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PACKAGING, HANDLING, STORAGE, AND TRANSPORTABILITY PROGRAM REQUIREMENTS FOR SYSTEMS AND EQUIPMENTS

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DEPARTMENT OF DEFENSE
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PACKAGING, HANDLING, STORAGE, AND TRANSPORTABILITY
PROGRAM REQUIREMENTS (FOR SYSTEMS AND EQUIPMENTS)

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: ASD/ENES, Wright Patterson Air Force Base, Ohio 45433-6503, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FOREWORD

The purpose of this standard is to establish uniform packaging, handling, storage, and transportability program management procedures for Department of Defense procurements.

Packaging, handling, storage, and transportability (called PHS&T throughout this standard) is one of many subsystems which must be considered in a system engineering effort. In its simplest essence, PHS&T management provides the requiring activity with the capability of having a useful system and assures him that its elements can be delivered to the user. Efficient PHS&T has significant impact on system effectiveness, reliability, maintainability, corrosion prevention and control, and safety. PHS&T consumes a measurable percentage of overall cost and is, therefore, a significant element of life cycle investment. Thus, PHS&T is a key ingredient in integrated logistics support.

Optimizing the PHS&T system is essential in optimizing the parent system. The degree to which PHS&T suboptimizing contributes to optimizing the system is directly dependent upon the management emphasis received during all phases of the life cycle.

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1. SCOPE

1.1 Purpose. This standard establishes uniform packaging, handling, storage, and transportability (PHS&T) program management procedures.

1.2 Implementation. This standard shall be used in preparing requirements included in contractual documents, system management plans, integrated logistics support plans (ILSPs), integrated support plans (ISPs), packaging management plans, and transportability reports.

1.3 Tailoring. The overall requirements of this standard must be tailored by the requiring authority, giving consideration to the following factors;

a. Program stage--Concept Exploration (CE), Demonstration and Validation (D&V), Full Scale Development (FSD), and Production and Deployment (P&D).

b. Nature of system or system components--In a practical sense, for example, a hazardous item such as a guided missile will require more detailed control than will a modified commercial off-the-shelf item. In tailoring, the depth and level of effort required for each task and data expected must be defined.

c. Nature and category of the acquisition program--Whether program is for major system or small program. Formal procedures may not apply to all programs.

d. For contractual use, tailor out provisions applicable only to the requiring authority or modify the provisions that apply to the performing activity.

2. APPLICABLE DOCUMENTS

2.1 Government documents

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

SPECIFICATIONS

MILITARY

MIL-P-116 - Preservation, Methods of

DoD-D-1000 - Drawings, Engineering and Associated Lists

MIL-M-8090 - Mobility, Towed Aerospace Ground Equipment, General Requirements For

MIL-S-83490 - Specifications, Types, and Forms

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheet, Preparation and the Submission of

MILITARY

MIL-STD-129 - Marking for shipment and storage

MIL-STD-147 - Palletized Unit Loads

MIL-STD-209 - Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment

MIL-STD-210 - Climatic Extremes for Military Equipment

MIL-STD-648 - Design Criteria for Specialized Shipping Containers

MIL-STD-669 - Loading Environment and Related Requirements for Platform Rigged Airdrop Material

MIL-STD-680 - Contractor Standardization Program Requirements

MIL-STD-810 - Environmental Test Methods

MIL-STD-814 - Requirements for Tiedown, Suspension, and Extraction Provisions on Military Materiel for Airdrop

MIL-STD-1319 - Item Characteristics Affecting Transportability and Packaging and Handling Equipment Design

MIL-STD-1365 - General Design Criteria for Handling Equipment Associated with Weapons and Related Items

MIL-STD-1366 - Material Transportation System Dimensional and Weight Constraints, Definition of

MIL-STD-1388-1 - Logistics Support Analysis (LSA)

MIL-STD-1510 - Container Design Retrieval System, Procedures for Use of

MIL-STD-1660 - Design Criteria for Ammunition Unit Loads

DOD-STD-1686 - Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices)

MIL-STD-1791 - Designing for Internal Aerial Delivery in Fixed Wing Aircraft

MIL-STD-2073-1 - DOD Materiel Procedures for Development and Application of Packaging Requirements

MIL-STD-2073-2 - Packaging Requirements Codes

HANDBOOKS

MILITARY

MIL-HDBK-157 - Transportability Criteria

DOD-HDBK-263 - Electrostatic Discharge Control Handbook for Protection of Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electronically Initiated Explosive Devices)

MIL-HDBK-304 - Package Cushioning Design

MIL-HDBK-695 - Rubber Products, Shelf Storage Life

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

Code of Federal Regulations (CFR) Title 49 Transportation

2.2 Non-Government publications. The following documents form a part of this standard to the extent specified herein. Unless otherwise specified, the issue of the documents which are DoD adopted shall be those listed in the issue of the DODISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the non-Government documents which are current on the date of the solicitation.

National Railway Publication Company's "The Official Railway Equipment Register" and "Car Builders Encyclopedia".

Limits of Motor Vehicle Size and Weights

International Civil Aviation Organization (IACO) Technical Instruction for the Safe Transport of Dangerous Goods

International Maritime Dangerous Goods Code (IMDG Code)

NATO Standardization Agreement, STANAG No. 2832

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

2.4 Source of documents

2.4.1 Government specifications, standards, and handbooks. Copies of the referenced federal and military specifications, standards, and handbooks are available from the Department of Defense Single Stock Point, Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia PA 19129-5099. For specific acquisition functions, these documents should be obtained from the contracting activity or as directed by the contracting activity.

2.4.2 Other Government documents. Copies of other Government documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.

2.4.3 Sources for non-Government publications. Non-Government documents are generally available from libraries and technical groups. The documents listed may be obtained as follows:

2.4.3.1 American Railway Engineering Association. Copies may be purchased from American Railway Engineering Association, 59 East Van Buren Street, Chicago IL 60605.

2.4.3.2 Federal Highway Administration Office. Copies may be purchased from U.S. Department of Transportation, Federal Highway Administration Office (HIA-10), 407 Seventh Street SW, Washington DC 20590.

3. DEFINITIONS

3.1 Baselines. The formally designated configuration fixed at a specific time which constitutes the current configuration identification. There are three types of baselines: functional, allocated, and product.

3.2 Configuration item (CI). An aggregation of hardware/software, or any of its discrete portions, which satisfies an end use function and is designated by the Government for configuration management. CIs may vary widely in complexity, size and type, from an aircraft, electronic, or ship system to a test meter or round of ammunition. During development and initial production, CIs are only those specification items that are referenced directly in a contract (or an equivalent in-house agreement). During the operation and maintenance period, any reparable item designated for separate procurement is a configuration item. Reusable engineered

containers and special handling equipment may be considered configuration items.

3.3 Configuration management. Configuration management is a management discipline applying technical and administrative direction and surveillance to accomplish the following;

a. Identify and document the functional and physical characteristics of a configuration item.

b. Control changes to those characteristics.

c. Record and report change processing and implementation status.

3.4 Container design retrieval system (CDRS). The management system and facilities to provide a central automated data system for storing, retrieving, and analyzing design and test information concerning specialized containers for new acquisitions or for modifications to items/equipment already in the inventory.

3.5 Corrosion prevention and control. The materials and processes used to prevent deterioration of materials as a result of chemical reaction with the environment.

3.6 Handling. Physical manipulation, directly or indirectly, by people (characterized as lifting, sliding, hoisting, lowering, or moving items on dollies or pallets through the use of manpower, tugs, cranes, forklifts, hoists and automated systems).

3.7 Handling equipment. Common or specially designed devices or apparatus used for handling.

3.8 Hazardous materials. Substances or materials which have been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce and which have been identified in Title 49 of the Code of Federal Regulations, Section 172.101.

3.9 Human factors. Human factors are scientific facts about human characteristics.

3.10 Integrated logistics support. A disciplined approach to the activities necessary to: (a) cause support considerations to be integrated into system and equipment design; (b) develop support requirements that are consistently related to design and to each other; (c) acquire the required support; and (d) provide the required support during the operational phase at minimum cost. The 10 ILS elements are:

a. Design Interfaces
b. Maintenance Planning
c. Support Equipment
d. Supply Support
e. Technical Data
f. Packaging, Handling, Storage and Transportation
g. Facilities
h. Training and Training Support
i. Computer Resource Support
j. Manpower and Personnel

3.11 Life cycle costs. Life cycle cost drivers related to shipping containers are container costs, transportation costs based on loaded container weight and cube, container life in terms of number of trips, container maintenance costs for long term containers, container performance and labor time for packing and unpacking. Reusable container cost shall include the transportation costs of shipping the empty containers, if necessary, based upon weight and cube.

3.12 Mobility. The ease in which an item, usually designed with wheels or tracks, can be moved by towing, pushing or self propulsion for use on or off the highways.

3.13 Packaging. The processes and procedures used to protect material from deterioration, damage, or both. It includes cleaning, drying, preserving, packing, marking, and unitization.

