INCH-POUND

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SUPERSEDING
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MILITARY STANDARD

PREPARATION AND HANDLING OF INDUSTRIAL PLANT EQUIPMENT FOR SHIPMENT AND STORAGE

AMSC N/A

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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

FOREWORD

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

2. Beneficial comments (recommendations, additions, deletions), and any pertinent data which may be of use in improving this document should be addressed to: Defense Industrial Plant Equipment Center, DIPEC-SSG, 2163 Airway Blvd., Memphis, TN 38114-5051, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of the document or by letter.

3. 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.

4. Thorough cleaning and preservation of IPE during shutdown, or immediately thereafter, will minimize the necessity for subsequent major disassembly operations (which may disturb precision fits). Storage of this type equipment in humidity controlled warehouses or hutments substantially extends the length of time it may be stored without deterioration.

5. Included in this revision are new requirements for shutdown, maintenance, interim cleaning, interim storage, and preparation of IPE for rebuilt equipment. Decontamination of IPE for PCBs shall be in accordance with DLAM 4215.2, Management of Defense-Owned Industrial Plant Equipment (IPE). Requirements for IPE containing hazardous contaminants have been addressed in paragraph 4.12. Complete instructions for equipment containing explosive, radioactive, corrosive, toxic materials, inspection, testing, and certification of equipment contaminated with polychlorinated biphenyls (PCBs) are not included in this standard.

6. 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 reuseable skids in accordance with the above handbook is a cost savings effort by the Government. Therefore, any proposed deviation from the use of DOD reuseable skids for equipment weighing 42,000 pounds or less shall be directed to: Defense Industrial Plant Equipment Center, ATTN: DIPEC-SQ, 2163 Airways Blvd., Memphis, TN 38114-5051.

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1. SCOPE

1.1 Purpose. This standard provides both general and detail 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. Levels of preservation and packing protection for specific machine components, and marking are some of the detail requirements that have been provided. Detailed requirements have also been provided for equipment inspection, shipment, and storage.

1.2 Applicability. The requirements of this standard are applicable to all Department of Defense (DOD) activities, their contractors or vendors who control or have in their possession, IPE that is to be shipped, co-signed for reuse, placed in reserve storage, or placed in storage.

1.2.1 Application guidance. This standard applies to all IPE to be shipped or placed in storage.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this standard to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense index of specifications and standards (DODISS) and the supplement thereto cited in the solicitation.

SPECIFICATIONS

FEDERAL

L-P-378	Plastic Sheet and Strip, Thin Gauge, Polyolefin.
P-D-680	Dry Cleaning Degreasing Solvent.
QQ-A-1876	Aluminum Foil.
TT-P-664	Primer, Coating, Alkyd, Corrosion-Inhibiting, Lead and Chromate Free, Lacquer Resistance
UU-T-81	Tag, Shipping and Stock.
MMM-A-260	Adhesive, Water Resistant (for sealing waterproofed paper).
PPP-P-40	Preservation and Packing of Hand Tools; Tools and Tool Accessories for Power Driven, Metal and Wood-working Machinery.
PPP-T-60	Tape, Packaging Waterproofed.

PPP-F-320	Fiberboard, Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.
PPP-C-843	Cushioning Material, Cellulosic.
PPP-B-1055	Barrier Material, Waterproofed, Flexible.
PPP-C-1752	Cushioning Material, Packaging, Unicellular Polyethylene Foam, Flexible.
PPP-C-1797	Cushioning Material, Resilient, Low Density, Unicellular, Polypropylene Foam.
PPP-C-1842	Cushioning Material, Plastic, Open Cell (for Packaging Applications).

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MIL-E-75	Electron Tubes, Packing of.
MIL-P-116	Preservation, Methods of.
MIL-P-117	Bags, Sleeve, and Tubing-Interior Packaging.
MIL-B-121	Barrier Material, Greaseproofed, Waterproofed, Flexible.
MIL-V-173	Varnish, Moisture and Fungus Resistant (for Treatment of Communications, Electronic, and Associated Equipment).
MIL-H-775	Hose, Hose Assemblies, Rubber, Plastic, Fabric, or Metal (Including Tubing) and Associated Hardware, Packaging of.
MIL-L-2105	Lubricating Oil, Gear, Multipurpose (Metric).
MIL-L-3150	Lubricating Oil, Preservative, Medium.
MIL-P-3420	Packaging Materials, Volatile, Corrosion Inhibitor, Treated Opaque
MIL-D-3464	Dessicants, Activated, Bagged, Packaging Use and Static Dehumidification.
MIL-C-3600	Compressor, Air and Gas (Except Oxygen), Packaging of.
MIL-A-3816	Abrasives and Abrasive Products, Packaging of.
MIL-C-5501	Cap and Plug, Protective, Dust and Moisture Seal.

MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance.
MIL-H-6083	Hydraulic Fluid, Petroleum Base, for Preservation and Operation
MIL-L-6085	Lubricating Oil, Instrument, Aircraft, Low Volatility.
MIL-I-8574	Inhibitor, Corrosion, Volatile, Utilization of.
MIL-E-10062	Engine, Preparation for Shipment and Storage of.
MIL-L-10547	Liner, Case, and Sheet, Overwrap, Watervaporproof or Waterproof, Flexible.
MIL-G-10924	Grease, Automotive and Artillery
MIL-C-11796	Corrosion Preventive Compound, Petroleum, Hot Application.
MIL-V-13811	Varnish, Waterproofing, Electrical, Ignition.
MIL-C-15074	Corrosion Preventive, Fingerprint Remover.
MIL-C-16173	Corrosion Preventive Compound, Solvent Cutback, Cold Application.
MIL-E-16298	Electric Machines Having Rotating Parts, Accessories and Associated Support Items, Packaging of.
MIL-E-17555	Electronic and Electrical Equipment, Accessories and Provisioned Items (Repair Parts): Packaging of.
MIL-L-21260	Lubricating Oil, Internal Combustion Engine, Preservative and Break-in.
MIL-B-22020	Bag, Transparent, Flexible, Sealable Volatile Corrosion Inhibitor, Treated.
MIL-B-22191	Barrier Material, Transparent, Flexible, Heat Sealable.
MIL-G-23827	Grease, Aircraft and Instrument, Gear and Actuator Screw.
MIL-I-26860	Indicator, Humidity, Plug, Color Change.
MIL-W-45562	Welding and Soldering Equipment, Supplies and Accessories, Packaging of.

MIL-A-46153	Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty, Single Package.
MIL-G-81322	Grease, Aircraft General Purpose, Wide Temperature Range, NATO Code Number G-395.
MIL-B-81705	Barrier Material, Flexible, Electrostatic Free, Heat Sealable.
MS-20003	Indicator, Humidity, Card, Three Spot, Impregnated Areas (Cobaltous Chloride).

STANDARDS

FEDERAL

FED-STD-H28	Screw Thread Standards for Federal Service.
FED-STD-376	Preferred Metric Units for General Use by the Federal Government.
FED-STD-595	Colors, Requirements for Color Chips.

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MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	Marking for Shipment and Storage.
MIL-STD-147	Palletized Unit Loads.
MIL-STD-454	Standard General Requirements for Electronic Equipment.
MIL-STD-1186	Cushioning, Anchoring, Bracing, Blocking, and Waterproofing, with Appropriate Test Methods.
MIL-STD-1189	Standard Department of Defense Bar Code Symbology.
MIL-STD-1191	Foam-In-Place Packaging Procedures for.
MIL-STD-2073-1	DOD Materiel Procedures for Development and Application of Packaging Requirements.
DOD-STD-1686	Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices) (Metric).

HANDBOOKS

MILITARY

MIL-HDBK-701 Blocking, Bracing, and Skidding of Industrial Plant Equipment for Shipment and Storage.

MIL-HDBK-773 Electrostatic Discharge Protective Packaging.

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents form a part of this standard to the extent specified herein. Unless otherwise specified, the issue shall be that in effect on the date of the solicitation.

CODE OF FEDERAL REGULATIONS (CFR)

U.S. DEPARTMENT OF LABOR, OCCUPATION, SAFETY AND HEALTH ADMINISTRATION (OSHA)

29 CFR 1910 - Occupational Safety and Health Standards.

40 CFR 761 - Protection of the Environment.

49 CFR 100 to 199 Transportation.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402-0001).

PUBLICATIONS

U.S. DEPARTMENT OF DEFENSE

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

DLAM 4155.4/AR750-26/NAVSUP pub 5011/MCO P4870.45C, Storage/Maintenance of Industrial Plant Equipment.

DLAM 4215.2 Operations Manual for Storage/Maintenance of Defense Industrial Plant Equipment.

DLAR 4145.7/AR 700-15/NAVSUPINST 4030.28C/AFR 71-6, MCO 4030.33C, Packaging of Materials.

DLAM 4145.9/TM 38-260/NAVSUP PUB 523/MCO 4870.62/AFR 71-18, Preparation of Industrial Plant Equipment for Storage or Shipment.

DLAR 4500.25/AR 70-44/OPNAVINST 4600.22C/ AFR 80-18/MCO 4610.14D, DOD Engineering For Transportability.

(Copies of specifications, standards, drawings, and 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).

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E 380 and ANSI/IEEE 268 Metric Practice.

ASTM D 3951 Standard Practice for Commercial Packaging.

ASTM D 3953 Steel Flat and Seals Strapping.

ASTM D 4675 Flat Strapping Materials, Selection and Use of.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103-0001).

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT CLASSES AND RULES

National Motor Freight Classification.

(Application for copies should be addressed to the ATA Traffic Department, 2200 Mill Road, Alexandria, VA 22314-4677).

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

3. DEFINITIONS. For the purpose of this standard, the following definitions apply.

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

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

3.3 Compressed air, moisture free. Compressed air, moisture free, is defined as air with a moisture content of 5 percent or less obtained by utilizing properly maintained traps, filters, dryers, and desiccants in the source system.

drawing number, order number, inspection procedure identification

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

3.5 Controlled humidity storage. Controlled humidity storage is storage areas with humidity control to prevent deterioration of stored equipment caused by moisture and other environmental conditions.

3.6 Critical items. Items meeting one or more of the following criteria are considered critical:

(1) Critical chemical items. Chemical items are items which are of such a nature that any degree of deterioration (in the form of corrosion, stain, scale, mold, fungi, bacteria, etc.) caused by oxygen, moisture, sunlight, living organisms, temperature, time, and other contaminants will result in premature failure or malfunction of the item, or equipment in which installed or to which the item is related.

(2) Critical physical items. 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.

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

3.8 Level of protection. The level of protection is defined in terms of the amount of processing required to protect the equipment under unknown or known conditions. There is no direct relationship between level of protection and methods of preservation and packing. The level of protection and its application is determined by the conditions that the equipment may be expected to encounter during shipment, handling and storage. Methods of preservation and packing are determined by the physical characteristics of specific items of IPE to be protected as follows:

(a) Adequate, but not excessive protection shall be provided to prevent damage and deterioration.

(b) Items shall be processed for shipment in accordance with the level/method specified in the shipping document.

