INCH-POUND

MIL-STD-107J
3 December 2001
SUPERSEDING
MIL-STD-107H
21 September 1990

DEPARTMENT OF DEFENSE STANDARD PRACTICE

PREPARATION AND HANDLING OF INDUSTRIAL PLANT EQUIPMENT (IPE) FOR SHIPMENT AND STORAGE

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FOREWORD

1. This standard is approved for use by all Departments and Agencies of the Department of Defense (DoD).

2. This standard contains instructions for preparing Government-owned industrial plant equipment (IPE) for shipment and storage. It is not intended for use in the procurement of new equipment.

3. Thorough cleaning and preservation of IPE during shutdown or immediately thereafter will minimize the necessity for subsequent disassembly operations. Storage of this type of equipment in humidity-controlled warehouses substantially extends the length of time it may be stored without deterioration.

4. Requirements for IPE containing hazardous contaminants have been addressed in paragraph 4.13. Complete instructions for equipment containing or contaminated with explosive, radioactive, corrosive, polychlorinated biphenyls (PCBs), or other toxic materials are not included in this standard.

5. This standard should be used in conjunction with MIL-HDBK-701, Blocking, Bracing, and Skidding of Industrial Plant Equipment for Shipment and Storage, when preparing IPE for shipment and storage. The use of DoD reusable skids in accordance with MIL-HDBK-701 is a cost savings effort by the Government. Therefore, any proposed deviation from the use of DoD reusable skids for equipment weighing 42,000 pounds or less will be directed to the Defense Supply Center Richmond, ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610.

6. Beneficial comments (recommendations, additions, deletions) and any pertinent data that may be of use in improving this document should be addressed to: Defense Supply Center Richmond, ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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CONTENTS

CONTENTS (Continued)

CONTENTS (Continued)

CONTENTS (Continued)

1. SCOPE

1.1 Scope. This standard provides both general and detailed requirements and approved methods for preparing Government-owned industrial plant equipment (IPE) for shipment or storage. General requirements have been provided to cover processes such as equipment disassembly, cleaning, weatherproofing, and skidding. Detailed requirements covered in this standard include methods of preservation and packing protection for specific IPE components.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, and 5 of this standard. This section does not include documents cited in other sections of this standard or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in sections 3, 4, or 5 of this standard, whether or not they are listed.

2.2 Government documents.

2.2.1 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).

SPECIFICATIONS

FEDERAL

A-A-52624	-	Antifreeze, Multi Engine Type.
A-A-59136	-	Cushioning Material, Packaging, Closed Cell Foam Plank.
MMM-A-260	-	Adhesive, Water Resistant, (for Sealing Waterproofed Paper).
PPP-B-1055	-	Barrier Material, Waterproofed, Flexible.
PPP-C-1797	-	Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam.

DEPARTMENT OF DEFENSE

MIL-PRF-121	-	Barrier Materials, Greaseproof, Waterproof, Flexible, Heat-Sealable.
MIL-DTL-197	-	Packaging of Bearings, Antifriction Associated Parts and Subassemblies.

SPECIFICATIONS (Continued)

DEPARTMENT OF DEFENSE (Continued)

MIL-PRF-680 - Degreasing Solvent.
MIL-H-775 - Hose, Hose Assemblies, Rubber, Plastic, Fabric, or Metal (Including Tubing) and Associated Hardware: Packaging of.
MIL-D-3464 - Desiccants, Activated, Bagged, Packaging Use and Static Dehumidification.

MIL-PRF-6083 - Hydraulic Fluid, Petroleum Base, for Preservation and Operation.
MIL-I-8574 - Inhibitors, Corrosion, Volatile, Utilization of.
MIL-PRF-10924 - Grease, Automotive and Artillery.
MIL-C-11796 - Corrosion Preventive Compound, Petrolatum, Hot Application.
MIL-C-15074 - Corrosion Preventive, Fingerprint Remover.
MIL-PRF-16173 - Corrosion Preventive Compound, Solvent Cutback, Cold-Application.
MIL-E-16298 - Electric Machines Having Rotating Parts, Accessories and Associated Support Items: Packaging of.
MS20003 - Indicator, Humidity, Card, Three Spot, Impregnated Areas (Cobaltous Chloride).
MIL-PRF-21260 - Lubricating Oil, Internal Combustion Engine, Preservative Break-in.
MIL-PRF-22191 - Barrier Materials, Transparent, Flexible, Heat-Sealable.
MIL-PRF-23827 - Grease, Aircraft and Instrument, Gear and Actuator Screw, NATO Code Number G-354.
MIL-PRF-81322 - Grease, Aircraft, General Purpose, Wide Temperature Range.
MIL-PRF-81705 - Barrier Materials, Flexible, Electrostatic Protective, Heat-Sealable.

STANDARDS

FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services.
FED-STD-376 - Preferred Metric Units for General Use by the Federal Government.

DEPARTMENT OF DEFENSE

MIL-STD-129 - Standard Practice for Military Marking.

STANDARDS (Continued)

DEPARTMENT OF DEFENSE (Continued)

MIL-STD-1686	-	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices).
MIL-STD-2073-1	-	Standard Practice for Military Packaging.

HANDBOOKS

DEPARTMENT OF DEFENSE (Continued)

MIL-HDBK-701	-	Blocking, Bracing, and Skidding of Industrial Plant Equipment for Shipment and Storage.
MIL-HDBK-774	-	Palletized Unit Loads.
MIL-HDBK-775	-	Foam-In-Place Packaging, Procedures For.

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094. Electronic copies of military and federal specifications, standards, and handbooks may be obtained from http://astimage.daps.dla.mil/quicksearch/.)

2.2.2 Other Government documents and publications. The following other Government documents and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

CODE OF FEDERAL REGULATIONS (CFR)

23 CFR	-	Highways.
29 CFR	-	Labor.
40 CFR	-	Protection of Environment.
49 CFR	-	Transportation.

(Application for copies should be addressed to the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. Electronic copies of CFR documents may be obtained from http://www.access.gpo.gov/.)

DoD REGULATIONS

DOD 4145.19-R-1	-	Storage and Materials Handling.

JOINT MILITARY

DLAR 4500.25/AR 70-44/ OPNAVINST 4600.22/ AFR 80-18/MCO 4610.14	-	DoD Engineering for Transportability.

(DoD regulations and joint military publications required by the contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting office.)

PURCHASE DESCRIPTION

ATPD 2232 - Engines: Preparation for Shipment and Storage of.

(Application for copies should be addressed to the U.S. Army Tank-Automotive and Armaments Command, ATTN: AMSTA-TR-E/BLUE, Warren, MI 48397-5000.)

2.3 Non-government publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise specified, the issues of documents that 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 documents cited in the solicitation.

Advanced Information Management (AIM)

AIM BC1 - Uniform Symbology Specification - Code 39 (DoD adopted).

(Application for copies should be addressed to the AIM, 634 Alpha Drive, Pittsburgh, PA 15238. Electronic copies of AIM standards may be obtained from http://www.aimusa.org/.)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 295 - Standard Test Methods for Varnished Cotton Fabrics Used for Electrical Insulation (DoD adopted).
ASTM D 3951 - Standard Practice for Commercial Packaging (DoD adopted).
ASTM D 3953 - Standard Specification for Strapping, Flat Steel and Seals (DoD adopted).
ASTM D 3955 - Standard Specification for Electrical Insulating Varnishes.
ASTM D 4675 - Standard Guide for Selection and Use of Flat Strapping Materials (DoD adopted).
ASTM D 4727/D 4727M - Standard Specification for Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes (DoD adopted).
ASTM D 5486/D 5486M - Standard Specification for Pressure-Sensitive Tape for Packaging, Box Closure, and Sealing (DoD adopted).

