

MIL-C-8068B(ASG)

18 JULY 1963

Superseding
MIL-C-8068A(ASG)
26 November 1956

MILITARY SPECIFICATION

CLOTH, COATED, NYLON, RUBBER-COATED, FUEL-RESISTANT

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

1. SCOPE

1.1 Scope.- This specification covers several types of rubber-coated nylon cloth for aeronautical use where fuel resistance is required.

1.2 Classification.- The rubber-coated cloth shall be of the following types, as specified (see 6.2):

Type I - cured:

Base cloth - Type II of Specification MIL-C-7020
Gages - 0.010 inch
 0.013 inch
 0.017 inch
 0.020 inch

Type II - cured:

Base cloth - table I
Gages - 0.025 inch
 0.050 inch

Type III - uncured:

Base cloth - Type II of Specification MIL-C-7020
Gages - 0.012 inch
 0.018 inch

2. APPLICABLE DOCUMENTS

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

FSC 8305

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SPECIFICATIONSFederalCCC-T-191
PPP-P-51Textile Test Methods
Packaging, Packing, and Marking of Textile
Fabrics (Woolens, Worsteds, Cottons, Silks,
and Synthetics)MilitaryMIL-S-3136
MIL-C-7020Standard Test Fluids, Hydrocarbons
Cloth, Nylon, ParachuteSTANDARDSFederalFED. TEST METHOD
STD. NO. 601

Rubber: Sampling and Testing

Military

MIL-STD-105

Sampling Procedures and Tables for Inspection
by AttributesPUBLICATIONSAir Force-Navy Aeronautical Bulletin

No. 438

Age Controls for Synthetic Rubber Parts

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

3. REQUIREMENTS

3.1 Materials.- The rubber-coated cloth shall consist of a nylon base cloth uniformly coated on both sides with a rubber compounded in such manner as to conform to this specification. Unless otherwise specified, the material shall be black in color. It shall not be injurious to any surface with which it may come in contact and shall be free from pinholes and any other defect that might adversely affect the serviceability of the finished product.

3.2 Dimensions and tolerances.- The minimum width of sheet material shall be 36 inches, and each roll shall be a minimum of 75 feet in length with a maximum of 3 pieces per roll, and no piece shall be less than 15 feet in length. Shapes cut from sheet or molded from uncured stock shall be as specified herein.

3.3 Physical properties.- The physical properties of the cloth, rubber coating, and finished rubber-coated material shall be as specified herein.

3.3.1 Base cloth.— The base cloth for the types I and III cloth shall conform to type II of Specification MIL-C-7020, except that the air permeability and permanence of finished requirements specified herein shall not apply; nylon base cloth for the type II fabric shall conform to table I.

TABLE I. Properties of base cloth for the type II cloth

Property characteristics	Type II
Thickness (in.)	0.013 ±0.002
Weight (oz/yd ²)	5.5 ±0.5
Breaking strength (grab method):	
Warp (lb min)	300
Filling (lb min)	300
Tear strength (tongue method):	
Warp (lb min)	20
Filling (lb min)	20
Thread count (thds/in.):	
Warp (min)	90
Filling (min)	90

3.3.2 Rubber coating.— The physical properties of the cured rubber used as the coating for the cloth shall conform to table II (see 4.4.3). It shall not blister or crack in service and shall have a minimum adhesion of 4 pounds per inch to the nylon cloth backing.

TABLE II. Properties of rubber coating

Property characteristics	Type I	Type II	Type III
Original:			
Hardness, points, Shore "A"	35 ±5	60 ±5	45 ±5
Tensile strength, psi min.	1,000	1,500	1,200
Elongation, percent min.	700	400	500
After air aging at 212° F for 70 ±2 hrs.:			
Hardness, points, change, Shore "A"	-10 max.	±15 max.	±10 max.
Tensile strength, percent change	-35 max.	-15 max.	-30 max.
Elongation, percent change	-50 max.	-60 max.	-60 max.
After aging for 70 ±2 hrs. at 75° ±5° F in type I fluid of Specification MIL-S-3136:			
Tensile strength, percent change	±20 max.	±25 max.	±10 max.
Elongation, percent change	±10 max.	±15 max.	±16 max.
Volume swell, percent	-15 max.	-10 max.	-10 max.
After aging for 70 ±2 hrs. at 75° ±5° F in type III fluid of Specification MIL-S-3136:			
Tensile strength, percent change	-75 max.	-40 max.	-60 max.
Elongation, percent change	-50 max.	-35 max.	-50 max.
Volume swell, percent	+25 max.	25 max.	18 max.

