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MILITARY SPECIFICATION

* CLOTH, COATED, ASBESTOS/ARAMID, PLAIN WEAVE, ALUMINIZED AND CHLOROPRENE COATED

This specification is approved for use by the Navy Clothing and Textile Research Facility, 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 the requirements for one type of lightweight asbestos/aramid plain weave material coated with a vacuum deposited aluminum face and a chloroprene back.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS

FEDERAL

QQ-S-766	- Steel Plates, Sheets, and Strip Corrosion Resisting
CCC-C-419	- Cloth, Cotton, Duck, Unbleached, Plied-Yarns, (Army and Numbered)
PPP-P-1136	- Packaging and Packing of Coated (Plastic; Rubber) and Laminated Fabrics

STANDARDS

FEDERAL

FED-STD-191	- Textile Test Methods

Beneficial comments (recommendations, additions, and deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

MILITARY

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-129	- Marking for Shipment and Storage
MIL-STD-1487	- Glossary of Cloth Coating Imperfections

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring 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 a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

D1918-Asbestos Content of Asbestos Textile Materials

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

3. REQUIREMENTS

3.1 Standard sample. When a standard sample is available, the finished cloth shall be equal to or better than the sample with respect to all characteristics for which the standard sample is referenced (see 6.3).

* 3.2 First article. When specified (see 6.2), the contractor shall furnish a sample for first article inspection and approval (see 4.3).

* 3.3 Material. (see 6.7)

* 3.3.1 Base fabric. The yarns for both the warp and filling shall be a 36 cut core spun asbestos-aramid yarn made by twisting asbestos strands (100% asbestos) around a 200 denier aramid yarn. The cloth shall conform to the physical requirements listed in Table I when tested as specified in 4.4.1.1 and 4.4.1.1.1.

* Table I - Physical requirements of base cloth

Characteristics	Requirements	
	Minimum	Maximum
Weight - oz/yd^2 (g/m^2)	10.3 (349.2)	11.7 (396.7)
Yarns per inch (2.5 cm)		
Warp	37	-
Filling	21	-
Asbestos content (percent)	80	84
Breaking strength - lbs. (Newtons)		
Warp	135 (600.8)	-
Filling	85 (378.3)	-
Tearing strength - lbs. (Newtons)		
Warp	17 (75.7)	-
Filling	15 (66.8)	-
Weave	Plain	

3.3.2 Chloroprene compound - The coating compound shall be a flame retardant, chloroprene rubber, pigmented black which shall meet the requirements of this specification. Flame inhibitors such as chlorinated paraffines and polychlorinated polyphenyls may be used. The use of water soluble compounding ingredients and reclaimed rubber is prohibited (see 4.4.1.2).

* 3.3.2.1 Coating. The chloroprene coating shall be applied to the back of the fabric, after which the fabric shall be fully vulcanized (see 6.5). There shall be no strike through of the coating to the uncoated side. The weight of the chloroprene coating shall be not less than 3.0 and not more than 4.0 ounces per square yard (111.7 to 135.6 g/m^2) when tested as specified in 4.4.1.1. To prevent blocking, the coated side shall be dusted with a whiting talc, or other finely divided mineral material which will not support mildew growth (see 4.4.1.2).

3.3.3 Aluminum film. The metal used for the application shall consist of pure aluminum which shall meet the requirements of this specification.

3.3.3.1 Application. The vacuum deposited aluminum shall be applied to the face of the cloth so that the resulting film will adhere firmly to the cloth and produce a smooth, highly reflective surface resistant to abrasion.

3.4 Finished cloth. The finished cloth shall conform to the physical requirements shown in table II when tested as specified in 4.5.

* Table II - Physical requirements of finished cloth

Characteristics	Requirements
Weight - oz/yd^2 (g/m^2)	
Minimum	15.0 (508.5)
Maximum	18.0 (610.2)
Breaking strength - Minimum lbs (Newtons)	
Warp	200 (890.0)
Filling	95 (422.8)
Tearing strength - Minimum lbs (Newtons)	
Warp	11 (48.9)
Filling	10 (44.5)
Stiffness, bending moment Maximum - inch - lbs. (N.m)	
Warp	0.052 (0.006)
Filling	0.030 (0.003)
Wet flexibility	No evidence of cracking or delamination of aluminized film from the adhesive coating and/or base cloth.
Adhesion of aluminized coating	No evidence of separation from the adhesive coating and/or base cloth.
Adhesion of aluminized coating after wet flexing	No evidence of separation from the adhesive coating and/or base cloth.
Blocking, scale rating	(1) No blocking: Cloth and coated surfaces are free.
Flame resistance, vertical (Warp direction only) Maximum	
After flame, sec.	1.0
Char length, inches (cm)	1.0 (2.54)
Resistance to low temperature	No signs of cracking
Reflectivity after abrasion	No visual discoloration of the blotting paper. No evidence of flaking of the aluminum coating during post flex and no cracking or separation of the coating from the base cloth.
Water resistance - psi (kPa) Minimum	175 (1206)
Water resistance after resistance to low temperature test - psi (kPa) Minimum	175 (1206)
Water resistance after adhesion of coating test - psi (kPa) Minimum	175 (1206)

3.5 Width. The minimum width of the coated portion of the cloth (excluding selvage), shall be as specified in the contract or order (see 6.2).