(c) Items previously prepared to a higher level shall not be reworked to conform to any lower level specified in the shipping document(s) except packing for air shipment. Items previously prepared at a lower level shall be reprocessed to conform to any higher level(s) specified in the shipping document.

(d) The levels of protection shall apply equally to preservation and packing.

3.8.1 Level A protection. Level A protection is designed to provide the maximum protection against the most severe conditions known or anticipated during shipment, handling, and storage. This level of protection is provided to selected items of IPE that are designated Military support items (MSI). Normally, level A protection is provided for non-controlled storage or overseas shipment and outdoor storage in all climatic conditions for a minimum of 12 months.

3.8.2 Level B protection. Level B protection is designed to provide the intermediate protection against conditions known to be less severe than those requiring level A, but more severe than those for which level C is adequate. Items processed at this level are intended to be shipped and handled under cover, and stored in favorable warehouses environments for a minimum of 18 months, or other structures having equivalent protection from the weather. This level of protection is adequate for standby in-place, standby on-site, and central storage. Level B preservation is basically the same as level A; however, level B packing may differ slightly from level A packing, (closure, strapping, etc.).

3.8.3 Level C protection. Level C protection is designed to provide minimum protection against known favorable conditions during shipment, handling, and storage. Level C protection shall be used on items of IPE to be placed in controlled humidity storage and for domestic shipment from user to user, PEP packaging, user to Department of Defense Industrial Reserve (DODIER), and manufacturer to user, and non-controlled warehouse environment for a maximum of 18 months. It provides for minimum protective measures required to ensure delivery to the first receiving activity without deterioration or damage during shipment and handling.

3.9 Disassembly. Disassembly is the removal of major components and assemblies, and other operations further dividing plant equipment to facilitate inspection, cleaning, drying, preservation, and shipment.

3.10 Documentation. Documentation consists of packing lists, inspection and test reports, operation and installation instructions, historical records, diagrams of electrical and hydraulic systems, and utility connections. When specified, the documentation shall include photographs, manufacturing procedures, and other required technical data.

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

3.12 Exercising. Exercising is a periodic no-load operation of stored machines through all feeds and speeds to distribute lubricants or preservatives.

3.13 Gross weight. Gross weight is the combined weight of an item, including its cushioning, blocking, and bracing materials and its shipping container. All weights shall be numerically indicated on the container and shall be expressed in pounds to the next largest pound.

3.14 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. Inch-pound units having the same names in other countries may differ in magnitude.

3.15 Metric units. Metric units are a system of basic measures defined by the International System of Units based on "Le System International d'Unites (SI)," of the International Bureau of Weights and Measures. These units are described in ASTM E 380 and IEEE 268.

3.16 Measurement system. In this standard, all measurements, dimensions, sizes, and capacities are given 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.

3.17 Commercial packaging. Commercial packaging may be acceptable for any level of protection when the technical design of the package meets all conditions of the level of protection specified. This level shall provide the same level of protection against physical and environmental damage as the military packaging during shipment and handling.

3.18 Commercial preservation. Commercial preservation is the preservation methods and materials suppliers use to meet the requirements of the distribution system serving both DOD and industrial users.

3.19 Industrial plant equipment (IPE). IPE is equipment with an acquisition cost of $5,000 or more used for the purpose of cutting, abrading, grinding, shaping, forming, joining, testing, measuring, heating, treating or otherwise altering the physical, electrical or chemical properties of the materials, components, or end items in manufacturing/maintenance, supply processing, assembly, or research and development operations.

3.20 Laid-away IPE. Laid-away IPE is DOD-owned equipment (in a contractor's plant, military installation, or activity) which meets all the criteria for IPE, and is laid-away/excess to the military contractual or mission requirements and is available for redistribution, general reserve or disposal.

3.21 Marking IPE. Application of numbers, letters, labels, tags, symbols, or colors for handling or identification of IPE during shipment and/or storage.

3.22 Mechanical damage. Mechanical damage is damage resulting from direct or indirect forces which may impair the mechanical or operating functions of IPE items. Some of the causes of mechanical and physical damages are improper handling, improper shipment, and vibration.

3.23 Numerical control (NC)/computer numerical control (CNC). Numerical control (NC)/computer numerical control (CNC) are control systems that accept and interpret pre-recorded alpha-numeric coded instructions and directs the operations of a machine or process.

3.24 Plant equipment package (PEP). Plant Equipment Package (PEP) is a complement of Government-owned IPE stored as an entity at a planned production site or a designated packaging area.

3.25 Packaging. Packaging is the processes and procedures used to protect equipment and material from deterioration, damage or both. It includes cleaning, drying, preservation, packing, marking, and unitization.

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

3.27 Packing list. Packing list is a printed listing of IPE on DD Form 1750 and packed in a container or containers, on a pallet, or on a skid. DD Form 250, DD Form 1149, DD Form 1342, or instructions sheets may be used as a packing list for IPE.

3.28 Polychlorinated biphenyl (PCBs). Polychlorinated biphenyls (PCBs) is referred to as any chemical substance that is limited to the Biphenyl molecule that has been chlorinated to varying degrees or any combination of substances which contains such substance.

3.29 Preservation. Preservation is the application of protective measures, including cleaning, drying, preservative materials, barrier materials, cushioning materials, and containers when necessary.

3.30 Shipping document. A shipping document may be either a DD Form 1149, Requisition and Invoice/Shipping Document, or DD Form 1348-1 or -1A, Single Line Item Release/Receipt Document, which directs or authorizes movement of and transfer of accountability for IPE items reportable to DIPEC.

3.31 Storage-in-place. Storage in-place is storage of IPE in its original operating position.

3.32 Storage non-humidity controlled. Non-humidity controlled storage is storage areas with non-humidity controlled storage, such as warehouses, open areas and unimproved areas for outside storage.

3.33 Storage on-site. On-site storage is storage of IPE on the premises of the user.

3.34 Shrouding. Shrouding is a protective cover of flexible material used to shed water from the top and sides of the item or load.

3.35 Unitization. Assembly of packs of one or more line items of IPE into a single load so that the load can be handled as a unit through the distribution system (unitized loads or unit loads) encompass consolidation in a container, placement on a pallet, reusable skids, or securely binding together.

3.36 User. A user is the Government activity or contractor operating or proposing to operate IPE.

4. GENERAL REQUIREMENTS

4.1 Preservation. All IPE, components, parts, attachments, accessories, tools and auxiliary equipment provided with either level A, B, or C protection, shall be preserved in accordance with the methods prescribed in MIL-P-116, and the applicable requirements of MIL-STD-2073-1. All IPE shall be cleaned, dried, preserved, and packaged in accordance with the general requirements of paragraphs 4.1 through 4.16, and detailed requirements in section 5 for the particular level specified.

4.1.1 Selection of levels of protection. When the level of protection is not specified in the contract or order, the selection of the appropriate level shall be made in accordance with DLAR 4145.7, AR 700-15, NAVSUPINST 4030.28C, AFR 71-6, and MCO 4030.33C. When a combination of conditions are used, the highest level of protection shall be selected.

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 these disconnections be made by cutting. Terminals or junctions shall be clearly matchmarked to facilitate proper reconnection. Disassembly shall be in accordance with the manufacturers' instructions or manual.

4.3 Processing facilities. Processing of IPE shall be accomplished within buildings that are weatherproof and substantially sound to prevent infiltration of wind-blown dust. The processing area shall be heated and equipped with an adequate amount of processing equipment to process the IPE such as spray booths, preservative tanks, solvent tanks, drying ovens and compressed moisture-free dry air. Additional protective equipment such as aprons, gloves, breather mask, showers, and any other equipment deemed necessary to protect the processing personnel from damage. Equipment brought into processing facilities shall be allowed to reach ambient temperature before processing.

4.4 Materials. Materials used for processing IPE shall be as specified herein or as specified in referenced specifications. All materials shall be free from defects affecting their serviceability. Materials inspection and testing shall be in accordance with MIL-STD-105, Sampling Procedures for Inspecting and Testing of Materials.

4.5 Cleaning. Thorough cleaning and drying shall be accomplished prior to the application of preservatives. All rust, sludge, chips, alkali, acidity, grease, corrosion, and other harmful foreign materials, and contamination shall be removed. All assemblies and parts shall be free of foreign matter by utilizing process C-1 of MIL-P-116. Cleaning and drying methods selected shall not cause damage to the items or surrounding area. Drying shall be accomplished by one or more of the drying procedures specified in MIL-P-116. Cleaning, drying, fingerprint removal, and the application of preservatives shall comprise an uninterrupted series of operations, holding the total elapsed time to the absolute minimum. When periods of interruption are necessary, temporary protection shall be applied to the partially processed items as specified in MIL-P-116 to insure against contamination.

The cleaning solution used for final wipe shall contain cleaning solvent conforming to P-D-680, type II, mixed with approximately 5 percent of P-10 preservative oil conforming to MIL-L-21260, grade 30. Items having irregular surfaces, crevices, undercuts, and pockets which can entrap cleaning fluids shall be cleaned by brushing, wiping, or by moisture-free compressed air. Prior to cleaning with solvents, exposed gears, precision bearings, electrical systems, electronic systems, motors, gauges, meters, timing devices, non-metallic units, and items containing organic materials shall be covered with a barrier material conforming to MIL-B-121, MIL-B-22191, type II or approved commercial materials to prevent damage and contamination.

4.5.1 Processing IPE for shipment to a rebuild facility. When IPE is shipped to a rebuild facility for rebuilding, the shipping activity shall process the item only to the extent necessary to assure the item reaches its destination without deterioration and damage. The process used to protect the item shall be capable of protecting the item for a minimum of 180 days. The receiving activity shall certify that the item will be inputted into the rebuilding stage within 180 days. If the time element 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 4.5.1.5 requirements herein. Regardless of the procedures used for processing, paragraph 4.12 herein shall always apply.

4.5.1.1 Federal Acquisition Regulations DAC #76-36 (FAR). Federal Acquisition Regulations (FAR) sets forth contractual requirements for preventive maintenance of Government property in the possession of the contractors and industrial vendors. In accordance with these regulations, the contractors and vendors shall be responsible for all cleaning, drying, preservation, and packaging of IPE during the interim storage period. IPE includes accessories and special tools furnished with the item of IPE, but not regularly used with the machine. All shutdown cleaning, drying, preservation, and packing shall be the responsibility of the contractor, vendor, or other using activity.

4.5.1.2 Interim cleaning. When IPE is designated for storage during the period following the end of production, the time period between shutdown maintenance and processing IPE for long-term storage is considered to be interim storage. During the interim storage period, grease, grit, chips, spent coolant, fingerprints, and other acidity and alkali residue that may cause considerable damage to critical surfaces, or close tolerance items shall be removed.

4.5.1.3 Production phase-down. When production is phasing down, the using activity, contractors, 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 purpose utilization. Both static and dynamic analytical testing shall be performed. Each item placed in interim storage shall be mechanically capable of performing the required operation for which it will be retained. 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, DOD Property Record, which shall be maintained by the contractor.

