

MIL-A-7965C(ASG)

22 MAY 1964

Superseding

MIL-A-007965B(Wep)

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MIL-A-7965A(ASG)

19 September 1955

MILITARY SPECIFICATION

ANTENNA COMPONENTS: ANTIPRECIPITATION STATIC

This specification has been approved by the Department of the Air Force and by the Bureau of Naval Weapons.

1. SCOPE

1.1 Scope.- This specification covers antiprecipitation static antenna components.

1.2 Classification.- The antenna components shall be one of the following two classes, as specified (see 6.3):

Class A: Capable of withstanding antenna transmission voltages of 7,500 volts at sea level.

Class B: Capable of withstanding antenna transmission voltages of 10,000 volts at an altitude of 50,000 feet.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

Military

MIL-S-5002	Surface Treatments and Metallic Coatings for Metal Surfaces of Weapons Systems
MIL-E-5400	Electronic Equipment, Aircraft, General Specification for
MIL-H-5606	Hydraulic Fluid, Petroleum Base, Aircraft, Missile, and Ordnance
MIL-W-6370	Wire, Electrical, Insulated, Antenna
MIL-S-6715	Springs; Helical, Aircraft
MIL-C-7439	Coating System, Elastomeric, Rain Erosion Resistant and Rain Erosion Resistant with Anti-Static Treatment, for Exterior Aircraft and Missile Plastic Parts.

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3.5 Design.- The equipment covered by this specification shall be primarily designed to be used with insulated antenna wire, type I, conforming to MIL-W-6370, to make up complete aircraft antenna systems insulated with respect to space.

3.5.1 Strength.- As a design objective, the mechanical strength of the components covered by this specification shall be such that any mechanical or electrical failure of the antenna system caused by mechanical breakage or deformation shall be evidenced first by failure of the wire, but at not less than the specified strength of the wire.

3.5.2 Chucks.- Chucks having spring-loaded jaws shall be used to secure the antenna wire in antenna components. The chucks shall be designed to meet the following requirements.

3.5.2.1 Engagement.- The chuck shall secure the antenna wire when a stripped uninsulated end of the conductor is inserted into the chuck the entire length of the chuck jaw. The chuck shall hold the wire, and the grip shall be sufficient to satisfy the tests specified herein.

3.5.2.2 Disengagement.- The chuck shall release the wire when its jaws are depressed by means of a wire retriever.

3.6 Construction.- Antenna components and special tools shall conform to the applicable MS drawings.

3.6.1 Coating (rain erosion).- Masts, adapters, and vee supports covered by this specification shall be coated in accordance with MIL-C-7439, class I.

3.7 Interchangeability.- All parts having the same manufacturer's part number shall be directly and completely interchangeable with each other with respect to installation and performance. Changes in manufacturer's part numbers shall be governed by the drawing number requirements of MIL-D-70327.

3.8 Performance.- The antenna components shall perform satisfactorily when subjected to the applicable tests as specified in section 4.

3.8.1 Dead-end mast.- The dead-end mast shall provide mechanical support for a terminated end of antenna wire at a distance from the aircraft skin.

3.8.2 Lead-through mast.- The lead-through mast shall provide mechanical support for an antenna wire at a distance from the aircraft skin, and provide a point of entry into the aircraft.

3.8.3 Antenna adapter.- The antenna adapter shall provide an additional means of attachment of a terminated end of antenna wire onto an antenna mast.

3.8.4 Dead-end insert.- The dead-end insert shall provide an insulated terminal for an antenna wire within an antenna mast or adapter.

3.8.5 Strain insulator.- The strain insulator shall provide electrical insulation between two mechanically connected segments of antenna wires.

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3.8.6 Tee connector.- The tee connector shall provide mechanical and electrical connection between three segments of antenna wires.

3.8.7 Lead-through insulator.- The lead-through insulator shall provide for an antenna wire entry into the aircraft that is insulated from the aircraft skin.

3.8.8 Lead-through insulator elbow.- The lead-through insulator elbow shall provide a means of angular attachment for an antenna wire to the lead-through insulator.

3.8.9 Antenna support sleeve (external thread).- The antenna support sleeve (external thread) shall function to reduce flexure and breakage of antenna wire at the point of entry into an antenna mast, antenna adapter, lead-through insulator (or elbow), or antenna vee support.

