

MIL-A-8416B(USAF)
18 OCTOBER 1979
SUPERSEDING
MIL-A-8416A(USAF)
17 March 1955

MILITARY SPECIFICATION
ADAPTER, HEADSET-MICROPHONE MX-1646()/AIC

This specification is approved for use by the Air Force Acquisition Logistics Division, Directorate of Electronic Support (AFALD/PTES), Wright-Patterson AFB, OH 45433, Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers one type of adapter designated Adapter, Headset-Microphone MX-1646()/AIC. This adapter permits the use of low impedance dynamic headsets and microphones with equipment designed for use with 600-ohm headsets and carbon microphones.

1.1.1 Types. In the type designation, the parentheses will be either removed or replaced by a letter. This information will be furnished after each contract has been awarded upon application by the contractor to the procuring activity. The complete nomenclature or type number will be used on nameplates, shipping records, and in instruction books as applicable.

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on the date of invitation for bids or request for proposal form a part of this specification to the extent specified herein.

SPECIFICATIONS

FEDERAL

PPP-B-636	Boxes, Shipping, Fiberboard
PPP-T-60	Tape, Packaging, Waterproof
PPP-T-76	Tape, Packaging, Paper (For Carton Sealing)
QQ-S-571	Solder, Tin Alloy, Lead-tin Alloy, and Lead Alloy

MILITARY

MIL-P-116	Preservation-Packaging, Methods of
MIL-C-9177	Connector, Audio, Airborne, General Specification For
MIL-C-9177/3	Connector, Audio, Airborne, Jack, Cable, 4 Contact
MIL-C-45662	Calibration System Requirements

STANDARDS

MILITARY

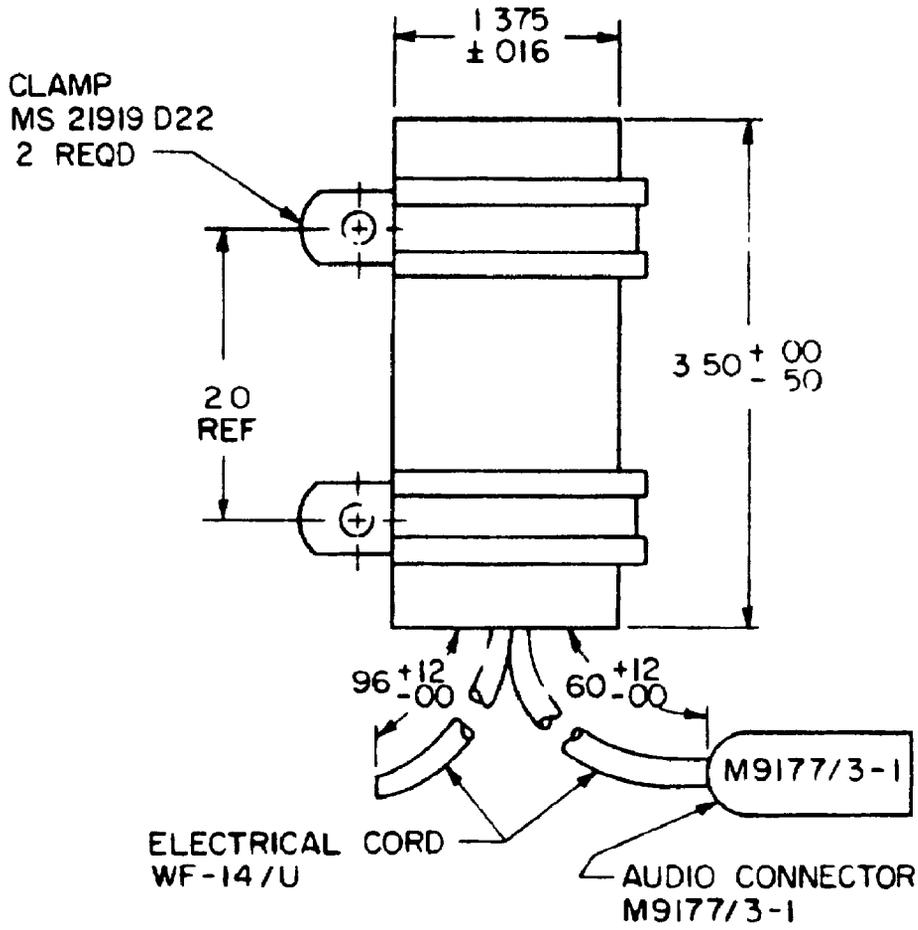
MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	Marking for Shipment and Storage
MIL-STD-147	Palletized Unit Loads for 40" X 48" Pallets
MIL-STD-202	Test Methods for Electronic and Electrical Component Parts
MIL-STD-454	Standard General Requirements for Electronic Equipment
MIL-STD-1285	Marking of Electrical and Electronic Parts
MS21919	Clamp, Cushioned Support, Loop Type