4.5.1.4 Shutdown maintenance procedures. Shutdown maintenance procedures shall begin as soon as 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. They shall not however, release the contractor of any responsibility for disassembly when disassembly is required, to meet 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 mandatory cleaning and preservation in accordance with sections 4 and 5 herein.

4.5.1.5 Interim storage. After the machine or item of 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 either MIL-B-22191, type I, L-P-378, plastic sheet and strip, thin gauge, polyolefin material class I, type II, or material conforming to PPP-B-1055, class E-2. Electrical and electronic equipment shall be enclosed in barrier material conforming to MIL-B-81705, class II or approved commercial material.

4.6 Fingerprint removal. After cleaning and drying, and before the application of preservative, critical operating surfaces, and other machined surfaces shall be treated for the removal of fingerprints and other perspiration residues. The compound used shall conform to MIL-C-15074 and the procedures for its use shall be in accordance with MIL-P-116, "Cleaning type C-8".

4.7 Health and safety standards. The cleaning, drying, preservation, and packaging processes specified herein, may cause health and safety hazards. Cleaning, drying, preservation, and packaging facilities processes shall be in accordance with the Code of Federal Regulations (CFR), U.S. Department of Labor, Occupation Safety and Health Administration (OSHA), 29 CFR 1910, Occupational Safety and Health Standards. Phosphate acid, dry cleaning solvents, paint thinners, trichloroethlene (methyl chloroform technical), vapor degreasing, trichloroethane, and other cleaning materials, preservation materials, and packing materials specified herein may be harmful. These materials demand special care, because the toxic vapors derived from these products and materials may cause injury to the lungs, eyes, and skin. Some solvent cleaning materials, and preservative materials are flammable when the boiling point is below 140 degrees Fahrenheit, and will cause skin irritation and nausea. Special equipment and sufficient ventilation are required by law, for solvent cleaners. Also, water based cleaning compounds when heated, may cause burns and rashes.

4.8 Preservation of surfaces. Preservatives shall be applied to clean interior and exterior surfaces by spraying, brushing, dipping, or other applicable methods specified in MIL-P-116. Care shall be taken to cover only the required surfaces with minimum overlap on adjacent painted surfaces. After draining liquid preservatives from internal systems, all trapped pools of preservative oil shall be removed by suction pump or other appropriate means.

4.8.1 Preservation of painted surfaces. Where an excessive amount of paint is missing or their is damage on exterior surfaces, the items shall be touched-up or repainted to prevent deterioration of the surfaces. The basic purpose for painting IPE is preservation; however, appearance is also important. 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; however, if either the number of spots or the total area requiring touch-ups are excessive, the item shall be repainted. For complete repainting, the color and workmanship shall be in accordance with FED-STD-595.

4.8.2 Preservation of unpainted surfaces. When paint is not required, preservation shall be applied to clean interior and exterior unpainted surfaces by brushing, spraying, dipping, or other applicable methods specified in MIL-P-116. Care shall be taken to preserve only the required surfaces, with minimum overlap on the adjacent painted surfaces. After draining liquid preservatives, coolant, hydraulic fluids, and oils from the internal systems, all trapped pools of excessive preservatives shall be removed from the internal and external systems by pump or other appropriate means. P-2 or P-19 conforming to MIL-C-16173, or approved commercial material shall be used to preserve unpainted surfaces.

4.9 Maintenance of preservative film. Caution shall be exercised to assure that the preservative is not rubbed off after application. Where blocking and bracing contacts the preserved areas, greaseproof paper conforming to MIL-B-121, grade A, type 1 shall be inserted with a double thickness fold at points of contact. The barrier materials shall extend approximately one-half inch beyond the edge of the blocking material. Barrier materials shall be secured in place with tape conforming to PPP-T-60, type IV.

4.10 Weatherproofing. Unless otherwise specified, a weatherproof barrier material shall be provided in the form of a case liner, crate liner, shroud or wrap fabricated from barrier material conforming to either PPP-B-1055, MIL-B-22191, or MIL-B-121. Weatherproof barriers are primarily intended to prevent deterioration of the item and the preservation materials used to protect IPE by excluding entry of free water or by diverting water from materials which are subject to water damage. Additionally, weatherproof barriers shall protect the items from dust, dirt, and other harmful foreign material. Waterproof barrier materials shall not be used when the interior packs are already weatherproofed, or when asphalt in some of the barrier materials would cause injury to the enclosed item. For overseas shipment (see paragraph 5.1.1.37).

4.11 Technical data. Technical data shall be complete and shall include all available data pertinent to each item of IPE. Technical data including photographs, installation and foundation drawings, manufacturers' parts and operations manuals, and other manufacturer's data relative to maintenance and lubrication shall be assembled and packed in accordance with submethods IC-1 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 either be attached to the machine with tape conforming to PPP-T-60, type IV, placed in a storage compartment of the machine, or placed in a consolidated box containing accessories or disassembled components.

4.12 Hazardous contaminants. All IPE and its components, parts, and attachments shall be made free of hazardous contaminants before movement. The activity having the responsibility for shipment and storage shall be responsible for providing the protection. Hazardous contaminants include polychlorinated biphenyls (PCBs), asbestos, radioactive, corrosive, or toxic materials. PCB content of fluids in machinery shall not exceed the limits specified in 40 CFR, Part 761, Environmental Protection Agency Regulations for Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions for Polychlorinated Biphenyls under the Toxic Substances Control Act, or limits specified by more stringent state or local standards. The equipment shall be inspected, tested, and certified to contain less than 50 parts per million of PCBs in accordance with 40 CFR, parts 761. IPE shall be free of other hazardous contaminants specified above before storage or shipment. Preparation and decontamination procedures shall be in accordance with DLAM 4215.2.

4.13 Palletizing and skidding. All IPE prepared for shipment, or placed in storage (except standby-in-place), shall be either palletized in accordance with MIL-STD-147 or skidded in accordance with MIL-HDBK-701 as dictated by the weight and configuration of the item.

4.14 Processing items for disposal. All IPE being prepared for disposal shall be afforded only the necessary preservation and packing required to retain the item in the condition existing at the time disposition action was determined. Machines mounted on DOD reusable skids shall have the skid removed. The removed skids shall be returned to one of DIPEC's directorates of IPE operations in accordance with the requirements of MIL-HDBK-701.

4.15 Caution tag. A waterproof tag conforming to either UU-T-81, or Government approved commercial tag shall be attached to each preserved machine. 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 machine markings, when required, shall be: HANDLE WITH CARE, METHOD II PACKAGE, CAUTION-SENSITIVE ELECTRONIC DEVICES, DO NOT SHIP OR STORE NEAR STRONG ELECTROSTATIC OR ELECTROMAGNETIC FIELDS, etc. Before start-up, follow all instructions packed inside the machine.

4.16 Waiver of preservation, packing, and marking procedures. All preservation, packing and marking requirements shall be in accordance with the requirements of MIL-STD-129, MIL-P-116 and this standard. Any request for deviation from or waiver of these requirements and procedures shall be made in writing to Defense Industrial Plant Equipment Center, ATTN: DIPEC-SQ, 2163 Airways Blvd., Memphis, TN 38114-5051.

5. DETAILED REQUIREMENTS

5.1 Preservation. Preservation shall be either level A (see 5.1.1), level B (see 5.1.2), or level C (see 5.1.3).

5.1.1 Level A preservation. When level A preservation is required, the basic item of IPE, its attachments, accessories, components, repair parts, and tools shall be processed in accordance with sections 4 and 5, paragraphs

5.1.1.1 through 5.1.1.38. All cleaning and drying shall be in accordance with the requirements of MIL-P-116. All items shall be thoroughly cleaned, dried, and preserved immediately following shutdown.

5.1.1.1 Exterior surfaces. Prior to cleaning, all accessories and attachments such as chucks, face plates, study rests, tool holders, jigs, fixtures, grinding wheels, and other components shall be removed. All exterior surfaces shall be cleaned. After cleaning, all machined surfaces of the basic unit, accessories, attachments and other components shall be preserved in accordance with the requirements of MIL-P-116. Parts shall be submerged or manually rotated as necessary to ensure complete coverage.

5.1.1.1.1 Tables, ball-screw drive mechanisms, and parts. Tables, ball-screw mechanism, parts, and other components moving on roller bearings or other types of high efficiency, low-friction ball, or roller bearing assemblies shall be removed or blocked, and components treated in such a manner that neither the way(S) surfaces nor the anti-friction devices will be subject to brinelling or other damage. The bearing preload, when required, shall be relieved. Recirculating ball-screw driven components shall have the ball nut(S) disconnected and the complete mechanisms shall be protected to prevent damage during shipment and handling. All required surfaces shall be coated with P-2 preservative compound conforming to MIL-C-16173.

5.1.1.2 Drive belts and pulleys. All drive belts shall be removed from the equipment. The face or grooves of all ferrous metal pulleys shall be coated with either P-2 or P-19 preservative compound conforming to MIL-C-16173, primer coating synthetic rust inhibiting lacquer-resisting compound conforming to TT-P-664, or approved commercial preservative. Belts that have been removed shall be packed in accordance with method III of MIL-P-116.

5.1.1.3 Internal mechanisms and systems. All non-electronic and electrical internal mechanisms and systems of the basic machine, except gear cases and hydraulic systems shall be drained and cleaned with a solution consisting of one part P-10, grade 30, preservative oil conforming to MIL-L-21260, and nine parts cleaning solvent conforming to P-D-680, type II. 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 assure thorough cleaning. The solution shall be drained, and the reservoir shall be refilled with P-10, grade 30, preservative oil conforming to MIL-L-21260. The oil shall be circulated to assure 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 those items with internal mechanisms which could become damaged under power shall be flushed with the solutions specified above. When feasible, during the cleaning and preservation, the item shall be rotated manually to completely coat the internal mechanisms. After cleaning, drying, and preservation, all systems shall be drained and all openings closed.

5.1.1.4 Lubrication systems. Lubrication systems shall be drained prior to cleaning. The systems shall be filled with P-10, grade 30, preservative oil conforming to MIL-L-21260, thoroughly flushed and drained, and all openings closed.

5.1.1.5 Gear cases. Gear cases shall be drained and flushed with P-10, grade 30, preservative oil conforming to MIL-L-21260. The gear cases shall be flushed while the machine is operating under power. After the oil has been circulated thoroughly, it shall be drained completely. The gear cases shall be refilled with either P-7, grade 80 preservative oil conforming to MIL-L-2105 or preservative oil conforming to MIL-L-3150 or P-10, grade 30, preservative oil conforming to MIL-L-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. A pump may be used for draining the gear cases. Whichever process is used, the gear cases shall be drained and all openings closed.

5.1.1.6 Cutting fluid systems. Cutting fluid systems shall be drained and all sludge, chips, grit, corrosion, spent coolants, and other foreign matter shall be removed. The systems shall be flushed thoroughly with a solution consisting of one part P-10, grade 30, preservative oil conforming to MIL-L-21260, and nine parts cleaning solvent conforming to P-D-680, type II. The solution shall be circulated thoroughly and drained. The system shall be preserved by flushing with P-3 preservative conforming to MIL-C-16173, grade 3. The system shall be drained and all openings closed.

