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MILITARY SPECIFICATION

MACHINERY, METAL AND WOODWORKING

PACKAGING OF

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

1 SCOPE

1.1 This specification covers requirements for materials and methods for cleaning, drying, preservation-packaging, packing and marking of new machinery, metal and woodworking, for the various levels of protection for handling, shipment and storage.

2 APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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, US Army Armament Research, Development and Engineering Center, ATTN: SMCAR-EST-S, Rock Island, IL 61299-7300 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 AREA PACK

SPECIFICATIONS

FEDERAL

L-P-378	- Plastic Sheet and Strip Thin Gauge Polyolefin
P-D-680	- Dry Cleaning Solvent
TT-P-664	- Primer Coating, Alkyed, Corrosion-Inhibiting, Lead and Chromate Free, Voc-Compliant
PPP-B-601	- Boxes, Wood, Cleated-Plywood
PPP-B-621	- Boxes, Wood, Nailed and Lock-Corner
PPP-B-636	- Boxes, Shipping, Fiberboard
PPP-B-640	- Boxes, Fiberboard, Corrugated, Triple-Wall
PPP-B-1055	- Barrier material, Waterproofed Flexible
PPP-C-843	- Cushioning Material, Cellulosic
PPP-D-705	- Drum: Metal Shipping, Steel, 16 and 30 Gallon Capacity
PPP-D-729	- Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters)
PPP-P-40	- Packaging and Packing of Hand Tools; Tools and Tool Accessories for Power Driven, Metal and Woodworking Machinery
PPP-T-60	- Tape: Packaging, Waterproofed

MILITARY

MIL-C-104	- Crates, Wood; Lumber and Plywood Sheathed, Nailed and Bolted
MIL-P-116	- Preservation, Methods of
MIL-B-121	- Barrier Material, Greaseproofed, Waterproofed, Flexible
MIL-H-775	- Packaging of Hose, Hose Assemblies; Rubber, Plastic, Fabric, or Metal (Including Tubing); and Fittings, Nozzles, and Strainers
MIL-C-3774	- Crates, Wood; Open 12,000- and 16,000-Pound Capacity
MIL-P-3316	- Abrasives and Abrasive Products, Packaging of
MIL-C-5501	- Caps and Plugs, Protective, Dust and Moisture Seal General Specification for
MIL-H-6083	- Hydraulic Fluid, Petroleum Base, for Preservation and Operation
MIL-E-16298	- Electric Machines Having Rotating Parts and Associated Repair Parts: Packaging of
MIL-E-17555	- Electronic and Electrical Equipment, Accessories, and Repair Parts; Packaging and Packing of
MIL-B-26195	- Boxes, Wood-Cleated, Skidded, Load-Bearing Base
MIL-C-52950	- Crates, Wood, Open and Covered

STANDARDS

FEDERAL

FED-STD-101	- Test Procedures for Packaging Materials

MILITARY

MIL-STD-129	- Marking For Shipment and Storage
MIL-STD-1186	- Cushioning, Anchoring, Bracing, Blocking and Waterproofing; With Appropriate Test Methods
MIL-STD-1188	- Minimum Guidelines for Level C Preservation, Packing and Marking

(Unless otherwise indicated, copies of federal and military specifications and standards are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.2 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exception has been obtained.

3 REQUIREMENTS

3.1 First article. When specified (see 6.2.1), the supplier shall furnish one complete pack for first article inspection. Whenever first article inspection is specified or performed, unit pack examination and tests for packaging may be performed also (see paragraphs 3.10 and 4.2.1). The first article may be either a preproduction pack or an initial production pack which conforms to the requirements of this specification. In either case, the approved first article and the production packs shall be identical and in accordance with the terms of the contract. Approval of the first article shall not relieve the supplier of the responsibility to furnish equipment and packaging in accordance with the requirements of this specification.

3.2 Disassembly. When practical, for the protection of components, attachments and accessories against damage, pilferage or to reduce cubage, items may be disassembled only to a necessary basic degree. Disassembled parts shall be preserved, anchored, braced, blocked, and cushioned to prevent damage. Disassembled parts shall be clearly and legibly marked as to identity and proper location on the assembled item. All fasteners removed during disassembly shall be secured in one of the mating parts. A part shall not be removed from an assembly unless it can be reassembled readily in the field without special skills or tools.

