

INCH-POUND
MIL-P-24396A(SH)
28 February 1994
SUPERSEDING
MIL-P-24396(SHIPS)
15 September 1970

MILITARY SPECIFICATION

PACKING MATERIAL, BRAIDED PTFE (POLYTETRAFLUOROETHYLENE)

This specification is approved for use by the Naval Sea 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 covers three types of braided polytetrafluoroethylene (PTFE) yarn packing impregnated with PTFE dispersion. All types of packing are for service on Naval ships when stuffing box temperatures are limited to a maximum of 450 degrees Fahrenheit (°F).

1.2 Classification. The material is of the following types, as specified (see 6.2).

- Type A - PTFE braided yarn packing impregnated with PTFE dispersion and containing a heat resistant, inert lubricant.
- Type B - PTFE braided yarn packing impregnated with PTFE dispersion and containing no lubricant.
- Type C - PTFE braided yarn packing impregnated with PTFE dispersion and containing no lubricant but which has been heat cleansed for oxygen service.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 03R42, 2531 National Center Building 3 Washington, DC 20362-5160 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5330

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

SPECIFICATIONS

FEDERAL

- QQ-A-1876 - Aluminum Foil.
- PPP-F-320 - Fiberboard; Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes.

MILITARY

- MIL-B-121 - Barrier Material, Greaseproofed, Waterproofed, Flexible.
- MIL-P-17667 - Paper, Wrapping, Chemically Neutral (Non-Corrosive).
- MIL-L-19140 - Lumber and Plywood, Fire-Retardant Treated.

STANDARDS

FEDERAL

- FED-STD-191 - Textile Test Methods.

MILITARY

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

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, BLDG. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 792 - Standard Test Methods for Specific Gravity and Density of Plastics By Displacement.
- D 1457 - Standard Specification for Polytetrafluoroethylene (PTFE) Molding and Extrusion Materials.
- D 2257 - Standard Test Method for Extractable Matter in Textiles. (DoD adopted)
- D 3951 - Standard Practice for Commercial Packaging. (DoD adopted)

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(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated detail specifications, specifications, specification sheets or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material.

3.1.1 Type A. The packing shall be made of virgin polytetrafluoroethylene (PTFE) yarn impregnated with a virgin PTFE dispersion and lubricated with a heat resistant, inert lubricant.

3.1.2 Type B. The packing shall be made of virgin PTFE yarn impregnated with a virgin PTFE dispersion and shall contain no lubricant.

3.1.3 Type C. The packing shall be made of virgin PTFE yarn impregnated with a virgin PTFE dispersion and shall contain no lubricant of any type and shall be heat cleansed for use against oxygen.

3.1.4 Yarn. The yarn shall be zero twist, in the range of 8400 to 11300 denier (see 4.5.6), multifilament virgin PTFE, preshrunk, and impregnated with a virgin PTFE dispersion before braiding (see 4.5.4). The specific gravity of the yarn and dispersion shall be $2.15 \pm .05$ grams per cubic centimeter and have a melting point of 327 ± 10 degrees Celsius.

3.1.5 Lubricant (type A only). The lubricant shall be a heat resistant inert petroleum oil weighing 15 ± 5 percent of the finished type A packing (see 4.5.3).

3.2 Construction. Types A, B, and C packing shall be braided, for sizes 1/4-inch and over, to a diagonal interlocking through-body-to-surface construction (as opposed to braid-over-braid or square-braid construction). This construction shall use either 20 or 36 braided diagonal strands with center-corner-stuffer strands placed as required to produce a dense square packing with good dimensional stability that is square or trapezoidally shaped when straight. Sizes 1/8-inch and 3/16-inch only shall be square-braided only (see 4.5.2).

3.3 Sizes and weights. Types A, B, and C packing shall be formed approximately square (or trapezoidal) in cross section "when straight" and furnished in sizes shown in table I (see 6.2). The weight per linear foot shall be not less than that shown in table I.

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TABLE I. Sizes and weights of packing.

