

MIL-C-85003B(AS)
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MILITARY SPECIFICATION

CHAFF CARTRIDGE (TYPE RR-()/AL), GENERAL SPECIFICATION FOR

This specification is approved for use by the Naval Air Systems Command, Department of the Navy and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

1.1 Scope. This specification establishes the design, performance, and acceptance requirements for the Chaff Cartridge (Type RR-()/AL). The chaff (radar reflector) cartridge contains components capable of creating confusing returns to radar systems operating within specified frequency ranges.

2. APPLICABLE DOCUMENTS.

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. Unless otherwise specified, the following specifications, standards, and handbooks of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Naval Air Engineering Center, Engineering Specifications and Standards Department (ESSD) Code 93, Lakehurst, NJ 08733, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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SPECIFICATIONS

Federal

PPP-T-45	Tape, Gummed, Paper, Reinforced and Plain, for Sealing and Securing
UU-P-268	Paper, Kraft, Wrapping
PPP-F-320	Fiberboard; Corrugated and Solid Sheet Stock (Container Grade), and Cut Shapes
PPP-B-636	Box, Shipping, Fiberboard
PPP-B-640	Boxes, Fiberboard, Corrugated, Triple-Wall
QQ-S-781	Strapping, Steel, and Seals
PPP-C-1797	Cushionive Material, Resilient, Low Density, Unicellulor, Polypropylene Foam

Military

MIL-P-116	Preservation-Packaging, Methods of
MIL-B-131	Barrier Materials, Water Vaporproof, Flexible, Heat-Sealable
DoD-D-1000	Drawing, Engineering and Associated List
MIL-T-18303	Test Procedures; Preproduction, Acceptance and Life for Aircraft Electronic Equipment, Format for
MIL-C-85003/1	Chaff Cartridge (Type RR-129/AL), Specification Sheet
MIL-C-85003/2	Chaff Cartridge (Type RR-144/AL), Specification Sheet

STANDARDS

Military

MIL-STD-129	Marking Shipment and Storage
MIL-STD-130	Identification Marking of U.S. Military Property

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MIL-STD-147	Palletized Unit Loads on 40" x 48" Pallets
DoD-STD-480	Configuration Control-Engineering Changes, Deviations and Waivers
MIL-STD-794	Parts and Equipment, Procedures for Packaging and Packing of
MIL-STD-810	Environmental Test Methods
MIL-STD-831	Test Reports, Preparation of
MIL-STD-2071	Testing of Chaff Radar Cross-Section

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings, and other publications form a part of this specification to the extent specified herein.

DRAWINGS

Naval Air Systems Command

DL 1050AS126	Chaff Cartridge Assembly (Type RR-()/AL)
DL 1050AS127	Vibration Fixture, Chaff Cartridge
DL 1050AS128	Chaff Cartridge RR-()/AL; Marking, Preservation, and Packaging of

MANUALS

Naval Air Systems Command

NAVAIR 16-30ALE29-3	Technical Manual, Maintenance Instructions, Intermediate, with Illustrated Parts Breakdown; Countermeasures Chaff Dispensing Set, AN/ALE-29A, Part Numbers 8033, 8704, 11879-0001 and 11880-0001
NAVAIR 16-30ALE39-1	Technical Manual, Intermediate Maintenance with Illustrated Parts Breakdown, Countermeasures Dispensing System AN/ALE-39

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NAVAIR 16-30ALE37-1

Technical Manual, Intermediate
Maintenance Instructions with
Illustrated Parts Breakdown, Dispensing
Set, Countermeasures Chaff, AN/ALE-37A.

PUBLICATIONS

Bureau of Naval Weapons

WR-43

Preparation of Quality Assurance
Provisions

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

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. The issues of the documents which are indicated as DoD adopted shall be the issue listed in the current DoDISS and the supplement thereto, if applicable.

STANDARDS

American Society of Mechanical Engineers

ANSI Y14.5

Dimensioning and Tolerancing for
Engineering Drawings

Application for copies should be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017.

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS.

3.1 Specification sheets. The individual item requirements shall be as specified herein and in accordance with the applicable specification sheets. In the event of any conflict between requirements of this specification and the specification sheets, the latter shall govern.

3.2 First article. When specified in the contract, a sample shall be subjected to first article inspection (see 4.2, 6.2.1, and 6.3).

3.3 Chaff material. The chaff material shall be in accordance with the applicable specification sheet.

3.3.1 Dipoles. Dipoles shall meet the dimension and composition requirements of the applicable specification sheets. Dipoles composed of coated filaments shall have dc resistivity of less than 10 ohms per linear inch.

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3.3.2 Coating. When required by the applicable specification sheet, a slip coating shall be applied to the chaff material to:

- a. prevent dipole end welding and metal smear during the cutting operation.
- b. prevent cohesion between dipoles which may be caused by corrosive conditions.
- c. increase dispersion by reducing dipole-to-dipole friction.

The formulation of the slip coating shall be approved by the procuring activity prior to use as part of the first article inspection procedures or quality conformance inspection procedures if a first article is not required (see 6.2.2).

3.4 Design and construction. Each chaff cartridge (see 6.4.3), including chaff and all parts, assemblies, packing, and packaging; shall conform to all the requirements of this specification and applicable specification sheet for design, construction, and workmanship, except as otherwise specified in the contract (see 6.2.1). Configuration control shall be maintained in accordance with DoD-STD-480.

3.4.1 Nomenclature and identification marking. Nomenclature and identification marking shall be in accordance with MIL-STD-129, MIL-STD-130, and as specified herein.

3.4.2 Item definition. The chaff cartridges covered by this specification shall consist of cases loaded with chaff (reflective) components and necessary non-chaff components as specified in DL 1050AS126 and the applicable specification sheet.

3.4.3 Physical characteristics. The chaff cartridges shall be functionally compatible with the AN/ALE-29A, AN/ALE-37A, and AN/ALE-39 dispensers and the MK 131 Mod 0 and QII-1627-03 impulse cartridges. Neither the operational reliability of the dispenser nor the effectiveness of the chaff shall be degraded when the chaff cartridges are used with any of these dispensers or impulse cartridges.

3.5 Standard conditions. The following conditions shall be used to establish normal performance characteristics under standard conditions.

- | | |
|----------------|---|
| a. Temperature | Room ambient (25° ± 10°C) |
| b. Altitude | Normal Ground |
| c. Vibration | None |
| d. Humidity | Room ambient up to 90 percent relative humidity |

3.6 Service conditions. The chaff cartridges shall operate as required under any of the environmental service conditions or combinations of these

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conditions specified in MIL-STD-810 as modified herein. Tolerances shall be in accordance with the general requirements of MIL-STD-810.

3.7 Performance requirements. Unless otherwise specified herein, values set forth to establish the specified performance apply to performance under both standard and extreme service conditions. When reduced performance under extreme conditions is acceptable, tolerances or values setting forth acceptable variations from the performance under standard conditions will be specified herein.