(Application for copies should be addressed to the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Electronic copies of ASTM standards may be obtained from http://www.astm.org/.)

NATIONAL AEROSPACE STANDARDS (NAS)

NAS 847 - Caps and Plugs, Protective, Dust and Moisture Seal (DoD adopted).

(Application for copies should be addressed to the Aerospace Industries Association of America, 1250 Eye Street, NW, Suite 1200, Washington, DC 20005-3924. Electronic copies of NAS standards may be obtained from http://www.aia-aerospace.org/.)

2.4 Order of precedence. In the event of a conflict between the text of this standard and the references cited herein, the text of this standard takes precedence. Nothing in this standard, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. DEFINITIONS

3.1 Adjacent storage. Adjacent storage is defined as storage in the vicinity of the premises of the last user.

3.2 Cleaning. Cleaning is defined as the removal of acidity, alkali, rust, dirt, sludge, chips, scale and other harmful foreign matter from the internal and external surfaces of IPE.

3.3 Commercial packaging. Commercial packaging is defined as packaging currently utilized and deemed acceptable by the IPE industry and meeting the requirements of ASTM D 3951.

3.4 Compressed air, moisture free. Compressed air, moisture free, is defined as air with a moisture content of 5 percent or less.

3.5 Container. A container is defined as any box, crate, drum, or container used for the protection of IPE from physical and mechanical damage during shipment and storage.

3.6 Controlled humidity storage. Controlled humidity storage is defined as storage in an area with humidity control sufficient to prevent deterioration of stored equipment caused by moisture and other environmental conditions.

3.7 Critical items. Critical items are defined as one of the following:

(1) Critical chemical items. Critical chemical items are items of such a nature that any degree of deterioration (in the form of corrosion, stain, scale, mold, fungi, bacteria, etc.) will result in premature failure or malfunction of the item.

(2) Critical physical items. Critical physical items are items of such a nature that the slight degree of physical action on the item or any of their integral surfaces, renders them unfit for use. This includes items having a surface finish of 32 micro inches maximum roughness average (RH) or less and which require a high degree of cleanliness and freedom from contamination as well as those requiring special protection against shock, vibration, abrasion, and deterioration damage.

3.8 Cube. A cube is defined as the volume of space occupied by the unit under consideration computed by multiplying overall exterior length, width, and height. For shipping purposes, a cube is expressed to the nearest tenth of a cubic foot.

3.9 Disassembly. Disassembly is defined as the removal of major components and assemblies from IPE to facilitate inspection, cleaning, drying, preservation, and shipment.

3.10 Documentation. Documentation is defined as packing lists, inspection and test reports, operation and installation instructions, historical records, diagrams, and utility connections, photographs, manufacturing procedures, and any other technical data utilized in the operation or maintenance of IPE.

3.11 Electrostatic discharge (ESD). ESD is defined as the transfer of electrostatic charge between bodies at different electrostatic potentials caused by direct contact or induced by an electrostatic field.

3.12 Inch-pound units. Inch-pound units are a system of measures based on the yard and pound commonly used in the United States of America and defined by the National Institute of Standards and Technology.

3.13 Industrial plant equipment (IPE). IPE is defined as equipment used for the purpose of cutting, grinding, shaping, forming, heating or otherwise altering the physical, electrical or chemical properties of materials and having an acquisition cost of $5,000 or more.

3.14 Levels of protection. A means of specifying the level of military preservation and packing that a given item requires to ensure that it is not degraded during shipment and storage. Specific levels of protection are as follow:

a. Military level of preservation. Preservation designed to protect an item during shipment, handling, indeterminate storage, and distribution to consignees worldwide.

b. Military levels of packing.

(1) Level A. Protection required to meet the most severe worldwide shipment, handling and storage conditions. A Level A pack must, in tandem with the applied preservation, be capable of protecting material from the effects of direct exposure to extremes of climate, terrain, and operational and transportation environments. Examples of situations which indicate a need for use of a Level A pack are: War Reserve Material, mobilization, strategic and theater deployment and employment, open storage, and deck loading. Examples of containers used for Level A packing requirements include, but are not limited to, overseas type wood boxes and plastic and metal reusable containers.

(2) Level B. Protection required to meet moderate worldwide shipment, handling and storage conditions. A Level B pack must, in tandem with applied preservation, be capable of protecting material not directly exposed to extremes of climate, terrain, and operational and transportation environments. Examples of situations which indicate a need for use of a Level B pack are: security assistance (for example, Foreign Military Sales (FMS) and containerized overseas shipments. Examples of containers used for Level B packing requirements include, but

are not limited to, domestic wood crates, weather-resistant fiberboard containers, fast pack containers, weather-resistant fiber drums, and weather-resistant paper and multi-wall shipping sacks. Items previously prepared to a higher level will not be reworked to conform to any lower level specified in the shipping document(s), except for air shipment. Items previously prepared at a lower level will be reprocessed to conform to any higher level(s) specified in the shipping document.

3.14.1 Military protection. Military protection is designed to provide maximum protection of IPE during shipping, handling and storage. Military protection is a non-controlled storage environment for a minimum of 12 months or overseas shipments in all climatic conditions for a minimum of 12 months. This level of protection is adequate for IPE designed Military Support Items (MSI).

3.14.2 Minimal protection. Minimal protection, as defined by ASTM D 3951, is designed to provide minimal protection of IPE during shipping, handling, and storage. IPE processed at this level is shipped and handled under cover, and stored in a controlled humidity environment for a maximum of 18 months. This protection is adequate for routine domestic shipping from user to user, plant equipment packaging, user to Department of Defense Industrial Reserve or manufacturer to user.

3.15 Marking IPE. Marking IPE is defined as the application of numbers, letters, labels, tags, symbols, or colors for handling or identification of IPE during shipment and/or storage.

3.16 Metric units. Metric units are a system of measures defined by the International System of Units (SI) of the International Bureau of Weights and Measures.

3.17 Measurement system. A measurement system is defined as a system in which all measurements, dimensions, sizes, and capacities are depicted in inch-pound units. The measurements may be converted to metric units through the use of the conversion factors and methods specified in FED-STD-376.

3.18 Computer numeric control (CNC). Computer numeric control (CNC) is defined as an automated means for IPE to interpret pre-recorded alpha-numeric coded instructions for directing the operation(s) of a machine or process.

3.19 Packaging. Packaging is defined as the processes and procedures used to protect equipment and material from deterioration, damage or both. Packaging encompasses cleaning, drying, preserving, packing, marking, and unitization.

3.20 Packing. Packing is defined as the assembly of IPE into a unit package, intermediate package, or exterior package with the necessary blocking, bracing, cushioning, weatherproofing, reinforcing, and marking.

3.21 Packing list. A packing list is defined as a printed listing of IPE on DD Form 1750, packed into a container on a pallet or on a skid. DD Form 1149, DD Form 1342, or instruction sheets may be used as packing lists for IPE.

3.22 Plant equipment package. Plant equipment package is defined as a complement of Government-owned IPE stored as an entity at a planned production site or a designated packaging area.

3.23 Polychlorinated biphenyl (PCB). PCB is defined as any chemical substance (or any combination of substances) that is limited to the Biphenyl molecule that has been chlorinated to varying degrees.

