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NASA Procedural Requirements

COMPLIANCE IS MANDATORY

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Subject: Requirements for Packaging, Handling, and Transportation for Aeronautical and Space Systems, Equipment, and Associated Components

Responsible Office: Logistics Management Division

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Chapter 2. Supplier Packaging Requirements

2.1. Selection of Packaging

2.1.1. Levels of preservation and packaging and the levels of packing to be applied selectively are defined in Military Standard 2073 and are mandatory for use. Selection of levels shall be in accordance with the level selection chart in Military Standard 2073 and in Appendix A of this NPR.

2.1.2. Selection of the levels of packaging and packing to be applied shall be the responsibility of the Center Transportation Officer unless levels are specified by the procuring activity. Selection shall depend on the modes of transport, environmental control, conditions, and length of storage, and the anticipated requirements for redistribution.

2.1.3. When Level A or Level B packaging and/or packing is selected, the protective process, materials, and containers shall be in accordance with the requirements of Military Standard 2073. NAS 850 and 851 may be considered for Level B or Level C application where the standard meets the requirements for that level.

2.2. Special Design Packaging

For those items possessing characteristics requiring special design packaging as defined in Appendix A, the contractor shall develop the necessary designs, maintain packaging engineering data in sufficient detail to permit necessary review, and implement the packaging specified therein. Prior to developing a newly designed container, maximum effort shall be made to use container designs or containers from those already available commercially or from Government inventories (see paragraphs 2.9. and 2.10.). Specifically identified special design packaging may be screened through the Air Force Container Design Retrieval System (hereinafter called the System). Candidates for screening through the System shall be selected on the basis of cost, schedule, and complexity of design and fabrication. Unless otherwise specified, search requests through the System shall be sent directly to Air Armament Center, United States Air Force Material Command, Eglin Air Force Base, Florida 32542. (See Appendix C for the Container Design Retrieval System Search Request Form.) Each request shall establish a desired response date. Pending timely response, the Transportation Officer shall withhold package container development. When specified by the procuring activity, new design data and engineering drawings with specifications in accordance with Military Standard 2073.1D and Change Notice 1, shall be submitted as stated in the contract .

2.3. Package Engineering Documentation

For purposes of this NPR, unless otherwise specified by the procuring activity, package engineering documentation shall be required only for special design packaging. Contractor documentation forms may be used unless otherwise specified in the contract. Submission and approval shall be in accordance with the Contract Data Requirements List or as otherwise authorized in the contract or by written direction of the contracting officer. Military Standard 2073

shall be used for guidance.

2.4. Environmental Analysis

2.4.1. The preservation, packaging, packing, and shipping techniques applied shall ensure protection of the contained item against the natural and induced environments to which it may be subjected. Analysis of these hazards is essential prior to item design and development of the packaging and shipping techniques to be applied. The contractor shall ensure that design engineering provides item fragility, engineering drawings, and sensitivity data to packaging engineering, line packaging, and transportation personnel by completing a NF 1426.

2.4.2. The contractor's packaging and transportation engineers and/or technicians shall participate in equipment design efforts from the earliest stages. They shall identify the ground handling, transport and storage environment requirements, including protection from contingency or emergency environments where the environmental analysis indicates that facility/carrier protection is more practical, reliable, or cost effective than providing the same protection by packaging and packing design; prepare or identify testing programs; prepare packaging and transportation data for use in management's configuration documents; and perform such other functions in the design effort as may be necessary or proper.

2.4.3. The environmental analysis shall include tradeoff considerations of the class of shipping and handling (probability of a loss, cost and schedule impact of loss, and cost of facility and carrier protection) versus cost of packaging and packing protection. The following phases shall be considered:

2.4.3.1. In-plant storage, handling, and local transportation conditions and environments, both normally anticipated and contingency due to such emergencies as natural disasters, fires, spillage, and other accidents.

2.4.3.2. In-transit modes, normal and contingency environments.

2.4.3.3. Receiving, redistribution, handling, and storage conditions at the destination installation, range, test or launch facility including normal and contingency environments.