3.14 Reusable containers. Shipping and storage containers which are designed for reuse without impairment of their protective function and which can be repaired and/or refitted to prolong their life or to adapt them for shipment of items other than that for which they were originally employed. Reusable shipping and storage containers are further defined in the following paragraphs.

a. Long life containers. Shipping containers having features such that they can be used repeatedly, and their service life can be expected to equal the service life of the item they are designed to protect. These containers may be refurbished by appropriate maintenance practices and restored to full usage for stockpile (100 trip minimum).

b. Short life containers. Shipping containers that can be used for a limited number of times. These containers are usually made of wood, plywood, fiberboard or similar material and includes cushioning, die-cuts, inserts, fasteners, etc., which may be described by drawings and bills of materials. These containers can usually be identified by military or federal specification numbers (10 trip minimum).

3.14.1 Reusable container category. Reusable containers are further defined by the following two categories based on the intended contents of the containers:

a. Specialized containers. Specialized containers are generally the long life variety and are uniquely configured to support and protect a specific item or limited variety of items during handling, storage, forward and return shipment, unpackaging by the user or to protect personnel and equipment from hazardous contents. Containers of this type frequently incorporate energy absorbing systems, temperature control systems or special features to make handling or shipment possible, easier or safer. Engineering drawings, or equivalent, are used to define form, fit, function, materials, tolerances and manufacturing techniques. Specialized shipping containers, internal fixtures and other fixtures result from original design efforts or the redesign or modification of an existing container to meet a specific application or need.

b. Multiapplication containers. Multiapplication containers are designed to protect a variety of components within a given fragility and size range. They can be manufactured in a similar manner to that used for specialized containers or in accordance with applicable/specified military or federal specifications. A multiapplication container can be either of the short life or long life variety.

3.15 Safety. Safety is freedom from those conditions which can cause injury or death to personnel, or damage to or loss of equipment or property. System safety is the optimum degree of safety within the constraints of operational effectiveness, time, and cost, attained through specific application of safety management and engineering principles throughout all phases of a systems life cycle.

3.16 Shelf life. The total period of time, beginning with the date of manufacture/cure/assembly or inspection of test/restorative action, that an item may remain in the combined wholesale (including manufacture) and retail storage system and still maintain suitability for issue/use by the end user.

3.17 Special packaging instruction (SPI). Detailed instructions for, constructing packages to protect items that require special preserving and packing. SPIs include details for special blocking, bracing, cushioning, shock mounts, tiedown devices, or containers.

3.18 Transportability. The capability to move an item by towing, pushing, self-propulsion, or by a carrier via railway, highway, waterway, pipeline, ocean, or airway using existing equipment or equipment that is planned for the movement of the item.

3.19 PHS&T problem item. An equipment/item in its proposed shipping configuration that, because of its size, weight, fragility, hazardous characteristics, or lack of adequate means for lifting and tiedown, or need for special permits, waivers, special equipment, handling, or special carrier services, may be denied movement or may be unacceptably delayed when moving within existing or newly designed transportation systems.

4. GENERAL REQUIREMENTS

4.1 PHS&T program requirements. The PHS&T program shall be planned, developed and maintained to reflect visibility in the logistics program. The program shall be integrated with the system or equipment design and support engineering program to assure effective and timely accomplishment. The PHS&T program shall contribute to the acquisition of an operationally effective and supportable system, designed for the lowest life cycle cost.

4.1.1 General program goals. The PHS&T program shall assure meeting the following goals:

a. Transportability of items and equipment, and technical adequacy of packaging designs, shall be consistent with program test, deployment, and logistics support concepts and plans.

b. Handling and mobility features shall be incorporated into items, equipment, and containers as required to facilitate handling and movement consistent with existing or planned equipment, facilities, and procedures.

c. Design, test, and production of transportation and handling equipment, containers, and packaging needed to conduct and support development and operational test and evaluation (DT&E and OT&E) and production shall be so accomplished as to assure their availability at the time and place required. They shall be suitable for use throughout the system program life without further major design and test effort unless program objectives, cost, or schedules justify otherwise, or unless deficiencies are detected which require correction.

d. The most cost-effective item-to-container design interface shall be determined using trade-off study techniques based upon program life cycle costs. Trade-off studies and transportability analyses shall be conducted to ensure compatibility between item, transportation, and handling equipment and to determine the most efficient and cost-effective packaging design required to satisfy functional requirements.

e. The levels of preservation and packing applied to deliverable items shall be consistent with the known or projected method of delivery, program requirements, destination environment, and logistics support plans and shall be in consonance with any contractually required logistics support analysis (MIL-STD-1388-1), reliability, maintainability and corrosion prevention control programs.

f. The performance of transportation and handling equipment and containers shall be continually evaluated during system or equipment development testing to identify design and other configuration deficiencies, and corrective action shall be taken as necessary to ensure that such equipment/containers will perform in accordance with its approved baseline.

G. Packaging for hazardous materials shall be designed to meet the requirements of Title 49 of the Code of Federal Regulations, the International Civil Aviation Organization Technical Instruction and the International Maritime Dangerous Goods Code.

h. Any PHS&T equipment developed shall be available for use within the time limits indicated in the contract.

i. The PHS&T equipment shall be maintainable by service activities no later than the beginning of deployment, regardless of the date the using service is scheduled to assume system support responsibility.

j. PHS&T equipment developed hereunder, unless otherwise authorized:

(1) Shall be capable of breakout for separate procurement as identical items and does not require sole source manufacture.

(2) Shall require minimum organizational maintenance.

(3) Shall be capable of maintenance at the intermediate level.

(4) Should not require depot level maintenance. A requirement for depot level maintenance shall be supported by appropriate trade studies demonstrating the necessity.

4.1.2 Lower-tier contractors. The performing activity's PHS&T program shall ensure applicability to lower-tier contractors (subcontractors and vendors) who deliver portions or all of the system or equipment directly to the Government, or to contracts for which such lower-tier contractors have design responsibility.

4.2 Program control. The PHS&T program shall ensure the following:

a. Scheduling to permit the performing activity and the requiring authority program review of status consistent with end item development, test, production, and delivery schedules.

b. Feedback mechanisms to ensure that the results of end item or PHS&T equipment testing, service experience, and configuration changes are incorporated in PHS&T development.

c. Scheduling and conducting PHS&T programs, technical, and design reviews as part of systems engineering design reviews, as required by the contract statement of work.

4.3 Time phasing. PHS&T program time phasing need not exactly coincide with parent system or equipment time phasing. In an orderly development program, the PHS&T milestones indicated in Table I and II should be completed coincident with the parent system milestones indicated. If PHS&T milestones are not accomplished by the system milestones indicated, appropriate efforts shall be initiated early in the next phase.

4.4 Program interfaces. When any of the following program efforts are imposed, the PHS&T program shall establish and maintain clear interfacial relationships therewith.

4.4.1 Engineering process. A PHS&T program shall be developed and implemented as part of the system engineering process. The program shall be an ongoing process consistent with the life cycle stage of the system or equipment.

4.4.2 Work breakdown structure. The performing activity shall relate the PHS&T to the elements of his work breakdown structure in such a manner that PHS&T costs are identifiable and traceable.

4.4.3 Configuration management. The PHS&T program shall be coordinated with, and be part of, the contractually imposed configuration management program.

4.4.4 Reliability. The PHS&T program shall be consistent with the reliability program.

4.4.5 Maintainability. The PHS&T program shall be consistent with the maintainability program.

4.4.6 Value engineering. The costs of PHS&T equipment and procedures shall be continuously evaluated during development, production, and contractor support phases to optimize the cost/benefit ratio. Evaluations shall be conducted in accordance with the standards set by the value engineering program.

4.4.7 Quality. The PHS&T program shall be coordinated with the quality program.

4.4.8 Standardization. Standardization shall be in accordance with MIL-STD-680 and consistent with logistics and performance requirements and standard PHS&T procedures. Equipment or parts already in the Government inventory shall be used unless otherwise justified. The PHS&T standardization effort shall be consistent with the standardization program requirements of the contract.

4.4.9 Corrosion prevention and control. The PHS&T development program shall be consistent with corrosion prevention and control programs.

4.4.10 Safety. The PHS&T development program shall be consistent with the system safety program. For additional information on ammunition or explosives, see 6.5. Container (or other shipping or storage device) designs for hazardous material shall be of the highest standards of safety so that single point failure of the container or device will not create a hazardous condition. Safety capability shall be demonstrated to the satisfaction of the Government. Where new materials are proposed for use in support of the system, necessary safety information for such materials shall be developed in accordance with FED-STD-313.

4.4.11 Human engineering. The PHS&T development program shall be consistent with the human engineering program.

4.4.12 Shelf-life controls. The PHS&T program shall be consistent with the DOD shelf-life program. As an example, the PHS&T program shall be consistent with MIL-HDBK-695 for elastometric items.

4.4.13 Product cleanliness levels and contamination program. The PHS&T program shall ensure compatibility with the procedures required for inspection, rework, and handling of precision cleaned items required to maintain product cleanliness pursuant to the standards imposed.

4.4.14 Electrostatic discharge. All items, components, and assemblies sensitive to partial or complete damage by electrostatic discharge (e.g., electro-sensitive explosives, transistors, diodes, resistors, microcircuits, etc., including handling and packaging devices and assemblies) shall be designed to provide protection as specified in MIL-STD-2073-1 or the appropriate process or commodity specification. Design shall be consistent with the program controls prescribed in DOD-STD-1686 and DOD-HDBK-263.