3.8.10 Antenna takeup.- The antenna takeup shall provide an uninsulated means for taking up excess length and quick disconnect of antenna wire, and shall provide a swiveling mechanical connection to the aircraft structure.

3.8.11 Antenna tension takeup.- The antenna tension takeup shall provide an uninsulated means for taking up excess length, adjusting tension, and quick disconnect of antenna wire, and shall provide a swiveling mechanical connection to the aircraft structure.

3.8.12 Clamp block.- The clamp block shall provide a means for attaching an antenna mast to the aircraft structure.

3.8.13 Vee support.- The vee support shall provide an additional means of attachment onto an antenna mast and for direction reversal for a continuous segment of antenna wire.

3.8.14 Antenna support sleeve(internal thread).- The antenna support sleeve (internal thread) shall function to reduce flexure and breakage of antenna wire at the point of entry into the antenna takeup or tension takeup.

3.8.15 Antenna takeup swivel.- The antenna takeup swivel shall provide a swiveling mechanical connection between the antenna takeup or tension takeup and the aircraft structure.

3.8.16 Antenna mast cap.- The antenna mast cap shall provide access to the interior of antenna masts from the forward end.

3.8.17 Antenna mast end and adapter screw.- The antenna mast end and adapter screw shall provide for positioning of the dead-end insert in the threaded interior of the dead-end mast and antenna adapter.

3.9 Special tools.- Antenna components shall be so designed that only the following special tools are required for assembly or disassembly.

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3.9.1 Wire retriever.- The wire retriever may be used to remove antenna wire from chucks and to guide a knife for safe removal of antenna wire insulation without nicking the conductor.

3.9.2 Mast plug driver.- The mast plug driver is a spanner-type device for adjusting the threaded plugs used to position dead-end inserts, and for guiding a knife for safe removal of wire insulation without nicking the conductor.

3.9.3 Pretensioning tool.- The pretensioning tool is used to grip the type I antenna wire for ease of operation of the antenna tension takeup.

3.10 Identification of product.- Antenna components shall be identified as required by their individual applicable drawing number and in accordance with MIL-STD-130.

3.11 Workmanship.- Workmanship shall conform to MIL-E-5400. Surfaces shall be smooth, free from voids, blisters, and cracks. Molded parts shall be clear and free from occlusions, bubbles, cracks, crazes, and weld lines.

#### 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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 supplies and services conform to prescribed requirements.

4.2 Classification of inspections.- Items covered by this specification shall be subjected to:

- (a) Preproduction inspection (4.3)
- (b) Quality conformance inspection (4.4)

4.3 Preproduction inspection.- Preproduction shall be made on items representative of the production items to be supplied under the contract. Preproduction samples shall consist of 10 of each item to be tested.

4.3.1 Inspections.- Preproduction inspections shall consist of the examinations and tests specified in table I and conducted in accordance with 4.6 and 4.7.

4.3.2 Preproduction approval.- Approval of the preproduction sample items shall be by the procuring activity upon satisfactory completion of all inspections. No items shall be delivered prior to approval of the preproduction samples.

4.4 Quality conformance inspections.- Quality conformance inspections shall consist of individual inspections, sampling inspections, and such other inspections as are deemed necessary by the inspector to determine compliance with this specification. These inspections shall be conducted by the manufacturer under the supervision of the procuring activity.

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TABLE I. Applicability of preproduction and sampling inspections

Components	Examination of product	Dimensions and interchangeability	Solvent resistance	Temperature cycle	Electrical insulation to space	R-f heating and break down	Tension	Strength	Accelerated life	Corrosion	Static load	Drop
Dead-end mast	X	X	X 2/	X	X	X	X	X				X
Lead-through mast	X	X	X	X	X	X	X	X				X
Antenna adapter	X	X	X	X	X	X	X					X
Dead-end insert	X	X	X	X	X 3/	X	X					
Strain insulator	X	X	X	X	X	X	X					
Fee connector	X	X	X	X	X 3/	X	X					
Lead-through insulator	X	X	X	X	X	X	X					X
Antenna support sleeve (external thread)	X	X	X	X	X	X	X				X	X
Lead-through insulator elbow	X	X	X	X	X	X	X				X	X
Antenna takeup	X	X					X		X			X
Antenna tension takeup	X	X					X		X			X
Mast clamp block	X	X	X	X	X	X	X		X			X
Antenna vee support	X	X					X					X
Antenna support sleeve (internal thread)	X	X	X									X
Mast cap	X	X	X	X	X							X
Adapter screw	X	X										
Wire retriever	X	X										
Plug driver	X	X										
Prestensioning tool	X	X										