Nominal size (inch)	Minimum weight (pounds/foot)	Nominal size (inches)	Minimum weight (pounds/foot)
1/8	0.008	7/8	0.560
3/16	0.026	15/16	0.640
1/4	0.038	1	0.740
5/16	0.062	1-1/8	0.970
3/8	0.100	1-1/4	1.180
7/16	0.135	1-3/8	1.420
1/2	0.180	1-5/8	2.200
9/16	0.220	1-3/4	2.300
5/8	0.260	1-7/8	2.550
11/16	0.320	2	2.850
3/4	0.390	----	----
13/16	0.460	----	----

3.4 Spools or reels. Unless otherwise specified (see 6.2), the packing shall be uniformly coiled on spools or reels according to the following:

<u>Packing size (inches)</u>	<u>Package</u>
1/8 through 7/16	1 pound (lb) spool
1/8 through 3/4	5 lb spool
3/8 through 3/4	10 lb spool
3/4 through 1	25, 50, or 100 lb reel
1-1/8 through 2	50 or 100 lb reel

Limited quantities of packing 9/16-inch and over may be shipped as flat spiral coils.

3.5 Installation instructions. Installation, use, and precautionary instructions shall be furnished with each unit package. The instructions may be in the form of labels or printed inserts that will not be affected by water or grease. Where the instructions are placed within any opaque package, the outside of the package shall be marked to indicate use instructions enclosed.

3.6 Workmanship. The packing shall be free from extraneous material and visible defects which may affect its serviceability (see 4.3.1).

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 (examinations and tests) as specified herein. Except as otherwise 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 this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of the manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 Sampling. Random samples shall be selected from each lot as specified (see 6.3).

4.2.1 Lot. For purposes of sampling, a lot shall consist of all finished packing of one size produced in a continuous run or at the same time under essentially the same conditions offered for delivery at one time. The sampling unit shall be one spool, reel, or coil of packing.

4.2.2 Sampling of visual and dimensional examination and quality conformance tests. As a minimum, the contractor shall randomly select a sample quantity of completed packing material in accordance with table II and examine and test the packing material in accordance with 4.3.1 and 4.4. If one or more defects are found in any sample, the entire lot represented by the sample shall be rejected. If a lot is rejected, the contractor has the option of screening 100% of the lot for the defective characteristic(s) or providing a new lot which shall be examined and tested in accordance with the sampling plan contained herein. (see 6.3)

TABLE II. Sampling for visual and dimensional examination and quality conformance tests.

Lot size	Sample size
2 to 50	5
51 to 90	7
91 to 150	11
151 to 280	13
281 to 500	16
501 to 1,200	19
1,201 to 3,200	23

4.3 Quality conformance inspection. Quality conformance inspection shall consist of the examination and tests specified in 4.3.1 and 4.4.

4.3.1 Examination for visual and dimensional defects. Each sample selected in accordance with table II shall be surface examined and measured to determine conformance with the requirements which do not require tests. Any sample containing one of more visual and dimensional defects shall be rejected, and shall be cause for rejection of the entire lot represented by the sample.

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4.4 Quality conformance tests. The sample selected in accordance with table II shall be tested as specified in 4.5.1 through 4.5.6. If a sample does not conform to all the test requirements, this shall be cause for rejection of the lot which it represents.

4.5 Test methods.

4.5.1 Weight. The weight shall be determined after carefully weighing and measuring a specimen not less than 2 feet long.

4.5.2 Construction. The diagonal interlocking through-body-to-surface, braid-over-braid, and square-braid patterns are shown on figure 1 for visual examination. In addition, a 1- to 2-inch length of coil being examined shall be unbraided and strands (not yarn plies or ends) counted and compared to the numbers as specified in 3.2.

4.5.3 Lubricant. The lubricant content of the finished type A packing shall be determined in accordance with ASTM D 2257, except for extracting 16 hours with the halogenated hydrocarbon solvent only, on duplicate specimens taken from different parts of the packing. Results are calculated as $P = 100E/S$ where,

P = Percent halogenated hydrocarbon solvent extract on the original samples.