4.5 Technical implementation. Handling equipment, preservation methods, and container designs shall satisfy the following technical criteria:

TABLE I. Optimized PHS&T time phasing

System Milestone No.	PHS&T Milestone Accomplishment
0	Basic development of system and its components sufficiently clear to proceed.
I	Transportability considered as constraint in generating PHS&T performance baselines for major system components. While the Packaging Management Plan and the Transportability Report should be submitted as early as possible, the initial Packaging Management Plan and Transportability Report should be submitted early enough to permit the results of Packaging Management Plan and Transportability Report evaluations to be available prior to Defense System Acquisition Review Council (DSARC) II.
II	Firm, allocated baselines for PHS&T equipment for major systems components. When the configurations and item characteristics are firmly established, an updated Packaging Management Plan and Transportability Report should be submitted. Also, a request for transportability approval will be submitted to the appropriate transportability agent. This request shall be made in sufficient time to permit approval prior to DSARC III.
III	PHS&T effort complete, except for spare and repair parts packaging. Based on LSA, allocated baselines established for any reusable containers required for spare and repair parts.

TABLE II. PHS&T time phasing for non defense items (NDI)

NDI Phasing	PHS&T Phasing Accomplishment
I (Definition and Validation)	PHS&T requirements have been tailored to the maximum extent possible to interface with the performing activity's commercial support facilities. PHS&T requirements are established as part of LSA and incorporated in the functional purchase description of the federal specification.
II (Acquisition and Deployment)	PHS&T problem items have been identified and transportability approval obtained prior to contract award.

4.5.1 Deliverable product compatibility. The PHS&T development program shall ensure compatibility with the deliverable product. The range of information which may be required to define such compatibility is contained in MIL-STD-1319.

4.5.2 Transportability. The PHS&T program shall be structured to integrate item design, packaging and handling procedures, and container or handling equipment design so as to ensure efficient transportation capability by rail, highway, barge, ocean going ships, and aircraft (unless otherwise specifically limited). The objective of this integration shall be to achieve deployment goals at lowest life cycle cost. Transportability criteria shall be stated in development specifications or in statements of work. For additional transportability information see MIL-HDBK-157 and 6.5. Those items exceeding the constraints of MIL-STD-1366 are considered as PHS&T problem items (see 4.6).

4.5.2.1 Preparation for military air transportation. When military air transportation is identified or contemplated for system test, deployment, operation or support, equipment shall be designed considering MIL-STD-1791 and, it is imperative that all items be configured for compatibility with the 463L materials handling system. This applies to nontactical as well as tactical systems since military cargo aircraft utilization rates are dependent on the improved turn-around-time made available with roller pallet equipment. For air transportability design information, see 6.5. Items requiring aircraft test loading or analysis are considered as PHS&T problem items (see 4.6).

4.5.2.2 Special transport equipment. The PHS&T program shall take into account possible need for special transport equipment such as air ride trailers, special heavy-duty flatcars, refrigerated cars, and the like. When the need for a completely specialized conveyance such as a missile transporter is proposed, such need will be supported by trade studies demonstrating advantages and disadvantages compared to standard vehicles. These studies shall show rationale for selecting use of specialized equipment, rationale behind requiring technical escort to maintain climatic control, unit reliability safety or security, and the skill level required (see 6.7). Items requiring special transport equipment are considered as PHS&T problem items (see 4.6).

4.5.3 Handling equipment design criteria. Specific design criteria for handling equipment developed hereunder shall be identified and selected from the requirements of MIL-STD-1365. New equipment shall not be designed if equipment in the DOD inventory is usable as is or with slight modification. For additional information on handling equipment design criteria, see 6.5. Items requiring special handling equipment shall be considered as PHS&T problem items (see 4.6).

4.5.4 Packaging design criteria. Unless another specification or standard is referenced in the development specification or work statement, guidance on selection and use of standard packaging procedures shall be taken from MIL-STD-2073-1. When a special design container is needed, it shall meet selected design criteria from MIL-STD-648. An item requiring special

radiation shielding (electromagnetic or radioactive) or a special design container shall be considered as a PHS&T problem item (see 4.6).

4.5.5 Wheeled or tracked vehicles. Wheeled or tracked vehicles shall be provided lifting and tiedown provisions per MIL-STD-209 commensurate with the size and weight of the item, the mode(s) of transportation, and the carrier equipment involved. Additional margins of safety shall be incorporated in the design of the restraining system when required because of peculiarities of the item, carrier safety considerations, or accident effects. Such provisions shall be appropriately depicted or described in related specifications and item design drawings. Vehicles intended for use on public highways shall comply with 5.6.1.2. Wheeled or tracked vehicles shall be considered as PHS&T problem items (see 4.6).

4.5.6 Hazardous materials. Packaging for hazardous material shall be designed to meet the requirements of Title 49 of the Code of Federal Regulations, and the International Maritime Dangerous Goods Code the International Civil Aviation Organization Technical Instructions, and be based on the characteristics of the item, mode of transportation, and destination. For guidance in preparing hazardous materials for military air transport, see 6.5. Disassembly of an item to provide separate packaging of the hazardous portion shall be accomplished when effective and efficient in terms of system life cycle costs. Marking and labeling of interior and shipping containers for articles classified as hazardous or restricted under provisions of the Department of Transportation shall be in conformance to the pertinent applicable documents cited within this document and general provisions of the contract. New explosive items must be classified as required by Title 49, Code of Federal Regulations, Section 173.88, prior to shipment. Items of hazardous materials shall be considered as PHS&T problem items (see 4.6).

4.6 Management of PHS&T problem items. When it appears in product development that PHS&T problem items may develop, such problems shall be identified in a transportability report and trade-off studies shall be made to identify possible alternatives. These studies must show relative costs of alternate methods, relative times involved, alternate methods of protection, and the need for special handling or transport equipment, Items exceeding the requirements of 4.5 as modified by the development specifications or statements of work shall be reported to the requiring activity. A decision chart is included as an aid in determining the need for a transportability report (see Figure 1.)(see 6.7).

5. DETAILED REQUIREMENTS

5.1 PHS&T program requirements. A PHS&T program shall be planned, developed and maintained for the system and be outlined in the performing activity's packaging management plan as contractually required by a DD Form 1423, Contract Data Requirements List (see 6.7).

5.1.1 General considerations. In consideration of program life cycle, preservation methods and packaging container designs shall provide a

reasonable balance between packaging cost and performance. The environmental control features, including preservation and packing methods selected, shall ensure protection of items against natural and induced environments. A prerequisite to such selection is the analysis of environments to which the item will be subjected during its life cycle. Such analysis shall include, but not be limited to, item characteristics, induced forces produced in transportation and handling, and climatic environments. System logistics, preoperational, operational, maintenance, and material support plans provide basic guidance in performing these analyses.

5.1.1.1 Preservation. Provisions of MIL-P-116 shall apply for selection of cleaning and preservation methods. Preservation selection charts contained in MIL-STD-2073-1 shall be used in selecting appropriate methods.

5.1.1.2 Levels of protection. The levels of protection shall be of the appropriate level(s) or combination of levels required to satisfy the statements of work, or other procurement or approved planning document and shall be accomplished in accordance with MIL-P-116 and MIL-STD-2073-1. All markings shall be in accordance with MIL-STD-129.

5.1.2 Determination of item fragility. Dynamic values in the nonoperating state established in the end item specifications shall be used to establish the maximum energy (normally expressed in g's) that can be permitted to reach the item during transportation and handling. It shall be necessary to provide a means of absorbing induced energy so as to limit shock values to or below the specification limits. Care shall be taken to ensure that there are no additional components installed with a lower fragility rating or that will alter the structural strength characteristics downward from conditions under which the prime item was tested and the shipping fragility was established.

5.1.2.1 Energy damping methods and package cushioning design. Design and application of conventional cushioning systems and selection of the appropriate cushioning material shall be in accordance with MIL-HDBK-304.

5.1.3 Induced environments. Design considerations shall include protection from the following induced environments.

5.1.3.1 Carrier equipment. The increasing availability of military and commercial transportation vehicles and equipment with more sophisticated shock/vibration isolation systems, together with differing size, mass, and internal cushioning features, has complicated the system designer's process for establishing standard and realistic guidance regarding shock and vibration environments of specific equipment. Where specific transportation vehicles are identified for use, their related shock and vibration environments shall be used.

5.1.3.2 Hoisting. Shock results from the application of lifting force. The shock extreme is considered to be 2g vertical for 11 to 40 milliseconds duration and may be incidental to any mode of transportation. Lifting rings or eyes shall be located to ensure a stable lifting configuration.

5.1.3.3 Handling. Shock results from the handling, loading, and unloading operations and may occur prior to or subsequent to the use of any mode of transportation. Unless otherwise specified, the frequency and type of handling to be encountered in worldwide distribution shall be a basic consideration in designing an adequate shock/vibration isolation system.

5.1.3.4 Airdrop. Shock results from the opening of the parachute and again from impact with the ground. If the ground delivery technique is employed, the initial shock will take place when the line attached to the aircraft cargo engages the ground anchor point. If material is to be prepared for airdrop, it shall be prepared in accordance with MIL-STD-1791, MIL-STD-814 and MIL-STD-669. These standards establish detailed design, number, and location requirements on airdrop material for tiedown to platform or aircraft, for suspension from retardation system , and for extraction from aircraft, loading environments, and related requirements.

