

MIL-C-882D  
22 October 1982  
SUPERSEDING  
MIL-C-882C  
26 September 1966  
(See 6.3)

## MILITARY SPECIFICATION

### CLOTH, DUCK, COTTON OR COTTON-POLYESTER BLEND, SYNTHETIC RUBBER, IMPREGNATED, AND LAMINATED, OIL RESISTANT

This specification is approved for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers laminated cotton duck or cotton-polyester blend duck cloth that has been impregnated with oil resistant synthetic rubber.

1.2 Classification. Cloth shall be of the following types as specified (see 6.2).

- Type I - Sheets
- Type II - Strips
- Type III - Cut items
- Type IV - Molded items

#### 2. APPLICABLE DOCUMENTS

##### 2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards 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: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362 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-B-576 - Box, Wood, Cleated, Veneer, Paper Overlaid.
- PPP-B-591 - Box, Shipping, Fiberboard, Wood-cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-636 - Box, Shipping, Fiberboard.
- PPP-B-640 - Box, Fiberboard, Corrugated, Triple-wall.

## MILITARY

- MIL-L-10547 - Liner, Case, and Sheet, Overwrap; Water-Vaporproof or Waterproof, Flexible.
- MIL-F-16884 - Fuel Oil, Diesel, Marine.

## STANDARDS

## FEDERAL

- FED-STD-191 - Textile Test Methods.
- FED-STD-601 - Rubber, Sampling and Testing.

## MILITARY

- MIL-STD-129 - Marking for Shipment and Storage.
- MIL-STD-289 - Visual Inspection Guide for Rubber Sheet Material.
- MIL-STD-407 - Visual Inspection for Rubber Molded Items.

2.1.2 Other government documents. The following other Government document, forms a part of this specification to the extent specified herein.

## NATIONAL BUREAU OF STANDARDS

- SP 260-261 - Special Publication - Characterization of Linear Polyethylene SRM's 1482, 1483, 1484.

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

(Copies of specifications, standards, and publications required by contractors 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. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 792 - Specific Gravity and Density of Plastics by Displacement.  
(DoD adopted)

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

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## UNIFORM CLASSIFICATION COMMITTEE AGENT

## Uniform Freight Classification Ratings, Rules and Regulations

(Application for copies should be addressed to the Uniform Classification Committee Agent, Tariff Publication Officer, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

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 Materials.

3.1.1 Duck. The duck shall be of highest quality cotton or cotton-polyester 50-50 blend, and shall weigh a minimum of 8 ounces per square yard. The cotton warp and the filling yarn shall be 2-ply. The cotton-polyester warp and fill shall be single yarn, with a minimum breaking strength by grab method of 150 pounds per inch per width (piw) warp, and 140 piw fill. The filling count of the duck shall be  $40 \pm 2$  threads per inch and the warp count shall be  $50 \pm 1$  thread per inch.

3.1.2 Synthetic rubber. The synthetic rubber used for impregnating the cotton or cotton-polyester blend duck material shall be a compound which shall conform to the requirements of this specification.

3.2 Configuration. Dimensions and shapes for types I through IV shall be as specified (see 6.2).

3.2.1 Tolerances. Tolerances are specified in each contract other than for type II.

TABLE I. Tolerances.

Thickness (All types)	Type II	
	Width (inches)	Tolerances ( $\pm$ inches)
$\pm 5$ percent	1/4 to 1/2 inclusive	1/32
	over 1/2 to 1 inclusive	3/64
	over 1	1/16

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3.3 Age. The age of the impregnated cotton or cotton-polyester blend duck based on the month in which it is cured shall not exceed 12 months at the time of acceptance under contract by the purchaser. Material shall be rejected when the cure date cannot be determined.

3.4 Physical requirements. The laminated material shall conform to the following physical requirements:

3.4.1 Density. The density shall be a minimum of 67 pounds per cubic foot, when determined by the procedure specified in 4.4.2.

3.4.2 Load deflection. The material shall be within the deflection limits shown in table II, when tested as specified in 4.4.3.

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TABLE II. Load deflection.