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3.3.3 Rubber-coated cloth.— The physical properties of the coated cloth shall conform to table III (see applicable tests in 4.4.4).

TABLE III. Physical properties of rubber-coated cloth

Property	Type I	Type II	Type III
Gage (inch)	0.010 ±0.002	0.025 ±0.003	0.012 ±0.002
	0.013 ±0.002	0.050 ±0.004	0.018 ±0.002
	0.017 ±0.002	---	---
	0.020 ±0.002	---	---
Mullen burst strength, points:			
Original	125	500	125
After air aging	125	500	125
After aging in:			
Type I fluid of			
Specification MIL-S-3136	125	500	125
Type III fluid of			
Specification MIL-S-3136	125	500	125

3.3.3.1 Low-temperature flexibility.— The rubber-coated cloth conditioned as specified in table IV and cooled at $-67^{\circ} \pm 2^{\circ}$ F for 24 hours shall not break, crack, or separate from its backing when flexed in both the warp and fill direction, when tested as specified in 4.4.4.2.

TABLE IV. Low-temperature flexibility

Types	Original	Air aged	Fuel aged in type I fluid of Specification MIL-S-3136	Fuel aged in type III fluid of Specification MIL-S-3136
Type I:				
Gage 0.010	Flexible	Flexible	Flexible	Flexible
Gage 0.013	Flexible	Flexible	Flexible	Flexible
Gage 0.017	Flexible	Flexible	Flexible	Flexible
Gage 0.020	Flexible	Flexible	Flexible	Flexible
Type II:				
Gage 0.025	---	---	---	Flexible
Gage 0.050	---	---	---	Flexible
Type III:				
Gage 0.012	Flexible	Flexible	Flexible	Flexible
Gage 0.018	Flexible	Flexible	Flexible	Flexible

3.3.3.2 Permeability.— The rate of diffusion of type III fuel of Specification MIL-S-3136 through the coated material shall not exceed 2 fluid ounces per square foot per 24 hours.

3.4 Identification of product.-

3.4.1 Sheet.- Unless otherwise specified, sheet material shall be marked to show the specification number, type, and gage, the manufacturer's identification, compound number, and date of cure in accordance with ANSulletin No. 438. The identification shall appear in rows of constantly recurring symbols from one end of the sheet to the other spaced approximately 3 inches apart. The manufacturer's identification, compound number, and date of cure shall appear immediately below the specification number, type, and gage. The symbols shall be clearly legible and not less than 3/8 inch high and shall be applied by suitable means, using marking fluids which are not deleterious to the material and which are not obliterated by normal handling. Materials older than 4 quarters shall not be offered to the Government for acceptance.

3.4.2 Cut and molded shapes.- Where the size of the material permits, the identifying symbols shall be marked as specified in 3.4.1. All other items shall be marked as specified by the procuring activity.

3.5 Workmanship.- The finished rubber-coated cloth shall be clean, free of pinholes and other defects which might affect serviceability, and shall conform to the quality and grade of product established by this specification.

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Classification of tests.- All the tests required herein for the testing of rubber-coated cloth are classified as quality conformance tests for which necessary sampling techniques and methods of testing are specified in this section.

4.3 Quality conformance tests.-

4.3.1 Lot.- A lot shall consist of the base cloth, coated with a rubber compound from the same batch manufactured at one time.