5.1.3.5 Shock/vibration transmission. Packaging and transportation equipment used shall have the capability to ensure that shock/vibration transmission is within the structural values established for the individual item or equipment.

5.1.4 Natural environments. Natural environments shall be considered in selection of packaging, materials, and designs. Climate extremes are shown in MIL-STD-210. However, since MIL-STD-210 represents the most severe conditions worldwide, if specific criteria are not included in the contract, system specification, or contractually applicable system documents, the performing activity shall be responsible for providing item protection based upon known transportation, handling, and storage conditions for deliverable items of the contract. Unless previously approved materials and processes are used, the performing activity shall verify by demonstration, test, or engineering analysis that selected materials and protective processes provide item protection against the applicable climatic extremes involved.

5.1.5 Reusable containers. The program shall identify any needs for reusable containers and the categories of reusability required (specialized long-life reusable (SLLR), multiapplication long-life reusable (MALLR), specialized short-life reusable (SSLR), or multiapplication short-life reusable (MASLR) and supported by trade studies where appropriate. These studies shall show the merits of the container(s) selected, alternate containers, the container estimated weights and costs. The program shall provide for timely design, test, and evaluation, or validation, of these containers (see 6.7).

5.1.5.1 Container design retrieval system. In selecting container designs, maximum effort shall be made to utilize containers or the container designs from those already available in the Department of Defense inventory, either in their existing configuration or with possible modification for new application, when this is the most cost effective approach. Container design retrieval system search procedures shall be in accordance with MIL-STD-1510 (see 6.7).

5.1.5.2 Engineered containers. Engineered containers shall be proposed for items of an especially complex nature, critically sensitive, hazardous,

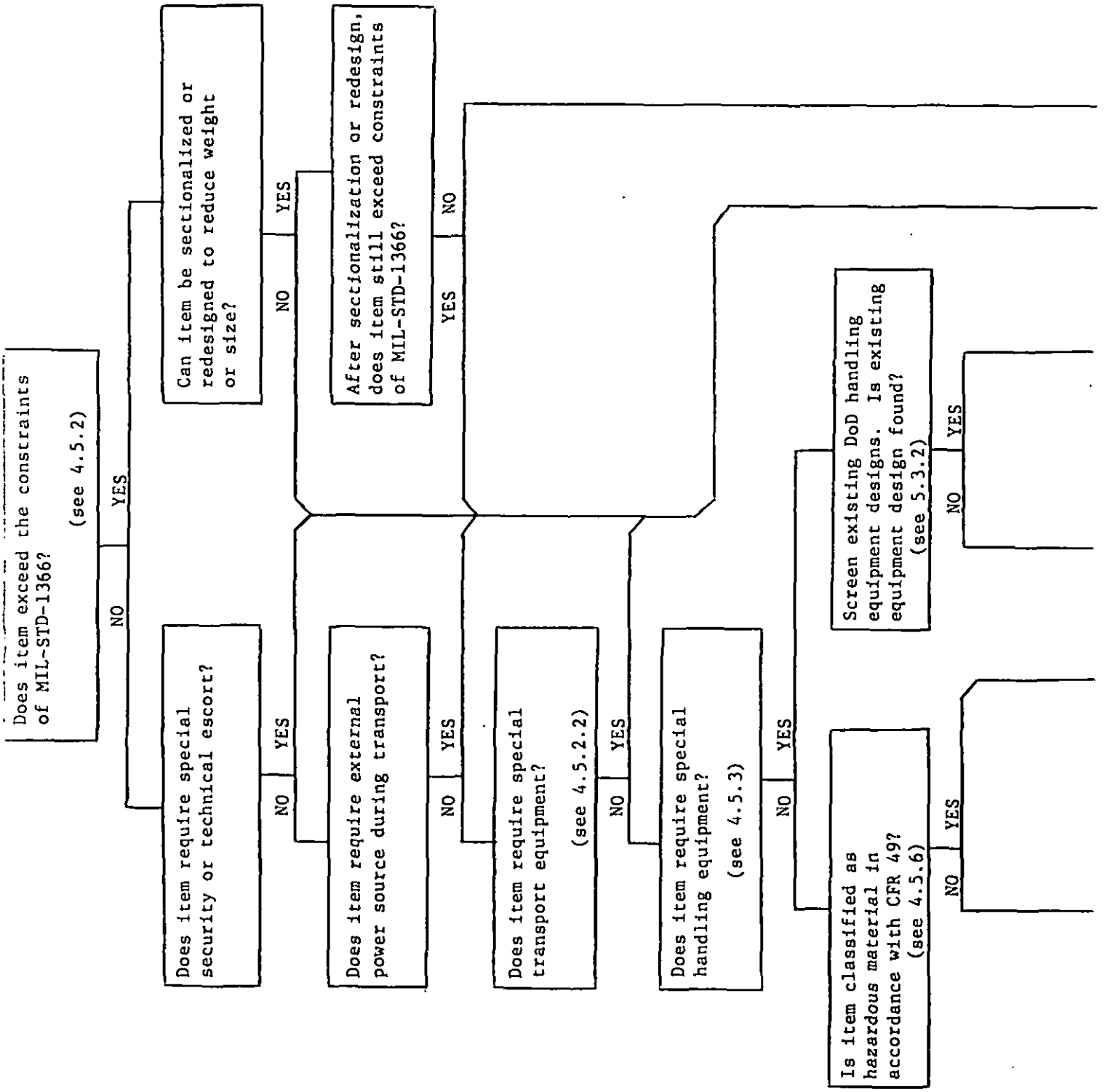

FIGURE 1. Transportability report decision chart.

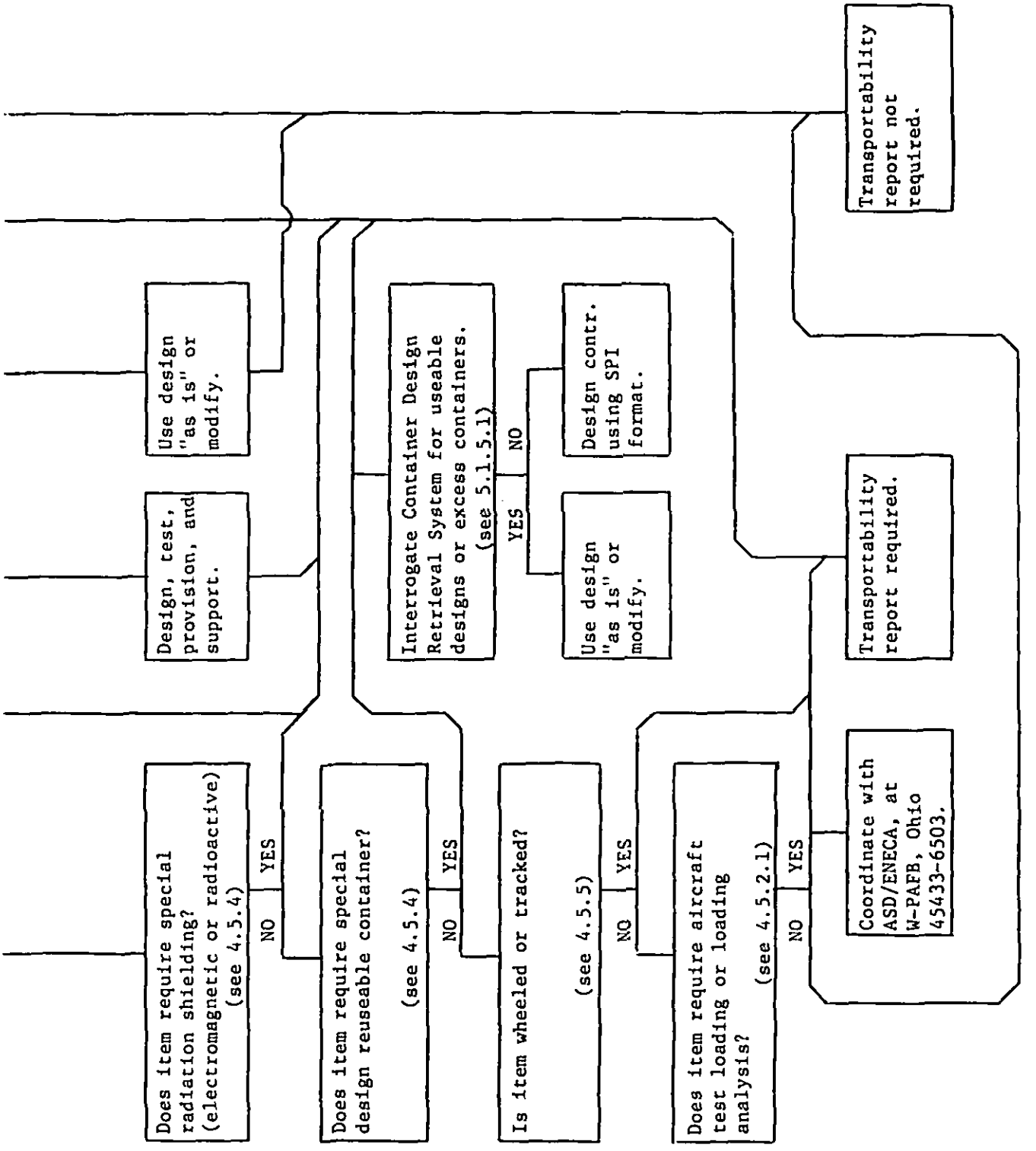

FIGURE 1. Transportability report decision chart - continued.

or fragile to the degree that a specialized container is required. These containers may have special features such as combined handling capability, a unique energy damping system or controlled temperature, humidity or pressure functions. These require engineering drawings, which shall be in accordance with DoD-D-1000, for the control of materials, dimensional tolerances, form fabrication, and assembly. The program shall recognize that engineered containers are configuration items (CI) and become separate items of supply requiring logistics support planning equal to that required for other deliverable items. Table III provides a matrix of normal expectancies for the actions described in the following sub-paragraphs and is furnished for guidance (see 6.7).