1/ For Preproduction approval, 8 out of 10 samples must withstand 240 kv The remaining 2 must withstand at least 200 kv  
 2/ Symbol X indicates preproduction tests only  
 3/ 160 kv max (in lieu of 240 kv)  
 4/ Symbol X → X indicates tests to be performed in sequences on same samples.

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4.4.1 Individual inspection.- Each component submitted for acceptance shall be subjected to examination of product (4.6.1).

4.4.2 Sampling inspections.-

4.4.2.1 Sampling.- Components submitted for acceptance shall be subjected to testing on a lot basis in accordance with MIL-STD-105, as specified in 4.4.2.2.

4.4.2.1.1 Lot.- For purposes of this specification a lot shall be as defined in the following paragraphs.

4.4.2.1.2 Plastic parts.- A lot of molded or extruded parts shall consist of all the parts of the same manufacturer's part number made in the same mold during a continuous run using molding powder from the same original container. A continuous run is considered to allow for overnight shutdowns, but is restricted to production where the temperatures, pressures, and molding cycles are unchanged.

4.4.2.1.3 Mechanical assemblies.- For mechanical assemblies or subassemblies, such as tension takeup units, chucks, and insert subassemblies, a lot shall consist of all the units of the same manufacturer's part number submitted for approval at the same time.

4.4.2.2 Inspections.- For sampling inspections, lots shall be subjected to the tests and the Acceptable Quality Levels (AQL's) listed in table II, as described under 4.6 and 4.7, when applicable to the components as specified in table I. Reduced inspection shall be used when permitted by MIL-STD-105. Except where a certain sequence of tests is specified to be run on the same samples, additional numbers of samples may be drawn from lots, at the manufacturer's convenience, for the purpose of expediting the test program.

TABLE II. Sampling inspections - acceptable quality levels

Test	AQL
Dimensions and interchangeability	2 defects per 100
Electrical insulation to space	10 percent defective
Strength	4 percent defective
Tension	4 (see 4.4.2.3)
R-f heating and breakdown	4 (see 4.4.2.3)
Temperature cycling	1 percent defective

4.4.2.2.1 Applicability of tests.- The applicability of tests for components of the antiprecipitation static antenna is indicated in table I..

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4.4.2.3 Critical defects.- Observation of a critical defect in a representative sample shall be cause for rejection of the entire lot. In lieu of complete rejection, each component of the lot shall be subjected to the critical test to determine acceptability. Critical defects are:

- (a) The release of a wire under tension or the mechanical failure of a component under test to such an extent that an antenna made up with the particular component would be carried away in flight or would be inoperative.
- (b) R-f breakdown, evidenced by visible arc discharge, permanent deformation, or inability to maintain a stable voltage-current relationship at the maximum test voltage.

4.4.3 Rejection and retest.- If defects are found equal to or in excess of the rejection number given in MIL-STD-105 for the sampling tests used to determine conformance to table I, the lot shall be rejected. Disposition of rejected samples shall be in accordance with MIL-STD-105, except that tightened inspection for the defects causing rejection shall be used on any resubmitted lot and 100 percent inspection shall be used where rejection was for critical defects.

#### 4.5 Inspection conditions.-

4.5.1 Electrical tests.- Unless otherwise specified for electrical tests, components under test shall be assembled to make up simulated antenna systems. Units shall be wired in the normal fashion with type I antenna wire.

4.5.2 Antenna wire.- For test purposes, type I antenna wire shall be used. Where the antenna wire is simply used to determine mechanical properties of the component, 50-mil copper-coated steel wire may be substituted, provided the copper coating is at least 5 mils thick and the breaking strength is in excess of 450 pounds.