Load lb/in <sup>2</sup>	Deflections of laminated material											
	14/64 - 16/64 inch thick		17/64 - 19/64 inch thick		21/64 - 23/64 inch thick		15/32 - 17/32 inch thick		19/32 - 21/32 inch thick		61/64 - 67/64 inch thick	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
52	0.001	0.005	0.002	0.005	0.002	0.007	0.003	0.009	0.004	0.011	0.006	0.019
100	.002	.007	.003	.009	.004	.011	.005	.014	.007	.017	.010	.028
200	.003	.011	.006	.013	.007	.016	.009	.021	.013	.027	.018	.043
300	.005	.014	.008	.017	.010	.020	.013	.027	.018	.034	.025	.054
400	.006	.016	.010	.020	.012	.024	.016	.033	.022	.040	.031	.064
500	.008	.018	.012	.023	.014	.027	.019	.038	.026	.046	.037	.073
600	.009	.020	.013	.025	.016	.030	.022	.042	.029	.052	.043	.081
700	.010	.022	.015	.027	.018	.033	.025	.047	.033	.056	.049	.090
800	.012	.024	.017	.029	.019	.035	.028	.051	.036	.062	.055	.098
900	.013	.025	.018	.031	.021	.038	.031	.055	.040	.066	.060	.105
1,000	.014	.027	.020	.033	.023	.040	.034	.058	.043	.070	.065	.111
1,200	.017	.030	.023	.037	.026	.044	.040	.065	.049	.078	.075	.124
1,400	.019	.033	.025	.040	.029	.048	.045	.072	.055	.086	.085	.136
1,600	.021	.035	.028	.043	.032	.052	.050	.078	.061	.093	.094	.147
1,800	.024	.038	.031	.046	.035	.055	.055	.084	.067	.100	.103	.157
2,000	.026	.040	.033	.049	.038	.058	.060	.090	.072	.107	.112	.168

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3.4.3 Permanent set. The permanent set of the laminated material, when determined by the method specified in 4.4.4, shall be no more than the values shown in table III.

TABLE III. Permanent set.

Compressive stress (lb/in <sup>2</sup> )	Permanent set
500	3.0
1,000	4.0
3,000	7.0
5,000	10.0
10,000	13.0

3.4.4 Laminated material oil resistance.

3.4.4.1 Delamination. When the laminated material is tested as specified in 4.4.5.1, there shall be no delamination.

3.4.4.2 Swell. When the laminated material is subjected to the immersion test specified in 4.4.5.2, the volume swell shall be no more than 25 percent.

3.5 Fungus resistance. No fungus growth shall be apparent when tested in accordance with 4.4.6.

3.6 Workmanship. The finished material shall be clean and evenly laminated. The occurrence of defects shall not exceed the acceptance number specified.

## 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 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.

4.2 Sampling for quality conformance inspection.

4.2.1 Lot. For purposes of quality conformance inspection, a lot shall consist of not more than 2,500 pounds of material of the same form and dimensions, produced in one plant under essentially the same conditions and offered for delivery at one time.

4.2.1.1 Cut and molded items. The lot size shall be the number of cut or molded items in the lot.

4.2.1.2 Sheets and strips. The lot size shall be the number of unit areas in all sheets or strips of the lot. A unit area is defined as an area of one square foot; thus a sheet 2 feet wide and 20 feet long would be 40 units, and a strip 4 inches wide by 20 feet long would be 7 units.

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4.2.2 Sampling for examination. The sample size (number of samples to be selected from a lot and examined as specified in 4.3.1) shall be as specified in table IV.

TABLE IV. Sampling for examination.

Lot size, number of cut or molded items, or unit areas of sheets or strips	Sample size, number of cut or molded items, or unit areas of sheets or strips	Number of nonconforming or defective pieces or unit areas			
		Major defects		Total defects	
		accept	reject	accept	reject
Up to 8	5	0	1	0	1
9 to 15	7	0	1	0	1
16 to 25	10	0	1	1	2
26 to 40	15	0	1	1	2
41 to 65	15	1	2	2	3
66 to 110	20	1	2	2	3
111 to 180	25	1	2	3	4
181 to 500	35	2	3	5	6
501 to 800	50	3	4	6	7
801 to 1800	75	4	5	9	10
1801 to 3200	110	6	7	12	13
3201 and Up	150	8	9	17	18

4.2.2.1 Specified samples. The specified samples shall be selected at random from the lot. The sampling of the sheet and strip material shall be divided among all rolls in the lot.

4.2.2.2 Special sample. With each lot, 1 foot of the cotton or cotton-polyester blend duck, the full width of the bolt, of the same material used in the manufacture of the lot, shall be furnished.