3.3 Disassembled parts marking. Disassembled parts shall be marked, when necessary with instructions, to facilitate reassembly. Removed parts and mating parts on the item shall be marked by stenciling, on the part, or by use of tags. Tags shall be waterproofed and ink used (on parts or tags) shall be waterproof. Tags shall be firmly secured to each individual part.

3.4 Materials. Materials used in preservation-packaging and packing of machinery shall be as specified herein. Materials shall be new and free from all defects and imperfections which may affect the serviceability of the completed package or pack.

3.5 Processing conditions. Preservation-packaging shall be accomplished within buildings which have facilities to limit the accumulation of dust and moisture on the equipment being processed. Machinery brought into processing areas from outside shall be allowed sufficient time to reach ambient temperature before processing. Cleaning, drying, and application of preservatives shall progress in an uninterrupted series of operations. When periods of interruption are necessary, temporary protection shall be provided to partially processed items, as required, to insure against contamination.

3.6 General requirements. Component parts of machinery, accessories, and maintenance tools shall be cleaned, dried, preserved, packaged, and packed as specified herein. Parts and assemblies which are not covered by this specification shall be preserved and packaged utilizing the materials and methods specified for similar parts and assemblies described herein. Cleaning and drying procedures and preservatives and their application, specified herein, shall conform to the criteria and guidelines of MIL-P-116 (Additional fundamental principles and approved methods and techniques of packaging and packing are referenced in 6.5.)

3.7 Preservation-packaging. Preservation shall be Level A or C, as specified in the contract (see 6.2.1).

3.7.1 Level A.

3.7.1.1 Preservation-packaging. Unless otherwise specified (see 3.7.1.27), the basic machine shall be preserved and packaged in accordance with method I criterion of MIL-P-116. Electronic and electrical equipment, hand tools and accessories shall be preserved and packaged as specified herein. When it has been determined that a preservative is required to protect a specific surface or item, but has not been specified herein, the preservative utilized shall be selected from MIL-P-116.

3.7.1.2 Cleaning and drying. Thorough cleaning and drying of all bare ferrous metal surfaces is essential before the application of a preservative or other protective finish such as paint, plating, etc.. Care must be taken to limit the handling of cleaned parts prior to the assembly of new machinery. Where practicable, processors and assemblers shall wear rubber or plastic gloves while handling cleaned parts. Unless otherwise specified herein, machines which have been functionally tested prior to shipment shall have all operational systems thoroughly drained before the application of a preservative. It may be necessary to connect the machine to a power source and operate at low speeds in order to drain all cavities. Extreme care shall be taken to immediately disconnect power when machine is being drained so as not to damage pumps, motor or other components.

3.7.1.3 Internal surfaces. All ferrous metal surfaces of parts which will be utilized internally in the assembly of new machinery shall be cleaned in accordance with process C-5 and dried in accordance with the applicable procedure of MIL-P-116. In the interim, to preclude contamination from forming on cleaned surfaces prior to the assembly operation, parts shall be coated with a light weight preservative oil conforming to P-9. To prevent dust from accumulating on cleaned parts, cover with a sheet of greaseproof material, such as MIL-B-121. In the event the supplier deems it necessary to clean a particular mechanism after draining the operational lubricant, flush with a solution of one part lubricating oil P-10, type I, grade 30 and nine parts cleaning solvent conforming to P-D-680. Otherwise, the mechanisms need not be cleaned. All ferrous metal internal surfaces shall be coated with the lubricant or a preservative. Internal mechanisms shall be cycled to assure all areas are protected with a coating of the lubricant before either sealing or draining. Any unprotected areas will have a preservative coating applied.

3.7.1.4 External surfaces. All accessories and attachments such as chucks, faceplates, steady rests, toolholders, and abrasive wheels shall be removed from the assembly prior to the external cleaning operation. All external, critical ferrous metal surfaces (fit or function) of the machine shall be cleaned in accordance with process C-5 and dried in accordance with the applicable procedures of MIL-P-116. Noncritical ferrous metal surfaces shall be cleaned in accordance with process C-3 and dried as specified above. Nonmetallic composites and painted metal surfaces shall be cleaned by wiping with a clean, dry cloth. (Care must be taken to prevent cleaning

solvents from coming in contact with nonmetallic composites.) When cleaned surfaces of the machine show signs of rusting before application of the final preservative, the cleaning process shall be confined to those specific small areas of the assembly. Alternatively, the solvent used for the final wiping operation shall contain a small amount (approximately 5 percent by volume) preservative oil conforming to P-10, type 1, grade 30. (It is extremely important that elapsed time between these operations be held to an absolute minimum).