3.6 Length and put-up. The cloth shall be furnished either in continuous full length rolls of not less than 40 yards (36.0m) each and not more than 50 yards (45.0m) or in sheets of not less than 2 yards (1.8m), as specified in 6.2. The cloth (full length or 2 yard (1.8m) sheets shall be put up to meet the requirements of PPP-P-1136 except that the material shall be rolled with the aluminized side facing outward.

3.7 Tickets. Each roll of full width pieces shall have an identification ticket conforming to the requirements of PPP-P-1136 attached to the selvage at the end of the roll. In addition to the markings specified, the date (month and year) of vulcanization and of aluminization shall be shown.

3.8 Workmanship. The finished cloth shall be clean, evenly coated, and shall conform to the quality and grade of product established by this specification. The occurrence of defects shall not exceed the specified acceptable quality levels.

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 order, the contractor may use his own of 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 the prescribed requirements.

4.1.1 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

* 4.2 Classification of inspection. The inspection requirements specified herein are classified as follows:

1. First article inspection (see 4.3).
2. Quality conformance inspection (see 4.4).

4.3 First article inspection. When required, the first article of the coated cloth submitted in accordance with 3.2 shall be visually inspected for finish and appearance and shall be tested for the chemical and physical properties in accordance with the applicable methods specified in 4.5.

4.4 Quality conformance inspection. Inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated.

4.4.1 Component and material inspection. In accordance with 4.1 above, components and materials shall be inspected and tested in accordance with all requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified or qualified in this specification or applicable purchase document.

4.4.1.1 Testing for components. In addition to the quality assurance provisions of the subsidiary specifications, components listed in Table III shall be tested for characteristics shown. The method of testing specified in FED-STD-191, wherever applicable, and as listed in Table III and in 4.4.1.2 shall be followed. The unit of product for lot formation shall be expressed in units of one yard (.9 m). The sample size shall be as shown in Table V. The sample unit of product for testing shall be 1/2 yard (0.5 m), full width of the base cloth and 1/4 yard (0.2m) of the chloroprene coated cloth. The physical values specified shall apply to the average of the determinations made on a sample unit for test purposes as specified in the applicable test methods. The lot shall be unacceptable if any unit fails to meet any requirement specified. All test reports shall contain the individual values utilized in expressing the final result.

Table III - Testing of components

Components	Characteristics	Specification Reference	
		Requirements	Test Methods
Base cloth	Weight	Table I	5041
	Yarns per inch (2.5cm)	Table I	5050
	Asbestos content	Table I	4.4.1.1.1
	Weave	Table I	Visual 1/
Chloroprene coating	Weight	3.3.2.1	5041 2/

1/ One determination per sample unit. Report shall indicate "pass" or "fail"
2/ The differences in weight between the chloroprene coated cloth and the base cloth shall be the weight of the coating

4.4.1.1.1 Asbestos content of base cloth. Two specimens, weighing not less than 5 grams each, shall be taken from each unit of product, brought to constant weight in an oven at 105° to 110°C (220° to 230°F) and the weights of the dried specimens recorded. The specimens shall be placed in an electric furnace and heated for not less than one hour at 800° to 810°C (1470° to 1490°F). After removal from the furnace they shall be cooled in a desiccator to room temperature, and the weights recorded. The asbestos content shall be computed as follows:

$$\text{Percent asbestos} = \frac{116.3 \times R}{D}$$

D - Dried weight of the specimen
R - Weight of the residue

The average of two determinations made on the unit of product shall be reported as the asbestos content of the base cloth.

4.4.1.2 Certificate of compliance. A certificate of compliance shall be furnished with each shipment or lot stating the following:

a. The flame retardant chloroprene rubber contains no reclaimed rubber or water soluble compounding ingredients (see 3.3.2).
b. Dusting powder will not support mildew growth (see 3.3.2.1).

