to the supplier's commercial practice when such meet these requirements.

18.3 *Marking*—Unless otherwise specified (see 4.1.7), shipment marking information shall be provided on interior packages and exterior shipping containers as follows:

18.3.1 *For Commercial Procurements*—In accordance with the contractor's commercial practice,

18.3.2 *For U.S. Government Agencies, Except Military*—In accordance with Fed. Std. No. 123, and

18.3.3 *For U.S. Military Agencies*—In accordance with MIL-STD-129.

19. Keywords

19.1 air hose; air motor; descaling; hose; air; hub; machine; pneumatic

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the contract or order.

S1. Referenced Documents

S1.1 *Military Standard*—MIL-STD-147.

S1.2 *Military Specifications*—MIL-B-117, MIL-H-775, MIL-L-17331, and DOD-G-24508.

S1.3 *Federal Specifications*—PPP-B-566, PPP-B-601, PPP-B-621, PPP-B-636, PPP-B-640, and PPP-B-676.

S2. Packaging

S2.1 *Disassembly and Matchmarking*—Item disassembly shall be the minimum necessary to make accessible for cleaning, drying, and preservation of machined and critical surfaces. Removal of items or projecting parts which will facilitate protection of the equipment or item from damage, pilferage, loss, or reduce package volume, is permitted where such removal will not affect permanent settings or alignments, and where the removed items can be readily reassembled at the installation site without the need for special tools. Removed items shall be matchmarked to facilitate reassembly. Removed items shall be tagged and marked with the tags attached to each mating item.

S2.2 *Carrying Case*—Each machine shall be packaged in its carrying case such that chaffing or contact of machine parts is prohibited. All accessories shall be packaged in packages conforming to MIL-B-117, Type 1, Class C, Style 2, and packed in a carrying case.

S2.3 *Packaging Materials:*

S2.3.1 *Unit Containers*—Unit containers shall conform to any one of the following specifications. Selection of the container and options provided in the applicable container specification shall be at the suppliers option:

Specifications	Container
PPP-B-566	Box, paperboard, folding
PPP-B-636	Box, fiberboard
PPP-B-676	Box, paperboard, setup

S2.3.2 Box closure shall be in accordance with the applicable box specification or appendix thereto. Closure, waterproofing, and reinforcing as applicable for fiberboard boxes, when selected, shall be as follows: domestic grade in accordance with Method 1 using pressure sensitive, reinforced, strippable tape; weather-resistant grade in accordance with Method 5.

S2.4 *Storage Box*—Each carrying case shall be placed in a container as specified in S2.3.1. Fiberboard pads shall be provided to obtain a snug fit and to protect all projecting items (hardware, handle) from damage during handling, shipment and storage.

S2.5 *Packing*—Packing shall be Level A, B, or C as specified.

S2.5.1 *Levels A and B*—Machines shall be packed in containers as specified (see S2.5.1.1). When the unit container selected is of the weather-resistant grade, no further overpacking is required.

S2.5.1.1 *Containers*—Containers shall be in accordance with any of the specifications listed in Table S2.1. Selection of the container and options provided in the applicable specification shall be at the suppliers option.

S2.5.1.2 *Closure, Reinforcing, and Waterproofing*—Shipping containers shall be closed, strapped, or banded in accordance with the applicable container specification or appendix thereto. For Level A packing, fiberboard boxes shall be reinforced with pressure-sensitive reinforced, filament tape, or nonmetallic banding as specified in the appendix, to the applicable fiberboard box specification instead of steel strapping.

TABLE S2.1 Container Selection

Specification	Container	Packing Application	
		Level A	Level B
		(Style, Type, or Class)	
PPP-B-601	boxes, wood cleated plywood	overseas type	domestic type
PPP-B-621	boxes, wood, nailed and lock-corner	Class 2 overseas	Class 1 domestic
PPP-B-636	boxes, shipping, fiberboard	Class weather resistant	Class domestic
PPP-B-640	boxes, fiberboard, corrugated, triple-wall	Class 2	Class 1

S2.5.2 *Level C*—Products shall be packed in containers at the lowest applicable level acceptable to the common carrier and that will ensure safe delivery of contents at the Naval receiving activity in a satisfactory condition for use. Containers, packing, and method of shipment shall comply with the ABS Uniform Freight Classification Rules and Regulations or other carrier as applicable to the mode of transportation.

S2.6 *Palletized Unit Loads*—When applicable, products packaged as specified shall be palletized in accordance with MIL-STD-147.

S2.7 *Hose*—Hose shall be prepared for shipment in accordance with MIL-P-775 for the levels of protection specified.

S3. Lubricants

S3.1 All lubricants shall be in accordance with MIL-L-17331 or DOD-G-24508.

S4. Inspection of Packaging

S4.1 Sample packs and the inspection of preservation, packing, and marking for shipment and storage shall be in accordance with Sections 16 and S2 and the documents specified herein.