3.24 Preservation. Preservation is defined as the utilization of protective measures (cleaning, drying, applying preservative materials, or using barrier materials, cushioning materials, and containers) for IPE.

3.25 Storage-in-place. Storage-in-place is defined as storage of IPE in its original operating position.

3.26 Storage, non-humidity controlled. Non-humidity controlled storage is defined as storage in an area with no provision for the control of humidity, such as warehouses, open or exposed areas and unimproved facilities.

3.27 Storage-on-site. Storage-on-site is defined as storage on the premises of the user.

3.28 Shrouding. Shrouding is defined as a protective cover of flexible material used to repel moisture from the top and sides of an item.

3.29 Unitization. Unitization is defined as the assembly of one or more items of IPE into a single load, effectively allowing the distribution system to manage the load as a single unit.

3.30 User. A user is defined as a government activity or contractor operating or proposing to operate IPE.

4. GENERAL REQUIREMENTS

4.1 Protection. All IPE shall be cleaned, dried, preserved, and packaged in accordance with the general requirements of paragraphs 4.2 through 4.17 and section 5 for the particular level of protection specified.

4.2 Disassembly and matchmarking. IPE shall be disassembled only to the extent necessary to permit adequate processing of the equipment. Electrical lines, tubing, piping, and related parts requiring disconnection, regardless of the size, shall be disconnected at the terminals or junctions. Under no circumstances shall disconnection be made by cutting. Terminals or junctions shall be clearly matchmarked to facilitate proper reconnection. Disassembly shall be performed in accordance with the manufacturers' instructions.

4.3 Processing facilities. Processing of IPE shall be accomplished within facilities that are weatherproof and dust-free. The processing area shall be temperature controlled and equipped with an adequate amount of processing equipment such as spray booths, preservative tanks, solvent tanks, drying ovens, and compressed moisture-free dry air. Protective equipment

such as aprons, gloves, breather masks, showers, and any other equipment deemed necessary to protect the processing personnel shall be utilized, as necessary.

4.4 Materials. Materials used for processing IPE shall be as specified herein or as specified in referenced specifications.

4.5 Cleaning. Thorough cleaning and drying shall be completed prior to the application of preservatives by any suitable means that will not damage the machine in any manner. All harmful foreign materials and contamination shall be removed (i.e. rust, sludge, chips, alkali, acidity, grease, etc.). Cleaning, drying, fingerprint removal, and the application of preservatives shall comprise an uninterrupted series of operations holding the total elapsed time to an absolute minimum. If periods of interruption are necessary, temporary wraps, covers, or enclosures shall be utilized to insure against contamination or deterioration of the item. The cleaning solution used for final wipe shall contain cleaning solvent conforming to type II of MIL-PRF-680 and mixed with 5 percent of preservative oil conforming to the Society of Automotive Engineers (SAE) viscosity grade 30 and MIL-PRF-21260. Items having irregular surfaces, crevices, undercuts, or pockets, shall be cleaned by brushing, wiping, or applying moisture-free compressed air. Exposed gears, precision bearings, electrical and electronic systems, motors, gauges, meters, timing devices, non-metallic units, and items containing organic materials shall be covered with a barrier material conforming to type II of MIL-PRF-22191 prior to the application of any solvents.

4.5.1 Processing IPE for shipment to a rebuild facility. When IPE is shipped to a rebuild facility, the shipping activity shall process the item only to the extent necessary to ensure the item reaches its destination without deterioration and damage. The process used shall be capable of protecting the item for a minimum of 180 days. The receiving activity shall certify that the item will be rebuilt within 180 days. If the time for processing the item exceeds 180 days, the item shall be stored in a controlled humidity warehouse or processed in accordance with paragraphs 4.5.1.1 through 4.5.1.4 herein. Regardless of the procedures used for processing, paragraph 4.13 herein shall always apply.

4.5.1.1 Interim storage cleaning. Interim storage is defined as the time period following shutdown maintenance and prior to long-term storage. Grease, grit, chips, spent coolant, fingerprints and other acidic and alkali residue shall be removed prior to interim storage.

4.5.1.2 Production phase-down. When production is phasing down, the using activity, contractor, maintenance activity, or government activity shall evaluate the production capability of each item of IPE. The production capability, operating capability or condition code of the item shall be based on its general utilization purpose. Both static and dynamic analytical testing shall be performed to ensure that the item is functioning within its specified parameters. In addition to condition coding, unusual circumstances such as missing parts, defective components, and erratic operations shall be noted. This data shall be provided as backup for the permanent record on DD Form 1342, and shall be maintained by the appointed activity.

4.5.1.3 Shutdown maintenance procedures. Shutdown maintenance procedures shall begin as soon as the IPE becomes idle. Every effort shall be directed toward initiating these progressive maintenance actions within a maximum period of 48 hours. These procedures shall represent the minimum cleaning, drying, and preservation operation to be performed on the IPE.

These procedures shall not release the contractor of any responsibility for disassembly and meeting the minimum requirements for long-term storage. To ensure thorough cleaning of the items, varying degrees of disassembly are mandatory. In normal atmospheric conditions, these procedures shall provide interim protection for 180 days. After 180 days, the equipment shall require additional cleaning and preservation in accordance with sections 4 and 5 herein.

4.5.1.4 Interim storage. After the IPE has been cleaned and preserved, all items shall be placed in interim storage to prevent deterioration. A protective dust shield or cover shall be provided for each machine. Dust shields shall be manufactured from waterproof barrier material conforming to type I of MIL-PRF-22191 or class E-2 of PPP-B-1055. Electrical and electronic equipment shall be enclosed in barrier material conforming to type I, class II of MIL-PRF-81705 or approved commercial material.

4.6 Fingerprint removal. After cleaning and drying and prior to the application of preservatives, surfaces shall be treated for the removal of fingerprints and other perspiration residues utilizing a compound conforming to MIL-C-15074.

4.7 Health and safety standards. All processes specified herein shall be in accordance with part 1910 of Title 29 CFR. Phosphate acid, dry cleaning solvents, paint thinners, trichloroethene (methyl chloroform technical), and other materials specified herein may be harmful. These materials demand special care due to toxic vapor emission and may cause injury to the lungs, eyes, and skin.

4.8 Preservation of surfaces. Preservatives shall be applied to interior and exterior surfaces by methods specified in MIL-STD-2073-1.

4.8.1 Preservation of painted surfaces. Where an excessive amount of paint is missing or there is damage to exterior surfaces, the item shall be touched-up or repainted to prevent deterioration of the surfaces. The color and workmanship of the paint application shall be such that the appearance of the machine is enhanced as much as practical. The choice between touch-up and complete repainting shall be made primarily on the basis of economy.

4.8.2 Preservation of unpainted surfaces. A preservative compound shall be applied to clean interior and exterior unpainted surfaces in accordance MIL-STD-2073-1. The preservative compound shall conform to the specified class and grade of MIL-PRF-16173. Care shall be taken to preserve only the required surfaces with minimum overlap on the adjacent painted surfaces.

4.9 Maintenance of preservative film. Caution shall be exercised to prevent preservatives from being rubbed off after application. When blocking and bracing comes in contact with a preserved area, greaseproof paper conforming to type I, grade A of MIL-PRF-121 shall be inserted with a double fold at the points of contact. The barrier material shall extend approximately one-half inch beyond the edge of the blocking material. Barrier materials shall be secured in place with tape conforming to ASTM D 5486/D 5486M.