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(Copies of specifications and standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

- 3.1 Detail requirements. The adapter requirements shall be as specified herein. (See 6.1).
- 3.2 First article. Adapters furnished under this specification shall be products that have been tested and have passed the first article inspection specified in 4.4.
- 3.3 Materials. Materials shall be as specified herein. When a definite material is not specified, a material shall be used that will enable the adapters to meet the performance requirements of this specification. Acceptance or approval of any constituent material shall not be construed as a guaranty of the acceptance of the finished product.
- 3.3.1 Metals. Metals shall be corrosion resistant and of the proper alloy and hardness necessary to provide the required strength and rigidity to meet the performance requirements of this specification.
- 3.3.2 Fungus-resistant materials. Certification shall be made to show compliance to Requirement 4 of MIL-STD-454.
- 3.3.3 Solder. Solder shall conform to composition Sn60 of QQ-S-571.
- 3.4 Design and construction.
- 3.4.1 Connector. The connector shall comply with the requirements of MIL-C-9177 (USAF) and MIL-C-9177/3(USAF) for the replacement for the U-92 A/U Audio Connector.
- 3.4.2 Adapter. The adapter shall electrically match an 8-Ohm headset to a 600-Ohm source and use an amplifier to couple a 5-Ohm dynamic microphone into input circuits designed for military carbon microphones. Configuration is shown in Fig. 1. Power for the amplifier shall be obtained from the carbon microphone input circuit in the aircraft when the unterminated cord of the adapter is connected to the existing carbon microphone terminals. Hermetic sealing or encapsulation may be employed to meet the environmental requirements of this specification.
- 3.4.3 Schematic diagram. The adapter shall be wired as shown in Fig. 2.
- 3.4.4 Automatic gain control (AGC). The adapter shall have incorporated AGC within the adapter container.
- 3.4.5 Mounting. The adapter shall be designed to be mounted by two type MS21919D22 clamps spaced on two inch centers. The two clamps in accordance with MS21919 shall be supplied with or as a part of each adapter.
- 3.4.6 Supply voltage. The adapter shall be capable of normal operation over a supply voltage range of 5-30 Vdc.
- 3.4.7 Shielding. Cord shields shall be connected to the housing from the headset matching device and microphone adapter. The adapter exterior housing shall be electrically grounded.
- 3.4.7 Weight. Weight shall not exceed 6 ounces excluding cords and connectors.
- 3.5 Performance.



DIMENSIONS IN INCHES

FIGURE 1. Adapter, headset-microphone MX-1646()/AIC.