4.4.2 Examination of the end item. The end item shall be examined for defects listed in 4.4.2.1 through 4.4.2.5.3.

4.4.2.1 Yard-by-yard examination when furnished in rolls. Both sides shall be examined for the defects listed below. The defects shall be counted regardless of their proximity to each other, except where two or more defects represent a single local condition of the cloth, in which case only one defect shall be counted. A continuous defect shall be counted as one defect for each warpwise yard or fraction thereof in which it occurs. In addition, the cloth shall be given a through-light inspection for pinholes. The through-light inspection shall be performed in accordance with MIL-STD-1487. The sample unit for this examination shall be 1 linear yard (0.9m). The acceptable quality level (AQL) for this examination shall be 4.0 defects per 100 units. The inspection level shall be level II of MIL-STD-105. The number of rolls from which the sample is to be selected shall be in accordance with table IV. An approximately equal number of yards shall be examined from each roll selected. No more than one roll shall be selected from any container.

Defects

Any cut, hole or tear.
Any missing or uneven coating (thin or heavy) or coating repairs.
Any discoloration (spot, stain or streak).
Selvage, rolled, wrinkled or folded.
Blister or flakiness.
Any tunnel or delamination of coating.
Any pinhole.
Any crease, wrinkle or foldover.
Abrasion mark resulting in a weak place or noticeable removal of the coating.

4.4.2.2 Overall examination when furnished in rolls. Each defect listed below shall be counted not more than once in each roll examined. The sample unit for this examination shall be one roll. The sample size (number of rolls selected as sample) for this examination and the acceptance number shall be as shown in table IV.

Defects

Coating not uniform, mottled, blotchy or spotted.
Selvage beaded, corded, loopy.
Overall uncleanness.
Width less than specified
Cloth not rolled with aluminized side facing outward.

4.4.2.3 Visual examination when furnished in sheets. The required number of sheets shall be examined on both sides for defects listed below. All defects found shall be counted regardless of their proximity except where two or more defects represent a single local condition of the cloth, in which case only one defect shall be counted. A continuous defect shall be counted as one defect for both warp-wise yards or fraction thereof in the sheet. In addition, the cloth shall be given a through-light inspection for pinholes. The through- light inspection shall be performed in accordance with MIL-STD-1487. The sample unit for this examination shall be one linear yard (0.9 m). The sample size, expressed in yards, shall be in accordance with inspection level II of MIL-STD-105. The number of sheets examined shall be the sample size, divided by 2. The acceptable quality level shall be 4.0 defects per 100 yards (91.4m) (50 sheets). The lot size shall be expressed in units of one linear yard each. An equal number of sheets shall be examined from each put-up or package. The number of put-up or packages from which the sample is selected shall be in accordance with table IV.

Defects

Any cut, hole or tear.
Any missing or uneven coating (thin or heavy) or coating repairs.
Any discoloration (spot, stain or streak).
Selvage, rolled, wrinkled or folded.
Blister or flakiness.
Any tunnel or delamination of coating.
Any pinhole.
Any crease, wrinkle, or foldover.
Abrasion mark resulting in a weak place or noticeable removal of coating.

4.4.2.4 Overall examination when furnished in sheets. Each defect listed below shall be counted not more than once in each sheet examined. The sample unit for this examination shall be one sheet. The sample size (number of sheets selected as sample) for this examination and the acceptance number shall be as shown in table IV.

Defects

Coating not uniform, mottled, blotchy or spotted.
Selvage beaded, corded, loopy.
Overall uncleanness.
Width less than specified.
Length less than 72 inches (183 cm)
Cloth not rolled with aluminized side facing outward.

Table IV - Sample size (rolls) for yard-by-yard examination

Lot size (Yards)	Sample size (rolls)	Acceptance No.
Up to 1200 1/	3	0
1201 up to and including 3200	5	0
3201 up to and including 10,000	7	0
10,001 up to and including 35,000	10	0
35,001 and over	15	1

1/ If lot contains fewer than 3 rolls, each roll in the lot shall be examined.

4.4.2.5 Examination for lengths.

4.4.2.5.1 Examination for length of individual rolls. Each individual roll in the sample shall be examined for gross length, number and length of pieces in the roll. Any gross length found to be less than specified minimum length, or any gross length found to be more than 2 yards (1.8m) below the gross length marked on the roll ticket shall be considered as a defect with respect to length. The unit of product for this examination shall be one roll. The sample size and acceptance number shall be as shown in table IV.

4.4.2.5.2 Examination for sheets. The sample unit for this examination shall be 1 yard (0.9m). The acceptable quality level shall be 4.0DHU. The lot size shall be expressed in units of 1 yard each. Any sheet more than 2 inches (5.1cm) below the required length shall be considered a defect with respect to length. The sample size shall be in accordance with inspection S-1 of MIL-STD-105.