3.7.1.5 Disassembled components. Parts detached from the basic machine shall be cleaned and dried as specified in 3.7.1.2 and 3.7.1.3.

3.7.1.6 Steam and air lines. Drain all water accumulation and dry by injecting moisture-free air into the systems.

3.7.1.7 Maintenance or machine tools and tool accessories. All machine, maintenance, metal or woodworking, hand tools and any accessories there of shall be preserved and packaged in accordance with Level A requirements of PPP-P-40.

3.7.1.8 Electrical equipment. Electrical equipment, whether attached or detached, shall be cleaned, dried and preserved in accordance with Level A requirements of MIL-E-17555 or MIL-E-16298, which ever applies to the individual electrical item.

3.7.1.8.1 Electrical motors. Electric motors, whether attached or detached, shall be preserved and packaged in accordance with Level A requirements of MIL-E-16298, and applicable subparagraph for assembled machines.

3.7.1.8.2 Electrical control devices. Control units, whether attached or detached, shall be preserved and packaged in accordance with Level A requirements of MIL-E-17555.

3.7.1.8.3 Electrical wiring system. Exposed ends of wires, plug openings, sockets. connector plugs, terminals and openings into switches and junction boxes shall be sealed with tape or cap-plugs conforming to PPP-T-60, type IV or MIL-C-5501, respectively. Electric cable shall be coiled to a minimim safe diameter and secured with cotton twine or tape to prevent uncoiling.

3.7.1.9 Hoses and fittings. Hoses and fittings which are not attached to the basic machine shall be cleaned, dried and preserved in accordance with Level A requirements of MIL-H-775.

3.7.1.10 Lubricating systems. The machine, with all lubricants, greases and other lubricating compounds either installed or included (see 3.8.2.9) shall have all vent openings in the lubrication systems temporarily capped, plugged or taped closed to prevent loss of lubricants during shipment and storage. Tags, warning that "ALL TEMPORARY CAPS, PLUGS OR TAPE MUST BE REMOVED BEFORE START-UP OR USE OF THE ITEM", shall be attached to all temporary caps, plugs or tape intended to be vented to the atmosphere during operation. In the event a lubrication reservoir cannot be covered and sealed, it shall appropriately be preserved and the lubricant shall be provided in a sealed container and shipped with the machine (see 3.8.2.9). A warning tag shall be placed in a conspicuous place near the filling area, warning the user to "INSTALL THE FURNISHED LUBRICANT BEFORE OPERATION OF THE EQUIPMENT".

3.7.1.11 Coolant systems. Coolant systems shall be drained and cleaned of all coolant residue and shall be preserved by flushing with P-3 preservative compound leaving a residual film of the preservative in the coolant lines and tank. Drain off the preservative and close the systems. Interior surfaces of the tank/reservoir which have not been covered or flooded with preservative while the machine is in operation shall be manually coated by brushing or spraying with similar type preservative.

3.7.1.12 High-speed spindle bearings. Reservoir shall be filled to normal operating level with manufacturer's lubricant and sealed closed for shipment and storage. If the system is of such design that the lubricant will leak out during shipment and storage, it shall be drained. The system shall then be preserved by filling with preservative oil P-10, type I, grade 30, drained, sealed and covered.

3.7.1.13 Hydraulic systems. Both open- and closed-type systems shall be filled to normal operating level with either the manufacturer's operative hydraulic oil or hydraulic oil conforming to MIL-H-6083. After filling, the machine shall be cycled to circulate the oil through the entire system. Prior to disconnecting the machine from the power source, place the piston(s), except opposing pistons, in their innermost position. The oil shall remain in the reservoir, providing the reservoir can be sealed to prevent any leakage during shipment and storage. If it cannot be sealed to prevent leaking, it shall be drained and preserved and the hydraulic oil shall be provided in a sealed container and shipped with each machine.

3.7.1.13.1 Hydraulic systems for tracer mechanism. These systems shall be filled to a normal operating level with manufacturer's hydraulic oil or MIL-H-6083 and sealed or preserved as stated above in Hydraulic systems paragraph.