3.7.1 Performance characteristics. Performance characteristics shall be in accordance with MIL-STD-2071 and the applicable specification sheet, when the chaff cartridges are tested in accordance with the requirements specified therein.

3.8 Detail requirements. The chaff cartridge contents shall meet the design, construction, and physical requirements contained herein. Drawings shall be interpreted in accordance with DoD-D-1000 and ANSI Y-14.5.

3.8.1 Components. Each chaff cartridge shall consist of an outer case, cap, squib retainer, piston, dividers, and chaff as specified in DL 1050AS126 and the applicable specification sheet.

3.8.2 Marking. The cap of each cartridge shall be marked in accordance with the requirements of MIL-STD-130, DL 1050AS126 and the applicable specification sheet. The cap and squib retainer shall be the same color as specified in the applicable specification sheet.

3.8.3 Assembly. The chaff cartridge shall be assembled in accordance with the requirements of the DL 1050AS126. Chaff cuts (see 6.4.1) shall be positioned within the cartridge as specified in applicable specification sheet. Chaff cuts shall be separated from each other with dividers constructed from 10-18 point tag board as specified in 3.8.1. Additional dividers shall, if required, be placed between the piston and adjacent chaff cut to ensure a tight assembled cartridge. Cumulative length tolerance of all chaff cuts within a cartridge shall be not greater than the difference between the length of the cartridge case (less end tab thickness) and the lengths of all non-chaff components within the case.

3.8.4 Dipole packing density. Unless otherwise specified in the specification sheet, the dipole packing density shall be 45 ± 4.5 percent of a theoretical hexagonal array. (See 6.5.)

3.8.5 Weight. The minimum gross weight of a chaff cartridge shall be as specified in the applicable specification sheet.

3.9 Workmanship. Workmanship shall be in accordance with DL 1050AS126 and this specification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise

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specified in the contract or purchase order, the contractor 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 supplies and services conform to prescribed requirements. The Government will conduct all flight tests.

4.1.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First Article Inspections (see 4.2)
- b. Initial Production Inspection (see 4.3)
- c. Quality Conformance Inspections (see 4.4)

4.1.2 Classification of characteristics. The characteristics verified by the tests and examinations described herein are classified as major or minor in accordance with WR-43. Test and examinations that verify major characteristics are identified by the symbol (M). Test and examinations described which are not annotated with a classification code are classified minor.

4.1.3 Lot information. A lot shall consist of a group of items of a specific configuration; produced within the same time frame at one location; by the same production line and production technique; and submitted for acceptance, inspection, or use at one time.

4.2 First article inspection. First article inspection shall be conducted by the contractor on 120 chaff cartridges representative of the production units to be supplied under the contract. These chaff cartridges shall be inspected according to the approved first article inspection procedure (see 4.5). The Government inspector and the procuring activity shall be advised when inspections are to be conducted so that a representative may be designated to witness or supervise the inspections when so desired. Contractors not having adequate facilities to conduct all required inspections shall obtain the services of a commercial testing laboratory acceptable to the Government. No first article inspections shall be conducted prior to approval of the first article test procedures by the procuring activity. First article samples shall not be submitted for functional (Government) tests until in-house tests have been conducted in accordance with the approved test procedures, and the test results have been approved by the procuring activity.

4.2.1 First article inspection data. The contractor shall prepare and make available a first article inspection report in accordance with MIL-STD-831 and the contract which includes all data collected during first article inspections (see 6.2.2).

4.2.2 Scope of inspections. At least 120 chaff cartridges shall be selected for first article inspection to verify that the chaff cartridges meet all the requirements of this specification, the specification sheet, and the contract (see table I). The tests on each group shall be ran in the order shown in table I. The group number shall be clearly marked on each cartridge before starting first article tests.

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TABLE I. First article inspections - schedule and sequence.

Inspection	Requirement Paragraph	Inspection Paragraph	Chaff Cartridge Group				
			1 (30 ea)	2 (20 ea)	3 (20 ea)	4 (20 ea)	5 (30 ea)
Chaff Material	3.3,	4.6	X	X	X	X	X
Chaff Cartridge	3.4	4.7	X	X	X	X	X
Push-Out Test	3.8.4	4.8.1	X				
Weight	3.8.5	4.8.2	X	X	X	X	X
High Temperature	3.6	4.10.1		X	X	X	
Low Temperature	3.6	4.10.2			X	X	
Temperature Shock	3.6	4.10.3				X	
Humidity	3.6	4.10.4				X	
Shock	3.6	4.10.5					X
Vibration	3.6	4.10.6					X
Test Firing (Ground)	3.7	4.9		X	X		
Functional	3.7.1	4.11	X			X	X

4.2.3 First article approval. Approval of the first article sample shall be by the procuring activity upon satisfactory completion of all inspections. No production chaff cartridges shall be delivered prior to the approval of the first article sample.

4.2.4 Production chaff cartridges. Chaff cartridges supplied under the contract shall in all respects; including design, construction, workmanship, performance, and quality be equal to the approved first article sample. Each chaff cartridge shall be capable of successfully passing the same tests as imposed on the first article sample. Evidence of noncompliance with the above shall constitute cause for rejection, and it shall be the obligation of the contractor to make necessary corrections as approved by the procuring activity.

4.3 Initial production inspections. Ninety of the first 1000 production chaff cartridges shall be selected and sent at the contractor's expense to a designated Government laboratory for inspections. These samples shall be selected by the Government representative after they have successfully passed all individual inspections. No other inspections shall be conducted on the samples prior to starting the initial production inspections. The first article samples shall not be selected for this inspection. Inspection procedures shall include, but not be restricted to, the procedures of 4.6 through 4.9.

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4.3.1 Scope of inspections. The samples shall be subjected to any and all inspections the procuring activity deems necessary to assure that the production equipment is equal to the previously approved first article samples in design, construction, workmanship, performance, and quality; and that they meet all requirements specified herein or in the contract.

4.3.2 Accessory material. In addition to the complete sample submitted for initial production inspections, the contractor shall also submit such accessory material and include data necessary to evaluate the sample in accordance with this specification and the contract.

4.3.3 Initial production sample approval. Approval of the initial production sample shall be by the procuring activity upon satisfactory completion of all inspections. Any design, material, or performance defect made evident during these inspections shall be corrected by the contractor to the satisfaction of the procuring activity. Failure of the initial production sample to pass any of the inspections shall be cause for deliveries under the contract to cease until proper corrective action is approved and accomplished.