4.4.2.5.3 Examination for total yardage in sample. For rolls, the lot shall be unacceptable if the total of the actual gross length of rolls in the sample (4.4.2.5.1) is less than the total of the gross lengths marked on the corresponding roll tickets. For sheets, the lot shall be unacceptable if the average of the lengths measured in the sample (4.4.2.5.2) is less than the total required for these sheets.

4.4.3 Examination of packaging. An examination shall be made to determine that packaging, packing and marking comply with Section 5 requirements of this specification. The examination shall be conducted as specified in PPP-P-1136.

4.5 Tests. The methods of testing specified in FED-STD-191 whenever applicable, and as listed in table VII and subsequent paragraphs shall be followed. The lot size shall be expressed in units of 1 linear yard. The sample unit for all characteristics, except flame resistance, reflectivity, wet flexing and adhesion after wet flexing shall be 2 yards (1.8m) full width of the coated cloth. The sample size shall be in accordance with table V. For the flame resistance, reflectivity, wet flexibility and adhesion after wet flexibility characteristics, the Government will test each lot and acceptance will be based on Government results. The sample unit for these four characteristics shall be 1 yard (0.9m) full width and the sample size shall be in accordance with table VI.

Table V - Sample size

Lot size	Sample size
800 or less	3
801 up to and including 22,000	5
22,001 and over	7

The lot shall be unacceptable if one or more units of product fail to meet any requirements specified.

Table VI - Sample size

Lot size	Sample size
800 or less	5
801 up to and including 2,000	8
2,001 up to and including 5,000	11
5,001 up to and including 10,000	13
10,001 and over	15

The lot shall be unacceptable if one or more units of product fail to meet any requirements specified.

Table VII - Test methods

Characteristics	Requirement	Test method
Weight	Table II	5041
Breaking strength	Table II	5100
Tearing strength	Table II	5132 1/
Stiffness, bending moment	Table II	5202 2/
Resistance to high temperature (blocking)	Table II	5872 3/
Flame resistance, vertical	Table II	5903

Table VII - Test methods (cont'd)

Characteristics	Requirement	Test method
Reflectivity after abrasion	Table II	4.5.1
Flexibility at low temperature	Table II	4.5.2 3/
Wet flexibility	Table II	4.5.3
Adhesion of coating	Table II	4.5.4
Adhesion after wet flexing	Table II	4.5.5
Water resistance	Table II	5512 4/
Water resistance after low temperature	Table II	5874 and 5512 4/ 5/
Water resistance after adhesion of coating	Table II	5972 and 5512 4/

1/ Add one augmenting weight; heavy duty instrument
2/ Moment weight 0.155 lbs.
3/ Failure of one specimen shall constitute failure of unit of product
4/ Method 5512 - The aluminum coated side of the cloth shall face the water.
5/ Method 5874 - Specimens exposed at minus 20°F (-29°C) for 1 hour.

4.5.1 Reflectivity after abrasion.

4.5.1.1 Apparatus - Abrasion. The apparatus for simulating wear shall be the Wyzenbeek Abrader described in Method 5304 of FED-STD-191.

4.5.1.2 Apparatus - Heat Reflectivity. The apparatus for conducting the heat reflectivity tests shall be in accordance with figure I. The heat source shall consist of a bank of five, 500 W, infrared, tubular, translucent quartz lamps having a 5-inch (12.7 cm) lighted length and a mean overall length of 8 13/16 inches (22.4 cm). The lamps shall be mounted so that the lamp surfaces are approximately 0.015 inch apart. The bank or array shall be mounted and centered behind a 2 1/4 by 5 1/2 inch (5.7 by 14.0 cm) cutout on 1/2 inch (1.3 cm) transite board. A specimen holder and holder plate with a 2 1/2 by 6 inch (6.4 by 15.2 cm) center cutout shall be positioned so that the distance from the nearest lamp sufaces to the test specimen is exactly one inch (2.5 cm). The quartz lamp shall be heated electrically and the power input controlled by means of a variac having a capacity of at least 25 amps. A voltmeter, accurate to ± 1 volt shall be installed on the load circuit to indicate operating or load voltage to the lamps.

4.5.1.3 Apparatus - Flexing Device. A device as described in figure 2 shall be used. This device must have a suitable weight on the weight arm to produce a 3 to 3 1/2 pound (1.4 to 1.6 kg) tension on the specimen during flexing. The tensioning jaw or clamp must be so located that, with tension jaw arm vertical, any point on the tensioning jaw would be the apex of a cone of motion generated between that point and the corresponding point on the moving jaw. The crank arms must be equal in effective length and in angular phase so that the moving jaw connecting the two arms remains parallel to the tension jaw throughout a complete revolution of the arms.