3.7.1.14 Grease fittings. Charge all grease fittings with manufacturer's compound or with preservative compound conforming to P-11.

3.7.1.15 Nonlubricated interior surfaces. Surfaces of internal gears which do not run in lubricant shall be thoroughly coated with P-7 preservative.

3.7.1.16 Air motors. Interior surfaces of air motors and air lines shall be coated with a preservative oil conforming to P-10, type I, grade 30 by injecting oil into the air stream while operating the machine until the oil appears at the exhaust ports. Air inlets and outlets shall be sealed with plastic caps, plugs or tape conforming to MIL-C-5501 or PPP-T-60, type IV, respectively. Air cylinders shall not be disassembled from the machine unless parts are vulnerable to damage during shipment and storage.

3.7.1.17 Gear cases. Fill the gear cases with normal lubricating oil. Shift gears into all possible positions while operating the machine. Make sure all surfaces are coated with lubricating oil and close and seal all openings to prevent any leakage during shipment and storage.

3.7.1.18 Sliding or friction surfaces. Surfaces of ways, gibs, driving gears, traversing and adjusting screws, and other critical, exterior operating machined surfaces shall be coated with P-2 preservative compound. Parts of the machine which are adjustable shall be locked into place by means provided and blocked to assure movement shall be kept to a minimum.

3.7.1.19 Non-critical surfaces. Exterior, non-critical, ferrous metal surfaces of the basic machine, which have not been painted or plated, shall be coated with type P-2 preservative and covered. Such places as legs, bolts, etc. from which the preservtive need not be removed may be preserved with P-1 or P-19.

3.7.1.20 Bearings and journals. Grease lubricated bearings shall be preserved with type P-11 preservative. Oil lubricated journals shall be filled with normal oil lubricant or with lubricating oil P-10, type I, grade optional.

3.7.1.21 Drive belts and pulleys. Drive belts shall either be removed from the machine or released from tension. Belts removed from the machine shall be packaged in accordance with method IC-1 or IC-3 criterion of MIL-P-116. Ferrous metal pulleys shall be coated with a rust-inhibiting primer conforming to TT-P-664.

3.7.1.22 Grinding wheels and abrasives. All abrasive products shall be preserved and packaged in accordance with Level A requirements of MIL-P-3816.

3.7.1.23 Closed dial indicators. Closed dial indicators shall be covered with 1 inch thick uncompressed cushioning materials conforming to PPP-C-843, type II, class B. Secure cushioning material in place with tape conforming to PPP-T-60, type IV. Other type cushioning materials and tapes may be used provided the materials are water-resistant, non-corrosive, and will provide equivalent or better protection of those specified above.

3.7.1.24 Drawers and door assemblies. Sliding surfaces of drawer guides shall be coated with P-11 preservative grease. Interior surfaces of door hinges shall be lubricated by the application of P-10, grade 30 preservative oil. In addition to mechanical locks or catches incorporated in the machine tool, secure doors and drawers with metal strapping or other devices which are suitable for the purpose intended. Fiberboard pads shall be placed under metal strapping, to prevent marring the painted surfaces.

3.7.1.25 Closure of openings. Small openings (except vents and louvers installed for ventilation purposes) which will admit dust or water shall be sealed with tape conforming to PPP-T-60, type IV. Large openings shall be covered with waterproof barrier material conforming to class E-1 or L-4 of PPP-B-1055, or, as a minimum, plastic material conforming to L-P-378, type and class optional. Secure materials in place with tape specified above. When very large openings are covered, or when location of openings render covering vulnerable to puncture, coverings shall be protected by applying wood, plywood or sheet metal over the materials. Open ends of all piping and fittings shall be plugged to prevent the entrance of foreign materials, using pipe fittings, plastic cap-plugs conforming to MIL-C-5501 or tape conforming to above.

3.7.1.26 Technical data. Technical data furnished with the machine shall be packaged in accordance with method IC-1 criterion of MIL-P-116. The package shall be marked "TECHNICAL DATA" in bold black letters. The package shall be protected against puncture and abrasion. The data shall be either attached to the machine with tape conforming to PPP-T-60, type IV, placed in a stowage compartment of the machine, or positioned in a consolidated box containing accessories or disassembled components.