#### 4.6 Examinations.-

4.6.1 Examination of product.- Each component submitted for acceptance under contract shall be subjected to detailed physical inspection to determine conformance with the requirements of this specification not covered by tests. Molded plastic parts shall be free from occlusions, bubbles, blisters, cracks, crazes, or weld lines. Acrylic parts shall be given special scrutiny to detect small cracks at points of stress concentration and weld lines. The sealing cavity shall have no surface irregularities or cloudiness. All molded parts shall have a smooth hard surface, except at sprue breakoff points, where slight irregularities are not considered detrimental. The inspector shall be provided with evidence to show that the materials used were in accordance with applicable specifications and the molding cycles were the same as those used for the preproduction samples.

4.6.2 Dimensions and interchangeability.- Dimensions shall be checked to determine compliance with the applicable drawing requirements and to insure interchangeability.

4.6.3 Preparation for delivery.- Preservation, packaging, packing, and marking shall be examined for conformance to section 5.



#### 4.7 Test methods.-

4.7.1 Solvent resistance test.- The component under test shall be assembled to type I wire and completely immersed in tap water at 160° F for 24 hours. The assembly shall remain intact with no adjustments upon removal, shaken to remove excess surface liquid, and subjected to the r-f heating and breakdown test specified in 4.7.4. This test shall be repeated, immersing the component in each of the following fluids: Ethylene glycol, 5 percent salt solution, SAE No. 30 machine oil, and MIL-H-5606 hydraulic oil. There shall be no degradation of performance, or mechanical or electrical failure of any component. At the option of the procuring activity, the five immersions may be conducted concurrently instead of subjecting a single sample to the entire test.

4.7.2 Temperature cycle.- The component under test shall be assembled to type I wire and subjected to the following cycle, repeated 10 times. After 10 cycles, the component shall be held at -65° F for 48 hours.

<u>Ambient temperature, ° F</u>	<u>Time, minutes</u>
-65	30
70	15
130	30
70	15

The transition from one ambient to the next shall be immediate. No steps shall be taken to prevent the accumulation of moisture on the component while undergoing this test.

4.7.3 Electrical insulation to space.- A high-voltage power supply capable of continuously maintaining an output of not less than 240 kv dc shall be used for this test. The output shall be capable of being varied in a nominally continuous manner or in steps not greater than 25 kv per step between 100 and 240 kv. The negative terminal of the high voltage shall be grounded. A metal cylinder having an inner diameter of 18 inches and a length of not less than 36 inches shall be suitably insulated from ground and connected to the positive electrode of the high-voltage supply. The antenna component under test shall be assembled in the normal fashion with adequate lengths of type I wire. The wire shall be mounted under tension, with the component under test located as nearly as possible at the center of the cylinder, with the wire along the axis of the cylinder. In testing dead-end inserts, the insert shall be held in position by the type I wire on one end and a nylon cord with a polyethylene suction cup on the other. A microammeter having a scale length sufficient to indicate minimum currents of one microampere, or less, shall be inserted between ground and the type I wire connected to the component under test. The microammeter should be suitably protected against the surge currents that may occur upon breakdown. For the preproduction samples, the high voltage may be applied at any temperature from -40° to +100° F. Two hundred and forty kv shall be applied at a rate not greater than two 25-kv steps per minute when the voltage is above 100 kv. The voltage shall be held at 240 kv for at least 10 seconds. Readings of the microammeter which are in excess of one microampere and which increase with an increase of applied voltage shall constitute evidence of the component failure, unless examination shows the failure to be in the wire.

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4.7.3.1 Alternative procedure.- When approved by the procuring activity, an alternative test procedure may be used. If the voltage generator has a current output capacity of at least 0.5 millampere, the microammeter need not be used. The voltage shall be applied in the manner specified in 4.7.3. There shall be no perceptible evidence of corona from the components under test. Perceptible evidence of corona shall consist of a visible spark while the test is being conducted, and of a "pinhole" or carbon track on the component upon inspection after the test.

4.7.4 R-f heating and breakdown.- Radio-frequency voltage breakdown tests shall be so set up that the voltage applied to the component is measured. The full voltage shall be applied across the chucks or between the chuck and mounting plate, as applicable, after immersion in tap water for 24 hours. The voltage shall be applied with wire inserted in the chucks simulating a typical installation. In the case of the lead-through insulator and elbow and the antenna support sleeve (external thread), a small quantity of insulating and sealing compound may be used in the threaded cavities to prevent entrance of moisture. The component shall be subjected to the altitude, voltage, and frequency conditions specified in table III for its class. The temperature of the component shall not increase more than 50° F above ambient, and the voltage at the component shall remain stable after 3 minutes at the specified maximum peak voltage. No mechanical breakdown or deformation shall occur.