5.1.5.2.1 Nomenclature assignment. Specific nomenclature (MK/MOD, CNU, M number) shall be requested in time to obtain stock listing prior to production (see 6.7).

5.1.5.2.2 National stock number. A national stock number shall be obtained and the results of this action shall be furnished to the requiring authority at the time the container is recommended for production procurement (See 6.5 and 6.7).

5.1.5.2.3 Provisioning. Provisioning requirements shall be based on a logistic support analysis in accordance with MIL-STD-1388-1.

5.1.5.2.4 Inventory management. The activity to become manager for the container shall be identified before production starts.

TABLE III Matrix of reusable container management actions

Management Action	Type of Container 1/			
	SLLR	MALLR	SSLR	MASLR
Nomenclature Assignment	A	A	R	R
National Stock Number	A	A	R	S
Provisioning	A	U	R	N
Inventory Manager Assignment	A	A	R	R
Container Design Retrieval System	A	A	S	R
Recycling Plan	A	U	R	R
Maintenance Planning	A	U	N	N

1/ SLLR=Specialized long-life reusable; MALLR=Multiapplication long-life reusable; SSLR=Specialized short life reusable; MASLR=Multiapplication short-life reusable

A=Always; U=Usually; R=Rarely; S=Sometimes; N=Never

5.1.5.2.5 Container design drawings. When a new reusable container is designed, a copy of the drawings of the new design must be forwarded for input in the CDRS data base as required by MIL-STD-1510 (see 6.7).

5.1.5.2.6 Container recycling. Plans shall be made to permit recycling of containers to the manufacturer of the contained items as ready-for-issue government-furnished equipment (GFE).

5.1.5.2.7 Maintenance. A maintenance concept shall be written and pertinent maintenance instructions (organizational, intermediate, and depot level) shall be developed and issued at an appropriate time. This step includes identification of any depot level overhaul points (see 6.7).

5.1.6 Uncrated shipments. The program shall identify items which may be effectively shipped uncrated or in specially prepared transport fixtures to facilitate loading, unloading and restraint such that the transport vehicle (rail car, truck, or designated model aircraft) is the container. Items eligible for such treatment must contain one or more of the following characteristics:

a. Addition of crating makes the item "a PHS&T problem item" or compounds existing concerns.

b. The item will withstand shipment in an uncrated condition, and qualified carriers are available to handle the shipment.

c. The destination is equipped to accept uncrated shipments.

d. The security classification of the item does not require packing or crating for concealment to preclude disclosure to unauthorized personnel.

e. The item is not classified as hazardous cargo, subject to packaging in accordance with Department of Defense or other regulatory agency regulations. Under certain circumstances, as outlined in individual service regulations, exceptions under the equal or greater strength and efficiency rule (49 CFR 173.7(a)) may be sought.

f. The item has adequate features for tiedown or securing in transport vehicle in accordance with MIL-STD-209.

5.1.6.1 Engineering support. Transportability engineering shall include preparing vehicle loading configuration drawings and necessary equipment clearance drawings. Ample time shall be allowed to secure approval of the Open-Top Carloading Rules Committee for the Association of American Railroads for such loadings and for approval of the Air Force for aircraft loading and tiedown procedures. Special lifting fixtures shall be documented as handling equipment. Shipping skids, transportability skids, or shipping fixtures shall be documented as containers. (see 6.7)

5.1.7 Handling equipment. The program shall identify all specialized handling equipment required and shall provide for timely design and test efforts and logistics support planning as a separate item of supply. The following management actions are normal expectancies.

5.1.7.1 Nomenclature assignment. Specific nomenclature (MK/MOD, CNU, M number) shall be requested in time to obtain stock listing prior to production (see 6.7).

5.1.7.2 National stock number. A national stock number (NSN) shall be obtained and the results of this action shall be furnished to the requiring authority at the time the handling equipment is recommended for production procurement (See 6.5 and 6.7).

5.1.7.3 Provisioning. Provisioning requirements shall be based on a logistics support analysis in accordance with MIL-STD-1388-1.

5.1.7.4 Inventory management. The activity to become inventory manager for the handling equipment shall be identified before production starts.

5.1.7.5 Maintenance. A maintenance concept shall be written and pertinent maintenance instructions shall be developed, and issued at an appropriate time. This step includes identification of any depot level overhaul points (see 6.7).

5.1.8 Special storage and stowage requirements. Special storage and stowage requirements for elements of the system shall be carefully identified and, where appropriate, shall be the subject of trade studies. These studies must show alternates to special storage or stowage, relative costs of alternates, need for special equipment for alternates and other pertinent information needed to compare benefits of special storage and stowage requirements with any alternates. Among the special storage and stowage requirements needing early identification and analysis are the following (see 6.7):

a. Need for temperature or humidity controlled storage areas.

b. Need for special temperature controls; for example, mechanical refrigeration of the storage or stowage area versus providing the control within a container, or the need for and methods of retaining cryogenic temperature.

c. Need for maintaining unit under various forms of continuous operation; for example, power to inertial reference systems; or maintaining special units, such as ion pumps, so as to retain specified vacuum or pressure levels.

d. Need for segregated storage or stowage facilities dictated by the nature of the contents, including the need for special security measures; for example, magazine storage or stowage needed because item is ammunition or explosive; flammable area storage required; or armed guards or two-man control required.

e. Any other factors requiring more than straight forward receipt, storage, simple cyclic inspection of any humidity indicators used, and issue of a standard commodity.

f. Need for special handling equipment or floor space for any item

which, as packaged, weighs more than 15,000 pounds, or is more than 10 feet long or 12 feet high.

5.1.8.1 Units stowed in combatant ships and in direct support auxiliary ships. Units to be stowed in combatant ships or direct support auxiliary ships shall receive special attention not only with respect to the foregoing factors but also with respect to space required as well as clearances and routings needed to move from stowage space to point of consumption.

5.1.9 Periodic inspection of communications electronics (CE) equipment. A detailed periodic inspection shall be planned for all CE equipment installed in vans, shelters, or trailers. Inspection procedures shall include detailed instructions for checking equipment for corrosion or deterioration and desiccant for humidity. When the above instructions are required, they will be secured to the underside of the van, shelter, or trailer.

5.2 PHS&T functional baseline.

5.2.1 Milestone zero mission element needs statement. A PHS&T functional baseline for end items shall be developed and documented. This will be included in the response of the developing command to the service development sponsor of the system or equipment. Normally, when developed, these functional baseline requirements shall be reflected in the system development specification and shall govern all further PHS&T development. Source of this baseline shall be the approved "Milestone Zero Mission Needs Statement" or statement of material need, required operational capability, or operational requirement. These statements require the following elements to be identified:

a. Tactical concepts affecting container design, such as rearming rate of platforms such as ships, tanks, or aircraft.

b. Delivery modes to platforms such as transfer-at-sea, helicopter delivery to an artillery battery, air transport (type aircraft must be specified) to an air base in a specific state of development, compatibility with tactical resupply vehicles such as 6 x 6 trucks, etc..

c. Basic transportability constraints affecting system components.

5.3 PHS&T allocated baseline.

5.3.1 Logistic flow analysis. Specific logistics operations and identification of each item of PHS&T equipment required to support system prime and critical items throughout the life cycle shall be identified. Every known or contemplated transfer and handling activity throughout the logistics cycle shall be identified. Each container and item of handling equipment required to perform each operation shall be identified in general terms; e.g., forklift truck, van, flatcar, container, etc..

5.3.2 Screening existing equipment. Containers and handling equipment existing in the inventory shall be screened (see 4.5.3 and 5.1.5.1) to

determine what existing designs may be used "as is" or after adaptation to the specific problem at hand (see 6.7).

5.3.3 Proposing specific containers and handling equipment for engineering development. Based on the results of the foregoing analysis and screening, specific design concepts for PHS&T equipment for prime and critical elements of the system shall be generated and proposed for implementation. Proposals may take one of two forms as specified in the contract.

a. PHS&T concept proposal. (Preferred for simple systems with few prime or critical elements.) A simple technical proposal covering, in narrative form supported by sketches as necessary, the type of container or handling equipment proposed for engineering development and the tests to be performed for proof of design.

b. Support equipment data. (Preferred for major systems.) Support equipment recommendation data forms, one for each item proposed, giving functional baselines and appropriate justification for each item (see 6.7).

5.3.4 PHS&T development specifications. Engineering critical item development specifications (type B1, 2, 3, Form 1, 2, 3 as defined in MIL-S-83490) shall be developed for the following PHS&T items requiring development:

a. All containers for PHS&T problem items.

b. All reusable containers for prime or critical deliverable products.

c. All containers requiring engineering design of cushioning or other shock and vibration isolation systems.

d. All containers requiring special temperature control systems or dynamic dehumidification during shipment and storage.

e. All handling equipment for prime, critical, and transportability problem items where the handling equipment will be used by any Government activity; that is, not exclusively for the performing activity's own in-plant handling procedures.