4.10 Weatherproofing. IPE processed for overseas shipment shall be protected from dirt, moisture, saltwater, salt-air, and other harmful foreign material by a weatherproof enclosure with desiccant conforming to MIL-D-3464. Weatherproof barrier material shall be provided in the form of a case liner, crate liner, shroud or wrap fabricated from barrier material conforming to PPP-B-1055, MIL-PRF-22191, or MIL-PRF-121. The enclosed equipment shall be provided with a humidity indicator device conforming to MS20003.

4.11 Foam in-place packaging procedures. Foam in-place packaging procedures for IPE, accessories, and component parts shall reference MIL-HDBK-775.

4.12 Technical data. Technical data, including photographs, installation and foundation drawings, manufacturers' parts and operations manuals, and any other data relevant to operation and maintenance of the IPE shall be assembled and packed in accordance with method 33 of MIL-STD-2073-1. The package shall be protected against puncture and abrasion, sealed with tape conforming to ASTM D 5486/D 5486M, and clearly marked "TECHNICAL DATA" in bold, black letters. The package shall be placed inside a storage compartment of the IPE.

4.13 Hazardous contaminants. IPE and all associated components, parts, and attachments shall be purged of hazardous contaminants before movement by the activity responsible for shipment or storage. Hazardous contaminants include polychlorinated biphenyls (PCBs), asbestos, and radioactive, corrosive, or toxic materials. Unless more stringent state or local standards apply, PCB content of fluids in machinery shall not exceed the limits specified in part 761 of Title 40 CFR. All IPE shall be tested and certified to meet the requirements of part 761 of Title 40 CFR before storage or shipment.

4.14 Palletizing and skidding. IPE prepared for shipment or placed in storage (except standby-in-place) shall be either palletized or skidded in accordance with MIL-HDBK-774 or MIL-HDBK-701, as applicable. DoD reusable skids shall be returned to a Defense Supply Center directorate of IPE operations in accordance with MIL-HDBK-701.

4.15 Processing items for disposal. IPE prepared for disposal shall be afforded only the minimum preservation and packing necessary to retain the item in the condition existing at the time disposition action was determined.

4.16 Caution tag. A waterproof caution tag shall be affixed to the IPE. The tag shall state: MACHINE HAS BEEN PRESERVED FOR SHIPMENT AND/OR STORAGE. ALL LUBRICANTS HAVE BEEN DRAINED FROM THIS UNIT. DO NOT ATTEMPT TO OPERATE UNTIL LUBRICANTS HAVE BEEN REPLACED. BEFORE PUTTING MACHINE INTO OPERATION, SERVICE ALL RESERVOIR AND LUBRICATING SYSTEMS. Other applicable caution tags (HANDLE WITH CARE, METHOD II PACKAGE, CAUTION-SENSITIVE ELECTRONIC DEVICES-DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC OR ELECTROMAGNETIC FIELDS, etc.) shall be affixed as necessary.

4.17 Waiver of preservation, packing, and marking procedures. All preservation, packing and marking requirements shall be in accordance with MIL-STD-2073-1 and this standard. Any request for deviation from or waiver of these requirements and procedures shall be made in writing to the packaging management section within a service's responsible inventory control point (ICP). If a DLA managed item is involved, write to the Defense Supply Center Richmond, ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond, VA 23297-5610.

5. DETAILED REQUIREMENTS

5.1 Military level of preservation. IPE shall be preserved in accordance with ASTM D 3951, section 4 and paragraphs 5.1.1 through 5.1.32 of section 5. All cleaning and drying shall be accomplished immediately following shutdown in accordance with 4.5.

5.1.1 Exterior surfaces. Prior to cleaning, accessories and attachments such as chucks, face plates, tool holders, jigs, fixtures, and grinding wheels shall be removed. All exterior surfaces shall be cleaned using cleaning solvent conforming to type II of MIL-PRF-680. After cleaning, all machined surfaces shall be preserved in accordance with MIL-STD-2073-1. Parts shall be submerged or manually rotated as necessary to ensure complete coverage of preservative.

5.1.2 Tables and ball-screw drive mechanisms. Tables, ball-screw mechanisms, and other components moving on roller bearings shall be removed or blocked to prevent damage to these devices. Preloaded bearings shall be relieved, ball-screw driven components shall have the ball nut disconnected, and the complete mechanisms shall be protected to prevent damage during shipping and handling. All required surfaces shall be coated with a preservative compound conforming to grade 2 of MIL-PRF-16173.

5.1.3 Drive belts and pulleys. All drive belts shall be removed from the equipment. The face or grooves of ferrous metal pulleys shall be coated with a preservative compound conforming to grade 2 and grade 4 of MIL-PRF-16173 or approved commercial preservative. Belts that have been removed shall be packed in accordance with method 10 of MIL-STD-2073-1.

5.1.4 Internal mechanisms and systems. All non-electronic and electrical internal mechanisms, except gear cases and hydraulic systems shall be drained and cleaned with a solution consisting of one part preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260 and nine parts cleaning solvent conforming to type II of MIL-PRF-680. The reservoir shall be filled with the cleaning solution. The solution shall be circulated with the equipment connected to power and operated at its lowest feeds and speeds. Circulation shall be no longer than necessary to ensure thorough cleaning. The solution shall be drained and the reservoir refilled with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260. The oil shall be circulated to ensure that all parts are coated. The reservoir shall be drained and all openings closed. Very large items of IPE that cannot be economically cleaned and preserved under power and items with internal mechanisms that could become damaged under power shall be flushed with the solutions specified above. When feasible during cleaning and preservation, the item shall be rotated manually to completely coat the internal mechanisms. After the preservation process, the system shall be drained and all openings closed.

5.1.5 Lubrication systems. Lubrication systems shall be drained and filled with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260. The lubrication system shall be flushed and drained and all openings closed.

5.1.6 Gear cases. Gear cases shall be drained and flushed with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260. The gear cases shall be flushed while the machine is operating under power. After the oil has been circulated thoroughly, the oil shall be drained completely. The gear cases shall be refilled with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260. The oil shall be circulated thoroughly, drained completely, and all openings closed. If power operation is not feasible, the gear case shall be flushed manually or with a pump and all openings closed.

5.1.7 Cutting fluid systems. Cutting fluid systems shall be drained and all foreign matter shall be removed. The systems shall be flushed thoroughly with a solution consisting of one part preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260 and nine parts cleaning solvent conforming to type II of MIL-PRF-680. The solution shall be circulated thoroughly and drained. The system shall be flushed with preservative oil conforming to grade 3 of MIL-PRF-16173. The system shall be drained and all openings closed.

5.1.8 Hydraulic systems. Hydraulic systems shall be inspected and tested to determine the condition of the reservoir and hydraulic fluid. If the reservoir and hydraulic fluid are clean and uncontaminated and certified to part 761 of Title 40 CFR, then no further processing is required except to fully retract and secure the hydraulic mechanisms, drain the system and close all openings. If the hydraulic system is dirty and/or contaminated with PCBs, the system shall be drained and decontaminated by cycling and flushing with new hydraulic fluid specified in the operator's manual or hydraulic fluid conforming to MIL-PRF-6083 until it meets the requirements of part 761 of Title 40 CFR. After decontamination, the hydraulic system shall be drained and all openings closed.

5.1.9 Water cooling chambers, water jackets, steam lines, and related systems. Cooling chambers and water jackets shall be drained, refilled with clean fresh water, and flushed to remove all corrosion, rust, and harmful foreign matter. The water shall be completely drained from the system and steam lines with moisture-free compressed air. No preservative shall be applied to these systems. All openings shall be closed.