4.4 Quality conformance inspections. The contractor shall furnish all samples and, with the exception of Government performed flight tests, shall be responsible for accomplishing the quality conformance inspections. All examinations and tests shall be under the supervision of the Government representative. Contractors not having adequate facilities for conducting all required inspections shall engage the services of a commercial testing laboratory acceptable to the procuring activity. The contractor shall make available inspection reports showing quantitative results for all applicable quality conformance inspections (see 6.2.2). Such reports shall be signed by an authorized representative of the contractor or laboratory, as applicable. Acceptance or approval of material during the course of manufacture shall not be construed as a guarantee of the acceptance of the finished product. Quality conformance inspections shall consist of the following:

- a. Individual Inspections (see 4.4.1)
- b. Sampling Inspections (see 4.4.2)
- c. Special Inspections (see 4.4.3)

4.4.1 Individual inspections. Individual inspections are those inspections conducted on each chaff cartridge. Individual inspections are specified in table II. Failure to pass any of these inspections shall be cause for rejection of the chaff cartridge.

TABLE II. Individual inspections.

Inspection	Requirement Paragraph	Inspection Paragraph
Chaff Cartridge Components	3.8.1	4.7.1
Chaff Cartridge Marking	3.8.2	4.7.2
Packaging and Packing	5.2, 5.3	4.7.3

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4.4.2 Sampling inspections. Chaff cartridges selected for sampling inspections shall first have passed the individual inspections. Chaff cartridges shall be selected for sampling inspections by the Government representative in accordance with the schedule contained herein.

4.4.2.1 Scope of inspections. Sampling inspections shall include examinations and tests for verification of manufacturing and performance requirements.

4.4.2.1.1 Sampling inspection for verification of manufacturing processes. Sampling inspections for verification of the manufacturing processes shall include, as a minimum, those in-process inspections specified in 4.6, 4.7, and 4.8.

4.4.2.1.2 Sampling inspection for verification of performance requirements.

4.4.2.1.2.1 Sampling inspection for verification of performance requirements (ground test firings). Sampling inspections for verifications of performance requirements (ground test firings) shall be conducted on chaff cartridges after low temperature exposure (see 4.10.2).

4.4.2.1.2.2 Sampling inspections for verification of performance requirements (Government performed flight test). Sampling inspections for verification of performance requirements (flight tests) shall be conducted on chaff cartridges to demonstrate conformance to the requirements of 4.11 and the applicable specification sheet when conducted in accordance with the procedures of MIL-STD-2071. Sampling shall be performed to provide 60 chaff cartridges from each delivery lot (see 6.4.7) for inspection.

4.4.3 Special inspections. Special inspections shall be conducted on a quantity of chaff cartridges for the purpose of checking the effect of any design or material change on performance, and to assure adequate quality control. The chaff cartridges selected for special inspections may be selected from those previously subjected to sampling inspections.

4.4.3.1 Special inspection schedule. Selection of chaff cartridges or assemblies for special inspections shall be made as follows:

- a. On early chaff cartridges after an engineering or major change.
- b. Whenever failure reports or other information indicate that additional inspections are required. (This will be determined by the procuring activity.)

4.4.3.2 Scope of inspections. Special inspections shall consist of such examinations and tests as required by the procuring activity (see 6.2.2). Inspection procedures previously approved for the first article inspection shall be used where applicable. When not applicable, the contractor shall prepare an inspection procedure and make it available to the procuring activity prior to conducting the inspections (see 6.2.2).

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4.4.4 Chaff cartridge failure. Should a failure occur during either the sampling or special inspections, the following action shall be taken:

- a. Determine the cause of failure.
- b. Determine if the failure is an isolated case or design defect.
- c. Prepare and make available, for procuring activity approval, the proposed corrective action intended to reduce the possibility of the same failure(s) occurring in future inspections (see 6.2.2.).
- d. Where practical, include an inspection in the individual inspections to check all equipment for this requirement until reasonable assurance is obtained that the defect has been satisfactorily corrected.

4.5 Inspection procedures. The procedures used for conducting first article and quality conformance inspections shall be prepared by the contractor and made available to the procuring activity (see 6.2.2). The right is reserved by the procuring activity or the Government inspector to modify the inspections or require any additional inspections deemed necessary to determine compliance with the requirements of this specification and the contract (see 6.2.1). MIL-T-18303 shall be used as a guide for preparation of inspection procedures. When approved inspection procedures are available from previous contracts, such procedures may be used provided their use is acceptable to the procuring activity; however, the right is reserved by the procuring activity to require modification of such procedures, including additional inspections, when deemed necessary (see 6.2.1).

4.6 Inspection of materials.

4.6.1 Chaff material inspection. Examinations of the materials receiving inspection report for each receiving inspection lot (see 6.4.8), and on-line inspection of chaff-hank (see 6.4.6) and chaff-cut lots (see 6.4.5) as defined herein shall be made to adequately demonstrate compliance with the requirements of this specification and the applicable specification sheet.

4.6.1.1 Chaff-hank inspections.

4.6.1.1.1 Dipole characteristics inspection. Fifty fibers or strands from each chaff-hank lot shall be inspected for the weight, dimension, and coating requirements of this specification and the applicable specification sheet. If more than 15 fibers or strands do not meet the specified requirements, the lot shall be rejected, and production stopped until corrective action has been taken. One chaff hank (see 6.4.2) from each chaff hank lot may be weighted, as a unit, in lieu of 50 fibers to verify the in-process weight requirement.

4.6.1.1.2 Secondary coating (M101). The formulation of the secondary coating shall be verified by means of appropriate chemical analysis. Two sample hanks (1 pound minimum) shall be randomly selected from each chaff-hank

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lot for this inspection. Samples failing to meet the approved coating formulation shall be cause for rejection of the chaff-hank lot.

4.6.1.2 Chaff-cut inspection.

4.6.1.2.1 Dipole length inspection (M102). Twenty dipoles from each chaff cut (see 6.4.1) shall be selected at random from each chaff-cut lot (specified herein). Each of these dipoles shall be measured, and its length recorded. If more than four dipoles from any cut, or more than 15 percent of the total sample are found to be out of the specified tolerance, that lot of chaff-cuts shall be rejected, and production stopped until corrective action has been taken. The inspection shall be repeated on the first chaff cuts processed after the corrective action has been taken to assure compliance with specification requirements.

4.7 Visual inspections.

4.7.1 Chaff cartridge components. Verification of the presence of all component parts in accordance with DL 1050AS126 and the applicable detailed specification sheet shall be made through visual inspection.

4.7.2 Chaff cartridge marking. Visual inspection shall be made to confirm compliance with 3.8.2 herein.

4.7.3 Packing and packaging. Visual examination shall be made of the packing, packaging, and carton markings to assure compliance with Section 5 of this specification. Any discrepancies from the specification shall be cause for rejection.