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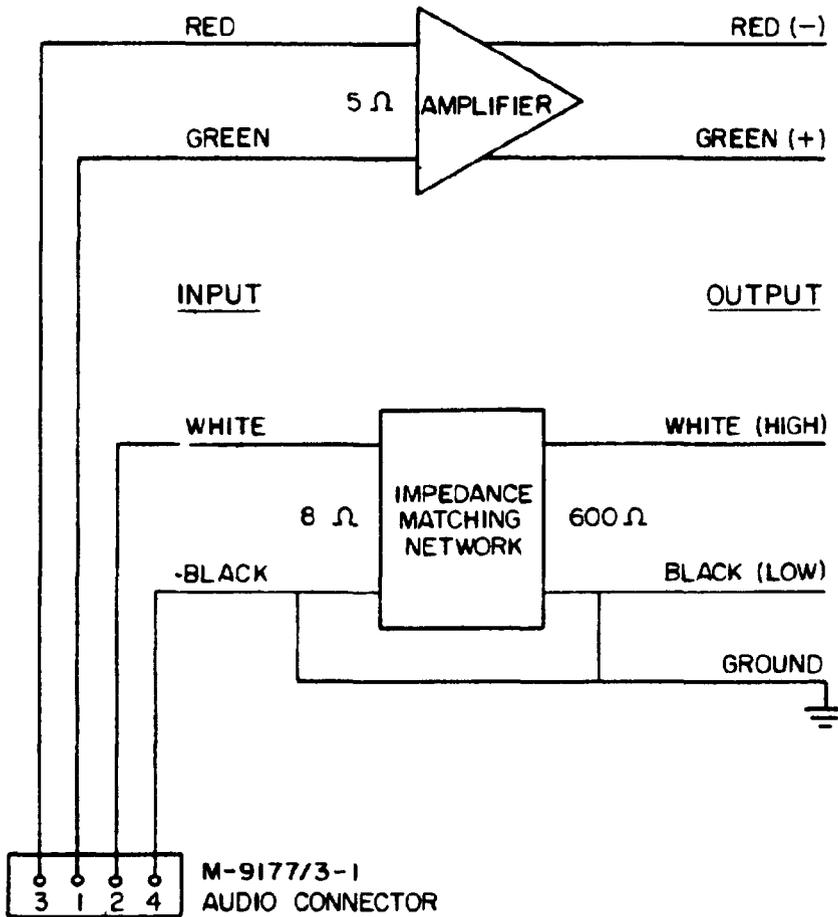


FIGURE 2. Schematic, headset-microphone adapter MX1646()/AIC.

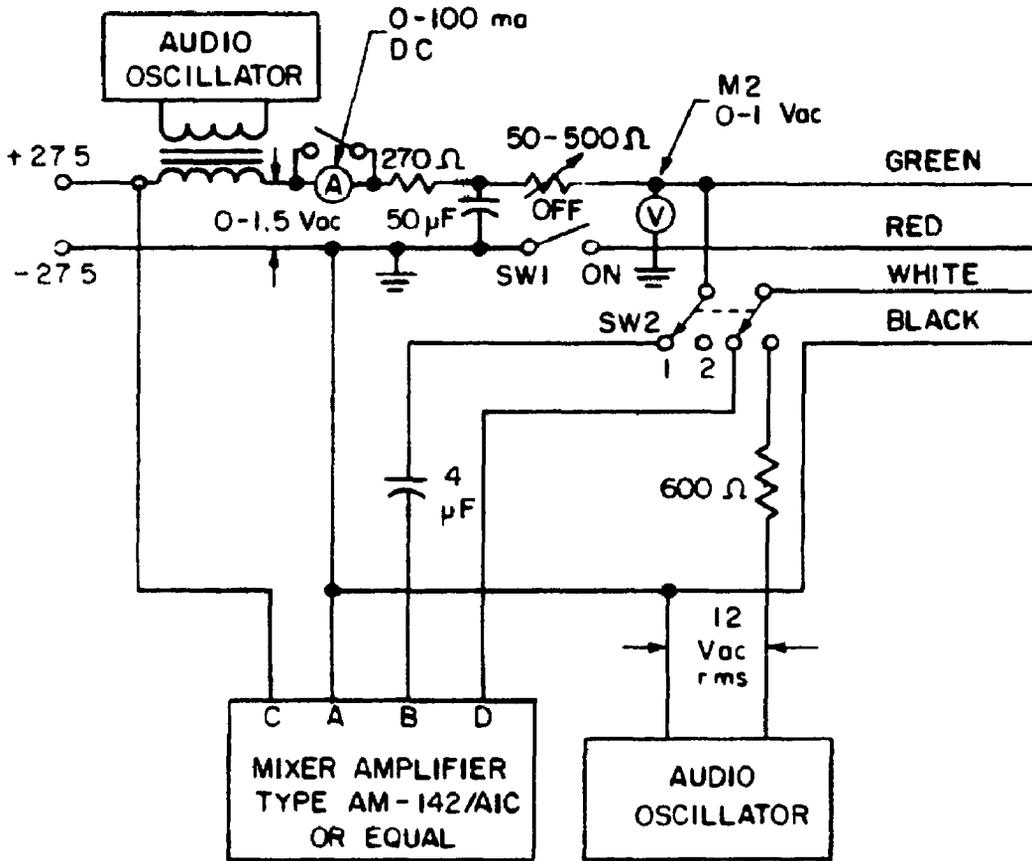


FIGURE 3. Interphone simulator.