TABLE III. R-f heating and breakdown test conditions

Class of component	Altitude	Voltage	Frequency
A	Sea level	7,500	3 mc
B	50,000 ft.	10,000	3 mc

4.7.5 Tension.- The component or assembly, mounted to simulate an aircraft installation, shall be subjected to a 450-pound straight pull applied through the type I antenna wire. The tee connector shall be tested only across the horizontal arms. The angle of pull may then be varied up to 20 degrees from the normal direction of the antenna wire for components which are rigidly mounted. This shall be repeated three times with a different wire each time. There shall be no failure of the wire caused by the component or assembly as a result of this test; that is, if the wire breaks, the break should be away from the chuck. There shall be no failure of the component or release of the wire from the chucks as a result of this test.

4.7.6 Strength (flexure or breaking).- The assembled mast and mast base, bolted to a suitable plate to simulate an actual installation, shall be subjected to the following tension loads applied at the top of the mast and normal to the axis of the mast:

- (a) 300 pounds at right angles to the direction of the wire.
- (b) 900 pounds in the direction of the wire.

There shall be no breakage, permanent deformation, or other deleterious effects as a result of this test.

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4.7.7 Calibration.- The tension takeup unit shall be mounted to a fixed support in such manner that, as a load is applied through the type I wire inserted in the chuck, the tension takeup travel can be measured. Indicated loads shall cause the tension takeup unit to travel as indicated in table IV. In addition, the force on the locking sleeve required to disengage the locking spring from the locking groove shall be not less than 3 nor more than 10 pounds.

TABLE IV. Calibration of tension takeup units

Tension takeup position	Pull (pounds)
Initial position	8 $\pm$ 5
Fully extended	65 $\pm$ 10

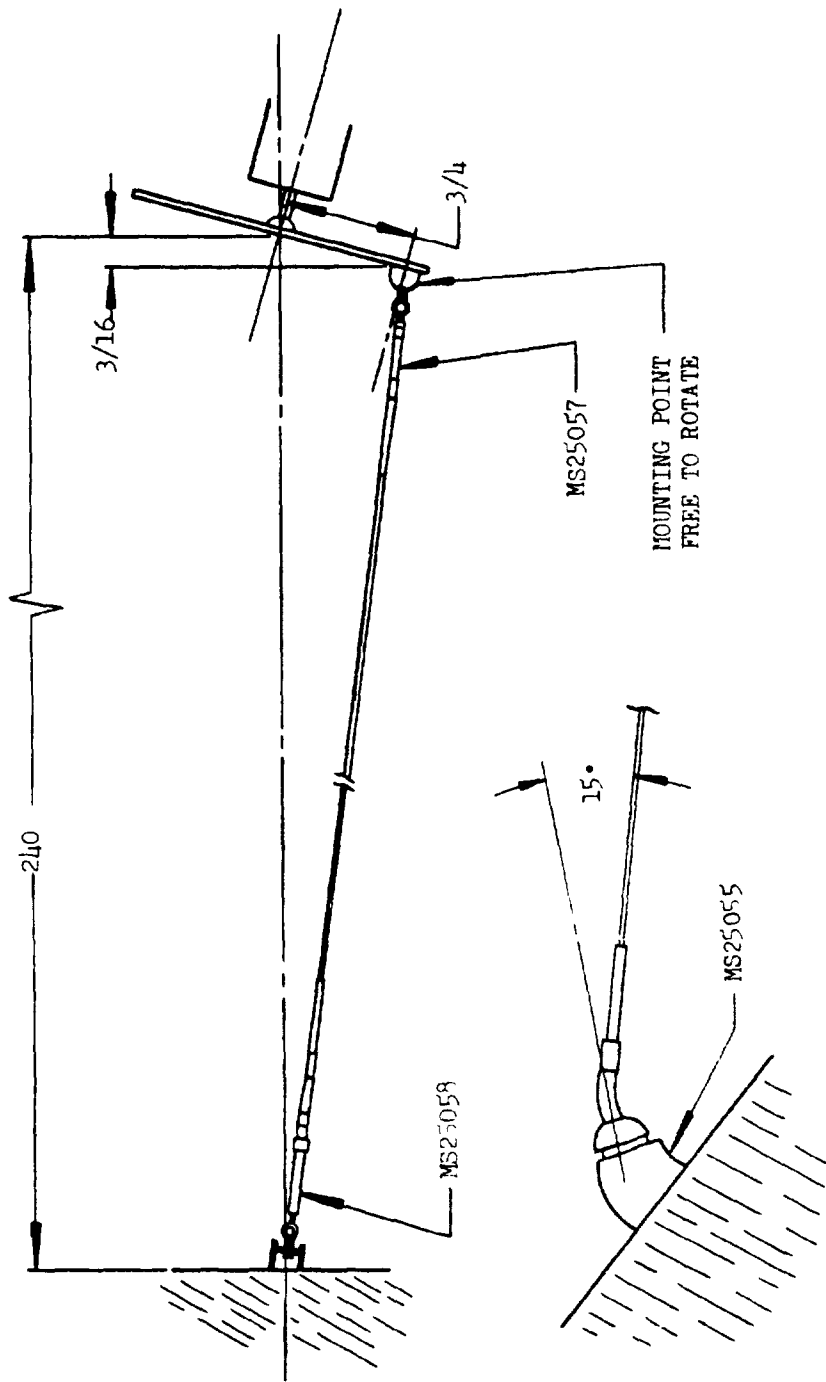
4.7.8 Accelerated life test.- The tension takeup, takeup, and elbow adapter units shall be assembled with type I wire and mounted as shown on figure 1. The wire tension shall be so adjusted that the tension takeup is at midstroke when the mounting point on the eccentric is at the midpoint of its longitudinal travel. The eccentric shall be driven at an angular velocity abruptly varying from 500 to 700 rpm at the rate of 5 cpm. The maximum single amplitude of vibration of the wire shall be 1.5 inches. After 100 hours, there shall be no evidence of undue wear or mechanical failure, and the pull required for full extension of the tension unit shall be not less than 95 percent of the pull required before this test.