5.3.4.1 Exceptions for drawings. Where the proposed design is relatively simple, pertinent explicit PHS&T design and test requirements may be included in Section 5 of the deliverable item development specification.

5.3.5 Deliverable product specifications. Section 5 of the deliverable product specifications shall cross-reference the PHS&T development specifications or shall be explicit within itself (see 5.3.4.1). Long, meaningless references to a collection of specifications shall be avoided. Deliverable product specifications shall reflect the levels of protection dictated by logistical necessity; but only the maximum level required to support program objectives shall be configured.

5.3.6 Inventory item specifications. Inventory item specifications (type

C4, Form 1a, as defined in MIL-S-83490) shall be developed for Government inventory items which interface directly with prime and critical items. Inventory item specifications shall not be developed for standard mechanical handling equipment such as forklift trucks and pallet trucks.

5.4 PHS&T product baseline.

5.4.1 PHS&T program execution. The approved PHS&T development program shall be executed in accordance with the technical criteria contained therein. The order of work events stated hereinafter shall not be construed as establishing relative time phasing nor importance.

5.4.2 PHS&T equipment data package. After completion of proof of design testing (as required), a technical data package sufficiently complete to fix the configuration of the PHS&T equipment item and suitable for procurement shall be developed. This data package shall include the following:

a. All engineering drawings (Level 3) or Special Packaging Instructions.

b. All data lists of the same type and form prescribed for the deliverable end product.

c. A procurement specification converted from the equipment development specification when required.

5.4.2.1 Packaging data. Preservation and packing data for items that are procured for the operational inventory shall be prepared and submitted for approval as contractually committed on a DD Form 1423. When packaging data or Special Packaging Instructions (SPIs) are required, they shall be submitted as required by MIL-STD-2073-1 (or MIL-STD-1388-2). The prime performing activity shall ensure that all packaging data and SPIs submitted (including that from lower-tier contractors) as the result of various contract data items are compatible, prior to those data being submitted to DOD agencies. For example, packaging data developed in accordance with MIL-STD-2073-1 shall be consistent with the packaging requirements specified in CI specifications for the same item (see 6.7).

5.4.3 Product specification conversion. The configuration of the approved item packaged for shipment (shipping condition) shall be incorporated in Section 5 of the applicable deliverable product specification, including vehicle loading configurations and unit load designs, where required (see 5.6.1 and 5.6.5). One of the following methods, listed in the order of preference, shall be used.

5.4.3.1 Detailed description in specification. If the container assembly and packaging details are fairly simple, a complete description, including figures as a part of the specification, shall be included in Section 5. The description required is the same as that indicated for a shipping condition drawing.

5.4.3.2 Written description in specification. Where the container is very simple and conforms in every respect to a standard specification, a written description shall be included in the specification. Information

included shall be explicit concerning the quantity contained, the container to be used, and all details including marking and closure. Gross weight and dimensions of the shipping condition configuration shall be stated.

5.4.4 Special processes. Special PHS&T processes, as may be necessary to ensure continued integrity of the system equipment throughout its life cycle, shall be developed. Such special processes include, but are not necessarily limited to, the following:

a. Procedures for preserving aircraft for transportation by surface or air and for storage in specified locations.

b. Procedures for preserving tanks and other major vehicles in designated pools.

c. Procedures for preserving major equipments installed in ships during installation (including backlog storage) at shipyards and in the reserve fleet, and for these equipments when removed from the ships for prolonged storage ashore.

5.4.5 Material safety data. Where new materials are proposed for use in support of the system, necessary safety information for such materials shall be developed and Material Safety Data Sheets, when required, shall be prepared and submitted in accordance with FED-STD-313.

5.4.6 Equipment release. The performing activity shall obtain approval of the requiring authority (through or by its designated PHS&T representative designated in the contract) for selected items of PHS&T equipment before adoption for full production. The following categories of PHS&T equipment as a minimum, require prior service approval:

a. Containers, unit loads, and vehicle loading configurations for ammunition, explosives, and other hazardous materials.

b. Handling equipment for the items categorized in a. above, in or out of containers.

c. PHS&T equipment (including unit loads and vehicle loading configurations) for all other transportability problem items.

d. PHS&T equipment and procedures for system prime and critical items.

e. PHS&T equipment and procedures for high-value components singled out by the requiring authority for intensified supply management.

f. PHS&T equipment and procedures for combat consumables, not otherwise mentioned herein.

g. PHS&T equipment and procedures for repairable components and assemblies, with particular emphasis on those components and assemblies which will be used at the organizational and intermediate maintenance levels (including repair ships and tenders) but will themselves be overhauled by depot level maintenance.

5.4.7 Support of operational test and evaluation (OT&E).

5.4.7.1 PHS&T equipment for end items. End item containers and specialized handling equipment needed for organizational and intermediate use and maintenance levels form a part of the system to be evaluated. These items may be engineering prototypes but must be representative of the production configuration and performance expected in service. Types and quantities to be furnished shall be stipulated in the pertinent contract.

5.4.7.2 Repair parts. Repair parts needed for OT&E support shall be packaged at levels consistent with the test environment and storage time. Where practical, they should be representative of the service issue package. Range and depth of parts to be furnished shall be determined in accordance with contract requirements.

5.4.8 Production phase.

5.4.8.1 PHS&T program execution. The PHS&T equipment developed as a part of the product baseline shall be produced in accordance with the PHS&T program and the applicable contract requirements.

5.4.8.2 Additional PHS&T engineering. Packaging procedures and containers for repair parts shall be developed, tested as necessary, and documented as required by the applicable data requirements. Guides to the degree of reusability shall be taken from the results of the level of repair analysis. Avoid designing packages for items which are not to be bought by the Government through the provisioning process. New designs shall be documented as required.

5.4.8.3 Government furnished equipment (GFE). Procedures for the control of Government property in the hands of the performing activity will be established and maintained as required. All cases of loss, damage, or destruction will be reported to the Property Administrator or other authorized Government personnel. GFE shall be packaged in accordance with instructions furnished by the Government. When packaging instructions have not been furnished, the following must be accomplished:

a. Inspect GFE upon receipt and notify the Government of any discrepancies.

b. Store for use.

c. Periodically, visually inspect humidity indicators on Method II packs, repair leaks in carriers, and redesiccate as necessary.

d. Touch up preservation coatings or apply paint where coatings are thin or absent from metal surfaces.

5.4.8.4 Consolidation points. Where the performing activity is a consolidation point for material, the performing activity shall ensure adequate packaging prior to onward movement into the military supply system.

5.4.8.5 Inspection of assets. Where packaging is opened by the

performing activity for purposes other than imminent installation or test, the performing activity shall restore the packaging to the as-received condition. Opening to satisfy idle curiosity shall be actively discouraged. Typical purposes for such openings include the following:

a. To obtain accompanying documentation such as installation manuals, log books, and packing lists.

b. To verify quantity of units contained.

c. To validate configuration of contents.

d. Where external indications of rough handling exists, to determine whether contents are damaged.

5.5 End of contract residuals.

5.5.1 Tools and test equipment. Government owned tools and test equipment shall be preserved and identified as necessary and stored under appropriately controlled and protected conditions until formal disposition and packaging instructions are received. Items shall be listed, identified, and have an in-use (operations list) provided with the packed container. The packing list shall be in two copies (one in a sealed envelope inside the packed container and one attached to the exterior of the container in a sealed envelope).

5.5.2 Serviceable excess or residual material. Serviceable or technical order compliance (TOC) excess or residual parts or equipment to be returned to the government shall be preserved, packed, and marked as specified by the government.

5.5.3 Repairable excess or residual material. Repairable excess or residual parts or equipment for which packaging has not been specified by the Government shall be provided protection as required to prevent further deterioration due to rust, corrosion, or physical damage. Spare repairable assemblies or components replaceable as a unit shall be individually packaged and provided similar protection. All packages shall display appropriate identification markings.

5.6 Transportation plan. The movement of material from the performing activity to the procuring activity must be in a manner consistent with the best transportation practices which protect the interests of the government. To assure timely delivery of systems/equipment, the requiring authority must be able to obtain responsive, economical, and efficient transportation in known areas of deployment and federal and local statutes and international agreements, when appropriate. The development of a transportation plan, as contractually required by a DD Form 1423, should identify the transportation requirements to support the systems/equipment during all phases of its life-cycle (see 6.7). The information provided should be adequate to:

a. Provide a basis for the evaluation of proposals in the functional area of transportation.

b. Aid the procuring activity in the management of the service and the performing activity's efforts in transportation.

c. When appropriate, serve as a basic document for implementation of acquisition contract requirements.

d. Assist in the identification of transportation problems expected to be encountered during acquisition and operation.

e. Permit surveillance and management of transportation funding.

5.6.1 Vehicle loading configurations. Vehicle loading configurations shall be developed for all ammunition and explosives, for transportability problem items, for all items to be shipped regularly on open-top equipment (whether or not in containers), and for all items to be shipped uncrated which are not incorporated into unit loads as contractually required by DD Form 1423. For items which are not oversize (as defined in MIL-STD-1366), required vehicle loading configurations shall be developed for both truck and rail transportation. For oversized items, the vehicle loading configurations shall be developed only for those transportation modes the design activity proposes to use (see 6.7).