3.7.1.27 Method II packaging. When specified (see 6.2.1), complex items which cannot be treated entirely externally with a contact preservative or where removal of the preservative would prevent timely use of the machine shall be packaged in accordance with method II criterion of MIL-P-116. Accessories, maintenance tools, control units, and all internal surfaces of the machine shall be preserved and packaged as specified herein. Method II packs will bear precautionary labels as stated in MIL-STD-129. Upon receipt of a Method II package, it shall be inspected to assure the vacuum seal is intact before being placed in storage or shipped elsewhere.

3.7.1.28 Protection of preservatives. All exposed preserved surfaces of machines which are subject to being disturbed during the packing operation shall be loosely covered with barrier material conforming to MIL-B-121, type 1, grade A. Not less than two layers of similar-type barrier material shall be used to separate wood or metal blocking and finished metal surfaces of the machine. When considered necessary, secure barrier in place with tape conforming to PPP-T-60, type IV.

3.7.1.29 Consolidated packaging. When size and weight permit, packaged accessories, maintenance tools, and small disassembled components shall be consolidated and placed in drawers and stowage compartments of the machine. When it is not feasible to stow parts as specified above, place parts in box(es) conforming to PPP-B-636, class WR or WWVR; PPP-B-640, class 2; PPP-B-601, domestic type; or PPP-B-621, class 1. Large bulky disassembled components shall be packed as specified in 3.7, as applicable.

3.7.1.30 Cushioning. Cushioning materials and methods of application shall conform to the criteria and guidelines of MIL-P-116 and MIL-STD-1186. In the event there are conflicting requirements, MIL-STD-1186 will have precedence.

3.7.1.31 Movable parts. Operating heads, sliding tables, rams, counter-balances, and other movable parts shall be secured by mechanical devices incorporated in the machine. The devices alone do not always provide adequate support to prevent movement in the handling and transporting of the item and therefore must be augmented with appropriate wood blocking, metal tie rods used in conjunction with wood blocking, metal strapping, or other devices which will immobilize the part. Handwheels, cranks, levers, and similar controls shall be secured in position with common annealed wire or steel strapping.

3.7.1.31.1 Positioning assemblies. Assemblies having vertical movement shall be blocked and braced in a lowered position; those capable of moving traversely shall be centered for blocking and bracing.

3.7.1.31.2 Tables. Tables and other components moving on ball bearings or other types of high efficiency, low-friction ball or roller bearing assemblies shall be removed, or blocked, and all components treated in such a manner that neither the way(s), surface(s), nor the anti-friction devices will be subject to brinelling or other damage.

3.7.1.31.3 Counterweights. Counterweights shall be locked and blocked in a manner which will release all tension from supporting cables, chains and springs. Concealed counterweights suspended in closed columns shall be removed or blocked to prevent vertical or horizontal movement.

3.7.2 Level C preservation. Preservation of metal and wood-working machinery shall conform to the requirements of MIL-STD-1190.

3.8 Packing. Packing shall be Level A, B or C, as specified in the contract.

3.8.1 General requirements for Levels A and B. When weight, size and design permit, machines shall be assembled when being prepared for shipment. When it is not considered feasible to ship a machine assembled, components shall be packed in accordance with weight limitations specified herein.

3.8.2 Level A.

3.8.2.1 Machinery weighing less than 2,500 pounds. Unless otherwise specified (see 6.2.1), machinery including accessories, weighing less than 2,500 pounds, shall be packed in cleated plywood boxes conforming to PPP-B-601, overseas type; nailed wood boxes conforming to PPP-B-621, class 2, style 2, 3, 4 or 7; or skidded boxes conforming to MIL-B-26195, type II, style A, class optional, with plywood superstructure. Selection of containers shall be governed by the size and weight limitations of the applicable container specification. Machines designed with mounting holes in areas that can withstand rough handling without breakage shall be bolted to an auxiliary base before being packed in a box conforming to PPP-B-601 or PPP-B-621. Contents of boxes shall be arranged, anchored, blocked, braced and cushioned in accordance with MIL-P-116 and MIL-STD-1186. In the event there are conflicting requirements, MIL-STD-1186 will have precedence. Top-heavy machines shall be packed as specified in 3.8.2.5. Box closure and strapping requirements shall be in accordance with the appendix to the applicable box specification.