4.3.2 Sampling.- The quality conformance tests, except for examination of product (4.4.1), shall be performed on each lot of the base cloth, the 6- by 6- by 0.75-inch rubber slabs manufactured from one batch of rubber compound, and the rubber-coated cloth. A sufficient number of test specimens shall be selected from each lot of cloth to perform all tests required by this specification. Where the size and nature of the coated cloth to be submitted for approval is not suitable for the preparation of test specimens, sufficient material to perform all the tests of this specification shall be furnished by the contractor and shall be accomplished by an affidavit to the effect that the samples are identical in composition and state of cure to the product under inspection.

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4.3.3 Tests.- The quality conformance tests shall consist of the tests specified under 4.4. Tests shall indicate satisfactory compliance with requirements specified in table II (see 3.3.2 and 4.4.3) and table III (see 3.3.3) and as specified in 3.3.3.2 (see applicable tests under 4.4.4).

4.3.4 Rejection and retest.- If any test specimen fails the specified tests, the material represented by the test specimen shall be rejected. The instructions on reworking or resubmitting rejected items shall be as specified in the general provisions of the contract.

4.4 Test methods.-

4.4.1 Examination of product.- The required yardage of coated fabric shall be examined on both sides for the visual defects of one class listed below. Defects shall be counted, regardless of their proximity to each other. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. The unit of product for this examination shall be 1 linear yard. The inspection level shall be level III of Standard MIL-STD-105 and the Acceptable Quality Level (AQL) shall be 0.25 defects per hundred units (yards). An equal number of yards shall be examined from each sheet or roll that appears in the sample. The number of pieces to be drawn shall be computed as follows:

$$\text{Number drawn} = \frac{\text{yards in sample}}{35}$$

Defects

Blister, lump, or foreign matter
Pinholes - any
Uneven coating causing thin areas
Creases - embedded
Cracked, blistered, or peeling coating
Overall uncleanliness

4.4.2 Physical tests on cloth.- The physical properties of the base cloth shall be determined as specified in Specification CCG-T-191.

4.4.3 Physical tests on rubber coating.- The physical properties of the rubber coating compound shall be determined as indicated herein.

4.4.3.1 Hardness and tensile strength and elongation.- The hardness and tensile strength and elongation shall be determined as specified in Methods 3021 and 6121, respectively, of Federal Test Method Standard No. 601. The test specimens shall have a constricted portion 1/4 inch by 2 inches for the tensile and elongation determination.

4.4.3.2 Air aging.- Specimens shall be given an accelerated aging by subjection to dry circulating air for 70 ± 2 hours at 212° ± 2° F. Determination of oven-aged properties shall be made not less than 16 hours nor more than 48 hours after removal from the oven.

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4.4.3.3 Fuel immersion test.- Rubber specimens shall be immersed in types I and III fluids of Specification MIL-S-3136, under the conditions specified in table III. At the expiration of the immersion period, the specimens shall be removed from the fluid and immediately tested.

4.4.3.4 Change in volume.- Volume change shall be determined in accordance with Method 6211 of Federal Test Method Standard No. 601 after 70 ± 2 hours immersion at 75° ± 5° F in types I and III fluids of Specification MIL-S-3136.