4.8 Chaff cartridge inspections.

4.8.1 Chaff push-out test (M103). Five samples from the first article lot and three samples from each production lot shall be selected at random for the push-out force test. Tests shall be conducted at standard atmospheric conditions using a standard load cell; however, if a standard load cell is not available, a calibrated hydraulic, pneumatic, or universal test cell capable of functioning as specified herein may be used. The squib retainer, piston, and fiber divider shall be removed from each sample and the sample placed on the load cell fixture with the end cap facing the load cell. A 1 inch (nominal) diameter ram shall be placed between the end cap and load cell. Force shall be applied to the end cap at a rate not exceeding 1 inch per minute, and shall be applied continuously until all chaff cuts within the cartridge have initiated movement concurrently. The maximum reading obtained to the point of concurrent movement of the chaff cuts shall be recorded as the push-out force. Each sample shall "initiate" movement through the cartridge tube when a force to be not greater than 15 pounds (10.48 p.s.i.) is applied to the end cap. Additionally, the average of forces exerted on all samples from any lot shall be not greater than 10 pounds (6.99 p.s.i.). Failure of any sample to meet the 15-pound requirement or failure of the average of samples to meet the 10-pound requirement shall be cause for rejection of the unit(s), and shall be cause for production to cease until corrective action is taken. Following the test, the removed cartridge components may be replaced and the cartridges returned to the production lot, provided the cartridge case is not damaged during performance of the test.

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4.8.2 Weight (M104). All of the first article cartridges shall be weighed. One hundred samples from the initial production units and ten samples from each 1800 production cartridges, as they are produced, shall be selected at random for the weight test. All the weights shall be recorded (see 3.8.5).

4.9 Test firing. Ground test firings shall be conducted on test sample sizes selected from table III after temperature exposures as shown in 4.9.1, 4.9.2, or 4.9.3. The test dispenser block, as a minimum, shall be subjected to the same temperature exposure as the sample cartridges. As many cartridges as possible should be installed in the dispenser during the temperature exposure. Test firings shall be conducted within five minutes of removal from the temperature chamber. Following the test firings, the chaff cartridge tubes shall be inspected for longitudinal cracks and transverse breakage of the tube material. A failure is as specified in 4.9.4.

4.9.1 First article test firings. First article inspection ground test firings shall be conducted on the 20 Group 2 chaff cartridges following at least a four hour high temperature exposure and the 20 Group 3 chaff cartridges following at least a four hour low temperature exposure. If larger test sample sizes (see table III) are chosen, the quantities shall be in addition to those contained in Groups 1, 4, and 5.

4.9.2 Initial production test firings. Initial production inspection ground test firing shall be conducted on a sample size chosen from table III following at least a four hour low temperature exposure. Initial production test firing shall be conducted on cartridges manufactured with production lot tubes.

4.9.3 Quality conformance test firings. Quality conformance inspection test firings shall be the test of 4.9.2 repeated on cartridges utilizing samples selected from each incoming production lot of chaff tubes (cases PN 1050AS126-1) prior to the use of these tubes in the manufacture of deliverable chaff cartridge assemblies.

4.9.4 Test firing failures. Any deployment of chaff tube or sections of the tube with the chaff such that the chaff would be prevented from dispensing or disbursing in its intended manner.

TABLE III. Acceptance criteria

Test Sample Size	Accept If Not More Than	Reject If
20	0 failures	1 or more failures
30	1 failure	2 or more failures
50	2 failures	3 or more failures
80	3 failures	4 or more failures

4.10 Environmental tests. The simulated environmental tests specified below shall be performed in the order presented herein. Tolerances for these tests shall be in accordance with MIL-STD-810 unless otherwise specified herein. The chaff cartridges shall not show signs of appreciable damage or

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degradation and shall meet all dimensional and performance requirements after exposure.

4.10.1 High temperature. The chaff cartridge shall be subjected to a high temperature test in accordance with MIL-STD-810, Method 501.1, Procedure I, including Method 501.1 paragraph entitled, Summary. The hot soak time prior to test firing shall be at least four hours.

4.10.2 Low temperature. The chaff cartridges shall be subjected to a low temperature test in accordance with MIL-STD-810, Method 502.1, Procedure I, including Method 502.1 paragraph entitled, Summary. The low temperature shall be limited to -65°F (-54°C), and cold soak time prior to test firing shall be at least four hours.

4.10.3 Temperature shock. The chaff cartridges shall be subjected to a temperature shock test in accordance with MIL-STD-810, Method 503.1, Procedure I, including Method 503.1 paragraph entitled, Summary.

4.10.4 Humidity. The chaff cartridges shall be subjected to a humidity test in accordance with MIL-STD-810, Method 507.1, Procedure I, including Method 507.1 paragraph entitled, Summary.

4.10.5 Shock. The chaff cartridges shall be subjected to a shock test in accordance with MIL-STD-810, Method 516.2, Procedure I, including Method 516.2 paragraph entitled, Summary.

4.10.5.1 Shock pulse. The pulse shape shall be as specified in figure 516.2-1 of MIL-STD-810 except that an electrodynamic vibration machine may be used, and if so, the tolerances of the specified pulse may be modified to allow amplitude variation up to ± 20 percent of maximum amplitude prior to the initiation of the sawtooth ramp. All other tolerances apply. (The change in tolerance allows for the normal necessary pre- and post-pulses for electrodynamic machine shock excitation.)

4.10.5.2 Shock fixture. The shock fixture shall conform to DL 1050AS127. The control accelerometer location for each axis shall be as specified in DL 1050AS127.

4.10.6 Vibration. The chaff cartridges shall be subjected to a vibration test in accordance with MIL-STD-810, Method 514.2, Procedure IIA, including Method 514.2 paragraph entitled, Summary; except as follows:

- a. The chaff cartridges must withstand both a Low Level Adequacy Test and a Critical Design Test.
- b. Testing shall be performed in all three axis.
- c. The same fixture used for the shock test shall be used for the vibration test.
- d. The fixture shall be oriented in the flight-up position.
- e. The control accelerometer location for each axis shall be as specified in DL 1050AS127.

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4.10.6.1 Vibration test sequence.

- a. Low Level Adequacy Vibration in accordance with figure 1 for 15 minutes in each axis.
- b. Critical Design Vibration in accordance with figure 2 for 10 minutes in each axis. (If the vibration machine cannot attain the required levels, the modified critical design vibration test contained in 4.10.6.2 may be performed upon approval by the procuring activity.)
- c. Repeat step a.

4.10.6.2 Modified critical design vibration test. To perform the modified critical design vibration test, first vibrate the test cartridges at the highest possible level for five minutes using the same spectrum shape and frequency range as specified. The overall level shall in no case be reduced more than 6 dB below that required in the critical design vibration test. Second, divide the frequency spectrum into not more than three bands as follows: The first band should be from 20 Hz to the highest frequency at which the vibration system will vibrate the test cartridges at the required g^2/Hz level, but in no case should be less than 500 Hz. The second band should be from the highest frequency of the first band to the highest frequency at which the vibration system will vibrate the test cartridges at the required g^2/Hz level. If possible, the second band shall extend to 2000 Hz so that a third band is not required. However, if required, the third band shall cover the remainder of the frequency spectrum up to 2000 Hz. The test cartridges shall be vibrated in each frequency band and each axis for five minutes. The chaff cartridges shall be carefully inspected after each phase of the modified test procedure.