The specimen is placed in the device with the moving jaw at bottom dead center, the tension jaw arm vertical, and the metallized face of the cloth down. Each jaw must clamp the specimen across the entire width. The crank handle is turned at a rate of 50 plus or minus 10 revolutions per minute of the crank arms (and moving jaw) during the test. The tray or board, flat black in color and sufficiently large to catch any particles that are removed from the fabric, is cleaned before each test and examined for metallic flakes after each test. (A motor driven apparatus may be used in lieu of the manual device specified).

4.5.1.4 Test procedure. The test specimen shall be approximately 3 by 9 inches (7.6 by 22.9 cm) with the long dimension in the direction of the warp. The test specimen shall be mounted on the oscillating drum of the abrasion apparatus. The abradant shall be No. 6 hard textured cotton duck conforming to type I of CCC-C-419 and shall be cut into strips 1 7/8 inches (4.7 cm) wide by 9 inches (22.9 cm) long with the long dimension in the direction of the warp. The abradant shall be mounted in the specimen holding clamps under a tension of 3 pounds (1.4 kg) and a head load of 3 pounds (1.4 kg). A new abradant shall be used for each test and the contact area of the abradant shall be free of slubs, knots, etc. The test sample shall be subjected to 300 abrasion cycles. Before positioning specimen holder in front of the heat source, apply current to the lamps and adjust variac to obtain 110 operating voltage as indicated by the voltmeter. The individual lamp temperature shall be determined by a properly scaled optical type pyrometer. The temperature indications shall be taken with an optical type Pyrometer along the center line of the individual lamps, not between the lamps. The average temperature of the array shall be 2990°F ± 10°F (1643°C + 6°C) and the individual lamps shall not vary more than ± 25°F (± 14°C) from the average temperature. Adjustments may be made in the variac setting to obtain the specified temperature. The variac setting shall be undisturbed and current to the lamps shall be shut off. The abraded specimen shall then be placed in the specimen holder so that the abraded area will be centered in the opening of the specimen holder. A sample of white blotting paper, approximately 4 x 8 inches (10.2 by 20.3cm) in dimension and conforming to requirements detailed in method 5500 of FED-STD-191 shall be placed behind the test specimen. The specimen holder containing the test specimen and the blotting paper shall be positioned in front of the heat source so that the distance from the specimen to the nearest edges of the lamp surface is exactly one inch (2.5 cm). Current shall be applied to the lamps and the specimen shall be exposed for 40 seconds. Timing shall start when the current is applied to the lamps and terminate when the current is shut off. The specimen holder shall be removed from the apparatus and the white blotting paper shall be examined for evidence of discoloration. The cooled specimen shall then be mounted in the flexing device and shall be flexed for 20 cycles.

4.5.1.5 Report. Any visual evidence of discoloration of the blotting paper shall constitute failure of the specimen. Any evidence of flaking of the aluminum coating during the postflex shall also constitute failure of the specimen. Five specimens shall be tested from each unit of product. Failure of any one specimen shall constitute failure of the unit of product.

4.5.2 Flexibility at low temperature. Five, 1 by 4 inches (2.5 by 10.2 cm) specimens, long direction warpwise, and coated face of side being tested away from the rod, shall be placed in the open test jigs (see figure 3). The specimens, in open jigs, shall be conditioned for 4 hours at a temperature of $-20^{\circ}F$ ($-29^{\circ}C$). At the end of the conditioning period, with the jigs and specimens still in the test atmosphere, the jigs shall be rapidly closed so that the specimens are bent face-out around the 1/8 inch (0.6 cm) diameter rod with the back of each specimen touching itself over its full width at least 3/16 inch (.5 cm) from the axis of the rod. The breaking, shattering, or cracking of the coating of a single specimen shall constitute failure in this test. The tested fabric shall be visually examined without magnification. Both the aluminum and chloroprene coated sides shall be tested.

4.5.3 Wet flexing. Test specimens shall be 4 inches wide by 8 inches (10.2 by 20.3 cm) long with the long direction parallel to the warp. The test specimen shall be immersed in a pan of water maintained at $140^{\circ}F \pm 5^{\circ}F$ ($60^{\circ}C \pm 3^{\circ}C$) fifteen (15) minutes. Only one specimen at a time shall be immersed and carried through to the end evaluation. Upon removal from the water it shall be placed on two (2) layers of absorbent type blotters (same as specified in 4.5.1.4) and covered by two (2) additional layers. After placing the wet specimen between the blotters a 10 pound (22.1 kg) weight, a steel rod 3 inches (7.6 cm) in diameter and 5 inches (12.7 cm) long, shall be rolled over the test specimen for four (4) complete cycles (eight passes). The specimen is then removed from between the blotters and placed in the flexing device (as described in figure 2), with the warp direction perpendicular to the jaw line. The distance between jaw lines shall be 4 1/2 inches (11.5 cm). The specimen shall be flexed for 1000 cycles and then removed from the apparatus and visually inspected for delamination. The test specimens shall be reported "failed" if delamination or cracking occurs further than 3/8 inch (1.0 cm) from either jaw line. Five (5) specimens from each sample unit shall be tested with no two specimens containing the same yarns. Failure of any one specimen shall constitute failure of sample unit.