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3.5.1 Noise. Output background noise, with no signal input, shall be at least 50 dB below normal output when the adapter is placed in any position within 10 inches of an isolated, insulated conductor carrying 10 amperes of 400 Hz current. Noise output due to ripple within the range of 100-8000 Hz shall not exceed the value obtained with switch SW-1 of Fig. 3 "off" when it is in the "on" position (see 4.6.2).

3.5.2 Distortion. Harmonic distortion shall not exceed 5 percent when operating at normal output levels. There shall be no oscillations or regeneration when Switch SW-2 of Fig. 3 is placed in position 1 (see 4.6.3).

3.5.3 Current consumption. The total current drain of the adapter shall not exceed 25 milliamperes, DC when SW-1 of Fig. 3 is in the "on" position (see 4.6.4).

3.5.4 Frequency response. The adapter shall provide a gain of 62 ± 3 dB over the frequency range of 300 to 6000 Hz with various load impedances of 50, 100, 200, 300, 400 and 500-ohms (see 4.6.5).

3.6 Environmental.

3.6.1 Cable retention. The cords shall withstand a 25 pound pull in line with the adapter body and not pull free from the housing or cause an electrical discontinuity (see 4.6.6).

3.6.2 Temperature range. The adapter shall remain operational throughout the range of -55°C to $+85^{\circ}\text{C}$ and show no damage as a result of exposure to the temperature range specified herein (see 4.6.7).

3.6.3 Humidity. When tested as specified in 4.6.8, the insulation resistance between the terminals of the cords and the case shall be at least 100 megohms.

3.6.4 Altitude. When tested as specified in 4.6.9, the adapter case shall not deform in a way to cause electrical performance degradation.

3.6.5 Salt spray. When the adapter is tested as specified in 4.6.10, there shall be no excessive corrosion of metal parts.

3.6.6 Vibration. When the adapter is tested as specified in 4.6.11, there shall be no loosening of parts or separation of the cord from the adapter.

3.6.7 Shock (specified pulse). When the adapter is tested as specified in 4.6.12, there shall be no loosening or separation of parts.

3.7 Finish. Adapters shall be painted lusterless black.

3.8 Marking. Adapters shall be marked in accordance with MIL-STD-1285 with the type designation and manufacturer's code symbol or name. In addition, a green paint dot shall be applied to the case of the adapter near the point of exit of the cord which is not terminated with Audio Connector M-9177/3. The diameter of the dot shall be between .125 and .250 inch. The unterminated cord shall have a tag attached bearing the following note:

"CAUTION: Red lead, negative; Green lead, positive"

3.9 Workmanship. Adapters shall be processed in such a manner as to be uniform in quality and shall be free from loose or deposited foreign materials, and other defects that will affect life, serviceability, or appearance.

4. QUALITY ASSURANCE PROVISIONS

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

4.1.1 Test equipment and inspection facilities. Test equipment and inspection facilities shall be of sufficient accuracy, quality, and quantity to permit performance of the required inspection. The supplier shall establish calibration of inspection equipment to the satisfaction of the Government. Calibration of the standards which control the accuracy of inspection equipment shall comply with the requirements of MIL-C-45662.

4.2 Classification of inspection. The examination and testing of adapters shall be classified as follows:

- a. First article inspection (see 4.4).
- b. Quality conformance inspection (see 4.5).
 - (1) Inspection of product for delivery (see 4.5.1).
 - (2) Inspection of packaging (see 4.5.2).

4.3 Inspection conditions. Unless otherwise specified, all inspections shall be made in accordance with the general requirements of MIL-STD-202, section 2.

4.4 First article inspection. When required by the procurement activity, first article inspection shall be performed by the suppliers, after award of contract and prior to production, at a laboratory acceptable to the government.