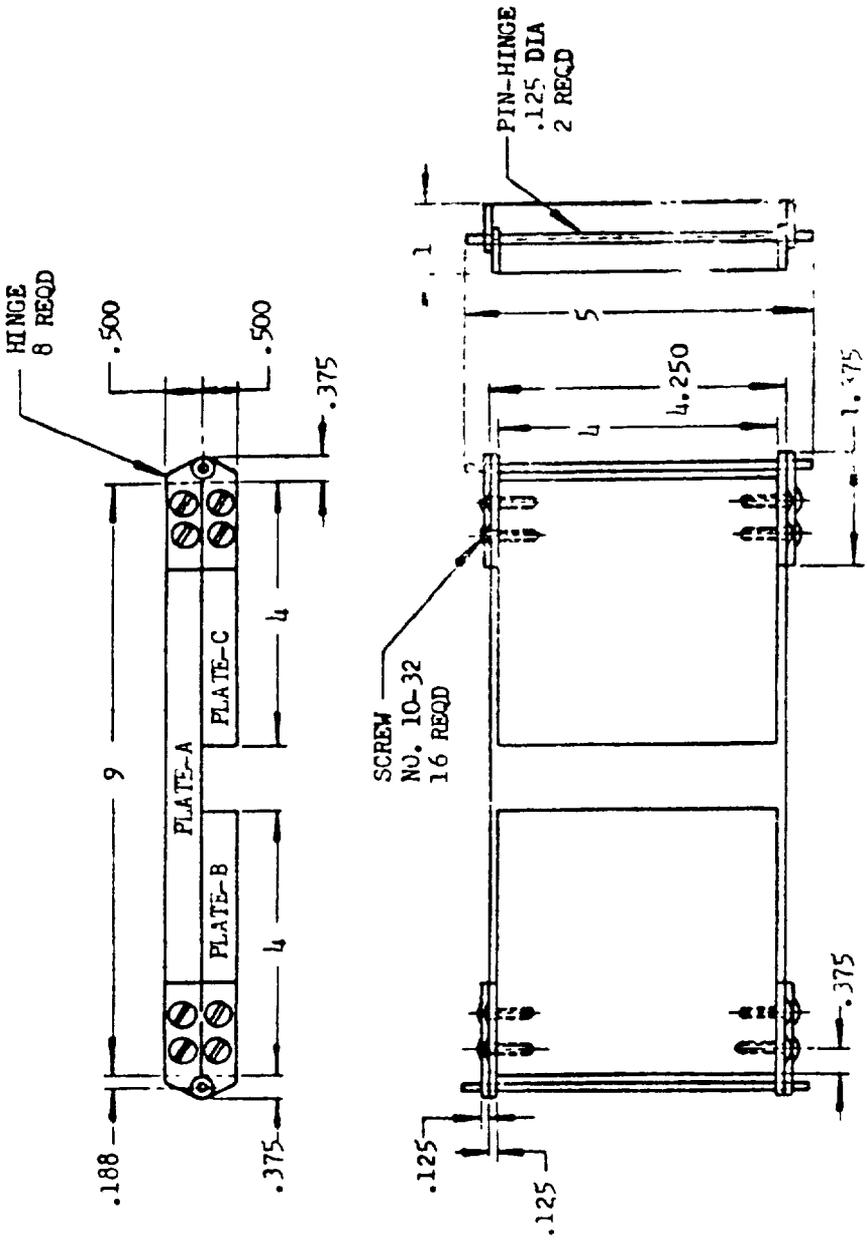
4.4.4 Physical tests on rubber-coated cloth.-

4.4.4.1 Thickness.- Measurements of thickness shall be made with a micrometer graduated to 0.001 inch under a load of 3 ± 0.1 ounces exerted by a weight through a flat contact foot 0.25 ± 0.01 inch in diameter. Measurements shall be made at 10 or more points, and the least value taken as the minimum thickness, and greater, as the maximum thickness.

4.4.4.2 Low-temperature flexibility test.- A 1- by 4-inch specimen of sheet rubber, a 1- by 4-inch diaphragm material specimen with the long direction warpwise, and specimen with the long direction fillingwise, shall be aged as indicated in table IV and subsequently cooled for 24 hours at a temperature of -67° ± 2° F in the test jig shown on figure 1. The jig shall then be bent sharply, face out, over a 1/8-inch rod to insure that the back of the specimen touches with 1/8-inch distance directly behind the rod.

4.4.4.3 Burst strength test.- The burst strength shall be determined by means of a Mullen tester. Measurements shall be made at five or more points distributed in reasonably uniform manner over the material. The average of five readings shall be recorded.