E = Weight of halogenated hydrocarbon solvent extract .

S = Specimen weight before extraction.

4.5.4 Tetrafluoroethylene yarn dispersion resin. The yarn and dispersion resin shall be tested after extraction in accordance with Melting Point Method of ASTM D 1457 to ensure that it is virgin PTFE resin.

4.5.5 Specific gravity of PTFE resin. The specific gravity of the PTFE yarn and dispersion resin shall be determined in accordance with ASTM D 792.

4.5.6 Denier. The denier of the PTFE yarn shall be determined in accordance with method 4021 of FED-STD-191.

4.6 Inspection of packaging. Sample packs and the inspection of packaging (preservation, packing, and marking) for shipment, stowage, and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 General.

5.1.1 Navy fire-retardant requirements.

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- (a) Lumber and plywood. When specified (see 6.2), all lumber and plywood including laminated veneer materials used in shipping container and pallet construction, members, blocking, bracing, and reinforcing shall be fire-retardant treated materials conforming to MIL-L-19140 as follows:

Level A and B - Type II - weather resistant.
Category 1 - general use.

Level C - Type I - non-weather resistant.
Category 1 - general use.

- (b) Fiberboard. Fiberboard used in the construction of interior (unit and intermediate) and exterior fiberboard boxes including interior packaging forms shall conform to the class-domestic/fire retardant or class-weather resistant/fire-retardant materials equipment as specified (see 6.2), of ASTM D 4727 .

5.2 Preservation. Preservation shall be level A, C, or commercial, as specified (see 6.2).

5.2.1 Level A.

5.2.1.1 Preservation. Each package (see 3.4) shall be protected with a greaseproof barrier material conforming to MIL-B-121 or QQ-N-1876 at the supplier's option for type A packing, and a neutral barrier paper conforming to MIL-P-17667 for type B packing. Spiral coils, in flat form, shall be secured with a minimum of three ties placed equidistant apart. The greaseproof barrier material specified herein is not required when the unit container selected (see 5.2.1.1.1) is treated for greaseproofness or is inherently greaseproof.

5.2.1.1.1 Unit pack. Each package shall be placed in a water-resistant folding, set-up, or metal edged paperboard, a metal can or a class-weather resistant/fire-retardant fiberboard (see 5.1.1(b)) box meeting the unit and intermediate container requirements of MIL-STD-2073-1. The container selection shall be at the contractor's option.

5.2.2 Level C. Material shall be preserved as specified under level A except that the interior (unit and intermediate) boxes shall be as follows:

- (a) The paperboard containers shall be of the domestic or non-weather resistant type, class or variety as applicable and,
(b) The fiberboard containers shall be of the class-domestic/fire-retardant material (see 5.1.1(b)). The box closure shall be in accordance with method I using pressure sensitive adhesive tape.

5.2.3 Commercial. Commercial packaging (cleaning, preservation, and unit package) shall be in accordance with ASTM D 3951.

5.3 Packing. Packing shall be level A, B, C or commercial as specified (see 6.2).

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5.3.1 General requirements for levels A, B, and C. Containers selected (see 5.3.2) shall be of minimum weight and cube consistent with the protection required, of uniform size, and contain identical quantities of identical material.

5.3.2 Levels A, B, and C containers. Packing, preserved as specified (see 5.2), shall be packed in exterior shipping containers for the level of packing specified (see 5.3), in accordance with MIL-STD-2073-1, and herein. Unless otherwise specified (see 6.2), container selection shall be at the contractor's option.

5.3.2.1 Caseliners, closure, and gross weight.

5.3.2.1.1 Caseliners. Unless otherwise specified (see 6.2), level A shipping containers containing packing preserved level C or commercial shall be provided with waterproof caseliners in accordance with MIL-STD-2073-1.