5.1.1.7 Variable speed gear mechanisms. Variable speed gear mechanisms shall be drained and flushed with P-10, grade 30, preservative oil conforming to MIL-L-21260 or P-7, grade 80, preservative oil conforming to MIL-L-2105 or preservative oil conforming to MIL-L-3150. The mechanisms shall be operated no longer than necessary to ensure a thorough coating of preservative oil on the internal surfaces. If the equipment has enclosed reduction gears, all necessary gear shifts shall be made to accomplish thorough coating of all gear surfaces. If power operation is not feasible, variable speed gear mechanisms shall be flushed with the solution specified above and rotated manually. After all internal surfaces have been coated with preservative oil, the system shall be drained and all openings closed. A pump may be used for draining the system.

5.1.1.8 Hydraulic systems. All hydraulic systems shall be inspected, and tested to determine the condition of the hydraulic system and fluid in the reservoir. If the hydraulic reservoir and fluid are clean and non-contaminated, and meet all the requirements of Title 40 CFR Parts 761, covering polychorinated biphenyls (PCBs), the hydraulic system shall be drained and refilled with new hydraulic fluid specified in the operator's manual or hydraulic fluid conforming to MIL-H-5606 or MIL-H-6083. The hydraulic system shall be cycled and flushed until it meets the requirements of DLAM 4215.2 and Title 40 CFR Parts 761. All mechanisms shall be fully retracted and secured in position. The system shall be drained and all openings closed.

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

5.1.1.9.1 Other coolant systems. Any coolant system that requires anti-freeze shall be filled to the operating level with 50 percent of anti-freeze conforming to MIL-A-46153 and 50 percent water. If the system contains a thermostat, the equipment shall operate no longer than necessary to allow the thermostat to open and assure mixing and even distribution of the coolant. The equipment shall not be drained, and all openings shall be closed. The equipment shall be tagged and indicate the following: NOTE: "THIS EQUIPMENT COOLANT SYSTEM CONTAINS WATER AND ANTI-FREEZE SOLUTION IN EQUAL PARTS. DO NOT DRAIN-CHECK COOLANT LEVEL."

5.1.1.10 Critical items. All critical items of the basic units, parts, and accessories shall be free of any form of contaminants which would cause damage to the item in any manner.

5.1.1.11 Bearings general purpose type. Bearings which have been removed from their operating position and are not to be reinstalled shall be cleaned in accordance with method C-1 of MIL-P-116. After cleaning and drying, P-6 preservative conforming to MIL-C-11796, Class 3, shall be applied to bearings. The bearings shall be securely wrapped in aluminum foil conforming to QQ-A-1876. Bearings having a bore greater than 3-1/2 inches or weighing over 20 pounds shall be doughnut wrapped. Separable bearing assemblies and cup-cone combinations that measure over 2-1/2 inches outer diameter shall have aluminum foil in accordance with QQ-A-1876 placed between each part to prevent brinelling. Bearings in operating positions are not required to be cleaned. Sealed bearings shall only be cleaned by wiping.

5.1.1.11.1 Instrument precision bearings. Instrument precision bearings which have been removed and are not to be reinstalled shall be cleaned in accordance with MIL-P-116. Bearings shall be coated with P-6 preservative conforming to MIL-C-11796, class 3. Bearings shall be wrapped in barrier material conforming to MIL-B-121, packed in accordance with sub-method IA-8 of MIL-P-116 and placed in a container conforming to Level A requirements of MIL-STD-2073-1.

5.1.1.12 Electrostatic protection. Electrostatic discharge sensitive devices as defined by DOD-STD-1686 shall be provided electrostatic discharge protection by properly safeguarding packaging workstations, and properly outfitting personnel (i.e., grounding devices, etc.), as well as, using electrostatic discharge protective packaging materials. Electrostatic discharge protective packaging shall be accomplished by initially wrapping the item with material conforming to either MIL-B-81705, type II, MIL-B-117, type I, class A, style 2, or cushioned with material conforming to PPP-C-1842, type III, style A or B, PPP-C-1752, type VII, class 4, or PPP-C-1797, type II. The wrapped or cushioned items shall be unit packed in heat-sealed bags conforming to MIL-B-117, type I, class F, style L.

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

5.1.1.12.2 Electrostatic and electromagnetic protection. Electronic devices requiring both electrostatic and electromagnetic protection shall be unit packed in accordance with paragraph 3.6.1.3.1 of MIL-P-116.

5.1.1.13 Field force protection. Sensitive electronic equipment and devices shall be protected by the applicable procedures specified in 3.6.1.3.1 through 3.6.1.3.3 of MIL-P-116.

5.1.1.14 Contact surfaces. Ways, friction surfaces, driving gears, and adjustment screws which are in contact with the opposing surfaces shall be coated with P-2 or P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4 before locking that part of the machine in place. Spindle gear trains and lead screws shall be rotated to ensure complete coverage with the preservative.

5.1.1.15 Other machined surfaces. All machined surfaces which are not otherwise described herein shall be coated with P-2 and P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4, or approved commercial preservative compound.

5.1.1.16 Non-lubricated internal surfaces. Surfaces of internal gears which do not operate in a lubricant, and the interior surfaces of coolant system tanks that are not covered or flooded with a preservative applied in accordance with this standard, shall be covered by spraying or fogging with P-3 preservative conforming to MIL-C-16173, grade 4 or otherwise with the type of preservative that was used in treating other internal mechanisms. The method of application shall be in accordance with MIL-P-116.

5.1.1.17 Recessed metal surfaces. Screws, exposed gears, recesses, blind holes, and cavities which cannot be easily cleaned or preserved shall be coated with either P-2 or P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4, or P-6 preservative compound conforming to MIL-C-11796, class 3.

5.1.1.18 Repair parts, attachments, and accessories. Machined surfaces of repair parts, attachments, and accessories shall be coated with P-2 or P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4. All preserved parts not attached to the equipment shall either placed in bags manufactured from barrier material conforming to MIL-B-117, or wrapped in barrier material conforming to MIL-B-121, grade A, type I or II, class 2, and secured with tape conforming to PPP-T-60, type IV. Wrapped items shall be placed in a container conforming to level A requirements of MIL-STD-2073-1 with the nomenclature, part number, NSN or PEC noted on the container packing list.

5.1.1.19 Welding and soldering equipment, supplies, and accessories. Welding and soldering equipment, supplies, and accessories shall be preserved in accordance with level A requirements of MIL-W-45562.

5.1.1.20 Cable, cord, and wire assemblies. Cable, cord, and wire assemblies shall be cleaned and coiled to a minimum safe diameter with no kinks or other deformations present, and placed in a container conforming to Level A requirements of MIL-STD-2073-1.

5.1.1.21 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.

5.1.1.22 Closure of openings. Small openings, except for vents and louvers installed for ventilation purposes, shall be sealed with tape conforming to PPP-T-60, type IV. Large openings shall be covered with waterproof barrier material conforming to PPP-B-1055, class E-1 or L-4, of not less than 6 Mil thickness or barrier material conforming to L-P-378, type and class optional. Materials shall be secured with tape conforming to PPP-T-60, type IV. When very large openings are to be covered, or when the location of openings render coverings vulnerable to puncture, wood, or plywood, or sheet metal shall be applied over the openings. Open ends of all pipe fittings shall be plugged with pipe fittings or plastic cap plugs conforming to MIL-C-5501.

5.1.1.23 Engines, gasoline and diesel. Gasoline and diesel engines shall be preserved in accordance with level A requirements of MIL-E-10062.

5.1.1.24 Grinding wheels and abrasive products. All used grinding wheels and abrasive products shall be removed and discarded. New grinding wheels and abrasive products shall be removed from the equipment and preserved in accordance with level A requirements of MIL-A-3816 for shipment with the parent item.

5.1.1.25 Air compressors. Air compressors shall be preserved in accordance with level A requirements of MIL-C-3600.

5.1.1.26 Air cylinders. Air cylinders shall remain installed. The internal surfaces of the cylinders and the operating mechanisms shall be cleaned, dried, and completely fogged with P-10, grade 30, preservative oil conforming to MIL-L-21260. Organic packing shall be inspected and replaced if necessary.

5.1.1.27 Air motors and lines. Interior surfaces of air motors and air lines shall be coated with P-10, grade 30, preservative oil conforming to MIL-L-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 MIL-C-5501 or tape conforming to PPP-T-60, type IV.

5.1.1.28 Journals. Oil lubricated journals shall be drained, cleaned, flushed and refilled with P-10, grade 30, preservative oil, conforming to MIL-L-21260.

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

5.1.1.30 Dial indicators. Dial indicators requires no preservation. They shall be cushioned with material conforming to PPP-C-1752 or PPP-C-843, packed in accordance with sub-method IA-8 or IA-15 of MIL-P-116, and placed in a container conforming to Level A requirements of MIL-STD-2073-1.

5.1.1.31 Gauges and measuring instruments. Gauges 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-B-121, or cushioning material conforming to PPP-C-843, and packed in accordance with methods 1A-8 or 1A-15 of MIL-P-116. Loose gauges and instruments shall be cushioned with barrier material conforming to MIL-B-121 or cushioning material conforming to PPP-C-843. The item shall be placed in a bag manufactured from bag, transparent, flexible, sealable volatile corrosion inhibitor treated conforming to MIL-B-22020, or bags manufactured from material conforming to MIL-B-117, or wrapped in barrier material conforming to MIL-B-121, or barrier material conforming to MIL-B-22191, type I or II.

5.1.1.32 Loose parts. All loose parts that have been preserved and are not to be reinstalled immediately or retained with the basic unit shall be either placed in bags manufactured from bags, transparent, flexible, sealable volatile corrosion inhibitor treated conforming to MIL-B-22020, or volatile corrosion inhibitor bags conforming to MIL-I-8574 placed in bags manufactured from barrier material conforming to MIL-B-117, or wrapped in barrier material conforming to MIL-B-121, grade A, type I or II, class 2, and secured with tape conforming to PPP-T-60, type IV. Wrapped or bagged parts shall be placed in a container conforming to level A requirements of MIL-STD-2073-1. VCI material shall not be used in any containers unless the containers are sealed.

5.1.1.33 Tool and tool accessories. Tool and tool accessories shall be cleaned, dried, and preserved in accordance with level A requirements of PPP-P-40. Volatile corrosion inhibitor material conforming to MIL-I-8574 using sealed containers may be used for packing tools and tool accessories.

5.1.1.33.1 Slides, counterbalances, motors, and hydraulic tables. Slides, counterbalances, motors, hydraulic tables, and all other moveable components shall be cleaned, dried, preserved, and securely braced to the machine itself, if not removed. After processing, projecting parts difficult to support or protect, and which will require considerable additional blocking if left in place on the machine, shall be removed and boxed in a container conforming to level A requirements of MIL-STD-2073-1, and if possible, placed on the same skid (see MIL-HDBK-701).