3.8.2.2 Machinery weighing 2,500 to 30,000 pounds. Unless otherwise specified (see 6.2.1), machines weighing 2,500 to 30,000 pounds shall be packed individually in crates conforming to MIL-C-104, type I, class 2, style A. To conserve cubage, safeguard components of the machine, and to comply with weight and dimensional limitations of the crate specification, subassemblies removed through disassembly and control units may be packed in separate shipping containers. When packed separately, items weighing less than 2,500 pounds shall be packed as specified in 3.8.2.1. Arrangement of contents, anchoring, blocking, bracing and cushioning shall be in accordance with the appendix to the crate specification, MIL-STD-1186, and as specified herein. MIL-STD-1186 will have precedence when there are conflicting requirements. When practicable, to facilitate loading into common carriers, the height of the crated machine shall be limited to 9 feet 8 inches.

3.8.2.3 Buttress blocking. Hold down bolts on machines weighing over 8,000 pounds shall be reinforced with backup buttress blocking extending from the machine base to the skid header; blocking shall be parallel to skid runners and in line with bolt holes on the machine. The blocks shall be similar to that used for the skid header. Carriage or step bolts shall be utilized to secure the block to the skid base.

3.8.2.4 Unsupported columns. Unsupported columns of the machine shall be reinforced by placing snug-fitting blocks between the columns and the skid platform or machine base, as applicable. Blocks extending from the column to the skid base shall be fitted so that tightening of the hold down bolts will not place undue stress on the column(s).

3.8.2.5 Top-heavy machinery. To safeguard equipment and personnel, top-heavy machine tools may be packed in a horizontal position, design permitting. Blocking and bracing shall be located at points of the machine with sufficient regidity to carry the machine weight. Crates for top-heavy items requiring upright skidding due to design, structural weakness, etc., shall be sized to provide stability in handling and transit. The length and width of the skid platform shall extend beyond the machine a distance equivalent to the height of the center of gravity of the machine above the base.

3.8.2.6 Leg-type machines. Leg-type machines with slotting holes for mounting shall be reinforced by placing a nominal 2- by 4-inch wood block against the leg opposite the slot opening and nailing to the skid base.

3.8.2.7 Bolting. Machines shall be secured to the skid base by not less than four bolts. When sufficient bolting points are not available, J-clamps or tie rod assemblies as specified in 3.7.1.31, or other devices, shall be used to provide the minimum of four holding points. Bolts shall pass completely through the skid runner or sleeper, as applicable, and the base flooring.

3.8.2.8 Consolidated containers. Consolidated containers specified in 3.7.1.29 shall be placed inside the shipping container housing the machine. The boxes shall be restrained by the use of metal strapping of sufficient strength or tie rod assemblies.

3.8.2.9 Operational oils. Operational oils furnished with the machine, but not placed in the machine stowage receptacles, shall be stowed in metal drum(s) conforming to PPP-D-705, type I or II or PPP-D-729, type I or II. Drums shall be positioned upright inside the shipping container housing the machine. Sufficient blocking shall be applied to immobilize the drum(s) inside the shipping container. Alternatively, when the drum(s) tend to increase the cubage of the shipping container, the drum(s) may be shipped as individual containers.

3.8.2.10 Machines exceeding crate limitations. Unless otherwise specified (see 6.2.1), machines exceeding the weight and size limitations of MIL-C-104 shall be packed in a similarly designed crate. The crate's structural members and anchoring devices shall be increased in number and size as needed to accommodate the load to be packed therein.

3.8.3 Level B. Machines weighing 16,000 pounds or less shall be packed for shipment utilizing boxes conforming to PPP-B-601, domestic type, style A, B, I, or J; PPP-B-621, class 1, style 2, 3, 4, or 7; MIL-B-26195, type I, style A; or crates conforming to MIL-C-52950 or MIL-C-3774. Selection of the container shall be governed by the size and weight limitations of the applicable container specification. Machines designed with mounting holes in areas that can withstand rough handling without breakage shall be bolted to an auxiliary base before being packed in a box conforming to PPP-B-601 or PPP-B-621. Arrangement of contents, anchoring, cushioning, blocking, bracing and container closure shall be the same as for level A (see 3.8.2). Items packed in open crates shall be covered with a waterproof shroud conforming to MIL-STD-1186. Machines exceeding 16,000 pounds shall be packed as specified in 3.8.2.2.