5.3.2.1.2 Closure. Container closure, reinforcing, or banding shall be in accordance with the applicable container specification or appendix thereto except that weather-resistant fiberboard boxes shall be closed in accordance with method V and reinforced with non-metallic or tape banding and domestic or domestic/fire-retardant fiberboard boxes shall be closed in accordance with method I using pressure sensitive tape.

5.3.2.1.3 Weight. Wood, plywood, and cleated type containers exceeding 200 pounds gross weight shall be modified by the addition of skids in accordance with MIL-STD-2073-1 and the applicable container specification or appendix thereto.

5.3.3 Commercial. Packing, preserved as specified (see 5.2), shall be packed for shipment in accordance with ASTM D 3951 and herein.

5.3.3.1 Container modification. Shipping containers exceeding 200 pounds gross weight shall have a minimum of two, 3- by 4-inch nominal wood skids laid flat, or a skid or sill type base which will support the material and facilitate handling by mechanical handling equipment during shipment, stowage, and storage.

5.4 Marking, levels A, B, C, and commercial. In addition to any special marking required (see 6.2), interior packs and shipping containers shall be marked for shipment, stowage, and storage in accordance with MIL-STD-2073-1.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful.)

6.1 Intended use.

6.1.1 Type A. This type is intended for dynamic service and shipboard fluids except superheated steam or other service resulting in packing temperatures of over 450°F oxygen, molten alkaline metals, or fluorochemicals. Pressures should not exceed 150 pounds per square inch (lb/in²) at the packing, and rod or shaft speed should not exceed 1,500 feet per minute (ft/min).

6.1.2 Type B. This type is intended for static to low speed or intermittent service and shipboard fluids except superheated steam or other services resulting

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in packing temperature of over 450°F, oxygen, molten alkaline metals, or fluorochemicals. Pressures should not exceed 2,500 lb/in² and rod or shaft speeds should not exceed 25 ft/min.

6.1.3 Type C. This type is intended for static to low speed or intermittent service against oxygen. Pressures should not exceed 2,500 lb/in² and rod or shaft speed should not exceed 25 ft/min. Packing must be kept absolutely clean and uncontaminated in any way.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification.
- (b) Type required (see 1.2).
- (c) Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- (d) Size required (see 3.3).
- (e) When preformed packing ring sets are desired (see 3.4). (The size, inside diameter and outside diameter of packing must be included when ordering and number of rings per set.)
- (f) Unit weight of packing if ordered on spools or reels (see 3.4).
- (g) When fire-retardant lumber and plywood is required (see 5.1.1(a)).
- (h) Class of fire-retardant fiberboard required (see 5.1.1(b)).
- (i) Level of preservation and level of packing required (see 5.2 and 5.3).
- (j) Container selection if other than contractor's option (see 5.3.2).
- (k) When caseliners are not required (see 5.3.2.1.1).
- (l) Special marking required (see 5.4).

6.3 Subject term (key word) listing.

Braided yarn
Inert lubricant
Shipboard fluids
Stuffing box

6.5 Sampling for visual and dimensional examination and quality conformance tests. The contractor shall maintain for a period of three years after contract completion, all records of inspections, tests, and any resulting rejections.

6.4 Changes from previous issue. Marginal notations 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 - SH
(Project 5330-N155)