2.4.3.4. General guidance on transportation environments is available in the following documents: Military Standardization Handbook 304, Package Cushioning Design. (Also see Military Standard's 810, Military Handbook 1791).

2.5. Packaging and Packing of Hazardous Materials

2.5.1. Department of Transportation regulations listed in 49 CFR Subchapter B define federal requirements applicable to shipments of hazardous materials, such as explosives or radioactive materials, within the United States. Shippers must contact their export control offices as various international regulations may apply to international shipments. Requirements for U.S. Government material, materials offered for transportation by, for or to the Department of Defense or the Department of Energy, are listed in 49 CFR 173.7.

2.5.1.2 Shippers, those who offer packages for transportation in compliance with DOT requirements, must comply with provisions for hazardous materials classification, proper container selection, packing, marking, labeling, placarding, shipping paper preparation, emergency response information, training, and, in some cases, registration and security plan preparation. Additional packaging and packing requirements may be found in the General Provisions and the Safety Provisions of the contract and this NPR. Provisions of NPD 6000.1 and NPR 6000.2 pertaining to the shipment of hazardous materials shall be complied with as applicable. In addition, the transportation of these materials must be in compliance with applicable State and municipal rules and regulations. All hazardous materials offered for military airlift shall also be prepared in accordance with the requirements of Air Force Logistics Manual 24-204.

2.5.1.3 All persons who participate in any of the activities described in paragraph 2.5.1.2 above are defined as "hazmat employees" under 49 CFR, and must successfully complete training described in 49 CFR 172.704 at least every three years.

2.5.2. All items that are subject to ignition or detonation by electrostatic discharge and which are to be packed in bags or wraps manufactured from Military Barrier Material 22191, 121, 131, or other static-generating materials shall be wrapped individually in antistatic material, meeting the requirements of Military Barrier Material 81705. Antistatic packaging material shall, in all cases, be intimate to the item.

2.5.2.1. The following notation, shall be affixed to each unit package:

WARNING

CONTENTS SUBJECT TO IGNITION OR DETONATION BY ELECTROSTATIC DISCHARGE. GROUND INNER ANTISTATIC WRAPPING BEFORE AND DURING REMOVAL FROM THIS PACKAGE.

NOTE: THIS WARNING DOES NOT TAKE PRECEDENCE OVER OR SERVE IN LIEU OF REQUIREMENTS SPECIFIED IN APPLICABLE REGULATIONS AND TARIFFS.

2.5.2.2. Where considerations of precision, cleanliness, flammability, or compatibility with propellants preclude the use of antistatic material meeting Military Barrier Material 81705, Type II, contractors are authorized to use commercially available antistatic materials. Preapproval for such use shall be granted by the Contracting Officer or the Center Transportation Officer.

2.5.3. In addition to the regulations cited in paragraph 2.5.1, further requirements regarding the packaging and transport of radioactive materials are contained in 10 CFR Part 71.

2.6. Degradation by Electrostatic Discharge

2.6.1. Many electronic devices such as thin or thick film resistors, semiconductors, field effect transistors, or circuitry containing any of these can be degraded by static electricity. The contractor shall assure that design engineering identifies such items and provides the essential precautions to all in-plant handling and packaging personnel.

2.6.2. Items shall be packaged in accordance with paragraph 2.5. Each package shall bear a label warning that the contents can be destroyed by static electricity and should be handled only by personnel instructed in the necessary precautions.

2.7. Kits (Parts and Modifications)

Preservation, packaging, and packing of kits (parts and modifications) shall be in accordance with Military Standard 2073, Appendix D.

2.8. Weight and Cube

Accomplished packs shall be as simple as possible and of minimum tare weight and cube, consistent with the protection required. Consolidation containers and pallets shall be properly used to reduce multiple handling; however, items bearing the NASA Critical Item Label (NASA Form 1368) shall not be commingled with noncritical items in any container. When the gross weight of the individual pack or consolidation exceeds 100 pounds or when the package cube exceeds 10 cubic feet, use of skids or pallets should be considered.