5.1.10 Coolant systems. Coolant systems that require anti-freeze shall be filled to the operating level with 50 percent of anti-freeze conforming to type I or type II of A-A-52624 and 50 percent water. If the system contains a thermostat, the equipment shall operate long enough to allow the thermostat to open to provide for even distribution of the coolant. The equipment shall not be drained and all openings shall be closed. The equipment shall be tagged with the following: NOTE: "THE COOLANT SYSTEM CONTAINS WATER AND ANTI-FREEZE SOLUTION IN EQUAL PARTS. DO NOT DRAIN-CHECK COOLANT LEVEL."

5.1.11 Bearings, general purpose. Bearings that have been removed from operating position for storage purposes shall be individually preserved in accordance with MIL-DTL-197.

5.1.12 Instrument precision bearings. Instrument precision bearings that have been removed for storage shall be cleaned and dried with any suitable process that is not damaging to the item. Bearings shall be coated with a preservative conforming to class 3 of MIL-C-11796. Bearings shall be wrapped in barrier material conforming to MIL-PRF-121, preserved in accordance with method 41 of MIL-STD-2073-1, and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1.

5.1.13 Electrostatic protection. Electrostatic discharge (ESD) sensitive devices as defined by MIL-STD-1686 sha1l be provided ESD protection by properly safeguarding packaging workstations, properly outfitting personnel (i.e., grounding devices, etc.), and using ESD protective packaging materials. The item shall be initially wrapped with ESD protective packaging or cushioning material. The ESD packaging material shall conform to type II of MIL-PRF-81705 or type I, class A, style 2 of MIL-B-117. The wrapped or cushioned items shall be unit packed in heat-sealed bags conforming to type I, class F, style 1 of MIL-B-117 or approved commercial materials.

5.1.14 Electromagnetic protection. Electromagnetic sensitive devices shall be provided electromagnetic protection by enclosing the items in a heat-sealed bag conforming to type I, class F, style 1 of MIL-B-117 or approved commercial materials.

5.1.15 Contact and machined surfaces. Contact and machined surfaces such as machine ways, friction surfaces, gear trains, and adjustment and lead screws shall be coated with a preservative compound conforming to grade 2 and grade 4 of MIL-PRF-16173. Gear trains and lead screws shall be rotated to ensure complete coverage with the preservative.

5.1.16 Non-lubricated internal surfaces. Non-lubricated internal surfaces such as on gears and coolant tanks shall be covered by spraying or fogging with a preservative compound conforming to grade 4 of MIL-PRF-16173.

5.1.17 Repair parts, attachments, and accessories. Repair parts, attachments, and accessories having machined surfaces shall be coated with a preservative compound conforming to grade 2 and grade 4 of MIL-PRF-16173. All preserved parts not attached to the equipment shall be placed in bags manufactured from barrier material conforming to MIL-B-117 or wrapped in barrier material conforming to grade A, type I or II, class 2 of MIL-PRF-121 and secured with waterproof tape conforming to ASTM D 5486/D 5486M. Wrapped items shall be placed in a container conforming to Level A requirements of MIL-STD-2073-1 and identified by nomenclature, part number, and National Stock Number (NSN) on the packing list.

5.1.18 Hose and hose fittings. Hose and hose fittings not installed on the equipment shall be cleaned, dried, and preserved in accordance with Level A requirements of MIL-H-775.

5.1.19 Closure of openings. Small openings, except for vents and louvers installed for ventilation purposes shall be sealed with tape conforming to ASTM D 5486/D 5486M. Large openings shall be covered with waterproof barrier material conforming to class E-l or L-4 of PPP-B-1055 and secured with tape conforming to ASTM D 5486/D 5486M. Very large openings shall be covered with wood, plywood, or sheet metal. Open ends of all pipes shall be plugged with pipe fittings or plastic cap plugs conforming to NAS 847.

5.1.20 Engines, gasoline and diesel. Gasoline and diesel engines shall be preserved in accordance with ATPD 2232.

5.1.21 Air cylinders. Air cylinders shall not be removed from the basic IPE unit. The internal surfaces of the cylinders and the operating mechanisms shall be cleaned, dried, and fogged with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260. Organic packing shall be inspected and replaced if necessary.

5.1.22 Air motors and lines. Interior surfaces of air motors and air lines shall be coated with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260 by injecting the oil into the inlet air stream while operating the motor until the oil appears at the exhaust ports. Air inlets and outlets shall be sealed with plastic cap plugs conforming to NAS 847 or tape conforming to ASTM D 5486/D 5486M.

5.1.23 Organic packing. Organic packing in coolant, lubricant, hydraulic and other liquid carrying systems shall not be removed.

5.1.24 Dial indicators. Dial indicators shall be cushioned with material conforming to A-A-59136. The dial indicators shall be preserved in accordance with method 41 of MIL-STD-2073-1 and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1.

5.1.25 Gauges and measuring instruments. Gauges and measurement instruments shall not be removed from IPE unless they protrude or otherwise are subject to damage. Gauges and instruments (other than dial indicators) including unit gauges, fixture gauges, and other measuring instruments shall be cushioned with barrier material conforming to MIL-PRF-121 and preserved in accordance with method 41 of MIL-STD-2073-1. Gauges and measuring instruments shall be placed in a container conforming to Level A packing requirements of MIL-STD-2073-1.

5.1.26 Loose parts. All loose parts that have been preserved and are not to be reinstalled immediately or retained with the basic unit shall be placed in bags conforming to MIL-B-117 or wrapped in barrier material conforming to type I or II, grade A, class 2 of MIL-PRF-121. Wrapped or bagged parts shall be secured with tape conforming to ASTM D 5486/D 5486M and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1. Volatile corrosion inhibitors shall not be used in any containers unless the containers are sealed.

5.1.27 Tool and tool accessories. Tool and tool accessories shall be cleaned, dried, preserved, and packed in accordance with standard commercial practices. Tools and tool accessories may be packed with volatile corrosion inhibitor material conforming to MIL-I-8574 and placed in sealed containers.

5.1.28 Slides, counterbalances, motors, and hydraulic tables. Slides, counterbalances, motors, hydraulic tables, and other moveable components shall be cleaned, dried, preserved, and securely braced to the machine or removed. Projecting parts difficult to support or protect shall be removed and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1, and if possible, placed on the same skid.

5.1.29 Forges, furnaces, and ovens. Forges, furnaces, and ovens shall be preserved in accordance with method 50 of MIL-STD-2073-1 and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1. Components, attachments, and accessories shall be removed to avoid damage. Palletizing and skidding shall be in accordance with section 4.14 herein.

5.1.29.1 Removal of furnace lining. The furnace lining consisting of firebrick, insulation, or firebrick and insulation in electrode-type salt bath furnaces with ceramic pots shall be removed and discarded. The furnace lining shall be removed entirely from any type of furnace that has been in uninterrupted service for five or more years. A furnace that has been in service for less than five years or has been in interrupted service under constant low heat, while idle, and is substantially free of any type of deterioration shall be considered for shipment with its lining in place. Blocking and bracing of the lining shall be in accordance with MIL-HDBK-701. Lining shipped separately from the furnace or oven shall be packed in a container conforming to Level A packing requirements of MIL-STD-2073-1. Each container shall not exceed 200 pounds when packed. To prevent damage to the lining, each piece of lining shall be separated from the other and from the inside face of the container with cushioning material conforming to PPP-C-1797 or approved commercial cushioning material. Palletization of the furnace liner should refer to MIL-HDBK-774.