4.7.9 Corrosion resistance, tension takeup, and takeup.- The tension takeup and takeup assemblies shall be assembled with a convenient length of type I wire and subjected to a continuous salt spray test in accordance with Method 811 of Fed. Test Method Std. No. 151. After 200 hours, the assemblies shall be subjected to the tension test without failure, and shall be examined for corrosion which would prevent proper functioning.

4.7.10 Static load.- The lead-through insulator, adapter, antenna support sleeve, and a 4-foot length of type I wire assembled and rigidly supported as shown on figure 2, shall be subjected to the 100-pound static load for 100 hours. There shall be no mechanical failure as a result of this test.

4.7.11 Drop.- The component shall be dropped in a random fashion from a height of at least 10 feet onto a firm, smooth, concrete surface. Components within a lot shall be dropped from varying starting orientations. In the case of the masts, the caps and screws shall be dropped individually, as well as in the assembled condition. After the drop, there shall be no evidence of mechanical or electrical failure which would prevent the components from meeting other requirements of this specification.

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DIMENSIONS IN INCHES.

FIGURE 1. Life test setup

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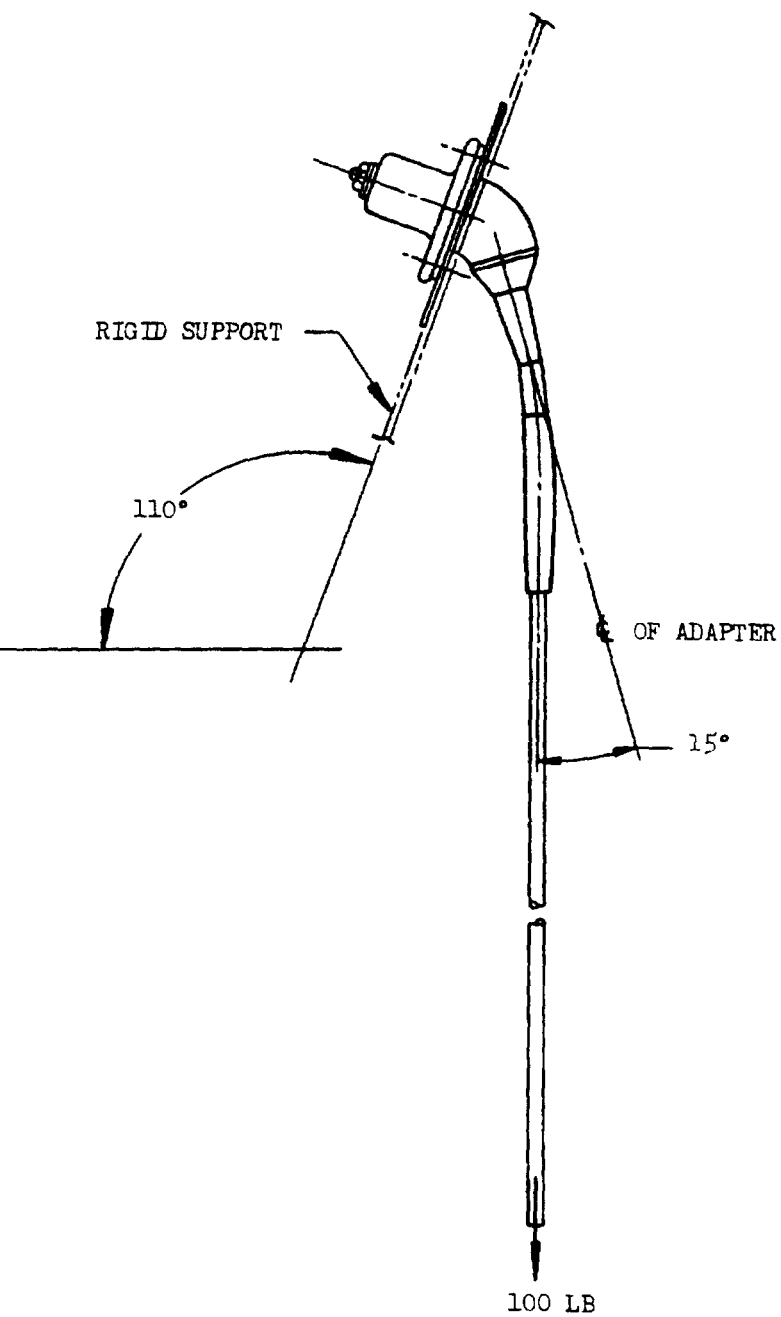


FIGURE 2. Static load test setup

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5. PREPARATION FOR DELIVERY

5.1 Packing and marking.- All components shall be packaged, packed, and marked for shipment in accordance with MIL-E-17555.

5.1.1 Each component procured shall be assembled and packaged as a unit.

5.1.2 Where several components are procured on one order, they shall be packaged and packed separately.