2.9. Reusable Containers

2.9.1. Reusable containers are those that are designed to provide adequate protection when reused for return shipments and/or throughout several shipping cycles or sequences. Reusable

containers shall be considered for all items that require periodic shipments to and return from repair activities and where adequate provisions to control the containers make reuse economical. The quantities of reusable containers authorized shall be the minimum essential to meet anticipated needs. The contractor shall identify reusable containers and provide storage to assure their maintenance in a serviceable condition for use. The container specifications issued by the International Air Transport Association merit consideration for application to air shipping cycles. Requirements for reusable containers for U.S. hazardous materials shipments are defined in 49 CFR Part 173.28. Inspection and testing are typical requirements for reusable containers.

2.9.2. Existing reusable containers available commercially or from Government or contractor inventories shall be used to reduce package design and fabrication costs. Modification of existing containers and container designs shall be considered when this is a cost-effective approach.

2.9.3. Multiapplication containers are especially useful for return of repairables since each size and type is suitable for shipment of a large number of different items within certain limits of size, weight, and fragility. These containers are described in Military Standard 2073, Appendix E. Use of this type of container is authorized for Level A, B, and C applications where the multiapplication containers will provide equivalent protection to the contained item.

2.10. Reuse of Packaging Materials

Packaging materials shall be considered for reuse to the maximum extent practicable.

The determination for reuse shall be based on the quality and condition of the material, the economics of storage and handling of the used material, and the incidence of usage anticipated.

2.11. Disassembly

Disassembly of major components to facilitate packaging, or to provide more effective procedures, is permissible unless otherwise specified. Normally, components shall remain assembled if previous inspection or test acceptances are invalidated by disassembly. Efforts shall be made to secure assembly hardware to one of the mating parts when disassembly is accomplished.

2.12. Matchmarking

When necessary to facilitate reassembly or repackaging, removed parts shall be matchmarked. Matchmarking information shall be put on cloth shipping tags or on metal tags using waterproofed ink or paint, and attached to mating parts. The marked cloth shipping tags shall be water proofed with a water resistant spar varnish, a water resistant paper label adhesive or any other suitable colorless waterproofing material. At no time shall tags or adhesive create interference with item reassembly.

2.13. Container Markings

2.13.1. Markings on unit packages, intermediate packages, and exterior shipping containers shall be in accordance with the applicable requirements of Military Standard 2073 and this NPR.

2.13.2. Items designated as Class I, Class II, or Class III, in accordance with Appendix A, shall normally bear an appropriate NASA Critical Item Label (NASA Form 1368). The label shall be affixed to each side, end, and top of the container. Labels shall not interfere with other required markings. Drums shall be marked with a label on the top and on opposite sides.

2.13.3. Shelf life terminal and preservation expiration dates shall be identified by marking, by tagging, or in log books as specified by design engineering requirements.

2.13.4. Marking and labeling of hazardous materials shall be in accordance with appropriate regulations as cited in paragraph 2.5 and with other contractual provisions. Marking of hazardous materials needed for compliance with DOT regulations must be displayed on a background of sharply contrasting color and not obscured by other container marking or labeling per 49 CFR Part 172.304.

2.14. Testing

2.14.1. Testing of packages, packing methods, and materials shall be in accordance with design engineering requirements. When specific guidance is not provided, tests shall be performed as specified in Appendix B of Military Standard 2073. In all instances, only standardized packaging testing techniques will be utilized.

2.14.2. Shipping contractors shall ensure that all special testing data is furnished, as required by the contract.

2.14.3. Preproduction tests shall be performed in accordance with the design requirements of the contract. The necessity for such testing will be determined by considering the following factors:

2.14.3.1. The contractor has data or other evidence to indicate that prior successful tests were conducted and are accepted by the contracting officer as being equivalent to those now being proposed.

2.14.3.2. The packaged item has been subjected to similar tests as a part of other testing programs.

2.14.3.3. The container for a specific item of equipment is developed under an end-item specification, with engineering and testing approval through configuration management procedures and reviews.

2.14.3.4. Detailed packaging instructions are imposed by the procuring activity.

2.14.4. Provisions for the testing of hoisting and material handling equipment shall be performed as required.

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