5.1.30 Electrical and electronic equipment. Electrical and electronic equipment shall be cleaned and dried with any suitable means that is not damaging to the item. Electrical and electronic equipment shall be preserved in accordance with method 50 of MIL-STD-2073-1 and protected with moisture and fungus resistant varnish conforming to ASTM D 3955 and ASTM D 295 as required. The equipment shall be placed in a container conforming to Level A packing requirements of MIL-STD-2073-1. Palletizing and skidding shall be in accordance with paragraph 4.14 herein. When essential to the preparation for shipment, handling, and storage, components may be disconnected and removed from the parent machine. Cable assemblies shall be carefully removed during disassembly. All openings in the electronic devices shall be sealed with tape conforming to ASTM D 5486/D 5486M.

5.1.30.1 Computer Numeric Controlled (CNC) system cleaning. CNC systems shall be cleaned with a damp cloth and non-detergent cleaning solution or a cleaning solution that is recommended by the manufacturer. After cleaning, the system shall be thoroughly dried before the application of a preservative and before putting the system back into service or storage. The display unit shall be wiped with a soft cloth, lint free paper towel, or a soft brush, using water only. Keyboards shall be cleaned with moisture-free air.

5.1.30.1.1 CNC preservation protection. CNC systems shall be preserved in accordance with section 5.1.1.30. Actuators, electronic servo, and similar devices shall be preserved with a preservative compound conforming to grade 2 of MIL-PRF-16173. Hydraulic actuators shall be preserved with an approved commercial hydraulic fluid. Loose electrical brush-holders, fuse-holders, tube-holders, and similar items shall be enclosed in moisture-proof barrier material conforming to type I, class 1 of MIL-PRF-81705.

5.1.30.1.2 CNC vibration insulation. Vibration dampening materials and other physical security measures shall be utilized as required to insulate against vibratory forces.

5.1.30.1.3 CNC removed parts. Parts that have been removed from the CNC system shall be preserved in accordance with section 5.1.1.30.

5.1.30.1.4 Identification (ID) of CNC units disconnected from machines. The CNC system model number, ID number, nomenclature, and manufacturer's name shall be recorded on a tag and taped to the inside of the control cabinet door. This data shall also be stenciled on the shipping cover or container to ensure correct identification and matching of the machine control unit upon reassembly.

5.1.30.2 Cable, cord, and wire assemblies. Exposed wires, sockets, connector plugs, terminals, and openings in switches and junction boxes shall be sealed with tape conforming to ASTM D 5486/D 5486M. Cable, cord, and wire assemblies shall be cleaned and coiled to a minimum safe diameter with no kinks or other deformations and placed in a container conforming to Level A packing requirements of MIL-STD-2073-1.

5.1.30.3 Electrical heating elements. Electrical heating elements removed from the basic unit shall be individually preserved in accordance with method 10 of MIL-STD-2073-1 and packed in a container conforming to Level A packing requirements of MIL-STD-2073-1.

5.1.30.4 Electrical motors. Electrical motors detached from machines shall be preserved in accordance with Level A requirements of MIL-E-16298.

5.1.30.5 Transformers. Transformers shall be preserved in accordance with sections 5.1.30.5.1 through 5.1.30.5.3.

5.1.30.5.1 Transformer, distribution and hermetically sealed type. Distribution and hermetically sealed type transformers shall be preserved in accordance with method 10 of MIL-STD-2073-1.

5.1.30.5.2 Transformer, molded and encapsulated type. Molded and encapsulated type transformers shall be preserved in accordance with method 30 of MIL-STD-2073-1.

5.1.30.5.3 Transformer, open construction type. Open construction type transformers shall be preserved in accordance with method 50 of MIL-STD-2073-1.

5.1.31 Drawers and door assemblies. Sliding surfaces of drawer guides shall be coated with preservative grease conforming to MIL-PRF-23827, MIL-PRF-10924, MIL-PRF-81322, or approved commercial grease. Internal surfaces of door hinges shall be coated with preservative oil conforming to viscosity grade SAE 30 of MIL-PRF-21260 or approved commercial oil. In addition to the mechanical locks and latches, doors and drawers shall be secured with metal strapping conforming to ASTM D 3953 and ASTM D 4675. Fiberboard pads conforming to ASTM D 4727/D 4727M shall be placed between the strapping doors and drawers to prevent the strapping from marring the painted surfaces.

5.1.32 Frames, tanks, paint spray booths, and conveyor systems. Equipment of this type shall be handled as a unit or disassembled only to the extent necessary for preservation and ease of transportability. Unpainted metal surfaces shall be coated with a preservative compound conforming to grade 2 and grade 4 of MIL-PRF-16173. Bearings and fittings shall be preserved with

preservative grease conforming to MIL-PRF-10924, MIL-PRF-23827, MIL-PRF-81322, or approved commercial grease.

5.2 Packing. Packing shall be Level A, B, minimal, or per ASTM D 3951, as specified. Packing shall comply with the minimum weight and cube requirements of the joint regulation Defense Logistics Agency Regulation (DLAR) 4500.25, Army Regulation (AR) 70-44, Navy Instruction (NAVINST) 4600.22, Air Force Regulation (AFR) 80-18, and Marine Corps (MCO) 4610.14.

5.2.1 Packing list. Exterior packing lists shall be sealed in waterproof or water-resistant envelopes. Envelopes shall be secured to the exterior of the skidded, palletized load or container in the most protected location with one-inch tape conforming to ASTM D 5486/D 5486M.

5.3 Level A packing. Level A packing shall be used for overseas shipment of IPE or for equipment to be retained in non-dehumidified storage. Containers with contents weighing more than 200 pounds shall be provided with skid runners in accordance with Level A packing requirements of MIL-STD-2073-1. All screws, nuts, and bolts used in the container shall conform to the requirements of FED-STD-H28. Electronic and electrical equipment weatherproofing shall be accomplished with material conforming to MIL-PRF-81705. Palletizing and skidding shall conform to paragraph 4.14 herein.

5.3.1 Equipment weighing 1,000 pounds or less. Equipment weighing 1,000 pounds or less shall be packed in an overseas container conforming to Level A packing requirements of MIL-STD-2073-1. Blocking, bracing, and skidding should reference MIL-HDBK-701. Contents of each container shall be secured in a waterproofed case liner or wrap material.

5.3.2 Equipment weighing between 1,001 and 4,000 pounds. Equipment weighing between 1,001 and 4,000 pounds shall be packed in an overseas shipping container conforming to Level A packing requirements of MIL-STD-2073-1. The contents of each container shall be secured in waterproof case liners or wrapped material. Blocking, bracing, and skidding should reference MIL-HDBK-701.

5.3.3 Equipment weighing between 4,001 and 16,000 pounds. Equipment weighting between 4,001 and 16,000 pounds shall be packed in an overseas shipping container conforming to Level A packing requirements of MIL-STD-2073-1. The contents of each container shall be secured in approved commercial waterproof enclosure materials or when electronic equipment is enclosed, the enclosure material shall conform to MIL-PRF-81705. Blocking, bracing, and skidding should reference MIL-HDBK-701.

5.3.4 Equipment weighing between 16,001 and 30,000 pounds. Each item weighing between 16,001 and 30,000 pounds shall be packed in an overseas shipping container conforming to Level A packing requirements of MIL-STD-2073-1. The contents of each container shall be secured in waterproofed bag, shroud or wrapped materials conforming to PPP-B-1055. Blocking, bracing, and skidding should reference MIL-HDBK-701.