4.10.6.3 Preparing the chaff cartridges for vibration and shock. In addition to the vibration/shock fixture, an ALE-29A dispenser block and MX-7721/ALE-29A housing are required to perform the vibration/shock tests. The full complement (30 cartridges) shall be loaded into the dispenser block, and the block secured to the housing. The housing must be secured to the vibration/shock fixture prior to securing the fixture to the vibration or shock machine.

4.11 Functional tests. All functional flight tests will be conducted by the Government in accordance with MIL-STD-2071, the applicable specification sheet, and as follows:

4.11.1 Flight tests. The Government performed flight tests will be conducted on first article, initial production, quality conformance, and special test units to verify performance capability. Tests will include Radar Cross-Section (RCS) measurements in accordance with MIL-STD-2071 and as modified herein.

4.11.1.1 Aircraft. Flight tests will be conducted by the Government using an aircraft type which has previously been used to provide data to establish the minimum performance requirements specified in MIL-STD-2071.

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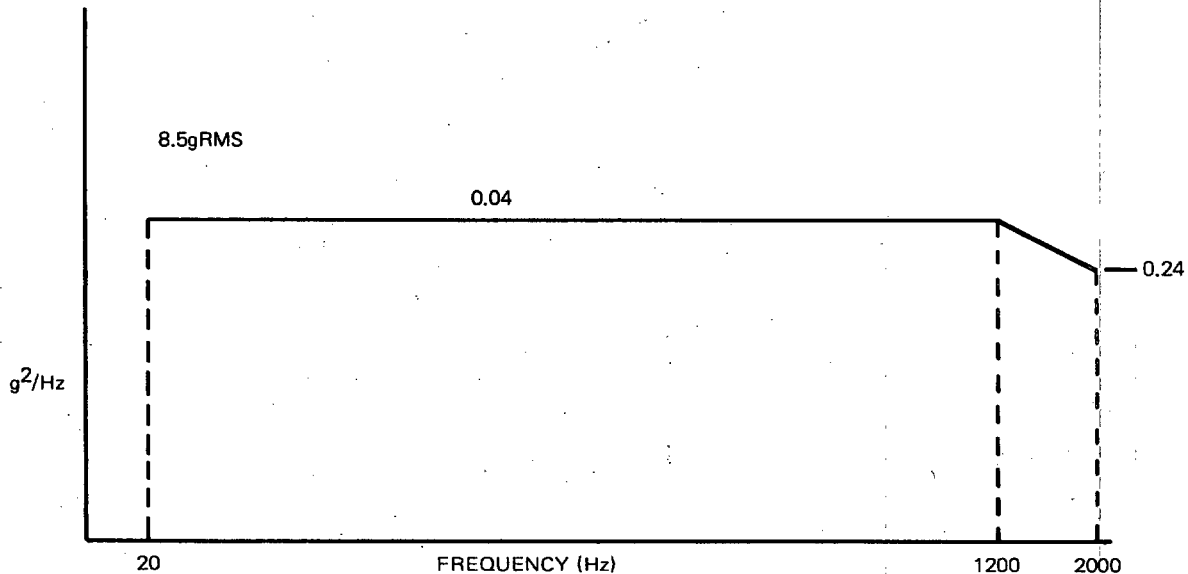


FIGURE 1. Low-level adequacy vibration spectrum for chaff cartridges

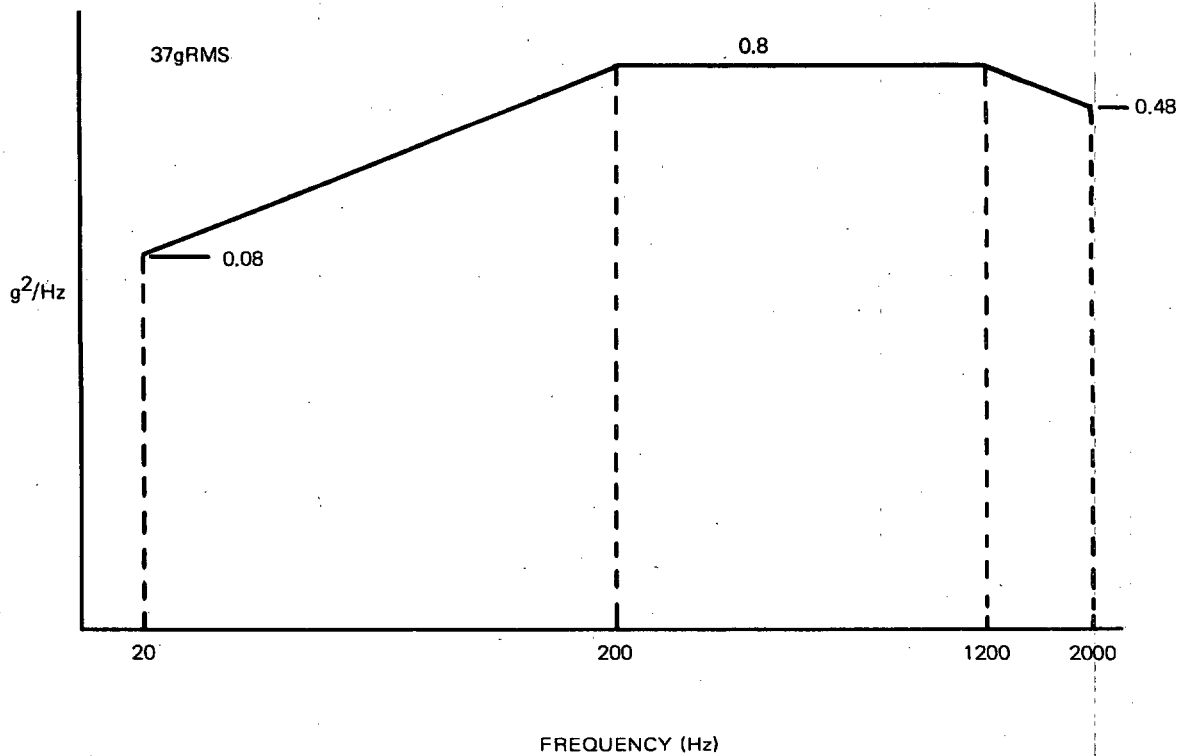


FIGURE 2. Critical design vibration spectrum for chaff cartridges

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4.11.1.2 Dispenser. The AN/ALE-39 dispenser should be used for all RR-()/AL flight tests, however, if an ALE-39 is not available, an ALE-29A or ALE-37A may be substituted. All tests will be conducted at a dispensing rate of one unit every 2 seconds.