5.6.1.1 Aircraft loading. Specific aircraft loading procedures for all items which cannot be restrained on 463L pallets with cargo nets or routine loading procedures shall be developed by the Air Force and displayed in Section 6 of the specific aircraft -9 Technical Order (TO). Most vehicles and equipments are covered in Section 4 (routine) and Section 6 (special) of the specific cargo aircraft -9 TO. Procedures for critical, sensitive, or transportability problem items shall be incorporated in the applicable -9 TO either in detail or by reference.

5.6.1.2 Highway transportation. Items in their shipping configuration to be transported via highways shall conform to the carriers handbook(s), the Limits of Motor Vehicle Size and Weights of the Federal Highway Administration Office, and the applicable rules of the Department of Transportation for the states through which the material will pass. Vehicle items intended for use on public highways shall comply with the established gross weight, axle, and tire load limits specified in federal and state vehicle safety statutes. Items intended for highway transportation in foreign countries shall be prepared to meet the requirements of the International Road Federation for Foreign Countries through which the material will pass. The performing activity's recommended routing shall consider statutory state, federal, and foreign highway limitations, DoT requirements, seasonal limitations, underpass clearances, bridge loadings, load curve radii, etc..

5.6.1.3 Railway transportation. Items intended for shipment by railway shall be successfully rail impact tested per MIL-STD-810 and shall meet the maximum dimensions and weight limitations for U.S. railways contained in the National Railway Publication Company's "The Official Railway Equipment Register" and "Car Builders Encyclopedia". Clearance dimensions and weight limitations applicable to railroads of foreign countries are contained in

the NATO Standardization Agreement (STANAG No. 2832) and shall apply if equipment is to be deployed in Europe or regions having such restrictions.

5.6.1.4 Water transportation. With the wide range of seaway and inland vessel configurations available, it is advisable to obtain information from commercial and military operators in the selection of specific water vessels. For planning purposes, consideration should be given to port facilities, seasonal pool levels, bridge clearances, shipping schedules, etc..

5.6.2 Mobility. Equipment intended to be mobile shall conform to MIL-M-8090 for the applicable type and class of mobility.

5.6.3 System or equipment integrity. Where the deliverable product is disassembled for shipment, particularly after system acceptance testing, the vehicle loading configuration shall show all elements of the deliverable product, even if more than one vehicle is required.

5.6.4 Equipment clearance drawings. Equipment clearance drawings shall be developed and submitted as contractually required by DD Form 1423 for all wheeled and tracked vehicles and for all uncrated transportability problem items that are to be shipped by the highway or rail mode (see MIL-STD-1366) (see 6.7).

5.6.5 Unit loads. Unit load (palletized or unpalletized) details shall be developed for shipments of smaller items suitable for unitizing where a considerable quantity may be shipped to the same destination. Designing and testing unit loads is mandatory for all ammunition and explosive deliverable products suitable for unitizing in accordance with MIL-STD-1660. For inert items, the palletizing pattern shall be selected from MIL-STD-147 and indicated as a contracting officer's option. Unit load configurations shall be included in Section 5 of the deliverable item specifications.

6. INFORMATION FOR GUIDANCE ONLY

(This section contains information of a general or explanatory nature which is helpful, but is not mandatory.)

6.1 Intended use. This standard is intended to be used in contracts for systems and equipment to control the development, design and use of adequate packaging, handling, storage, and associated equipment and procedures for the system or equipment and to control the transportability program requirements.

6.2 Tailoring guidance for contractual application. The Government project or acquisition manager is responsible for tailoring the contract work statements to ensure timely development of PHS&T for the system or equipment and submittal of needed data. The program requirements must be tailored to the complexity of the system or equipment being procured and the life cycle phase. These work statements may be invoked by citing this standard and the pertinent specific paragraphs or by quoting or paraphrasing a specific paragraph or two. Tailoring should be accomplished by those personnel with expertise in PHS&T. Table IV provides general guidance considering application of the specific paragraphs concerned.

TABLE IV Guidance to application of this standard

Paragraph	Title	Life cycle phase 1/ CE	DV	FSD	PD
4.1	PHS&T program requirements	A	A	A	A
4.4	Program interfaces	N	A	A	A
4.5.1	Deliverable product compatibility	A	A	A	P
4.5.2	Transportability	A	A	A	A
4.5.3	Handling equipment design criteria	N	N	A	P
4.5.4	Packaging design criteria	N	N	A	A
4.5.5	Wheeled or tracked vehicles	A	A	A	P
4.5.6	Hazardous materials	N	P	A	P
4.6	Management of PHS&T problem items	N	P	A	P
5.1	PHS&T program requirements	N	A	A	P
5.1.1.1	Preservation	N	N	P	A
5.1.1.2	Levels of protection	N	N	P	A
5.1.2	Determination of item fragility	N	P	A	P
5.1.3	Induced environments	N	P	A	A
5.1.4	Natural environments	N	P	A	A
5.1.5	Reusable containers	N	P	A	P
5.1.6	Uncrated shipments	N	N	A	A
5.1.6.1	Engineering support	N	N	A	P
5.1.7	Handling equipment	N	N	A	P
5.1.8	Special storage and stowage requirements	N	A	A	P

TABLE IV. Guidance to application of this standard - Continued

		Life cycle phase 1/			
Paragraph	Title	CE	DV	FSD	PD
5.1.9	Periodic inspection of communication electronic (CE) equipment	N	N	A	P
5.2	PHS&T functional baseline	A	N	N	N
5.3	PHS&T allocated baseline	N	N	A	P
5.3.1	Logistics flow analysis	N	P	A	N
5.3.2	Screening existing equipment	N	A	P	N
5.3.3	Proposing specific containers and handling equipment for engineering development	N	A	P	N
5.3.4	PHS&T development specifications	N	A	P	N
5.3.5	Deliverable product specification	N	A	P	N
5.3.6	Inventory item specifications	N	A	P	N
5.4.1	PHS&T program execution	N	N	A	N
5.4.2	PHS&T equipment data package	N	N	A	N
5.4.2.1	Packaging data	N	N	P	A
5.4.3	Product specification conversion	N	N	A	N
5.4.4	Special processes	N	N	P	P
5.4.5	Material safety data	N	N	A	N
5.4.6	Equipment release	N	N	A	N
5.4.7	Support of operational test and evaluation (OT&E)	N	N	A	P
5.4.8.1	PHS&T program execution	N	N	P	A
5.4.8.2	Additional PHS&T engineering	N	N	N	A
5.4.8.3	Government-furnished equipment (GFE)	N	P	P	P
5.5	End of contract residuals	N	N	N	P

TABLE IV. Guidance to application of this standard - Continued

Paragraph	Title	Life cycle phase 1/ CE	DV	FSD	PD
5.6	Transportation plan	N	P	A	A
5.6.1	Vehicle loading configurations	N	N	P	A
5.6.4	Equipment clearance drawings	N	N	P	A
5.6.5	Unit loads	N	N	P	P

1/ CE= concept exploration; DV= demonstration and validation; FSD= full scale development; PD= production and deployment
A= generally applicable; P= possibly applicable; N= generally not applicable

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6.3 Relation to integrated logistic support plan (ILSP). The system or equipment integrated logistic support plan, in its various required iterations, provides management with an overall view of when and by whom specific PHS&T efforts should be accomplished. Individual contract tailoring can easily be done when a good ILSP exists. A PHS&T program manager's check list is furnished for information in Appendix A.

6.4 Changes from previous issue. Asterisks or vertical lines are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.5 Additional reference documents. The following documents may be pertinent to the paragraph indicated and are listed for informational purposes:

Paragraph No.	Document No.	Title
4.4.10	DOD 4145.26M	DOD Contractor's Safety Manual for Ammunition and Explosives
4.5.2	AFR 80-18/ AR 70-47 OPNAVINST 4600.22 MCO 4610.14 DLA 4500.25	DOD Engineering for Transportability
4.5.2, 4.5.2.1	Air Force Systems Command Design Handbook DH 1-11	Air Transportability

4.5.3	Air Force Systems Command Design Handbook DH 1-2	Handling Equipment Design Criteria
4.5.6	AFR 71-4/ TM38-250/ NAVSUP PUB 505/ MCO P4030.19E/ DLAM 4145.3	Preparing Hazardous Materials for Military Air Shipment
5.1.5.2.2, 5.1.7.2	DOD 4100.38-M	Provisioning and Other Preprocurement Screening Manual

6.6 Keywords.

Transportability
Acquisition packaging
Transportability report
Transportation plan
Vehicle loading configuration
Equipment clearance
Packaging management plan
Acquisition packaging
Program packaging requirements

6.7 Consideration of data requirements. The following Data Item Descriptions (DIDs) must be listed, as applicable, on the Contract Data Requirements List (DD Form 1423) when this standard is applied on a contract, in order to obtain the data, except where DoD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Reference Paragraph/s	Data Requirement	DID Title
4.5.2.2/ 4.6/ 5.1.5/ 5.1.8	System/Design Trade Study Reports	DI-S-3606
4.6	Transportability Report	DI-PACK-80880
5.1	Packaging Management Plan	DI-PACK-80878
5.1.5.1	Container Design Retrieval System (CDRS) Search Request	DI-PACK-80683
5.1.5.2	Drawings, Engineering and Associated Lists	DI-E-7031
5.1.5.2.1/ 5.1.7.1	Request for Nomenclature	DI-L-7194

5.1.5.2.2/ 5.1.7.2	Request Assignment of National Stock Number	DI-CMAN-80197
5.1.5.2.5	Container Design Retrieval System (CDRS) Data Input	DI-PACK-80684
5.1.5.2.7/ 5.1.7.5	Maintenance Plan Summary Report	DI-L-7164
5.1.6.1/ 5.6.1	Vehicle Loading Configuration Drawings	DI-PACK-80879
5.1.6.1/ 5.6.4	Equipment Clearance Drawings	DI-PACK-80881
5.3.3b	Support Equipment Recommendation Data (SERD)	DI-ILSS-80118B
5.4.2.1	Preservation and Packing Data	DI-PACK-80120
5.4.2.1	Special Packaging Instructions (SPI)	DI-PACK-80121
5.6	Transportation Plan	DI-PACK-80877

The above DIDs were those cleared of the date of this standard. The current issue of DoD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DIDs are cited on the DD Form 1423.