3.8.4 Level C packing. Packing of metal and woodworking machinery shall conform to the requirements of MIL-STD-1190. When authorized by the transportation media and when safe handling with mechanical equipment is provided, the machines may be mounted on skids or a skid base in lieu of being boxed or crated. Openings in skids shall be a minimum of 3 inches in height to provide access for forklift tines. Machines not packed in fully sheathed containers shall be completely covered with a waterproof

plastic shroud. The shroud shall be secured to the base of the machine. Polyvinyl chloride (PVC) and ethylene vinyl acetate (EVA) shall not be acceptable as an intimate wrap or shroud material due to the possible corrosive effect of PVC and EVA vapors on the shrouded item and its component parts.

3.9 Marking. All marking shall be in accordance with MIL-STD-129. Bar code markings are required and shall be in accordance with MIL-STD-129. Center of balance markings and arrow markings, indicating THIS SIDE UP, shall be applied to each shipping container for all levels for the protection of the machinery and personnel.

3.10 Rough handling. The unit packs shall not be damaged or items displaced when subjected to the rotational drop, impact and stackability as specified (see 4.5). These tests shall be performed whether there is a first article or not. If a first article is specified (see 3.1) they may be conducted at that time but if no first article is required, the rough handling tests shall still be required.

3.11 Workmanship. Workmanship shall be such that when the proper procedure is followed, materials and equipment being processed will be provided the maximum protection against corrosion and deterioration consistent with the shipment hazards known or anticipated, and sutible for the term of storage expected.

4 QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the supplier is responsible for the performance of all inspection and test requirements as specified herein. Except as otherwise specified in the contract, the supplier may use his own or any other facilities suitable for the performance of the inspection and test requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of Section 3. The inspections set forth in this specification shall be come 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 assuring that all products submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

a. First article inspection (see 4.2.1).
b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. When first article inspection is required by the contract or purchase order (see 3.1) a unit pack, which shall include the first article if more than one item per pack, shall be subjected to the examination in 4.4 and all tests in 4.5. Failure of the examination or any test shall be cause for rejection.

4.2.2 Quality conformance inspection. Quality conformance inspection shall be applied to production packs offered for acceptance under the contract or purchase order. Quality conformance shall consist of the examination in 4.4. In addition, a unit pack shall be randomly selected from the first ten production packs and subjected to all tests in 4.5. Failure of any pack to pass the examination or tests shall be cause for rejection.

4.3 Sampling. Sampling for quality conformance inspection shall be performed as listed with all samples selected randomly.

Inspection or test	Lot or Batch Size	Sample Size
Unit pack examination (4.4)	1 - 150	13

The lot size shall not exceed the maximum size indicated above. If lot size in less than or equal to sample size, 100 percent inspection is required. Each lot shall be accepted with no defects and rejected if one or more defectsi are found.

4.4 Unit pack examination. The unit pack shall be visually examined before, during and after packing to determine compliance with 3.2 through 3.9 and 3.11. The visual examination shall include verification of completeness of manufacture and assembly, conformance to specified standards, adequacy of markings, proper cleaning, and freedom from specified defects. Failure of the contractor to provide objective evidence that the pack and its components have passed the examinations prescribed for them by the contractor's inspectioon system shall be cause for rejection.

4.5 Tests. If a first article test is required in the contract or purchase order, the first article shall be included in the following tests of a unit pack. The remaining items in the pack, if more than one item per pack, may be dummy loads comparable in size and weight of the items. The dummy loads shall be blocked and braced in the same manner as the actual items, but shall not provide support or rigidity to the pack beyond that normally provided by the items. When the following tests are performed on a randomly selected pack from the first ten production packs, the pack shall contain only actual items. No dummy laods are permitted. If a conflict exists between the test requirements of this specification and the test methods referenced below, this document shall take precedence.

4.5.1 Rotational drop test. The rotational drop test shall be perfromed in accordance with Method 5008.1 in FED-STD-101. Failure in any of the categories (a) through (e) in paragraph 7.1.5 of Method 5008.1 shall be cause for rejection (see 3.10).

4.5.2 Pendulum-impact test. The pendulum-impact test shall be performed in accordance with Method 5012 in FED-STD-101. The unit pack shall be subjected to four (4) impacts, one on each side and one on each end. The pass/fail criteria for the test is given in paragraph 7.1.5 of Method 5012 (see 3.10).