5.3.5 Equipment weighing over 30,000 pounds. Equipment weighing over 30,000 pounds or in excess of the dimensional limitations specified in MIL-STD-2073-1 shall be packed in accordance with directions issued by the organization directing the shipment. Blocking, bracing, and skidding should reference MIL-HDBK-701. Contents of each container shall be secured in weatherproofed wrap or shroud conforming to class E of PPP-B-1055.

5.4 Level B packing. Level B packing shall be used for domestic and overseas shipment of IPE under favorable environmental conditions. The only difference between Level A and B packing is in the requirement for a container and container closure. Containers with contents weighing more than 200 pounds shall be provided with skid runners. Blocking, bracing, and skidding should reference MIL-HDBK-701. Containers shall conform to Level B requirements of MIL-STD-2073-1.

5.5 Minimal packing. When anticipated logistics paths indicate that items requiring military preservation will not be exposed to shipping environments more severe than those normally in the commercial distribution system, acceptable minimal packing methods, as outlined in table J.IXa of MIL-STD-2073-1, may be utilized.

5.6 Commercial packing. Containers shall meet the requirements of ASTM D 3951. Palletizing and skidding shall conform to section 4.14 herein. Equipment shall be packed in a manner that will prevent deterioration and damage during shipping, handling and storage. The shipping container (including any necessary blocking, bracing, cushioning, or waterproofing) shall comply with the regulations of the carrier used and shall provide safe delivery to the destination at the lowest tariff cost.

5.7 Marking. Marking shall be in accordance with MIL-STD-129.

5.7.1 Bar code marking. When bar code marking is specified in the contract or order, the bar code marking shall be in accordance with AIM BC-1.

5.8 Inspections. Inspection of IPE shall be performed by a designated government agent before shipping or placing the equipment in storage. Each component shall be visually inspected to determine the completeness and condition of the cleaning, drying, and preservation of the equipment. The item shall be inspected to ascertain the condition of the item after transportation and handling and before placing the item in storage. The item shall be provided with warning tags, packing list, and all other conditions that may be discovered during inspection as specified herein. Any discrepancy discovered shall be corrected before shipment or storage.

5.8.1 Inspection after disassembly. Equipment shall be inspected after disassembly and before cleaning to identify and replace missing parts or components.

5.8.2 Inspection after cleaning. Inspection shall be performed after disassembly and cleaning and before preservation to ensure that all cleaning and drying has been accomplished. The inspection shall determine if the item is free of corrosion, dirt, spent coolant, grease, oil, alkalis, salt, acidity, and other foreign materials. If re-cleaning is required, the item shall be re-inspected until the equipment passes.

5.8.3 Inspection of preservation. IPE processed for shipment and storage shall be inspected to ensure that the proper preservative was used on the equipment. The inspection shall confirm that correct reassembly was accomplished after disassembly and cleaning. All surfaces requiring a preservative have been treated in such a manner that it will withstand the terrain and environmental conditions it may encounter during transportation, handling, and storage. After cleaning, drying, preservation, and reassembly has been accomplished, additional inspections shall be performed to determine if all the procedures, processes, and practices have been satisfactorily accomplished. If any discrepancies are found, it shall be cause for rejection, and the equipment shall be reprocessed and re-inspected until the equipment passes all inspections specified herein.

5.8.4 Inspection before shrouding. Inspection shall be performed before shrouding to ensure that all accessories and components have been properly packaged and containerized. Marking shall be checked to ensure that it is in accordance with MIL-STD-129. Inspection of preservation, packing, skidding, shrouding, and loading shall be performed to ensure that they conform to the requirements of sections 4 and 5 of this standard and the applicable paragraphs herein.

5.8.5 Inspection of blocking and bracing. Machine heads shall be inspected to ensure that they have been locked and braced in the lowest position. Machine tables, ball-screw mechanisms, and ball or roller bearing assemblies shall be inspected to ensure they have been removed or securely braced in position. If weight and size permit, IPE shall be shipped completely assembled provided that all necessary blocking and bracing has been accomplished to ensure adequate protection for all components, attachments, and accessories. When it is not considered feasible to ship a machine assembled, the attachments, accessories, and components shall be packed in accordance to weight as specified herein. Cables, springs, drive belts, and similar components shall be inspected to ensure that all tension has been relieved. Recirculating ball-screw drive components shall be inspected to ensure that the ball nuts are disconnected and the complete mechanism is protected to prevent damage during shipping and handling. When required, preloaded bearings shall be relieved. Equipment shall be inspected after loading to ensure that the equipment is not blocked to the wall or floor of the trailer in which equipment is being shipped.

5.8.6 Responsibility for inspection. The using activity, contractor, packaging activity, owning activity, and the shipping activity having possession of the IPE shall be responsible for the inspection. The receiving activity is responsible for the equipment when it is accepted at its destination.

5.9 Shipment. All cleaning, drying, preservation, and packing requirements contained in this standard shall be accomplished prior to shipment. All markings, condition tags, inspection and test reports, certification requirements, and all other processes and procedures shall be performed before shipment.

5.9.1 Shipping covers and tarps. After the equipment has been loaded and secured to the conveyance, visual examination and inspection shall be performed on the equipment to determine if any disturbance has occurred to the preservatives on the machined surfaces. The integrity of the preservative shall be verified, and if touch-up procedures are required, the same type of preservative shall be applied to the scared areas. When uncovered transportation is utilized and the equipment is not preserved in accordance with military preservation

requirements, the equipment shall be covered with flexible, weatherproof barrier material conforming to class E of PPP-B-1055 or approved commercial plastic material. Polyvinyl chloride (PVC) or ethylene vinyl acetate (EVA) shall not be used as wrap, shroud, or cover material due to the possible corrosive effects of PVC and EVA vapors on the covered items and its components parts. All covers shall be of sufficient strength and secured in a manner to adequately protect the equipment throughout the transit period. Covers constructed of waterproof paper shall not be used. All sharp corners and projections shall be padded with polyethylene foam or cushioned material before covering. Covers shall be draped in a manner to completely cover the item and shall be arranged to avoid the formation of water pockets. Tarp seams shall be sealed with water-resistant adhesive conforming to MMM-A-260.

5.9.1.1 Shipping covers for CNC units. All CNC units shall be protected from the environment by enclosing the units in weatherproofed bags manufactured from material conforming to MIL-PRF-81705 or class E of PPP-B-1055. Seams shall either be heat-sealed or closed with tape conforming to ASTM D 5486/D 5486M.

5.9.2 Transportation mode. Except for shipment of delicate equipment such as computer numerical control units and other fragile items, IPE may be shipped by motor carrier, ship or air transportation as specified by the shipping activity. Unless a waiver is obtained, rail shipment is not authorized. Regardless of the mode of transportation used, the equipment shall be processed, loaded, protected, and shipped in a manner that will protect the equipment to the maximum extent possible. The motor carrier shall comply with Title 23 CFR, Chapters I and II, and Title 49 CFR, Chapter III.

5.9.2.1 Transportation mode for CNC equipment. CNC units, accessories, attachments, components, and other fragile items or assemblies shall be shipped in air ride vans only.

5.9.2.2 Waiver of transportation mode. When it is determined to be in the best interest to the Government to relax the transportation mode, a written request for waiver shall be provided to the Defense Supply Center Richmond, ATTN: DSCR-VBD, 8000 Jefferson Davis Highway, Richmond VA 23297-5610.