5.1.1.34 Forges, furnaces, and ovens. Each complete forge, furnace, and oven with components and repair parts shall be cleaned, dried, and preserved in accordance with level A requirements of MIL-E-17555. Components, attachments, and accessories shall be removed to avoid damage or to reduce cubage. These items shall be palletized in accordance with MIL-STD-147.

5.1.1.34.1 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 lining shall be removed entirely from any type of furnace which has been in uninterrupted service for five or more years, when burned, cracked, or deteriorated sections are found. A furnace which 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. Records shall indicate whether

lining has been removed. Lining shipped separately from the basic furnace or oven shall be packed in a container conforming to level A requirements of MIL-STD-2073-1. 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 either PPP-C-843, type 1, class B, grade 6 not less than 3/8 inches thick, material conforming to PPP-C-1797 or approved commercial cushion material. Each container shall not exceed 200 pounds when packed. Closure of container shall be in accordance with the container specification. Palletization shall be in accordance with MIL-STD-147.

5.1.1.35 Corrosion of electronic systems. The corrosion of electronic systems is of paramount importance in packaging and storage of electronic systems for long-term storage. When in storage, an invisible thin film of corrosion forms on circuit boards and other electronic systems when the electronic systems are packaged for a long period of time, and the systems are not started up or cycled periodic to prevent corrosion. The corrosion in electronic systems are influenced by three major factors; namely, humidity, temperature, and environmental contamination. Any relative humidity above 50 percent drastically increases the rate of corrosion, however, humidity alone is not the sole factor which causes corrosion. The environmental contamination causes pollutants such as sulfides and chlorides, and is a major factor in the corrosion process. Corrosion does occur at extremely low levels of contamination, and low levels of relative humidity. Temperatures are also significant, since the expansion and contraction of metals will cause movement of components which in turn cause certain types of corrosion. For further information on corrosion of electronic systems, (see DLAM 4145.9/TM 58-260, NAVSUP PUB 523, MCO 4870.62, and AFR 71-18).

5.1.1.35.1 Numerical control (NC)/computer numerical control (CNC) system cleaning. Numerical control (NC)/computer numerical control (CNC) systems do not require extensive cleaning; however, dust, grit, grease, grease-dirt in combination, fingerprints, and dust film build-up can cause damage from contamination. Whenever these conditions exist, the systems shall be cleaned with a clean damp cloth and non-detergent cleaning solution, or a cleaning solution that is recommended by the manufacturer. After the systems have been cleaned, they shall be thoroughly dried before the application of a preservative and before putting them back into service or storage. The CRT unit shall be made free from dirt, dust,and fingerprints with either a soft cloth, lint free paper towel, or a soft brush, using water only. Keyboards shall be cleaned with moisture-free air. The hard drive ports, or A and B drives shall be cleaned by approved qualified computer services personnel. Any portion of the systems that cannot be cleaned by the above procedures shall be cleaned by approved qualified computer services personnel.

5.1.1.35.1.1 Preservation protection. NC/CNC systems shall be preserved, and processed for shipment or storage in accordance with the requirements of MIL-STD-454, MIL-E-17555, and herein. Actuators, electronic servo and similar systems shall be preserved with either P-2 preservative compound conforming to MIL-C-16173 grade 2, or P-18 preservative conforming to MIL-P-3420. Hydraulic actuators, when used in NC/CNC systems, shall be preserved with P-15 hydraulic fluid conforming to MIL-H-5606 or approved commercial hydraulic fluid. Loose electrical brush-holders, fuse-holders, tube-holders, and similar items shall be enclosed in moisture-proof barrier material, flexible, electrostatic-free, heat sealed container conforming to MIL-B-81705, class 1 material.

5.1.1.35.1.2 Electrical and electronic equipment. Electrical and electronic equipment including programmable controllers, and digital readouts, their accessories, components, attachments, and spare parts shall be cleaned, dried, and preserved in accordance with MIL-STD-454 and MIL-E-17555 and shall be protected with moisture and fungus resistant varnish conforming to MIL-V-173 or approved commercial varnish, and shall also be protected from mildew with varnish conforming to MIL-V-13811. The equipment shall also be protected from electrostatic discharge in accordance with level A requirements of DOD-STD-1686 and MIL-HDBK-773. In addition to the requirements contained in the above documents, the following detailed requirements apply when preparing delicate electrical and electronic equipment for shipment. Equipment of this type depends heavily on the integrity of the systems and demands special care in disassembly and reassembly. This is particularly true with respect to the many electrical conductors which interconnect separable components. When essential to preparation for shipment, handling, and storage, components may be disconnected and removed from the parent machine. Cable assemblies and conductors shall be carefully removed during disassembly. The complexity of the design and circuits, particularly NC/CNC systems and their control panels necessitates processing as assembled units, using only those methods of cleaning that will not damage delicate components and materials.

5.1.1.35.2 Electronic devices. Conductors, control panels, printed circuit boards, pendants, electro-limit switches, and units that are removed from the basic machine shall be cleaned, dried, preserved, and protected with moisture and fungus resistant varnish conforming to MIL-V-13811 and MIL-V-173.

5.1.1.35.3 Electrical balanced and calibrated equipment. The electrically balanced and calibrated equipment, components parts, assemblies, and equipment shall be preserved in accordance with level A requirements of MIL-STD-454 and MIL-E-17555.

5.1.1.35.4 Control panels, switch panels, instrument panels, and recording instruments. All openings in the control panels, switch panels, instrument panels, and recording instruments shall be sealed with tape conforming to PPP-T-60, type IV. Terminals shall be coated with varnish conforming to MIL-V-13811. Control panels, instrument panels, switch panels, and recording instruments not installed on the machines shall be individually preserved in accordance with level A requirements of MIL-STD-454 and MIL-E-17555.

5.1.1.35.5 Electrical wiring systems. Exposed ends of wire, sockets, connector plugs, terminals, and openings in switches, and junction boxes shall be sealed with tape conforming to PPP-T-60, type IV, or approved commercial tape.

5.1.1.35.6 NC/CNC units. NC/CNC units provided with machine tools may be in one or more cabinets separable from the parent machine. For the purpose of simplicity, the fundamental requirements are structured around the separable off-the-machine type of units. Preservation instructions herein shall also apply to all other types of numerically controlled machines varying only as dictated by configuration factors. The degree of protection shall in all cases remain the same.

5.1.1.35.6.1 Vibration insulation. Insulation from vibratory forces is of paramount importance to the above units for protection of the electrical and electronic components therein. Vibration dampening materials and other physical security measures shall be utilized as required to insulate against vibratory forces. The assembled units shall be preserved in accordance with level A requirements of MIL-STD-454 and MIL-E-17555.

5.1.1.35.6.2 Removed parts. Parts which have been removed from numerical control/computer numerical controlled units shall be preserved in accordance with Level A requirements of MIL-STD-454 and MIL-E-17555, and placed in a container conforming to level A requirements of MIL-STD-2073-1.

5.1.1.35.6.3 Drawers and door assemblies. Sliding surfaces of drawer guides shall be coated with P-11 preservative grease conforming to either MIL-G-23827, MIL-G-10924, MIL-G-81322, or approved commercial grease. Internal surfaces of door hinges shall be coated with P-10 preservative oil conforming to either MIL-L-21260, MIL-L-6085, or approved commercial oil. In addition to the mechanical locks and catches, doors and drawers shall be secured with metal strapping conforming to ASTM D 3953 and ASTM D 4675. Fiberboard pads conforming to PPP-F-320 shall be placed between the strapping, doors and drawers to prevent the strapping from marring the painted surfaces.

5.1.1.35.6.4 Identification and matching of NC/CNC units disconnected from machines. When NC/CNC units are disconnected from machines, the machine model number, ID number, nomenclature, and manufacturer's name shall be recorded on a tag conforming to UU-T-81 and taped to the inside of the control cabinet door. This data shall also be stencilled on the shipping cover or container to assure correct identification and matching of machine control unit upon reassembly.

5.1.1.35.6.5 Electrical heating elements. Electrical heating elements removed from the equipment shall be individually preserved in accordance with level A requirements of MIL-P-116, method III and packed in a container conforming to level A requirements of MIL-STD-2073-1.

5.1.1.35.7 Transformers. All transformers shall be preserved in accordance with level A requirements of MIL-STD-454 and MIL-E-17555.

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

5.1.1.35.9 Electron tubes. Electron tubes shall be removed, and the mating sockets marked to permit correct tube reinstallation at the time of reassembly. Tubes shall be preserved in accordance with level A requirements of MIL-E-75.

5.1.1.36 Frames, tanks, paint spray booths, and conveyor systems. Each item of this type of equipment 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 P-2 or P-19, preservative compound conforming to MIL-C-16173, grades 2 and 4. Bearings and fittings shall be charged with P-11, preservative grease conforming to either MIL-G-10924, MIL-G-23827, MIL-G-81322 or approved commercial grease.

5.1.1.37 Weatherproof enclosure with desiccant. All industrial plant equipment processed for overseas shipment shall be protected from dirt, moisture, saltwater, salt-air, environmental corrosion, and other harmful foreign material by a weatherproof enclosure with desiccant. The bagged activated desiccant shall conform to MIL-D-3464. The enclosed equipment shall be provided with an humidity indicator device conforming to MS-20003 or MIL-I-26860.

5.1.1.38 Foam in-place packaging procedures. Industrial plant equipment, accessories, and component parts may be blocked, braced, and cushioned in accordance with one of the eight techniques specified in the foam in-place procedures of MIL-STD-1191.

5.1.2 Level B preservation. When level B preservation is required, the item and accompanying equipment shall be processed the same as that specified for level A except for packing. Packing shall be in accordance with 5.2.1. All cleaning and drying shall be accomplished in accordance with 4.5 and 4.6.

5.1.3 Level C preservation. When level C preservation is required, the basic item of IPE, its attachments, accessories, components, repair parts, and tools shall be processed in accordance with section 4, paragraphs 5.1.3 through 5.1.3.32. All cleaning and drying shall be accomplished immediately following shutdown in accordance with paragraphs 4.5 through 4.6.

5.1.3.1 Exterior surfaces. All chips, dirt, spent coolant residues, alkali, acidity, rust, corrosion and other harmful foreign materials shall be removed from the exterior surfaces of the basic unit, its attachments, accessories, and component parts by using cleaning solvent conforming to P-D-680, type II. After cleaning, all surfaces shall be dried either by wiping with a cleaned dust-free cloth, or with moisture-free compressed air. After drying, all unpainted surfaces attachments, accessories, and components parts shall be preserved with P-2 or P-19, preservative compound conforming to MIL-C-16173, grades 2 and 4.

5.1.3.1.1 Tables, ball-screw driven mechanisms, and parts. Tables, ball-screw driven mechanisms, parts, or other components moving on ball bearings, or 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 ways, surfaces nor the anti-friction devices will be subject to brinelling or other damage. The bearings preload, when required, shall be relieved and the recirculating ball-screw driven components shall have the ball nut disconnected, and the complete mechanisms shall be protected to prevent damage during shipment and handling.