4.5.4 Adhesion of aluminum coating. (tape method)

* 4.5.4.1 Preparation for test. The pressure sensitive tape used for testing the adhesion of the aluminum shall have an adhesion value of not less than 2.75 pounds per inch (481N/m) width. Five 1 by 8 inch (2.5 by 20.3 cm) specimens of the tape shall be tested using:

a. A tensile testing machine as described in FED-STD-191, Method 5100 (except that all machine attachments for determining maximum load shall be disengaged and the speed of the pulling clamp shall be 20 inches per minute.)
b. Five 2 by 4 inch (5.1 by 10.2 cm) steel plates conforming to class 301 of QQ-S-766 which have been polished to a No. 4 finish

c. A 1 1/2 inch (3.8 cm) wide steel roller weighing 10 pounds ± 2 ounces (22.1 kg ± 57g).
Before each test, the steel plates shall be thoroughly cleaned with trichloroethylene or other suitable solvent using a clean piece of lintless wiping tissue. The tape shall be applied to the clean surface of the plate so that it covers the entire length of the plate and extends 4 inches (10.2 cm) beyond one end of the plate. The tape shall be pressed down by passing the roller over it six times, three times in each direction. The free end of the tape shall be doubled back and 1 inch (2.5 cm) of the tape peeled off the plate. The plate shall be inserted and clamped in the bottom jaw of the tensile testing machine with the free end of the tape downward. The free end of the tape shall be looped upward and inserted and clamped in the upper jaw so as to peel the tape from the plate when the jaw motion is started. The minimum tension required to remove the remainder of the tape, except for the final inch (2.5 cm), shall be the adhesion value and shall be determined by means of the autographic recording device.

4.5.4.2 Test procedure. Five 1 by 8 inch (2.5 by 20.3 cm) specimens of similar tape, taken from a lot of material which has passed the test as specified above, shall be used for testing the adhesion of the aluminum film to the adhesive coating and/or base cloth. The apparatus and procedure shall be as specified above, except that instead of the steel plates, five 2 by 4 inch (5.1 by 10.2 cm) specimens of the finished cloth shall be used. Two "X" and three horizontal cuts shall be made with razor blade through the aluminum and adhesive layers, but not through the cloth, as shown in figure 4. The tape shall be applied so that the long dimension of the tape is superimposed on the axis of the "X" and horizontal cuts. The specimens need not be cleaned prior to the test and shall not contain any imperfections.

4.5.4.3 Report. Evidence of separation of the aluminum coating from the adhesive coating and/or base cloth shall constitute failure of the unit of product represented. Five specimens shall be tested from each unit of product. The failure of one specimen shall constitute failure of unit of product represented.

4.5.5 Adhesion after wet flexing. The five (5) specimens tested in 4.5.3 shall be immediately tested and evaluated for adhesion in accordance with the procedure in 4.5.4 except that the razor cut design shall be symetrically centered within the 4 by 8 inch (10.2 by 20.3 cm) specimen.

5. PACKAGING

5.1 Preservation-packaging. Preservation-packaging shall be level A or C as specified (see 6.2).

5.1.1 Levels A and C.

5.1.1.1 Rolls (see 6.2). The coated cloth shall be put-up and packaged in accordance with the applicable requirements of PPP-P-1136.

5.1.1.2 Sheets (see 6.2). Twenty-five, two yard (1.8 m) length sheets of coated cloth, abutted end to end, shall be placed on a sheet of commercial grade kraft paper that is cut the same length and width as the combined number of pieces. The twenty-five sheets of coated cloth placed on the sheet of kraft paper shall be rolled and packaged in the same manner as specified for the rolls of coated cloth in paragraph 5.1.1.1.

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

5.2.1 Levels A, B and C. The coated cloth shall be packed in accordance with the applicable requirements of PPP-P-1136.

5.3 Marking. In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with PPP-P-1136.

6. NOTES

6.1 Intended use. The cloth covered by this specification is intended for use in the manufacture of proximity fire fighters protective clothing.