5.1.3 All parts containing chucks or high-voltage seals, except the takeup units, shall be packaged in accordance with Method IA-8 of MIL-E-17555. The dead-end insert assembly, strain insulator, and tee connector shall be assembled with clean rods in the sealing cavities as shown on the applicable drawing.

6. NOTES

6.1 Intended use.- The components are intended to be used with type I insulated antenna wire to make complete aircraft antenna systems insulated with respect to space, thus avoiding corona discharge under conditions of high electrical gradient and the resulting precipitation static interference.

6.2 Drawing requirements.- The attention of contractors is directed to the fact that Government contracts for equipment, whether procured directly by the Government or through another contractor, require that all drawings submitted must be in accordance with MIL-D-70327.

6.3 Ordering data.- Procurement documents should specify:

- (a) Title, number, and date of this specification.
- (b) Class of antenna components required (see 1.2).
- (c) Level of preservation, packaging, and packing required (see section 5).
- (d) Data requirements (see 3.3).
- (d) Where the preproduction inspection samples should be sent and instructions concerning the submittal of the inspection reports, if required (see 4.3).

Custodians:

Navy - Weps  
Air Force - (85)

Preparing activity:

Navy - Weps

Reviewer activity:

Navy - Weps  
Air Force - (85)

User activity:

Navy -  
Air Force -

Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DoD Standardization Documents.

## SPECIFICATION ANALYSIS SHEET

Form Approved Budget  
Bureau No. 119-0004INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity.

SPECIFICATION

MIL-A-79050(ASG) Antenna Components: Antiprecipitation Static

ORGANIZATION

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

 Direct Government Contract Subcontract

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

 YES NO

IF "YES" IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)

DATE

FOLD

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