5.1.3.2 Drive belts and pulleys. All drive belts shall be released from tension. The face or grooves of all metal pulleys shall be coated with P-2 or P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4, primer coating synthetic rust inhibiting lacquer resisting compound conforming to TT-P-664 or approved commercial materials.

5.1.3.3 Internal mechanisms. Internal mechanisms shall be completely drained and all openings closed.

5.1.3.4 Exposed gears. Exposed gears shall be cleaned with cleaning solvent conforming to P-D-680, type II. After cleaning and drying, the gears shall be preserved with P-3 or P-19 preservative compound conforming to MIL-C-16173, grades 3 and 4.

5.1.3.5 Enclosed gears. Gear cases shall be drained and all openings closed.

5.1.3.6 Hydraulic systems. All hydraulic systems shall be inspected and tested to determine the condition of the hydraulic systems reservoir and fluid. If the hydraulic reservoir and fluid are clean and uncontaminated, and certified to meet the requirements of Title 40 CFR Part 761, 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 tested and determined to be 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-H-5606 or MIL-H-6083 until it meets the requirements of DLAM 4215.2. After decontamination procedures have been completed, the hydraulic system shall be drained and all openings closed.

5.1.3.7 Cutting fluid systems. The cutting fluid systems shall be drained and all sludge, chips, grit, corrosion, and other harmful foreign materials shall be removed and all openings closed.

5.1.3.8 Water cooling chambers, water jackets, steam lines, and related systems. Water cooling chambers, water jackets, steam lines, and related systems shall be processed in accordance with paragraphs 5.1.1.9 and 5.1.1.9.1 herein.

5.1.3.9 Critical surfaces. All critical surfaces of the basic units, parts, and components shall be free of any form of contaminants which would damage the items in any manner.

5.1.3.10 Bearings and journals. Grease lubricated bearings and journals shall be coated with P-11 preservative grease conforming to either MIL-G-10924, MIL-G-23827, MIL-G-81322 or approved commercial materials.

5.1.3.11 Electrostatic protection. Equipment having semi-conductors and other sensitive devices susceptible to electrostatic and environmental damage shall be processed in accordance with paragraph 5.1.1.12 herein.

5.1.3.12 Magnetic protection. Equipment having magnetic fields shall be processed in accordance with paragraph 5.1.1.13 herein.

5.1.3.13 Electrical control devices. Electrical control devices shall be preserved in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.14 Electrical wiring systems. Exposed ends of wires, sockets, connector plugs, terminals and openings in switches and junction boxes shall be sealed with tape conforming to PPP-T-60, type IV or cap plugs conforming to MIL-C-5501. Electrical cables shall be coiled to a safe diameter and secured with cotton twine or appropriate securing device to prevent uncoiling.

5.1.3.15 Contact and machined surfaces. Ways, friction surfaces, driving gears, and adjusting screws that will be in contact with opposing surfaces shall be processed in accordance with paragraphs 5.1.1.14 and 5.1.1.15 herein.

5.1.3.16 Non-lubricated interior surfaces. Surfaces of internal gears which do not operate in a lubricant, and the interior surfaces of coolant system tanks which are not covered or flooded with a preservative applied in accordance with this standard shall be coated by spraying or fogging with the type of preservative that was used in treating other internal mechanisms. The method of application shall be in accordance with MIL-P-116.

5.1.3.17 Recessed metal surfaces. Screws, exposed gears, recesses, blind holes and cavities which cannot be easily cleaned or preserved shall be coated with P-2 and P-19 preservative conforming to MIL-C-16173, grades 2 and 4, or P-6 preservative compound conforming to MIL-C-11796, class 3.

5.1.3.18 Repair parts, attachments, and accessories. Machined surfaces of repair parts, attachments, and accessories shall be coated with P-2 or P-19 preservative compound conforming to MIL-C-16173, grades 2 and 4. 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 MIL-B-121, grade A, type I or II, class 2, and secured with tape conforming to PPP-T-60, type IV. Wrapped items shall be placed in a container conforming to level A requirements of MIL-STD-2073-1 with the nomenclature, part number, NSN or PEC noted on the container packing list.

5.1.3.19 Cables, cords, and wire assemblies. Cables, cords, and wire assemblies shall be cleaned, and coiled to a safe diameter and placed in a container conforming to table VII of MIL-STD-2073-1.

5.1.3.20 Hose and hose fittings. Hose and hose fittings not installed in the equipment shall be preserved in accordance with level C requirements of MIL-H-775.

5.1.3.21 Closure of openings. Small openings, except vents and louvers installed for ventilation purposes, shall be sealed with tape conforming to PPP-T-60, type IV. Large openings shall be covered with weatherproofed barrier material conforming to class E-1 or L-4 of PPP-B-1055, of not less than 6 mil thickness, or plastic sheet and strip, thin gauge, polyolefin material conforming to L-P-378. When very large openings are to be covered, or when location of the opening renders coverings vulnerable to puncture, wood or plywood, or sheet metal shall be applied over the openings. Open ends of all pipe fittings shall be plugged with pipe fittings or plastic cap plugs conforming to MIL-C-5501.

5.1.3.22 Engines, gasoline and diesel. Gasoline and diesel engines shall be preserved in accordance with level C requirements of MIL-E-10062.

5.1.3.23 Grinding wheels and abrasive products. All used grinding wheels and abrasive products shall be removed and discarded. New grinding wheels and abrasive products shall be removed from the equipment and preserved in accordance with level C requirements of MIL-A-3816 for shipment with the parent item.

5.1.3.24 Air compressors. Air compressors shall be cleaned and preserved in accordance with level C requirements of MIL-C-3600.

5.1.3.24.1 Air cylinders. Air cylinders shall remain installed. The internal surfaces of cylinders and operating mechanisms shall be cleaned, dried, and completely fogged with P-10, grade 30 preservative oil conforming to MIL-L-21260. Organic packing shall be inspected and replaced if necessary.

5.1.3.24.2 Air motors and lines. Interior surfaces of air motors and air lines shall be coated with P-10, grade 30 preservative oil conforming to MIL-L-21260 by injecting the oil into the inlet air stream while operating the motor until oil appears at the exhaust ports. Air inlets and outlets shall be sealed with plastic cap plugs conforming to MIL-C-5501 or tape conforming to PPP-T-60, type IV.

5.1.3.25 Organic packing. Organic packing in coolant, lubricant, lubricating, hydraulic and other liquid carrying systems shall be removed.

5.1.3.26 Dial indicators. Dial indicators requires no preservation. They shall be wrapped in cushioned material conforming to either PPP-C-843, type II or cushioning material conforming to PPP-C-1752, packed in accordance with sub-method 1A-8 or 1A-15 of MIL-P-116.

5.1.3.26.1 Gauges and measuring instruments. Gauges 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-B-121 or cushioning material conforming to PPP-C-843, and packed in accordance with methods 1A-8 or 1A-15 of MIL-P-116. Loose gauges and instruments shall be cushioned with barrier material conforming to MIL-B-121 or cushioning material conforming to PPP-C-843. The item shall be either placed in a bag manufactured from bag, transparent, flexible, sealable volatile corrosion inhibitor treated conforming to MIL-B-22020 or bags manufactured from material conforming to MIL-B-117 or wrapped in barrier material conforming to MIL-B-121 or barrier material conforming to MIL-B-22191, type I or II.

5.1.3.27 Loose parts. All loose parts that have been preserved and are not to be reinstalled immediately or retained with the basic unit shall be either placed in bags manufactured from bags, transparent, flexible, sealable volatile corrosion inhibitor treated conforming to MIL-B-22020, volatile corrosion inhibitor bags conforming to MIL-I-8574 and placed in bags manufactured from barrier material conforming to MIL-B-117, or wrapped in barrier material conforming to MIL-B-121, grade A, type I or II, class 2, and secured with tape conforming to PPP-T-60, type IV. Wrapped or bagged parts shall be placed in a container conforming to level C requirements of MIL-STD-2073-1. VCI material shall not be used in containers unless the containers are sealed.

5.1.3.28 Tools and tool accessories. Tools and tool accessories shall be processed in accordance with level C requirements of PPP-P-40.

5.1.3.28.1. Slides, counterbalances, motors, and hydraulic tables. Slides, counterbalances, motors and hydraulic tables shall be processed in accordance with paragraph 5.1.1.33.1 herein.

5.1.3.29 Welding and soldering equipment, supplies, and accessories. Welding and soldering equipment, supplies and accessories shall be preserved in accordance with level C requirements of MIL-W-45562.

5.1.3.30 Forges, furnaces and ovens. Each complete forge, furnace or oven with components and repair parts shall be preserved and processed in accordance with level C requirements of MIL-E-17555 and paragraph 5.1.1.34 herein. The furnaces shall be palletized in accordance with MIL-STD-147.

5.1.3.30.1 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 lining shall be removed from any type of furnace which has been in uninterrupted service for five years or more, when burned, cracked, or deteriorated sections are found. A furnace which has been in service 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 lining shall be in accordance with MIL-HDBK-701. RECORDS SHALL INDICATE IN BOLD LETTERS: LINING HAS OR HAS NOT BEEN REMOVED. Lining shipped separately from the basic furnaces or ovens shall be packed in a container conforming to level C requirements of MIL-STD-2073-1. 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-843, type I, class B, grade 6 not less than 3/8 inches thick. Each container shall not exceed 200 pounds when packed. Container closure shall be in accordance with the container specification. Palletization shall be in accordance with MIL-STD-147.

5.1.3.31 Corrosion of electronic and electrical systems. The occurrence of corrosion in electronic and electrical systems are of paramount importance in electronic and electrical systems which are packaged for long-term storage. The corrosion in electronic and electrical systems, which are in storage, is influenced by three major factors; namely, humidity, temperature, and environmental contamination. Any relative humidity above 50 percent (RH) drastically increases the rate of corrosion of electronic and electrical equipment in storage, however, humidity alone is not the sole factor which causes corrosion. The environmental contamination which is caused by pollutants such as sulfides and chlorides is also a significant factor in the corrosion process. Corrosion can occur at extremely low levels of contamination, and low levels of relative humidity. Temperatures are also significant since expansion and contraction of metal causes movement of components which will cause certain types of corrosion.

5.1.3.31.1 Numerical control (NC)/computer numerical control (CNC) systems cleaning. Numerical control (NC)/computer numerical control (CNC) systems do not require extensive cleaning; however, dust, grit, grease, grease-dirt in combination, fingerprints, and dust film build-up can cause damage from contamination. Whenever these conditions exist, the systems shall be cleaned with a clean damp cloth and non-detergent cleaning solution, or a cleaning solution that is recommended by the manufacturer. After the systems have been cleaned, they shall be thoroughly dried before the application of a preservative and before putting them back into service or storage. The CRT

unit shall be made free from dirt, dust, and fingerprints with either a soft cloth, lint free paper towel, or a soft brush, using water only. Keyboards shall be cleaned with the moisture-free air. The hard drive ports, or A and B drives shall be clean by approved qualified computer services personnel. Any portion of the systems that cannot be cleaned by the above procedures shall be cleaned by approved qualified computer services personnel.