Custodians:
Army - SM
Navy - SA
Air Force – 11

Preparing Activity:
Air Force - 11

(Project PACK - 0789)

Review Activities:
Navy – AS, EC, OS, MC, SA, SH
Army – AL, AR, AT, AV, GL, ME, MI, MT, TM
Air Force – 10, 13, 14, 18, 19, 25, 43, 69, 99
DLA - DH

APPENDIX A

PHS&T CHECKLIST FOR MANAGERS

10. GENERAL.

10.1 Scope. No two systems or equipment developments are exactly alike. Hence, not every point raised herein invariably requires a substantive answer. In other words, "not applicable" is an answer.

10.2 Format. For simplicity, the checklist is formatted as a series of questions. These questions are organized in groups related to the PHS&T sub-discipline involved and have no relation whatsoever to the time sequence in which answers are needed. Since each program is different from all others, times for completion of various PHS&T milestones will necessarily also vary. It is generally good practice for the acquisition manager to have clear-cut answers to the pertinent questions prior to DSARC Milestone III, or equivalent, or to have positive knowledge that these answers will be forthcoming prior to actual start of deliveries.

20. Checklist questions.

20.1 Transportability.

(1) What transportability requirements are established by the Development Concept Paper (DCP), or equivalent?

(2) Are the DCP requirements reflected in the systems specification or in the prime and critical item development specifications? If not, where are they reflected?

(3) Has a logistics flow chart from factory to install (launch device loading, in the case of ammunition) been prepared? If not, when and by whom will it be prepared?

(4) When, by whom, and how are the following transportability capabilities to be validated:

(a) Truck shipment?

(b) Rail shipment?

(c) Air shipment? (Commercial, Military Airlift Command, Tactical Cargo Aircraft, Carrier on Board Delivery, Helicopter)

(d) In International Organization for Standardization (ISO) containers?

(e) Break, Bulk Ship?

(f) Barge?

(g) UNREP operations/VERTREP?

(h) Strikedown and storage?

(5) Will vehicle loading diagrams be required? (Answer must be yes for all ammunition and for all shipments on open-top equipment and all PHS&T problem items and should be yes for all large items, especially those to be shipped uncrated.)

(6) When, and by whom, will vehicle loading diagrams be prepared? Who is the review activity? Approval activity?

(7) When, and by whom, will equipment clearance drawings be prepared? (Mandatory for flatcar loads and for transportability problem items.)

(8) What activity will perform the following? Activities need to be performed 90 days prior to DSARC III.

(a) Seek approval for open-top railcar loading procedures from Association of American Railroads (AAR)--Commander, Military Traffic Management Command Transportation Engineering Agency, ATTN: MTT-TR, P.O. Box 6276, Newport News, VA 23606.

(b) Review of aircraft loading procedures and test loading if applicable--ASD/ENECA, Wright-Patterson AFB, OH 45433.

(c) Approach USN for review, and test loading as necessary, of ship loading procedures.

20.2 Hazardous materials. Includes non-ammunition items with hazardous components such as explosive actuators, compressed gases, corrosives, oxidizers, poisons, etc.

(1) Has the item been hazard-classified and assigned a proper shipping name? If so, by whom? If not, when and by whom will it be classified and assigned name?

(2) Will the packaging require the following:

(a) An exemption from DOT regulations? If so, who will assemble necessary supporting transportation safety data? When? By whom, and when will petition to DOT be prepared? (Note: Allow at least six months for DOT processing).

(b) Approval under the equal or greater strength and efficiency clause (Title 49 CFR 173.7(a))? If so, by whom and when will approval be requested?

(c) Special clearance from USAF for military aircraft? If so, when and by whom will such clearances be sought?

(3) Will the packaging require:

(a) One trip packages/containers?

(b) Reusable containers?

(c) Unit load details?

(d) Vehicle loading procedures (car loading, truck loading, ISO container loading, aircraft loading, etc.).

(e) Special handling equipment required?

(4) When, and by whom, is validation and documentation of the procedures and equipment of question (3) to be accomplished?

(5) What has been or is to be accomplished to demonstrate transfer-at-sea capability, if required? When? By whom?

(6) Are the development schedules so organized as to ensure availability of the production equipment in time for OPEVAL/OT&E/TEEN?

(7) By whom, and when, will data be furnished for incorporation into general-purpose safety and hazardous materials publications?

(8) When, and by whom, are pertinent supply management data (e.g., provisioning, maintenance instructions) to be furnished for reusable containers and handling equipment?

(9) Who is to be inventory manager of reusable containers and of handling equipment?

(10) Have the various activities identified above been tasked and funded to perform the functions indicated? If not, when, by whom, and for what amount will they be tasked and funded?

(11) Has the container design activity been tasked to use the Container Design Retrieval System?

(12) Has a Military Safety Data Sheet (MSDS) been obtained?

(13) Have hazardous material packages been tested in accordance with international requirements for all overseas shipments?

20.3 Non-hazardous end items.

(1) Where is installation in a larger platform (e.g., ship, aircraft, or combat vehicle) to occur?

(2) What is shipping breakdown of end items?

(3) What is weight and cube budget for end item components, as packaged?

(4) What kinds of shipping containers/shipping rigs and lifting devices to be designed?

(5) Who is design agent, acquisition engineering agent, and in-service engineering agent for question (4)?

(6) When, and by whom, are container and special handling equipment designs to be validated?

(7) Who is to be inventory manager (IM) of reusable containers and special handling equipment?

(8) When, and by whom, are pertinent containers and handling equipment supply management data to be furnished?

(9) Have the various activities identified above been tasked and funded to perform the functions indicated? If not, when, by whom, and for how much will they be tasked and funded?

(10) Has the container design activity been tasked to use the Container Design Retrieval System?

20.4 Spare and repair parts.

(1) How will installation and checkout (I&C) spares be packaged? Who will approve?

(2) When are packaging concepts for support spare and repair parts to be generated?

(3) Is special care needed for certain packages (e.g., submarine stowage compatible, static electricity protection)? If so, what?

(4) When will the results of Logistics Support Analysis (LSA) be reflected in performance baselines for packages?

(5) If LSA shows reusable containers desirable, when and by whom will the need be validated?

(6) When, and by whom, will reusable containers be designed, tested, and approved?

(7) Who is to be inventory manager (IM) for reusable containers?

(8) When, and by whom, are pertinent reusable containers supply management data to be furnished?

(9) Have funds for special storage been identified? If not, when will they be identified?

(10) Have personnel skills for "care and feeding" of items in storage been identified? If not, when and by whom will such skills be identified?

20.5 Data acquisition/management.

(1) When, and by whom, will packaging data be furnished? Approved?

(2) What data format will be used for packaging data?

(3) Have data requirements been established?

(4) Are there sources that might have previously developed the necessary data?

(5) Have appropriate FAR clauses and Data Item Descriptions (DIDs) been identified and tailored if need be?

(6) Were Level 3 drawings requested for reusable containers and other items of PHS&T equipment that are candidates for future competitive procurement?

(7) Has distribution of data to requiring activities been established, including time for delivery?

(8) Will data be distributed by established systems/documents or will special procedures be required?

(9) Are there any incompatibilities of coding/formatting/transmission between data generator and recipient(s)?

(10) Have appropriate data requirements been levied on the contractor? Subcontractor(s)?

(11) Does contractor recognize/understand data interfaces between PHS&T and other ILS elements?

(12) Have appropriate data requirements been levied on appropriate Government activities?

(13) Are actual generators of data aware of requirements?

(14) Are data users/managers aware of impending receipt of data?

(15) Has effect of later delivery of data been evaluated?

(16) If late delivery of data causes serious impact on PHS&T program, what alternatives exist?

(17) Have provisions been made for updating of data when required?

APPENDIX B

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1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-STD-1367A	Packaging, Handling, Storage, and Transportability Program Requirements for Systems and Equipments

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ VENDOR ☐ USER ☐ MANUFACTURER ☐ OTHER *(Specify)*:_____

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI)* – Optional	b. WORK TELEPHONE NUMBER *(Include Area Code)*–Optional
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