4.2.3 Sampling for tests. Two sets of samples shall be taken from each lot in sufficient quantity to perform all tests specified in 4.3.2. The samples shall be taken from those selected in accordance with 4.2.2. No two samples shall be taken from the same sheet, strip, cut or molded item. Where test specimens cannot be prepared from the items, the contractor shall furnish two samples each 6 by 6 by 0.5 inches thick. These pieces must be identical in composition and equivalent in cure, and prepared from material used in the lot of finished material offered for delivery.

### 4.3 Quality conformance inspection.

4.3.1 Visual and dimensional examination. Each of the sample pieces taken in accordance with 4.2.2 shall be subjected to surface examination for number of plies, workmanship, dimensions, and tolerances. MIL-STD-289 or MIL-STD-407 shall be used to determine and evaluate defects through visual examination. In addition the samples shall be examined for tackiness and brittleness. Any sample sheet, strip, cut, or molded part found not to be in accordance with this specification shall not be offered for delivery. If the number of nonconforming items exceeds the acceptance number specified in 4.2.2 for that sample, this shall be cause for rejection of the lot represented by the sample.

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4.3.2 Quality conformance tests. Each set of samples selected in accordance with 4.2.3 shall be subjected to the tests specified in 4.4.2 through 4.4.6. If any sample fails to conform to this specification, this sample shall be cause for rejection of the entire lot represented by the sample.

4.3.2.1 Special sample. The sample piece of duck furnished in accordance with 4.2.2.2 shall be subjected to the tests specified in 4.4.1.

4.4 Test procedures<sup>1/</sup>

4.4.1 Count and weight. Thread count and weight of duck shall be determined in accordance with methods 5050 and 5041 respectively of FED-STD-191.

4.4.2 Density. The specific gravity shall be determined by the standard hydrostatic displacement method of ASTM D 792. Density in pounds per cubic foot = specific gravity (s.g.) times 0.03613 times 1728. ( $\text{lb/ft}^3 = \text{s.g.} \times 0.03613 \times 1728$ ).

4.4.3 Load deflection. The load deflection shall be determined as follows:

- (a) Each specimen of impregnated cotton or cotton-polyester blend duck, 2 by 2 inches by the thickness of the material, shall be compressed, perpendicular to the direction of lamination, between two steel plates which are held rigidly parallel. The origin of deflection measurements shall be taken at a stress of  $5 \text{ lb/in}^2$  on the specimen.
- (b) The load shall be increased at the rate of 500 pounds per minute and the deflection recorded at the specified load (see 3.4.2). The average material deflection of 2 specimens shall be reported as the deflection at each specified load.

4.4.4 Permanent set. The permanent set shall be determined as follows:

- (a) The specimen of impregnated cotton or cotton-polyester blend duck, 2 by 2 inches by the thickness of the material, shall be compressed, perpendicular to the direction of the lamination, between two steel plates under a preliminary load of  $50 \text{ lb/in}^2$  for 5 minutes. This shall be considered the zero point.
- (b) The load shall then be increased at the rate of 500 pounds per minute up to 500 pounds per square inch. The total load shall then be released. The loss in thickness shall be measured between 30 seconds and 1 minute after the load is removed and expressed as a percentage of the original "zero point" thickness. The next higher specified load shall then be applied to the same specimen within 5 minutes of release except that no precondition load shall be applied. The loss in height shall again be determined as a percentage of the original "zero point"

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<sup>1/</sup> Unless otherwise indicated in the test method, no tests shall be conducted prior to a conditioning period of the test specimen of 4 hours at room temperature  $27 \pm 5^\circ\text{C}$ . Sample preparation may be undertaken without regard to this time interval.



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thickness. This loading and unloading shall be repeated on the same specimens in duplicate to cover the range of permanent set determinations specified in 3.4.3. The average value of the two determinations shall be reported as the permanent set after the specified loads.

#### 4.4.5 Laminated material oil resistance.

4.4.5.1 Delamination. The delamination test shall be in accordance with method 6311 of FED-STD-601, except that diesel oil in accordance with MIL-F-16884 shall be used as the immersion medium.

4.4.5.2 Volume swell. The volume swell test shall be in accordance with method 6211 of FED-STD-601, except that the immersion period shall be 24 + 1/4 hours. The immersion medium shall be diesel oil in accordance with MIL-F-16884.