5.1.3.31.1.1 Preservation protection. NC/CNC systems shall be preserved and processed for shipment or storage in accordance with the requirements of MIL-STD-454, MIL-E-17555, and herein. Actuators, electronic servo, and similar systems shall be preserved with either P-2 preservative compound conforming to MIL-C-16173, grade 2 or P-18 preservative conforming to MIL-P-3420. Hydraulic actuators, when used in NC/CNC systems shall be preserved with P-15 hydraulic fluid conforming to MIL-H-5606 or approved commercial hydraulic fluid. Loose electrical brush-holders, fuse-holders, tube-holders, and similar items shall be enclosed in moisture-proof barrier material, flexible, electrostatic-free, heat sealed containers conforming to MIL-B-81705, class 1 material.

5.1.3.31.1.2 Electrical and electronic equipment. Electrical and electronic equipment including programmable controllers, digital readouts, and similar systems, accessories, attachments, and component parts shall be cleaned, dried, and reserved in accordance with level C requirements of MIL-STD454 and MIL-E-17555. The above items shall also be protected from moisture and fungus with moisture and fungus resistant varnish conforming to MIL-V-173. The equipment shall be protected from mildew and other deterioration with varnish conforming to MIL-V-13811. The equipment shall be protected from electrostatic discharge in accordance with DOD-STD-1686 and MIL-HDBK-773. In addition, preservation and processing for shipment and storage shall be in accordance with paragraph 5.1.1.35.1 herein.

5.1.3.31.2 Electronic devices. All conductors, control panels, pendants, electro-limit switches, and assemblies shall be preserved and processed for shipment and storage in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.31.3 Electrically balanced and calibrated equipment. Electrically balanced and calibrated equipment, component parts and assemblies shall be preserved and processed for shipment and storage in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.31.4 Control panels, switch panels, instrument panels, and recording instruments. All openings in the control panels, switch panels, instrument panels, and recording instruments installed on the basic units shall be preserved and processed for shipment and storage in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.31.5 NC/CNC units. NC/CNC units provided the machines may be in one or more cabinets separable from the parent machine, or may have other intermediate arrangements. For simplicity, the fundamental requirements are structured around the separate, off the machine type units and machines. Preservation instructions herein shall apply to all other machines. Units and machines vary only as dictated by configuration factors. The degree of protection specified shall, in all cases, remain the same.

5.1.3.31.5.1 Vibration insulation. Insulation from vibratory forces is of paramount importance to the above units for protection of electronic and electrical components therein. Using vibration dampening materials and other physical security measures shall be utilized as required to insulate against vibratory forces. The assembled units shall be preserved in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.31.5.2 Removed parts. Other parts which have been removed from the basic unit shall be cleaned, dried, and preserved in accordance with level C requirements of MIL-E-17555.

5.1.3.31.5.3 Drawers and door assemblies. Sliding surfaces of drawer guides shall be coated with P-11 preservative grease conforming to either MIL-G-10924, MIL-G-23827, MIL-G-81322 or approved commercial grease. Internal surfaces shall be coated with P-7 preservative oil conforming to MIL-C-3150 or P-10 preservative oil conforming to MIL-L-21260. In addition to mechanical locks and catches, doors and drawers shall be secured with non-metallic strapping conforming to ASTM D3953 and ASTM 4675. Fiberboard pads shall be placed between the metal and strapping to prevent the strapping from marring the painted or preserved surfaces.

5.1.3.31.5.4 Identification and matching of NC/CNC units disconnected from machines. When NC/CNC units are disconnected from machines, the machine model number, ID number, nomenclature, and manufacturer's name shall be recorded on a tag conforming to UU-T-81 and taped to the inside of the control cabinet door. This data shall also be stenciled on the shipping cover of the container to assure correct identification and matching of machine and control unit upon assembly.

5.1.3.31.5.5 Electric heating elements. Electric heating elements removed from the basic unit shall be individually preserved in accordance with level C requirements of MIL-F-3296, and packed in accordance with method III requirements of MIL-P-116. Preserved items shall be placed in a container conforming to level C requirements of MIL-STD-2073-1.

5.1.3.31.5.6 Transformers. All transformers shall be processed for shipment and storage in accordance with level C requirements of MIL-STD-454 and MIL-E-17555.

5.1.3.31.5.7 Electric motors. Electric motors detached from the basic unit shall be cleaned, dried, and preserved in accordance with level C requirements of MIL-E-16298.

5.1.3.31.5.8 Electron tubes. Electron tubes shall be removed from the mating sockets marked to permit correct tube reinstallation at the time of reassembly. Tubes shall be preserved in accordance with level C requirements of MIL-E-75.

5.1.3.32 Frames, tanks, paint spray booths, and conveyors systems. Each item of this type of equipment shall be handled as a unit or disassembled only to the extent necessary for processing for shipment and storage. Unpainted metal surfaces shall be coated with P-2 or P-19 preservative compound

conforming to MIL-C-16173, grades 2 and 4, or approved commercial materials. Bearings and fittings shall be charged with P-11 preservative grease conforming to either MIL-G-10924, MIL-G-23827, MIL-G-81322 or approved commercial grease.

5.1.4 Packing list. Exterior packing lists shall be sealed in waterproof or water-resistant envelopes conforming to PPP-E-540, class I. 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 PPP-T-60. For overseas shipment of IPE, the waterproof envelope containing the packing list shall be further protected with a packing list protector in accordance with paragraph 5.1.6 of MIL-STD-129, and securely attached to the skidded, palletized/unitized load or container.

5.2. Packing. Packing shall be level A, B, or C as specified, and for equipment to be stored for a long term or indefinite period under any storage condition. Packing shall be designed to comply with the minimum weight and cubage requirements of joint regulation DLAR 4500.25, AR 70-44, NAVINST 4600.22, AFR 80-18, and MCO 4610.14, DOD Engineering for Transportability.

5.2.1. Level A packing. Level A packing shall be used for overseas shipment of IPE or for equipment to be retained in non-dehumidified storage. Each container with contents weighing more than 200 pounds shall be provided with skid runners in accordance with level A requirements of MIL-STD-2073-1. All screws, nuts and bolts used in the container shall conform to the requirements of Federal Standard FED-STD-H28.

5.2.1.1 Equipment weighing 1,000 pounds or less. Each complete item weighing 1,000 pounds or less shall be packed in an overseas container conforming to level A requirements of MIL-STD-2073-1. Each container with contents weighing more than 200 pounds shall be provided with skid runners in accordance with the container specification. Contents of each container shall be secured in a waterproofed case liner or wrap material conforming to MIL-L-10547. Cushioning, blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186. Container closure and strapping shall be in accordance with level A requirements of the container specification.

5.2.1.2 Equipment weighing between 1,001 and 4,000 pounds. Each complete item weighing between 1,001 and 4,000 pounds shall be packed in an overseas shipping container conforming to level A requirements of MIL-STD-2073-1. The contents of each container shall be secured in waterproof case liners or wrapped material conforming to MIL-L-10547. Cushioning, blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186. Closure and strapping shall be in accordance with level A requirements of the container specification.

5.2.1.3 Equipment weighing between 4,001 and 16,000 pounds. Each complete item weighing between 4,001 and 16,000 pounds shall be packed in an overseas shipping container conforming to level A requirements of MIL-STD-2073-1. The contents of each container shall be secured in waterproof enclosure materials conforming to either L-P-378, MIL-L-10547, or when

electronic equipment is enclosed, the enclosure material shall conform to MIL-B-81705. Cushioning, blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186. Container closure and strapping shall be in accordance with level A requirements of the container specification.

5.2.1.4 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 requirements of MIL-STD-2073-1. The contents of each container shall be secured in waterproofed bag, shroud or wrapped materials conforming to either L-P-378, PPP-B-1055, MIL-L-10547 or when electronic equipment is enclosed, the enclosure material shall conform to MIL-B-81705. Cushioning, blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186. Container closure and strapping shall be in accordance with the container specification.

5.2.1.5 Equipment weighing over 30,000 pounds. Equipment weighing over 30,000 pounds or dimensionally in excess of the limitation specified in MIL-STD-2073-1 shall be packed in accordance with directions issued by the organization directing the shipment. Cushioning, blocking, bracing, anchoring, and waterproofing shall be in accordance with MIL-STD-1186. Contents of each container shall be secured in weatherproofed wrap or shroud conforming to either MIL-L-10547, PPP-B-1055 class E, or L-P-378 having a minimum thickness of 6 mils, and for electronic electrical equipment, weatherproofing shall be accomplished with material conforming to MIL-B-81705.

5.2.1.6 Consolidation of items preserved to level A. All items preserved to level A requirements which have not been containerized in the above paragraphs, shall be consolidated in an overseas shipping container conforming to level A requirements of MIL-STD-2073-1.

5.2.2 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 in accordance with container specification. Cushioning, blocking, bracing, and anchoring shall be in accordance with MIL-STD-1186. Containers shall conform to level B requirements of MIL-STD-2073-1. Container closures and strapping shall be in accordance with the container specification. All screws, nuts and bolts used in the container shall conform to the requirements of Federal Standard FED-STD-H28.

5.2.3 Level C packing. Containers shall conform to level C requirements of MIL-STD-2073-1. Container closure and strapping shall be in accordance with the container specification. Each complete item shall be packed in a manner which will prevent deterioration and damage during shipment, handling, and storage. Container and packing shall comply with Uniform Classification and Rules as applicable. All screws, nuts and bolts used in the container shall conform to the requirements of Federal Standard FED-STD-H28.

5.3 Marking. When level A or C protection is specified, marking shall be in accordance with MIL-STD-129.

5.3.1 Bar code marking. When bar code marking is specified in the contract or order, bar code marking shall be in accordance with MIL-STD-1189 and MIL-STD-129. DD Form 1387, Military Shipment Label shall be bar coded in accordance with Appendix H of MIL-STD-129. The plant equipment code (PEC) shall be placed adjacent to the National Stock Number (NSN). The PEC shall not be bar coded.

5.4 Inspection. Inspection of IPE shall be performed before shipping or placing the equipment in any form of storage. Each item shall be visually inspected to determine the completeness and condition of the cleaning, drying, and preservation of the equipment. Each item shall be inspected to ascertain condition of the item after transportation and handling and before placing the item in storage. Each item shall be provided with warning tags, inspection records, PCB laboratory test report, condition tags, packing list, and all other conditions which may be discovered during inspection requirements as specified herein. The inspection shall conform to the requirements of DLAM 4155.4, AR 750-26, NAVSUP PUB 5011, and MCO 4870.45C. Any discrepancy discovered shall be corrected before shipment or the item is placed in any form of storage.

5.4.1 Inspection after disassembly. Equipment shall be inspected after disassembly and before cleaning to identify and replace missing parts or components. Inspection shall be performed on the item and the material used for this purpose in accordance with MIL-STD-105, Sampling Procedures and Table for Inspection by Attribute.