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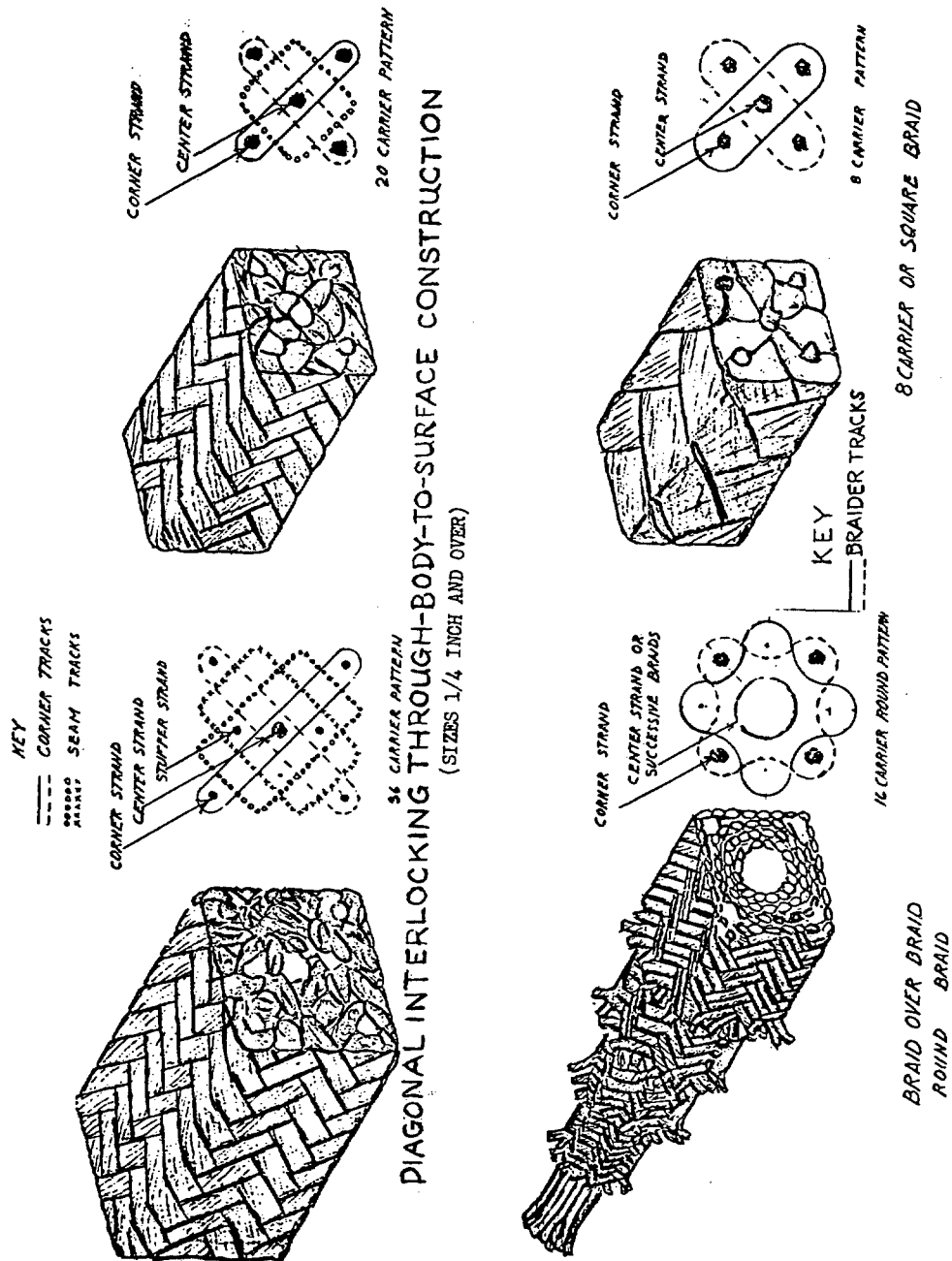


FIGURE 1. Interlocking versus braid-over-braid patterns.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-P-24396A(SH)	2. DOCUMENT DATE (YYMMDD) 28 February 1994
3. DOCUMENT TITLE PACKING MATERIAL, BRAIDED PTFE (POLYTETRAFLUOROETHYLENE)			
4. NATURE OF CHANGE (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (If applicable)	7. DATE SUBMITTED (YYMMDD)
8. PREPARING ACTIVITY			
a. NAME COMMANDER NAVAL SEA SYSTEMS COMMAND		b. TELEPHONE (Include Area Code) (1) Commercial Richard Dempsey 703-602-0146 (2) AUTOVON 332-0146	
c. ADDRESS (Include Zip Code) SEA 03R42 2531 JEFFERSON DAVIS HWY ARLINGTON, VA 22242-5160		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	