4.11.1.3 Loading. The RR-()/AL chaff cartridges will be loaded in the AN/ALE-39 dispenser starting with the starboard assembly. The order of loading will be in accordance with the firing order as outlined in NAVAIR 16-30ALE39-1, NAVAIR 16-30ALE-37-1 or NAVAIR 16-30ALE29A-3. This procedure will then be repeated for the port assembly.

4.11.1.4 Radar. The RR-()/AL chaff will be evaluated using a M-33 radar equipped in accordance with the applicable specification sheet (see 3.1).

4.11.1.5 Sampling. The test objective will be to deploy eight cartridges per run and to conduct as many runs as required to deploy all of the test units that are loaded into the dispenser. Data will be collected in all 15 gates for all the test samples.

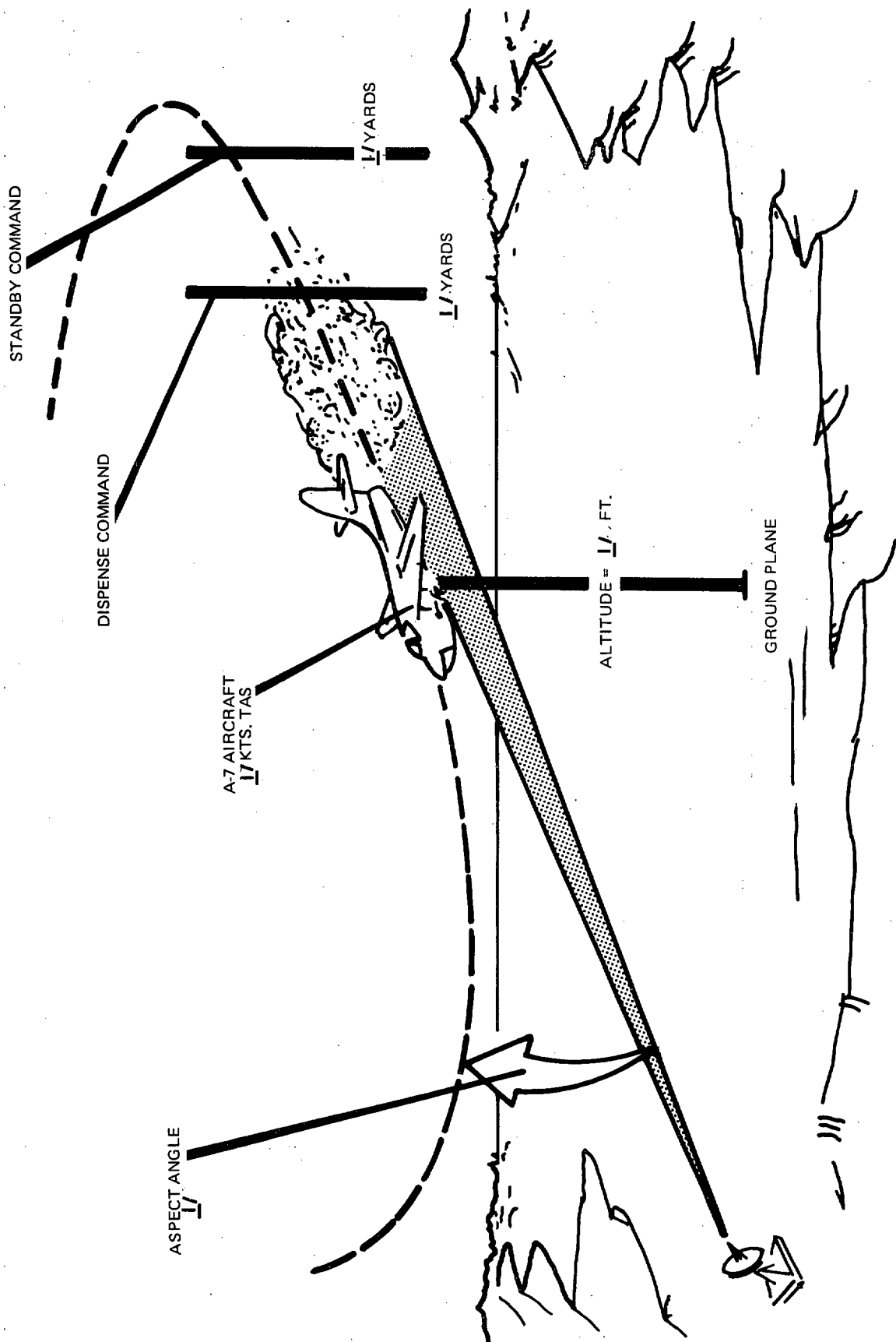
4.11.1.6 Data processing of pulse-to-pulse RCS data. The pulse-to-pulse RCS data will be processed as specified in MIL-STD-2071 to provide: shadow graphs; first level statistics, including summary sheets; and second level statistics for basic data, corrections for aspect angle, and corrections for aspect angle and antenna gain. A printout will be provided to show range, azimuth angle, elevation angle, and aspect angle for all data runs.

4.11.2 Radar cross-section procedures.

4.11.2.1 Aircraft operation. The aircraft will fly a "racetrack" course as specified in figure 3. The aircraft will follow the station TACAN to fly a course directly over the test radar. Chaff will be dispensed on the inbound radial. Upon initial radar acquisition, the aircraft will be directed to maximum range, then brought in for each run.

4.11.2.2 Data gathering. The test radar will track the aircraft during the entire radial inbound run. Provisions will be made to prevent breaklock by installing a radar beacon or Luneberg lens on the aircraft. Areas of old chaff inadvertently crossed, or segments of runs in which the radar broke lock on the aircraft will be identified using the shadow graph, and rejected as invalid data. Data gathered where the combination of aspect angle and range makes correction of RCS values questionable will be identified and rejected as invalid data. The range in yards divided by the sine of the aspect angle will be equal to or greater than specified in applicable specification sheet for acceptable data in gates 12 through 15. As depicted in figure 3, a standby and dispense command will be given at a range specified in the applicable specification sheet. Data recording will commence at the standby command and will continue for 5 seconds after termination of chaff dispensing. If old chaff creates an interference problem, a delayed start will be acceptable. The delayed start, however, may result in a short run and fewer than eight units may be deployed. Gate number 2 on the RCS processing equipment will track the aircraft and RCS data will be collected from gates 1 through 15 which will be spaced the number of nanoseconds in time specified in the applicable specification sheet. A full scale value specified in the applicable specification sheet will be used (see 3.1).

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1/ Refer to applicable specification sheet for flight profile data.

FIGURE 3. Flight profile for testing of the RR-()/AL Chaff Cartridge.