4.5.3 Stackability test. The stackability test shall be performed in accordance with Method 5016.1 in FED-STD-101. In addition, the maximum allowable stacking height shall be marked on each side of the pack in accordance with MIL-STD-129. The pass/fail criteria for the test is given in paragraph 7.1.5 of Method 5016.1 (see 3.10).

4.6 Disposition of samples. All samples used for inspection and testing shall be reprocessed as necessary. They may, after reprocessing in accordance with the original method of preservation, be considered a part of the original lot. When the packaged item may have been damaged as a result of testing, the item shall be inspected as necessary to determine its acceptability.

5 PACKAGING

5.1 This section is not applicable to this specification.

6 NOTES

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

6.1 Intended use. This specification is intended to be used for reference in section 5 of commodity specifications or direct reference in contracts or orders. The cleaning, drying, preservation, packaging, packing, and marking requirements specified herein are intended to insure proper and safe storage and transportation of machinery, equipment, associated parts, and machine tool accessories for direct shipment to Government activities, or shipments to be processed at a military activity or agency.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. First article, when required (see 3.1).
c. Specify level A or C preservation (see 3.6) specify level A, B or C packing (see 3.7).
d. When hydraulic systems are to be filled with a preservative (see 3.7.1.13).
e. When method II protection is required (see 3.7.1.27).
f. Packing of equipment under 2,500 pounds, if different (see 3.8.2.1).
g. Packing of equipment weighing over 2,500 pounds to 30,000 pounds, if different (see 3.8.2.2).
h. Packing of equipment weighing over 30,000 pounds, if different (see 3.8.2.10).
i. First article inspection, if different (see 4.2.1).
j. Rough handling test (see 4.5).

6.3 General information. A first article test will not be required when:

a. The procuring activity waives first article testing after establishing that prior successful first article tests have been conducted on an item similar in all respects to the new item and its packaging details.

b. For other reasons waived by the procuring activity.

6.4 Machinery, metal and woodworking. Metal and woodworking machinery is equipment that is used for the purpose of abrading, cutting, grinding, molding, joining, measuring, testing, heating, or which otherwise treats or alters materials into the desired forms or shapes.

6.4.1 The following group and classes listed herein are considered as applicable to this specification:

a. Boring machines.
b. Broaching machines.
c. Drilling machines.
d. Gear cutting and finishing machines.
e. Grinding machines.
f. Lathes (includes screw machines).
g. Milling machines.
h. Planers.
i. Shapers, speed lathes, saws, metal cutting.
j. Mechanical presses, power driven.
k. Punching and shearing machines.
l. Riveting machines, power driven.
m. Machine tools, portable, includes portable abrasive cutting machines, portable drilling machines, portable slotters and shapers.
n. Bending and forming machines.
o. Forging machinery and hammers.
p. Miscellaneous secondary metal forming and cutting machines.
q. Woodworking machinery, planers, surfacers, shapers, saws, jointers, mortisers, etc.
r. Honing machines.

6.5 Supplemental information. Supplemental information on cleaning, preservation, packaging, and packing may be found in the following Government publications:

a. Packaging of Materiel: Preservation (Vol I) Army - TM 38-230-1, Navy - NAVSUP PUB 502, Air Force - AFP 71-15.
b. Packaging of Materiel: Packing (Vol II) Army - TM 38-230-2, Navy - NAVSUP PUB 503, Air Force - AFP 71-16.
c. MIL-HDBK-701, Blocking, Bracing and Skidding of Industrial Plant Equipment for Shipment and Storage.
d. MIL-STD-107, Preparation and Handling of Industrial Plant Equipment for Shipment and Storage.

(Copies of the above documents may be obtained from Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

6.6 Disposability methods. Environmental Pollution Preventative Measures are contained in the materials' specifications indicated herein. Refer to the materials' specifications (or preparing activity) for recommended disposability methods.

6.7 Subject term (key word) listing.

Metal
Woodworking
Packaging
Moveable parts
Counterweight
Preservative
Cushioning
Containers

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

Custodians:
Army - AL
Navy - SH
Air Force - 99

Preparing activity:
Army - AL

Project No. PACK-0865

Review activities:
Army - SM, ME
Navy - YD
DSA - IP
Air Force - 84

User activities:
Navy - OS

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OMB Approval
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