4.4.4.4 Permeability test.- Two disks 2-1/2 inches in diameter shall be cut from a sample of the coated cloth. One hundred milliliters of test fluid conforming to type III of Specification MIL-S-3136 shall be placed in a cup conforming to figure 2. A nylon solution of 10 percent of nylon in methyl alcohol, maintained at about 120° F, shall be applied to the cup flange as indicated on figure 2. When the nylon solution is almost dry, the test disk shall be applied to the cup. The assembly shall be completed by attaching the bolting ring shown on figure 2 and tightening the bolts to a torque of 15 to 20 inch-pounds. The cups shall then be placed in a suitable rack and maintained at a temperature of 75° ± 5° F and a relative humidity of 65 percent ± 5 percent for a 1-hour equilibrium period. At the end of the 1-hour equilibrium period, the cup shall be weighed to the nearest 0.005 gram and placed in the rack with the face of the cup facing upward. The cup shall be maintained at a temperature of 75° ± 5° F and a relative humidity of 65 percent ± 5 percent for a 24-hour period. The cup shall then be weighed to check for excessive vapor loss. The bolts shall be retorqued if necessary. The cup shall be inverted (test disk down) in a rack that permits free access of air to the test disk. The cups shall be weighed at the end of the third, fifth, and eighth day after inverting. Defective films or leaks caused by faulty assembly will usually be found when weighing on the third day. The diffusion rate calculation shall be made on a 72-hour period between the fifth and the eighth day period and expressed as fluid ounces per square foot per 24 hours. The permeability shall be less than 2 fluid ounces per square foot per 24 hours.

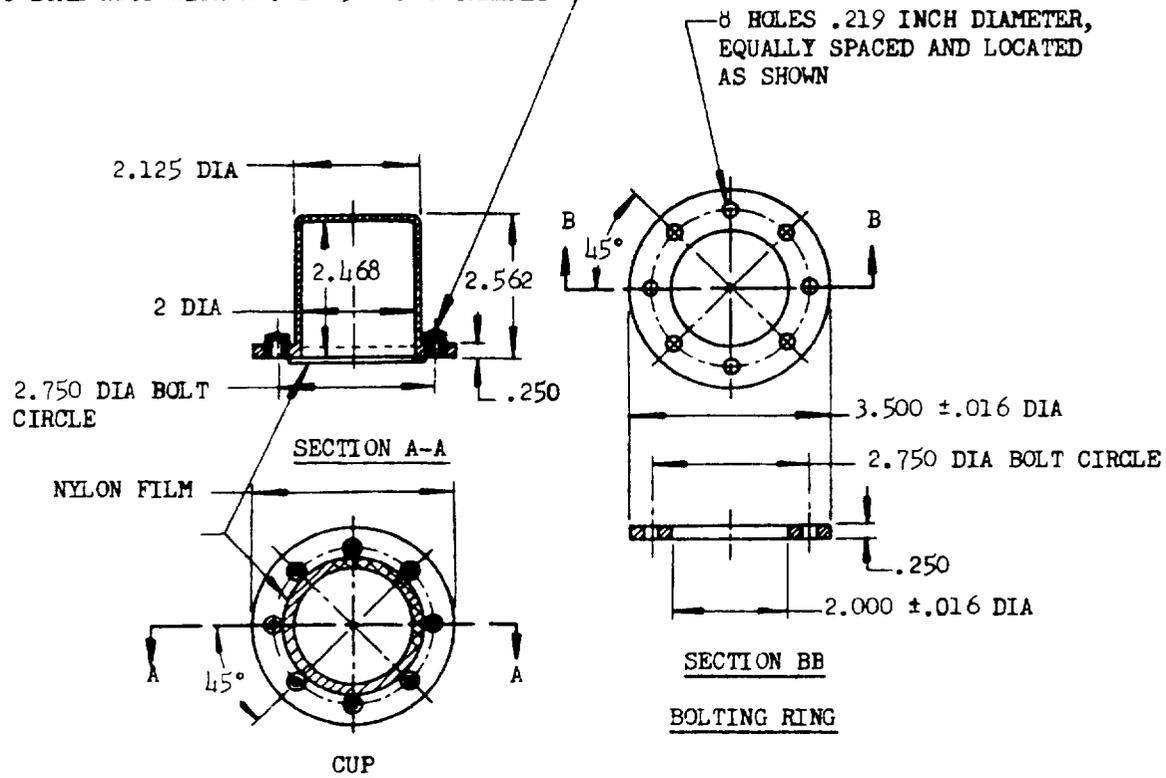


MATERIAL: PLATES AND HINGES, ALUMINUM ALLOY.
 HINGE PINS, STEEL ROD.
 SMOOTH MACHINE FINISH ALL OVER.
 DIMENSIONS IN INCHES.