5.10 Storage. Machines mounted on wooden skids may be subjected to abnormal structural loads created by warpage of skid components under variable relative humidity conditions and temperature changes during storage. These structural loads can distort precision machinery and in extreme cases cause structural damage. After a machine has been placed in storage, the machine hold-down bolts shall be loosened a minimum of one-half inch from the base. The bolts shall be coated with preservative compound conforming to grade 2 and 4 of MIL-PRF-16173. Other machine-to-skid retention devices shall be similarly adjusted. Machines mounted on DoD reusable skids do not require loosening of the hold-down bolts or other retention devices. Each machine placed in storage with hold-down bolts loosened shall have a plain manila tag secured to each unit in a conspicuous location. Tag shall be stamped in red ink with the following statement: "MACHINE MOUNTING BOLTS LOOSENED-DO NOT MOVE UNTIL BOLTS ARE TIGHTENED." The machine-to-skid retention devices, whatever their configuration, shall be properly tightened and secured prior to movement of equipment.

5.10.1 Locator system. Each DoD storage maintenance activity shall have a locator system that shall reflect the current location of stored assets by ID number, parts number, and national stock number. All changes in the location of equipment shall be recorded immediately after completion of any move. Basic requirements for a locator system are provided in DoD 4145.19-R-1.

5.10.2 Storage types. IPE shall be stored in controlled humidity storage unless a waiver or deviation is obtained from DSCR-VBD. Non-controlled storage areas may be used for large bulky items such as tanks, furnaces, conveyors, drop hammers, and large casting and forging equipment.

5.10.2.1 Controlled humidity storage. Controlled humidity storage shall conform to DoD 4145.19-R-l. Controlled humidity areas shall consist of enclosed buildings, hutments, or other enclosed areas that maintain a 50 percent or less relative humidity. The relative humidity may be controlled by the use of air conditioning, heating, or dehumidification to ensure that it does not exceed 50 percent relative humidity.

5.10.2.2 Non-dehumidified storage. Non-dehumidified storage areas include warehouses, underground storage, or open areas which may be used for storage purposes, but for which humidity control equipment such as air conditioning, heating, or dehumidification units have not been provided. Equipment stored in uncovered or unsheltered areas shall be protected by tarpaulins, cocoons, or other appropriate means.

5.10.3 Storage areas. IPE may be stored in adjacent storage areas, in-place areas, on-site nearby, enclosed buildings, outdoor under cover, shed, or other appropriate locations.

5.10.3.1 Adjacent storage. Adjacent storage preparation shall be in accordance with the level specified.

5.10.3.2 Storage-in-place. In-place storage preparation shall be made immediately following or during shutdown. There are two types of storage-in-place: (1) Cycled/timed and aligned, and (2) Non-cycled/non-timed and aligned. Equipment in these areas shall remain in the original operating position connected to power. Preparation shall be in accordance with Level A requirement of this standard. When type I or type II storage-in-place is in a controlled humidity environment, preparation shall be in accordance with the minimal packing requirements of this standard.

5.10.3.3 Storage-on-site. Preparation for storage on site shall be in accordance with the requirements of sections 4 and 5 for the level of protection specified.

5.10.4 Storage arrangements. Whenever possible, like-items shall be stored together in the same area.

5.10.4.1 Leveling. All items shall be stored in a level position to prevent distortion of precision aligned elements. IPE having machine ways or other precision aligned elements that are over 6 feet long shall be maintained in a level position by shimming support members as required. Leveling of equipment on wooden skids shall be accomplished by placing shims between the skid and the machine base to ensure load transfer to the skid and the floor at the same points. Equipment on DoD reusable skids shall be leveled by placing shims between the

skid and the floor or by adjusting the leveling screws. If it becomes necessary to move equipment, the equipment shall be re-leveled upon relocation.

5.10.4.2 Aisle space. Equipment shall be arranged in storage to provide adequate aisle space for inspection and to provide adequate room for the removal of equipment. The width of aisles should be governed by the size of equipment stored and material handling equipment available for use. When practicable, the aisles should be continuous to promote a straight-line traffic pattern.

5.10.4.3 Attachments and accessories. Boxed and crated attachments and accessories shall be placed on the skid with the related equipment and avoiding contact with preserved surfaces. When the above requirements are not practical, boxed and crated attachments and accessories shall be block-stacked separately from the basic item and properly marked and identified to the item on which they belong. An appropriate notation shall be made on the record of the item to indicate that such attachments and accessories are stored in a particular location and are identified to the item.

5.10.4.4 Dust shields. Dust shields shall be used for covering IPE, attachments, accessories, and components preserved for long-term storage. Dust shields shall be placed over the equipment in a manner that will permit free circulation of air around and under the edges of the shields. All machine projections that could tear the shield(s) shall be wrapped with barrier material conforming to grade A of MIL-PRF-121 or type II of MIL-PRF-22191. If cushioning material is used, the material shall conform to PPP-C-1797. Polyvinyl chloride (PVC) or ethylene vinyl acetate (EVA) material shall not be used as a wrap, shroud, or cover material. Barrier and cushioning material shall be secured with tape conforming to ASTM D 5486/D 5486M.

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 standard is intended to be used for preparing government-owned IPE for shipment or storage. This standard is not intended for use in new procurement of equipment.

6.2 Issue of DoDISS. When this standard is used in acquisition, the applicable issue of the DoDISS must be cited in the solicitation (see 2.2.1 and 2.3).

6.3 Tailoring guidance. To ensure proper application of this standard, invitations for bids, requests for proposals, and contractual statements of work should tailor the requirements in sections 4 and 5 of this standard to exclude any unnecessary requirements.

6.4 Subject term (keyword listing).

Applicable documents	Hydraulic system
Cleaning	Inspection requirements
Definitions	Level of protection
Detailed requirements	Marking
Disassembly	Preservation
Federal acquisition regulations	Shipping requirements
General requirements	Storage requirements
Hazardous contaminants	Waiver procedures

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

Custodians:
Army - AR
Navy - SH
Air Force - 11
DLA - DH

Reviewers:
Army - AV, CR, SM
Navy - MC, YD
Air Force - 84, 99

Preparing activity:
DLA - GS6

(Project PACK-1104)

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.

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I RECOMMEND A CHANGE:	**1. DOCUMENT NUMBER** MIL-STD-107J	**2. DOCUMENT DATE (YYYYMMDD)** 20011203

DOCUMENT TITLE
PREPARATION AND HANDLING OF INDUSTRIAL PLANT EQUIPMENT (IPE) FOR SHIPMENT AND STORAGE

4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

5. REASON FOR RECOMMENDATION

6. SUBMITTER

a. NAME *(Last, First, Middle Initial)*	b. ORGANIZATION	
c. ADDRESS *(Include Zip Code)*	d. TELEPHONE (Include Area Code) (1) Commercial (2) DSN *(if applicable)*	**7.DATE SUBMITTED** (YYYYMMDD)

8. PREPARING ACTIVITY

a. NAME Defense Supply Center Richmond	b. TELEPHONE *Include Area Code)* (1) Commercial (804) 279-5019 (2) DSN 695-5019
c. ADDRESS *(Include Zip Code)* ATTN: DSCR-VBD (C. Hammond) 8000 Jefferson Davis Highway Richmond, VA 23297-5610	**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:** DEFENSE STANDARDIZATION PROGRAM OFFICE (DLSC-LM) 8725 John J. Kingman Road, Suite 2533 Fort Belvoir, VA 22060-6221 Telephone (703) 767-6888 DSN 427-6888