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4.11.2.3 Data evaluation. Data will be evaluated to determine the presence of at least nine gates of pulse-to-pulse data for each chaff unit meeting the requirements of the procedures for collecting data on chaff immediately behind the aircraft, and the requirements for aspect angle as specified in MIL-STD-2071. The shadow graph will be examined to ensure that at least eight gates of data for each unit meet the requirements for valid data as stated in 4.11.2.2 above. Poor radar tracking in angle as shown by the shadow graph will invalidate the data that would otherwise meet the requirements of 4.11.2.2 above. The valid data as shown by the shadow graphs will be identified for further data processing. The test data will be invalid for any chaff unit where less than nine gates contain valid RCS data.

4.11.2.4 Data processing. Data will be processed to obtain RCS values of dispensed chaff in the radar resolution cells the number of feet behind the aircraft specified in the applicable specification sheet. Processing will be accomplished in accordance with MIL-STD-2071 and provide the outputs specified in 4.11.1.6 herein. The data will be normalized to 10° aspect angle and 0° antenna boresight gain. The data will be processed to provide average RCS values and the weighted average of the number of consecutive gates specified in applicable specification sheets.

4.11.2.4.1 Data selection. A technique of using a running average of the number of consecutive pulse-to-pulse RCS values specified in applicable specification sheets will be used to define the data to be processed for each RR-()/AL chaff cartridge in each of the 12 sample gates. The center of the number of consecutive pulses specified in applicable specification sheets at which a maximum average is obtained will be the center of the data to be processed for the chaff unit and sample gate concerned. The procedure for selecting the data to be processed is specified in MIL-STD-2071.

4.11.2.4.2 Calibration check. RCS measurement of a standard calibration sphere will be made prior to any chaff measurements. The sphere RCS data will be compared to the theoretical RCS of the sphere, and the calibration constant (ΔK) for the processor will be set to provide the measured sphere data as near as possible to the theoretical value of the sphere RCS. The corrected value of ΔK will be used in the first and second level data processing.

4.11.2.4.3 Correction factors. Correction factors will be in accordance with applicable specification sheet.

4.11.3 Pass/fail criteria. The RR-()/AL Chaff Cartridge will meet the requirements of 4.11.3.1.

4.11.3.1 Radar cross-section (RCS). The average of the pulse-to-pulse RCS values as measured the number of feet specified in applicable specification sheet behind the aircraft will meet or exceed the number of square meters specified in applicable specification sheet per gate for any unit to be acceptable. This value will be achieved when the data are corrected to 10° aspect angle and boresight antenna gain. Additionally, the average of 10 or more units of chaff must be equal or be greater than the number of square meters specified in the applicable specification sheet per gate for the conditions specified above. Only the units passing the individual chaff unit RCS Requirement will be used to compute the average of 10 or more units.

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5. PACKAGING

5.1 General. All major units and parts of the equipment shall be preserved, packaged, packed, and marked for the level of shipment specified in the contract or purchase order (see 6.2.1) in accordance with MIL-STD-794 and as specified herein. Unless otherwise specified in the procurement document, the method of preservation-packaging shall be Method I, Submethod IA-15 in accordance with MIL-P-116 and this specification (see 6.2.1).

5.2 Detailed assembly in cartons. Thirty chaff cartridges shall be initially packed in a fiberboard box in accordance with the requirements of DL 1050AS128. Each cartridge shall be separated by filler material conforming to PPP-F-320 and an end pad material conforming to PPP-C-1797. The filler and pad material shall be such as to prevent the carton contents from being crushed or deformed during handling or storage.

5.3 Carton details. The initial carton shall be a style RSC (regular slotted carton), type CF, class domestic, variety SW, grade 200 container conforming to PPP-B-636 and DL 1050AS128. The bottom longitudinal closure of the carton shall be completed by using a suitable length of filament reinforced tape, Type I or II conforming to PPP-T-45, with a minimum width of 3 inches. The four end joints formed by the flaps shall be sealed with 60 pound Kraft paper tape with a minimum width of 3 inches. The top closure shall be completed after the carton is filled by using a suitable length of filament reinforced tape, Type I or II conforming to PPP-T-45, with a minimum width of 3 inches. A 6 inch length of this tape shall be left free at one end of the tape and folded back and sealed to itself for a length of 3 inches to provide a handle for grasping to use the tape as a ripcord in unsealing the top longitudinal flaps. The four top end joints shall be sealed with 60 pound Kraft paper tape with a minimum width of 3 inches. Cartons shall conform to the test requirements specified herein.

5.3.1 Barrier material. The initial folding box containing chaff cartridges shall be first enclosed in a one-piece wrapping of water vaporproof, oil resistant barrier material, Class 1, conforming to MIL-B-131. The barrier material shall be sealed by the application of heat as specified in MIL-B-131.

5.4 Packaging details.

5.4.1 Interior packaging. All interior cartons shall be packaged in accordance with MIL-P-116 and DL 1050AS128.

5.4.2 Exterior packaging. Consignments shall be prepared for either domestic or overseas shipments as specified by the procuring activity.

5.4.3 Outer carton. Eight inner cartons, shall be packed in an exterior fiberboard box, Class 2, style E conforming to PPP-B-640 and DL 1050AS128. The exterior dimensions of this box shall be not greater than 2 feet in width, depth, and height. A case liner composed of Kraft paper in accordance with UU-P-268 shall be used.

5.4.4 Marking. The inner cartons, barrier material, and outer carton shall be permanently stamped in waterproof, petroleum resistant ink as specified in MIL-STD-129 and DL 1050AS128.

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5.5 Palletization. Eight of the outer cartons shall be palletized for shipment in accordance with MIL-STD-147, Load Type I, and as detailed in figure 4 herein. Galvanized strapping in accordance with QQ-S-781, Class 1, Type I or IV, Heavy Duty, Finish B, Grade 2; 0.75 inch wide x 0.025 inch thick shall be used. Seals shall be compatible with the above strapping and shall conform with the requirements of QQ-S-781, Type D, Class H, Finish B, Grade 2. Courses shall be interlocked as detailed in figure 4, and equal amounts of overhang of the payload on the pallet shall be provided. Storage aids as specified in MIL-STD-147 may be used to provide a stable load.

6. NOTES

6.1 Intended use. The RR-()/AL chaff cartridge is intended for use with the AN/ALE-29A, -37A, or -39 chaff dispensers.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Chaff cartridge type (see Item description of applicable specification sheet)
- c. Levels of preservation - packaging, packing and marking required (see Section 5)
- d. If design, construction or workmanship are to be other than specified in specification (see 3.4)
- e. If first article is required (see 3.2, 6.3).
- f. If test procedures are to be expanded or modified (see 4.5).

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below will be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n) (2) are invoked and the DD Form 1423 is not used, the data specified below will be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraphs.