FIGURE 1. Jig assembly - low-temperature flexibility

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8 DOME NUTS WITH NO. 10-32 NF-2 THREADS



BREAK ALL EDGES .031 MAX RAD.

ALL FILLETS .031 MAX RAD.

MATERIAL: 17ST ALUMINUM-ALLOY BAR STOCK, OR EQUAL.

DIMENSIONS IN INCHES. UNLESS OTHERWISE SPECIFIED, TOLERANCES: ± 0.010 .

FIGURE 2. Cup for permeability test

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NOTE: Diffusion expressed in fluid ounces per square foot per 24 hours equals the gram loss of the test specimen per 24 hours multiplied by a factor K which is defined as follows:

$$K = \frac{144}{(\text{Specific gravity}) (29.573) (3.142) (R)}$$

Where specific gravity = specific gravity of test fluid at 77° F,

R = inside radius of the test cup in inches.

4.5 Examination of packaging, packing, and marking.- An examination shall be made to determine that packaging, packing, and marking comply with section 5 of this specification. Defects shall be scored in accordance with table V. The sample unit shall be one shipping container fully prepared for delivery. The lot size shall be the number of shipping containers prepared for shipment at the same time. The inspection level shall be L-7 of Standard MIL-STD-105 and the AQL shall be 2.5 defects per 100 units.

TABLE V. Classification of defects - packaging, packing, and marking

Examination	Defects
Marking (exterior and interior)	Omitted, incorrect, illegible, of improper size or method of application.
Materials	Any component missing or damaged affecting serviceability.
Workmanship	Incomplete closures of case liners, container flaps, loose or inadequate stapling, bulged or distorted containers.
Weight	Gross weight exceeds requirements.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking.- Shipments shall be packaged, packed, and marked in accordance with Specification PPP-P-51 and as specified in (a) and (b). Packaging and packing shall be level A, B, or C as specified by the procuring activity (see 6.2).

- (a) Sheet: Within exterior shipping containers, one to a container. Unless otherwise specified, each roll shall be a minimum of 75 feet in length with a maximum of 3 pieces per roll, and no piece shall be less than 15 feet in length. The material shall be wound on suitable cores which will provide rigid support and which will not distort or change shape during handling or shipment. Each roll shall be wrapped in heavy kraft paper and sealed with paper tape before packing in the containers.
- (b) Cut and molded shapes: Packaged in 25 unit containers and packed with exterior shipping containers of dimensions designed to prevent permanent deformation of the material under storage conditions.

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5.1.1 Marking.- The identification marking shall include the following information:

CLOTH, COATED, NYLON, RUBBER-COATED, FUEL-RESISTANT
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 Type
 Cured or uncured
 Gage
 Width _____, Length _____, Pieces _____

5.1.1.1 Precautionary marking.- The following precautionary markings shall be included on each shipping container:

"STORE IN A COOL DRY PLACE"

6. NOTES

6.1 Intended use.- The rubber-coated cloth covered by this specification is intended for use as fuel metering diaphragms on aeronautical equipment, or any other application where a fuel-resistant, rubber-coated cloth is necessary.

6.2 Ordering data.- Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Types (see 1.2).
- (c) Form, dimensions, number of sheets or shapes required (see 5.1).
- (d) Detail drawings, and additional specifications (if any).
- (e) Levels of packaging and packing (see 5.1).

NOTE: The material will not be ordered for more than 6 months' use.

6.3 Marginal indicia.- The margins of this specification have been marked to indicate where changes, deletions, or additions from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written, irrespective of the marginal notations and relationship to the last previous issue.

Custodians:
 Navy - Weps
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Preparing activity:
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