4.4.1 Sample size. Six (6) adapters shall be submitted for first article inspection as required in Table I.

4.4.2 Test routine. Sample units shall be subjected to the inspections specified in Table I in the order shown below.

TABLE I. First article inspection

Examination or Test	Requirement	Method	No. of Units
Visual & Mechanical	3.1, 3.3, 3.7, 3.8, 3.9	4.6.1	All
Noise	3.5.1	4.6.2	
Distortion	3.5.2	4.6.3	
Current consumption	3.5.3	4.6.4	
Frequency response	3.5.4	4.6.5	
Cable retention	3.6.1	4.6.6	
Temperature range	3.6.2	4.6.7	
Humidity	3.6.3	4.6.8	
Altitude	3.6.4	4.6.9	
Salt spray	3.6.5	4.6.10	
Vibration	3.6.6	4.6.11	
Shock (specified Pulse)	3.6.7	4.6.12	

4.5 Quality conformance inspection.

4.5.1 Inspection of product for delivery. Inspection of product for delivery shall consist of group A inspections.

4.5.1.1 Inspection lot. An inspection lot shall be as specified in MIL-STD-105, and shall consist of adapters covered by this specification, produced under essentially the same conditions and offered for inspection at one time.

4.5.1.2 Rejected lots. If an inspection lot is rejected, the supplier may withdraw the lot, rework it to correct the defects, or screen out the defective units, as applicable and reinspect. Such lots shall be separate from new lots, and shall be clearly identified as reinspected lots. Rejected lots shall be inspected using tightened inspection.

4.5.1.3 Group A inspection. Group A inspection shall consist of the examinations and tests specified in Table II.

TABLE II, Group A inspection

Examination or Test	Requirement	Method	AQL	
			Major	Minor
Visual & Mechanical	3.1, 3.3, 3.7, 3.8, 3.9			4.0%
Cable retention	3.6.1		1.0%	
Noise	3.5.1		1.0%	
Distortion	3.5.2		1.0%	
Frequency response	3.5.4		1.0%	

4.5.1.4 Sampling plan. Two (2) adapters shall be selected from the first 100 produced and from each lot of 500 or less thereafter, or from every six (6) months of production, whichever occurs first. The first samples shall be selected at the start of the contract from the first production lot.

4.5.2 Inspection of packaging. Sample packages or packs and the inspection of the preservation, packaging, packing and marking for shipment and storage shall be in accordance with section 5.

4.6 Methods of examination and test.

4.6.1 Visual and mechanical examination. The adapters shall be examined to verify that the materials, design, construction, physical dimensions, finish, marking, and workmanship are as specified herein (see Table I).

4.6.2 Noise. Measure and record the output background noise, with no signal input to the adapter when the adapter is placed within 10 inches of the required conductor (see 3.5.1).

4.6.3 Distortion. The harmonic distortion shall be measured and recorded and shall not exceed the value specified herein (see 3.5.2).

4.6.4 Current consumption. The current drain shall be measured at the output of the primary power supply of Fig. 3 and shall not exceed the value specified (see 3.5.3).

4.6.5 Frequency response. The frequency response of the adapter shall be measured at 300, 1000, 2000 and 6000 Hz and shall fall within the limits specified (see 3.5.4).

- 4.6.6 Cable retention. A 25 pound weight shall be hung vertically along the axis of each cord and the adapter for 5 minutes. A visual inspection shall be made for breakage or damage failures (see 3.6.1).
- 4.6.7 Temperature range. The adapter shall be placed in a test chamber at 85°C for four (4) hours. It shall be tested for normal operation and inspected for damage within 15 minutes of the end of the four (4) hours. It shall then be placed in a test chamber at -55°C for ten (10) hours. Upon completion of the cold soak, the adapter shall be examined for physical damage (including the cords) and tested for normal operation (see 3.6.2).
- 4.6.8 Humidity. Humidity testing shall be in accordance with MIL-STD-202, Method 103, test condition B. At the conclusion of this test, the insulation resistance between the metal case and all of the conductors shall be at least 100 megohms (see 3.6.3).
- 4.6.9 Altitude. Altitude testing shall be in accordance with MIL-STD-202, Method 105, test condition A, unmounted and subjected to visual inspection upon completion (see 3.6.4).
- 4.6.10 Salt spray. Salt spray test shall be in accordance with MIL-STD-202, Method 101, test condition B. No excessive corrosion shall be present following the test (see 3.6.5).
- 4.6.11 Vibration. Vibration of the adapter excluding cords and connectors shall be in accordance with MIL-STD-202, Method 201 and checked for normal operation (see 3.6.6).
- 4.6.12 Shock. Shock test shall be in accordance with MIL-STD-202, Method 213, test condition C and visually inspected (see 3.6.7).
5. PACKAGING
- 5.1 Preservation - packaging. Preservation-packaging shall be level A or C, as specified (see 6.1).
- 5.1.1 Level A.
- 5.1.1.1 Cleaning. Adapters shall be cleaned in accordance with MIL-P-116, process C-1.
- 5.1.1.2 Drying. Adapters shall be dried in accordance with MIL-P-116.
- 5.1.1.3 Preservative application. Preservatives shall not be used.
- 5.1.1.4 Unit packaging. Unless otherwise specified (see 6.1) adapters shall be individually packaged in accordance with MIL-P-116, submethod IA-15, insuring compliance with the general requirements paragraph under methods of preservation (unit protection) and the physical protection requirements paragraph therein. The container shall conform to PPR-B-636.
- 5.1.1.5 Intermediate packaging. Not required.
- 5.1.2 Level C. Adapters shall be clean, dry and packaged in a manner that will afford adequate protection against corrosion, deterioration and physical damage during shipment from supply source to the first receiving activity.
- 5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.1).