4.4.6 Fungus resistance. Fungus resistance shall be determined by the qualitative procedure of method 5750 of FED-STD-191, except the number of specimens shall be two. The specimens shall be cut from the finished material and shall be the thickness of the material in the lot. Prior to inoculation, the specimen shall be heated at  $149 \pm 2.2^{\circ}\text{C}$  for 1 hour and then cooled to room temperature.

4.5 Packaging inspection. An examination shall be made to determine that packaging, packing, contents, and markings comply with the requirements of this specification. The sample unit shall be one shipping container, fully packed, selected just prior to the closing operation. Shipping containers fully prepared for delivery shall be examined for closure defects. Sampling requirements shall be the same as specified for material in 4.2.2, but shall apply to unit containers and not the impregnated cotton or cotton-polyester blend duck.

Examine	Defect
Packaging	Unit package not packaged as specified, not level specified. Packaging material not as specified. Closure not as specified.
Packing	Not in accordance with contract requirements. Container not as specified; closure not accompanied by specified or required methods or materials. Any nonconforming component, component missing, damaged or otherwise defective affecting serviceability. Inadequate application of components such as: incomplete closure and case liners, container flaps loose or inadequate strappings: bulged or distorted containers.
Count	Number of sheets per container less than specified or indicated quantity.
Weight	Gross weight exceeds specified requirements.
Markings	Interior or exterior markings (as applicable) omitted, illegible, incorrect, incomplete, or not in accordance with contract requirements.

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4.5.1 Rejected lots. A unit container found with a defect shall not be offered for delivery and if the number of defective units exceeds the acceptance number shown in table IV, this shall be cause for rejection of the entire lot represented by the units.

## 5. PACKAGING

(The packaging or preparation for delivery requirements specified herein apply only for direct Government acquisitions.)

5.1 Packaging. Packaging shall be level A or C as specified (see 6.2).

5.1.1 Level A. The laminated material shall be packaged as follows:

5.1.1.1 Type I. Unless otherwise specified (see 6.2), sheets shall be packaged as flat slabs not over 7 feet long and shall be sealed in seamless minimum 4 mil thick polyethylene tubing conforming to SP 260-261. The polyethylene shall be heat sealed preferably but may be twisted and tied with plastic if desired.

5.1.1.2 Type II. Strips shall be individually coiled and sealed in polyethylene as specified in 5.1.1.1. Bagged coiled strips shall then be intermediate packaged in fiberboard boxes conforming to style RSC, type CF of PPP-B-636. The gross weight shall not exceed 50 pounds.

5.1.1.3 Type III and IV. Cut or molded items shall be bulk bagged in polyethylene as specified in 5.1.1.1. Bagged items shall then be intermediate packaged in fiberboard boxes conforming to style RSC, type CF of PPP-B-636. The gross weight shall not exceed 50 pounds.

5.1.2 Level C. Packaging shall afford protection against deterioration and physical damage during shipment from the supply source to the first receiving activity for immediate use. The contractor's normal retail or wholesale packaging methods may be utilized when such meets the requirements of this level.

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

5.2.1 Level A. The material packaged as specified (see 6.2), shall be packed in containers conforming to any one of the following specifications at the option of the contractor:

Specification	Box	Classification
PPP-B-576	Wood cleated, veneer, paper overlaid	Class 2
PPP-B-591	Fiberboard, wood-cleated	Class II
PPP-B-601	Wood, cleated-plywood	Overseas type
PPP-B-636	Fiberboard	Weather resistant
PPP-B-640	Fiberboard, corrugated, triple-wall	Class 2

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5.2.1.1 Shipping containers (level A). Shipping containers shall have caseliners conforming to MIL-L-10547 and shall be closed and sealed in accordance with the appendix of MIL-L-10547. Caseliners for fiberboard boxes, conforming to PPP-B-636 and PPP-B-640, may be omitted provided all center and edge seams and manufacturer's joint are sealed and waterproofed with pressure sensitive tape in accordance with the applicable fiberboard box specification. Shipping containers shall be closed, strapped, or banded in accordance with the applicable box specification or appendix thereto, with method V closure applicable to PPP-B-636 containers. Fiberboard containers shall be reinforced with pressure sensitive reinforced tape or non-metallic banding in lieu of metal bands or strapping. The gross weight of wood, wood-cleated, and triple wall boxes should not exceed 250 pounds. If the gross weight of a shipping container exceeds 250 pounds, it shall be modified to include a skid type base. Containers conforming to PPP-B-636 shall not exceed the weight limitations of the specification. Intermediate fiberboard containers conforming to weather resistant class of PPP-B-636 closed, sealed, and banded as specified herein may be used as the shipping container and need not be over packed.