5.4.2 Inspection after cleaning. Inspection shall be performed after disassembly and cleaning, and before preservation to ensure that all cleaning and drying have been accomplished in accordance with MIL-P-116 and sections 4 and 5 of this standard. The inspection shall be performed on the equipment and the material used for cleaning and drying the item to determine if the item is free of corrosion, dirt, spent coolant, grease, oil, alkalies, salt, acidity, and other foreign materials. If the equipment is found to be unclean, it shall be cause for rejection and further cleaning shall be required. After recleaning, the item shall be reinspected until the equipment passes all inspections specified herein.

5.4.3 Inspection of preservation. All 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 environment. After disassembly, 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 reinspected until the equipment passes all inspection specified herein.

5.4.4 Inspection before shrouding. Inspection shall be performed before shrouding to ensure that all accessories, attachments, and components have been properly containerized or placed on skids, pallets, or reinstalled on the machine on which they are to be used. When the items are not installed on the machine, they shall be packed correctly and identified with the machine on which they are to be used, and stored with the parent machine when possible. 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.

5.4.5 Inspection of blocking and bracing. Inspection of the machine heads shall be performed to ascertain that the machine heads are being locked in the lowest position. Movable parts shall be inspected to ascertain that the parts have been removed or carefully locked in position and braced to prevent movement in transit or handling. All industrial plant equipment shall be inspected to ensure the item is completely assembled when being prepared for shipment whenever weight and size permit, provided all necessary blocking has been or can be 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, etc., shall be inspected to ascertain that all tension has been 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.

5.4.6 Inspection of machine tables and ball-screw mechanisms, components. Machine tables, ball-screw mechanisms and other components moving on ball bearings or other types of high efficiency, low friction ball or roller bearing assemblies, shall be inspected to ascertain that the bearings have been removed or blocked, and all components treated in such a manner that neither the ways surfaces nor the anti-friction devices will be subject to brinelling or other damage. The bearing preload when required, shall be 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 shipment and handling. Slides, counter-balances, motors, hydraulic tables, and any movable components shall be inspected to ensure that the components are securely braced to the machine itself.

5.4.7 Inspection of items processed for storage. All IPE processed for storage shall be inspected in storage as specified herein. The inspection phases and frequency of inspection shall be determined by the storage environment such as controlled humidity, heated or non-controlled storage.

5.4.8 Responsibility for inspection. The using activity, contractor, packaging activity, owning activity, and the shipping activity having possession of the IPE are responsible for the inspection of cleaning, drying, preservation, packing, blocking, bracing, skidding, cushioning, weather-proofing, marking, shrouding, and loading of industrial plant equipment prior to shipment and storage. The receiving activity is responsible for the equipment when it is accepted at its destination.

5.5. 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.

5.5.1 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 of 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 unhealed or scared areas. Where the open type of transportation is utilized, equipment that is not preserved in accordance with level A requirements shall be covered with flexible, weatherproof barrier material conforming to PPP-B-1055, class E or heavier, not less than 6 mils thick, plastic sheet and strip, thin gauge, polyolefin, class 1, type II conforming to L-P-378, or approved commercial plastic material. Polyvinyl chloride (PVC) or ethylene vinyl acetate (EVA) shall not be used as an intimate 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 be secured in a manner to adequate 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.

5.5.1.1 Shipping covers for machine control and computer numerical control units. All numerical control/computer numerical control units shall be protected from the environment by enclosuring the units in weatherproofed bags manufactured from material conforming to either L-P-378, PPP-B-1055, class E or heavier not less than 6 mils thick, or material conforming to MIL-B-81705. Seams shall either be heat sealable or sealed with tape conforming to PPP-T-60.

5.5.2 Transportation mode. Except for shipment of delicate equipment such as numerical control and computer numerical control units, and other fragile items, all 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. Due to the high susceptibility of delicate electronic and electrical systems to damage from vibration and shock, these systems shall be shipped on specialized equipment available from the carrier for movement of fragile items. 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. Transportation mode shall comply with Title 49 CFR Code of Federal Regulations, Transportation, parts 100 to 199.

5.5.2.1 Transportation mode for numerically controlled equipment. All numerically controlled equipment including numerically control units, accessories, attachments, components, and assemblies shall be shipped in air ride vans only. Transportation mode shall comply with Title 49 CFR Code of Federal Regulations, parts 100 to 199.

5.5.2.2 Waiver of transportation mode. When it is determined to be more economical or otherwise in the best interest to the Government to relax the transportation mode or when air ride vans cannot be utilized due to size, weight, or configuration of the item, a written request for waiver shall be addressed to: Defense Industrial Plant Equipment Center, ATTN: DIPEC-SQ, 2163 Airways Blvd., Memphis, TN 38114-5051.

5.6. Storage. In addition to other protective measures prescribed in this standard, proper support of machine bases is required to prevent distortion. Machines mounted on wooden skids may be subjected to abnormal structural loads created by warpage of skid components under variable relative humidity conditions during storage. These loads can distort precision machinery, and in extreme cases, cause structural damage. After a machine has been placed in storage, the machine bolt hold-down nuts on wooden skids shall be loosened a minimum of one-half inch from the base. The bolts shall be coated with P-2 preservative compound conforming to MIL-C-16173, grade 2 or 4. Other machine-to-skid retention devices on wooden skids 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.

5.6.1 Locator system. Each DOD storage maintenance activity shall have a locator system which shall reflect the current location of stored assets by ID number, parts number, plant equipment code, or national stock numbers. 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.

5.6.2 Storage types. IPE shall be stored in controlled humidity storage, unless a waiver or deviation is obtained from DIPEC-SQ. Except that non-controlled areas may be used for large bulky items such as tanks, furnaces, conveyors, drop hammers, large casting and forging. These items shall be processed in accordance with level A requirements of their specifications and level A requirements of this standard for non-controlled storage.

5.6.2.1 Controlled humidity storage. Controlled humidity storage shall conform to DOD 4145.19-R-1. Controlled humidity areas shall consist of enclosed buildings, hutments, or other enclosed areas which have the atmosphere maintained at 50 percent or less relative humidity. The relative humidity may be controlled by the use of air conditioning, heating, or dehumidification to assure that it does not exceed 50 percent relative humidity.

5.6.2.2 Non-dehumidified storage. Non-dehumidified storage areas include warehouses, underground storage, open areas which have been paved to permit effective material handling equipment operations and non-improved areas

To facilitate nailing to base.

which have not been improved, but can be used for storage purposes. Equipment not stored in enclosed buildings shall be protected by tarpaulins, cocoons or other appropriate means.

5.6.3 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.

5.6.3.1 Adjacent storage. When IPE is to be placed in adjacent storage, preparation shall be in accordance with the level specified.

5.6.3.2 Storage-in-place. When IPE is to be stored in-place, preparation shall be made immediately following or during shutdown. There are two types of storage in-place: (1) storage in-place cycled, and (2) storage in-place and non-cycled. Both types of equipment shall remain in the original operating position connected to power. Type I storage in-place is equipment which have been timed and aligned need no further preservation. Type II storage in-place is equipment which have not been timed and aligned. Preparation shall be in accordance with level A requirement of this standard. When type I or type II storage in-place are in a controlled humidity environment, preparation shall be in accordance with level C requirements of this standard. Exercising of equipment may be specified by the cognizant activity to maintain a high level of readiness.

5.6.3.3 Storage-on-site. When IPE is to be stored on-site, it is necessary to determine whether any equipment is non-severable and should therefore, remain in its installed position. Non-severable equipment includes industrial plant equipment not feasible to move due to construction and size. Preparation for storage on site shall be in accordance with the requirements this standard and the level specified.

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

5.6.4.1 Skids and boxes. Skidded or crated IPE shall not be stored in as received condition unless the containers and/or skids meet the requirements of MIL-HDBK-701. If the containers and/or skids do not meet the requirements of MIL-HDBK-701, complete repacking, recrating, and/or reskidding shall be accomplished prior to storage. An item received on wooden skids meeting the requirements of MIL-HDBK-701 shall not be reskidded on DOD reuseable skids or reskidded to meet a higher skidding level. Lifting devices, whenever available, shall be used to facilitate handling of equipment. In order to conserve storage space, consolidation of boxes or parts shall be accomplished whenever possible.

5.6.4.2 Leveling. All items shall be stored in a level position to prevent distortion of precision aligned elements. All IPE having ways or other precision aligned elements which are over six feet long, shall be maintained in a level position by shimming supporting members as required. Leveling of equipment on wooden skids shall be accomplished by placing shims between the skid and the machine base, when required, to ensure load transfer to the skid and the floor at the same points if the skid is not bearing

FIGURE 1 ... trays and open end cells

solidly on the floor. 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 releveled upon relocation.

5.6.4.3 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 straight line traffic pattern.

5.6.4.4 Attachments and accessories. Boxed and crated attachments and accessories shall be placed on the skid with the related equipment, avoiding contact of wood with preserved surfaces. When the above requirements are not practical, boxed and crated attachments and accessories may be block-stacked separately from the basic item, provided they are 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.

5.6.4.5 Dust shields. Dust shields shall be used for covering IPE, attachments, accessories, and components preserved for long-term storage. When conditions are such that harmful quantities of dirt and harmful contamination would settle on the equipment, 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 rupture the shields, shall be wrapped with barrier material conforming to MIL-B-121, grade A or MIL-B-22191, type II. Additional cushioning protection as required for the machine projections shall be provided. The cushioning material used shall be either cushioning material resilient, low density, unicelluar, polypropylene foam conforming to PPP-C-1797, or cushioning material, plastic, open cell (for packaging applications) conforming to PPP-C-1842. Polyvinyl chloride (PVC) or ethylene vinyl acetate (EVA) material shall not be acceptable as an intimate wrap, shroud, or cover material due to the possible corrosive effects of PVC and EVA vapors on the covered items and its components parts. Barrier and cushioning material shall be secured with tape conforming to PPP-T-60, type IV.

6. NOTES

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

6.2 Subject term (keyword listing).

Applicable documents
Cleaning
Definitions
Detailed requirements
Disassembly
Federal acquisition regulations

General requirements
Hazardous contaminants
Hydraulic system
Inspection requirements
Level of protection
Marking
Preservation
Shipping requirements
Storage requirements
Waiver procedures

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

Custodians:
Army - AL
Navy - SH
Air Force - 69

Review activities:
Army - AR, AV, ER, SM
Navy - YD
Air Force - 84
DLA - DH, GS

User:
Navy - MC

Preparing Activity
DLA-IP

(Project PACK-0916)

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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

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

I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER	2. DOCUMENT DATE (YYMMDD)
	MIL-STD-107H	21 September 1990

3. DOCUMENT TITLE
Preparation & Handling of Industrial Plant Equipment 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) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)

8. PREPARING ACTIVITY

NAME	b. TELEPHONE (Include Area Code)	
JOHN W. PURDY	(1) Commercial (901) 775-6699	(2) AUTOVON AV 683-6699
c. ADDRESS (Include Zip Code) Defense Industrial Plant Equipment Center 2163 Airways Blvd. Memphis, TN 38114-5051	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	