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5.2.1 Level A. The packaged adapter shall be packed in fiberboard containers conforming to PPP-B-636, class weather resistant, style optional, special requirements. In lieu of the closure and water proofing requirements in the appendix of PPP-B-636, closure and waterproofing shall be accomplished by sealing all seams, corners, and joints with tape, 2 inches minimum width, conforming to PPP-T-60, class 1 or PPP-T-76. Banding shall be applied in accordance with the appendix to PPP-B-636 using non-metallic or tape banding only.

5.2.2 Level B. The packaged adapters shall be packed in fiberboard containers conforming to PPP-B-636, class domestic, style optional, special requirements. Closures shall be in accordance with the appendix thereto.

5.2.3 Level C. The packaged adapter shall be packed in shipping containers in a manner that will afford adequate protection against damage during direct shipment from the supply source to the first receiving activity. These packs shall conform to the applicable carrier rules and regulations.

5.2.4 Unitized loads. Unitized loads, commensurate with the level of packing specified in the contract or order, shall be used whenever total quantities for shipment to one destination equal 40 cubic feet or more. Quantities less than 40 cubic feet need not be unitized. Unitized loads shall be uniform in size and quantities to the greatest extent practicable.

5.2.4.1 Level A. Adapters, packed as specified in 5.2.1, shall be unitized on pallets in conformance with MIL-STD-147, load type I, with a fiber-board cap (storage aid 4) positioned over the load.

5.2.4.2 Level B. Adapters, packed as specified in 5.2.2, shall be unitized as specified in 5.2.4.1 except that the fiberboard caps shall be class domestic.

5.2.4.3 Level C. Adapters, packed as specified in 5.2.3 shall be unitized with pallets and caps of the type, size and kind commonly used for the purpose and shall conform to the applicable carrier rules and regulations.

5.3 Marking. In addition to any special marking required by the contractor or purchase order (see 6.1), each unit package, exterior container, and unitized load shall be marked in accordance with MIL-STD-129.

5.4 General. Exterior containers (see 5.2.1, 5.2.2, and 5.2.3) shall be of a minimum tare and cube consistent with the protection required and shall contain equal quantities of identical stock numbered items to the greatest extent practicable.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification (see 3.1).
- b. Levels of preservation - packaging and packing required (see 5.1).
- c. Method of preservation, if other than submethod IA-15 (see 5.1.1 4).
- d. Special marking, if required (see 5.3).

6.1.1 Indirect shipment. The preservation, packaging, packing, and marking requirements specified in section 5 apply only to direct purchases by or direct shipment to the Government and are not intended to apply to contracts or orders between the supplier and prime contractor.

6.2 First article. When a first article is required, it shall be tested and approved under the appropriate provisions of 7-104.55 of the Armed Services Procurement Regulation. The first article should be a preproduction item. The first article should consist of six units. The contracting officer should include specific instructions in all procurement instruments, regarding arrangements for examinations, test and approval of the first article.

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Review activity:
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MIL-A-8416B, 18 October 1979

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