5.2.2 Level B. The laminated material packed as specified (see 6.2), shall be packed in containers conforming to any one of the following specifications at the option of the contractor:

Specification	Box	Classification
PPP-B-576	Wood cleated, veneer, paper overlaid	Class 1
PPP-B-591	Fiberboard, wood-cleated	Class 1
PPP-B-601	Wood, cleated-plywood	Domestic type
PPP-B-636	Fiberboard	Domestic
PPP-B-640	Fiberboard, corrugated, triple-wall	Class 2

5.2.2.1 Shipping containers (level B). Shipping containers shall be closed, strapped, or banded in accordance with the applicable container specification or appendix thereto, with method I closure applicable to PPP-B-636 containers. Containers conforming to PPP-B-636 shall not exceed the weight limitations of this specification. Intermediate fiberboard containers conforming to PPP-B-636 closed, sealed, and banded as specified herein may be used as the shipping container and need not be overpacked.

5.2.3 Level C. The laminated material packaged as specified (see 6.2), shall be packed in a manner which will ensure acceptance by common carrier, at lowest rate and will afford protection against physical or mechanical damage during direct shipment from the supply source to the first receiving activity for early installation. The shipping containers or method of packing shall conform to the Uniform Freight Classification Rules and Regulations or other carrier regulations as applicable to the mode of transportation.

5.3 Marking. In addition to any special marking required by the contract or order, interior and exterior shipping containers shall be marked with the date (month and year) of cure and in accordance with MIL-STD-129.

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## 6. NOTES

6.1 Intended use. The laminated cotton or cotton-polyester blend duck covered by this specification is intended for use in vibration attenuation and shock damping.

6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type material required (see 1.2), and dimensions, tolerances, and shape, as applicable (see 3.2 and 3.2.1).
- (c) Selection of applicable level of packaging and packing required (see 5.1 and 5.2).

6.3 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.

## Custodians:

Army - GL  
Navy - SH  
Air Force - 99

## Preparing activity:

Navy - SH  
(Project 8305-0761)

## Review activities:

Army - MI, MR  
DLA - CT

## User activities:

Army - ME  
Navy - AS

**INSTRUCTIONS:** In a continuing effort to make our standardization documents better, the DoD provides this form for use in submitting comments and suggestions for improvements. All users of military standardization documents are invited to provide suggestions. This form may be detached, folded along the lines indicated, taped along the loose edge (*DO NOT STAPLE*), and mailed. In block 5, be as specific as possible about particular problem areas such as wording which required interpretation, was too rigid, restrictive, loose, ambiguous, or was incompatible, and give proposed wording changes which would alleviate the problems. Enter in block 6 any remarks not related to a specific paragraph of the document. If block 7 is filled out, an acknowledgement will be mailed to you within 30 days to let you know that your comments were received and are being considered.

**NOTE:** This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification 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.

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DEPARTMENT OF THE NAVY



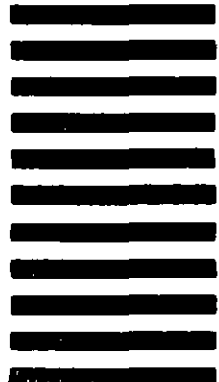
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**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)*

1. DOCUMENT NUMBER

2. DOCUMENT TITLE

3a. NAME OF SUBMITTING ORGANIZATION

4. TYPE OF ORGANIZATION *(Mark one)* VENDOR USER MANUFACTURER OTHER *(Specify):* \_\_\_\_\_b. ADDRESS *(Street, City, State, ZIP Code)*

5. PROBLEM AREAS

a. Paragraph Number and Wording:

b. Recommended Wording:

c. Reason/Rationale for Recommendation:

6. REMARKS

7a. NAME OF SUBMITTER *(Last, First, MI) - Optional*b. WORK TELEPHONE NUMBER *(Include Area Code) - Optional*c. MAILING ADDRESS *(Street, City, State, ZIP Code) - Optional*8. DATE OF SUBMISSION *(YYMMDD)***DD FORM 1426**  
82 MAR

(TO DETACH THIS FORM, CUT ALONG THIS LINE.)