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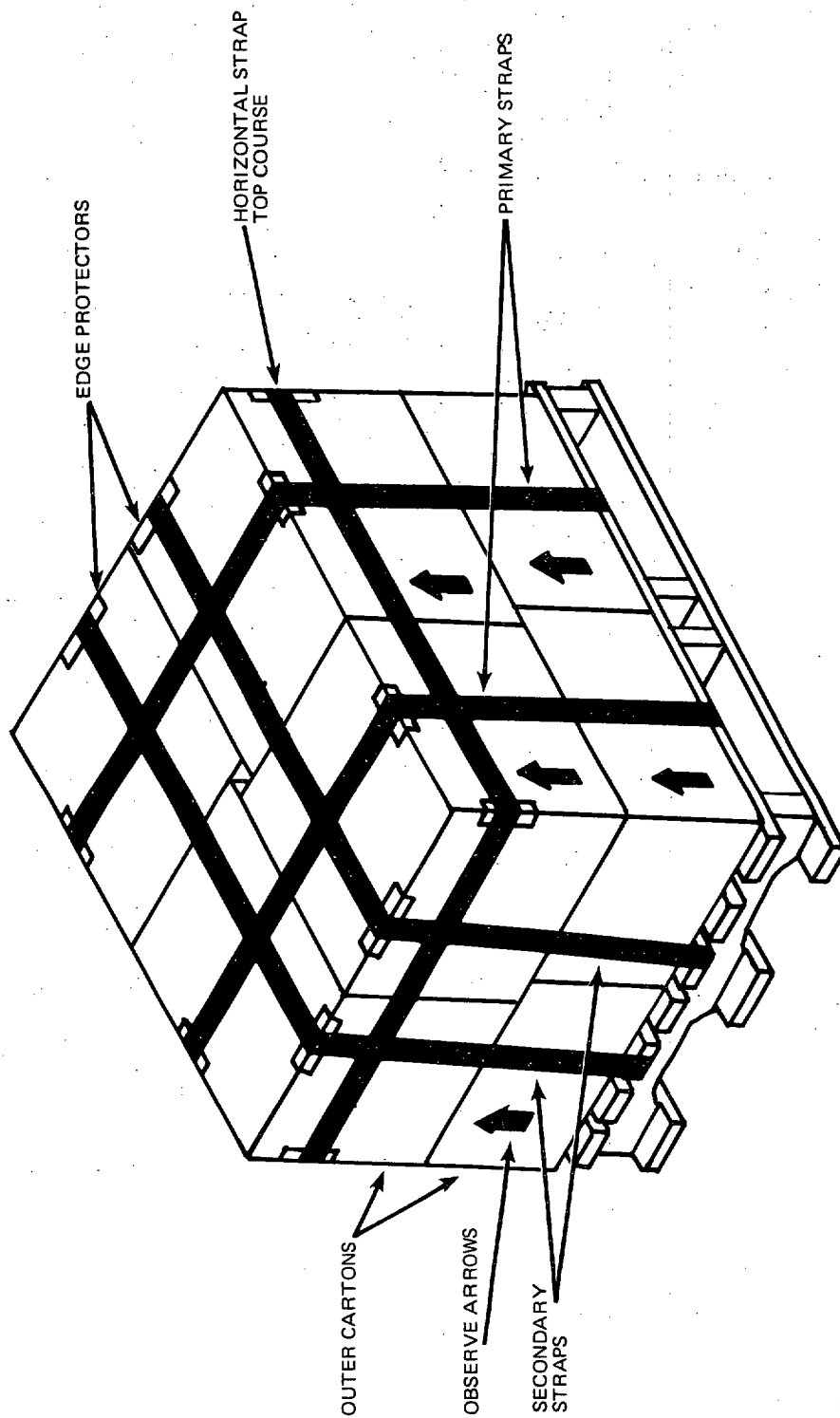


FIGURE 4. Palletizing for overseas shipment of chaff cartridges.

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Paragraph no.	Data requirement title	Applicable DID no.	Option
3.3.2, 4.5	Procedure, First Article Inspection	DI-T-4901	
4.2.1	Report, First Article Inspection	DI-T-4902	
4.4	Report, Production Inspection	DI-T-4904	
4.4.3.2, 4.5	Procedure, Production/Acceptance Inspection	DI-T-4903	
4.4.4c	Failure Data Collection, Analysis and Corrective Action Plan	UDI-T-23719	

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L, Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.3 First article. When a first article inspection is required, the item will be tested and should be a first article sample. The first article sample should consist of 120 chaff cartridges. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination and test approval of the document's first article.

6.4 Definitions. The following definitions apply to this specification:

6.4.1 Chaff cut. A quantity of dipoles cut from a chaff hank to provide one row of dipole elements within a chaff cartridge.

6.4.2 Chaff hank. An assemblage of drawn metallized glass fibers or slit metallic strands produced by one machine prior to the dipole cutting operation. The number of fibers or strands in the chaff hank is normally equivalent to the number of dipoles required for each chaff cut within a specific chaff cartridge.

6.4.3 Chaff cartridge. The package configuration containing the chaff payload for use with AN/ALE-29A, -37A, or -39 dispensing sets.

6.4.4 Equipment. As used herein refers to a chaff cartridge or group of cartridges.

6.4.5 Lot, chaff-cut. A chaff cut lot will consist of all chaff-cuts produced by one cutting machine for use in the chaff cartridge payload. The lot will contain as a maximum that quantity of chaff-cuts necessary to produce one chaff cartridge lot.

6.4.6 Lot, chaff-hank. A chaff-hank lot will consist of all chaff hanks produced by the same production machine and submitted for inspection at one time. This lot will not contain more hanks than are required to produce one chaff cartridge lot.

6.4.7 Lot, chaff cartridge. A chaff cartridge lot will contain that quantity of chaff cartridges specified in the contract or purchase order.

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6.4.8 Lot, receiving inspection. A receiving inspection lot will consist of all material of one type received from one supplier at one time.

6.5 Dipole quantity per chaff cut. The dipole quantity per chaff cut (Q) can be calculated given the dipole diameter (d) and the percent packing density (p), as follows:

$$Q = \frac{p}{100} \left(\frac{1.44414}{2.59808 (.57735d)^2} \right)$$

Table IV provides typical dipole quantities for selected dipole diameters based on the above formula.

TABLE IV. Dipole quantities per chaff cut

Dipole Diameter (d) (mil)	Percent Packing Density (p)		
	40.5	45	49.5
	Dipole Quantity per Chaff Cut (Q)		
0.5	2.7×10^6	3.0×10^6	3.3×10^6
0.75	1.2×10^6	1.3×10^6	1.4×10^6
1.0	6.75×10^5	7.5×10^5	8.25×10^5
1.5	3.0×10^5	3.3×10^5	3.6×10^5
2.0	1.69×10^5	1.87×10^5	2.06×10^5
3.0	7.5×10^4	8.3×10^4	9.1×10^4

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

Preparing Activity:
Navy - AS
(Project 5865-N032)