6.2 Ordering data. Procurement documents should specify the following:

a. Title, number and date of this specification
b. Requirements for first article approval (see 3.2)
c. Width required (see 3.5)
d. Whether cloth shall be in full length pieces or in sheets (see 3.6)
e. Selection of applicable levels of packaging and packing (see 5.1 and 5.2)

6.3 Samples. For access to samples, address the procuring activity issuing the invitation for bids.

6.4 Testing devices outlined in figures 1, 2, 3, and 4 are not manufactured commercially.

6.5 Note. A satisfactory material has been produced by application of the chloroprene coating to the base cloth prior to aluminization.

* 6.6 The asbestos aramid fabric is manufactured solely by Raybestos-Manhattan, Inc., Turnbull, CN, and has been given the trade name Novatex.

* 6.7 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

* 6.8 Changes from previous issue. The margins of this specification are marked with an asterisk to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was 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 irrespective of the marginal notations and relationship to the last previous issue.

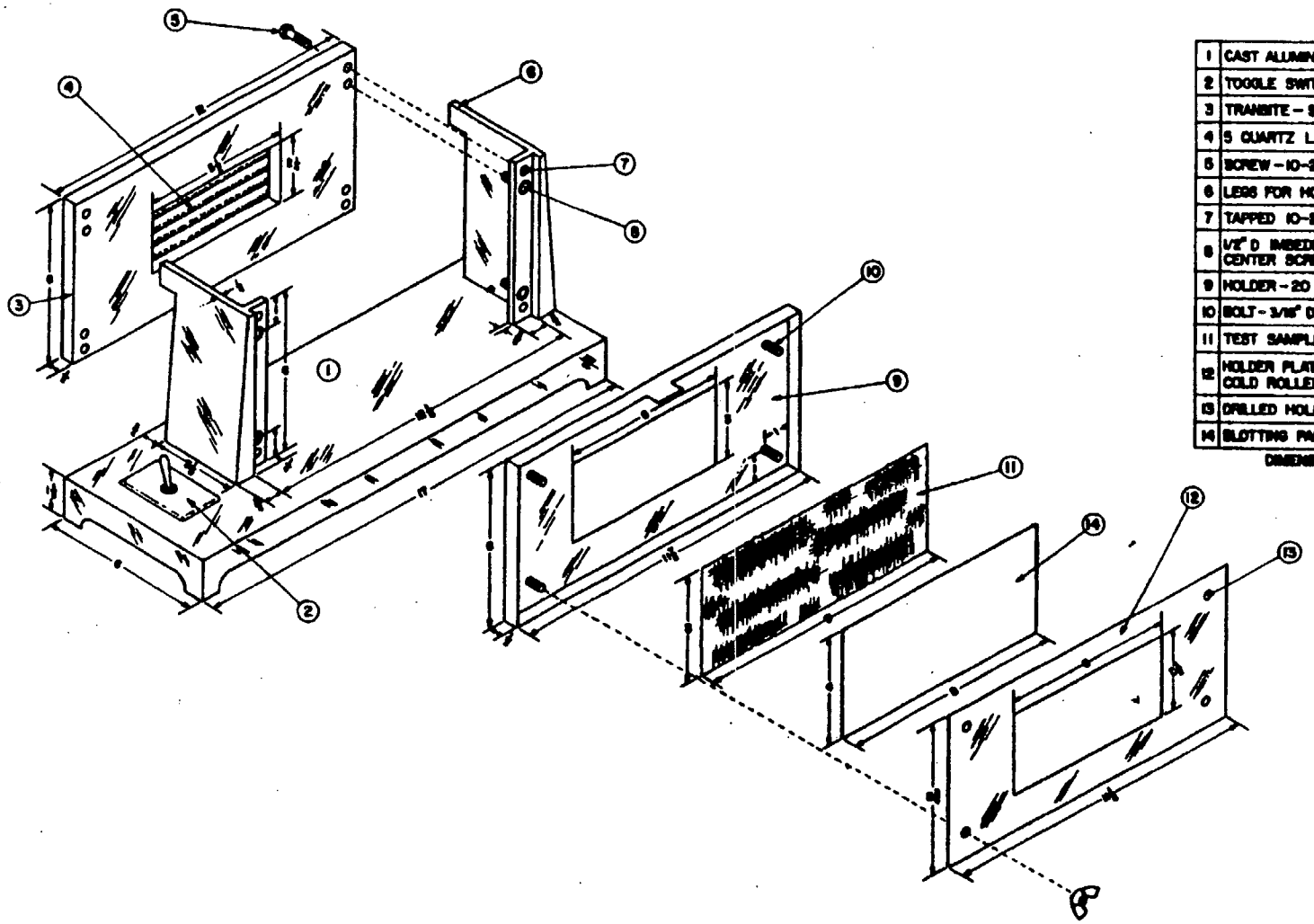
Custodian:
Navy - NU

Preparing activity:
Navy - NU

Review activity:
DLA - CT

User:
Navy - MC

Project No. 8415-N745

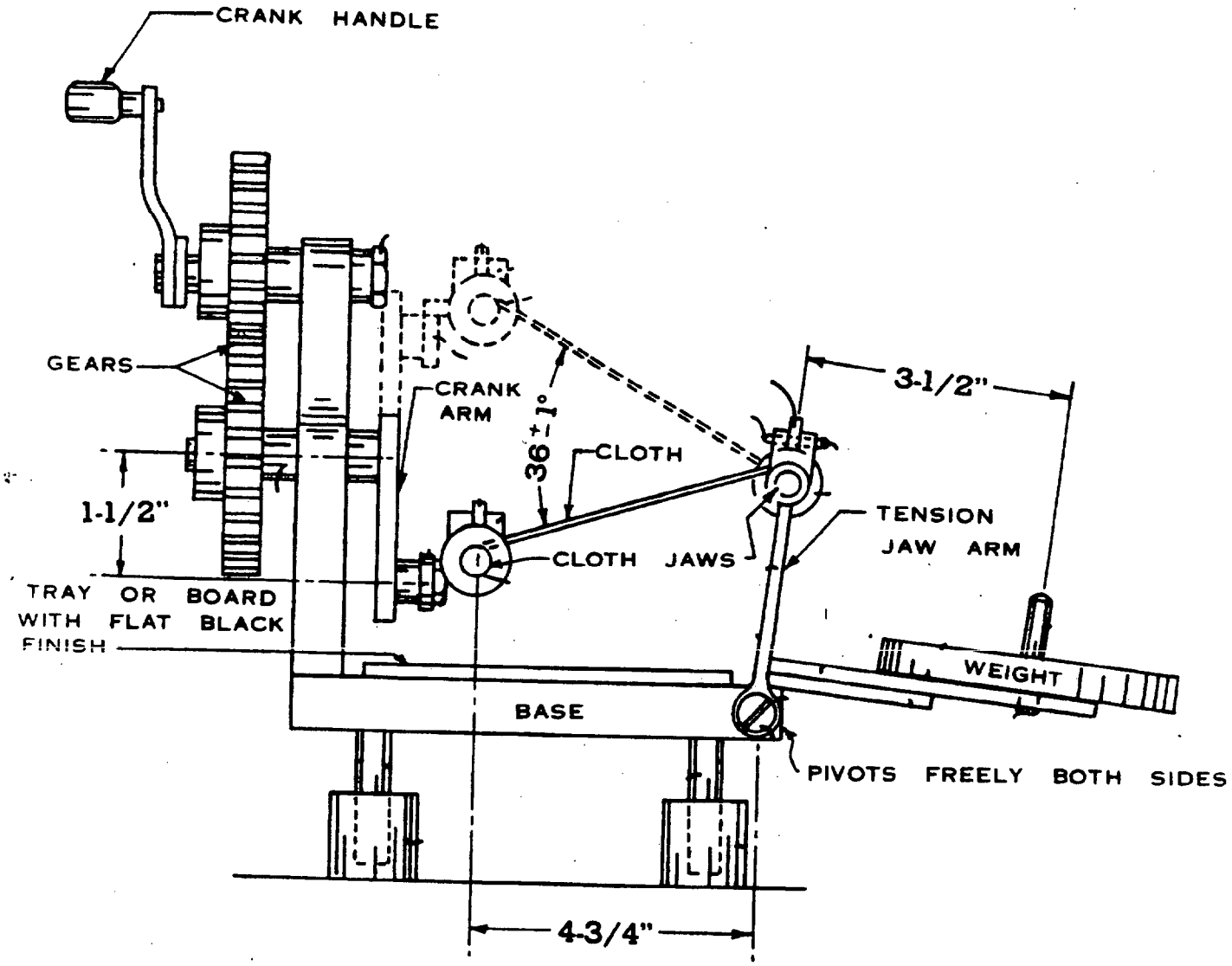


1	CAST ALUMINUM APPARATUS BODY
2	TOGGLE SWITCH - DPST
3	TRANSITE - SMOOTH SURFACES
4	5 QUARTZ LAMPS - 500T3 115-125V
5	SCREW - 10-24 3/4"
6	LEGS FOR HORIZONTAL TEST POSITION
7	TAPPED 10-24
8	1/2" D IMBEDDED MAGNET CENTER SCREW FASTENING
9	HOLDER - 20 GAGE COLD ROLLED STEEL
10	BOLT - 3/16" D 1/2" BRAZED FLUSH
11	TEST SAMPLE
12	HOLDER PLATE - 20 GAGE COLD ROLLED STEEL
13	DRILLED HOLES - 3/8" D
14	BLOTTING PAPER

DIMENSIONS IN INCHES

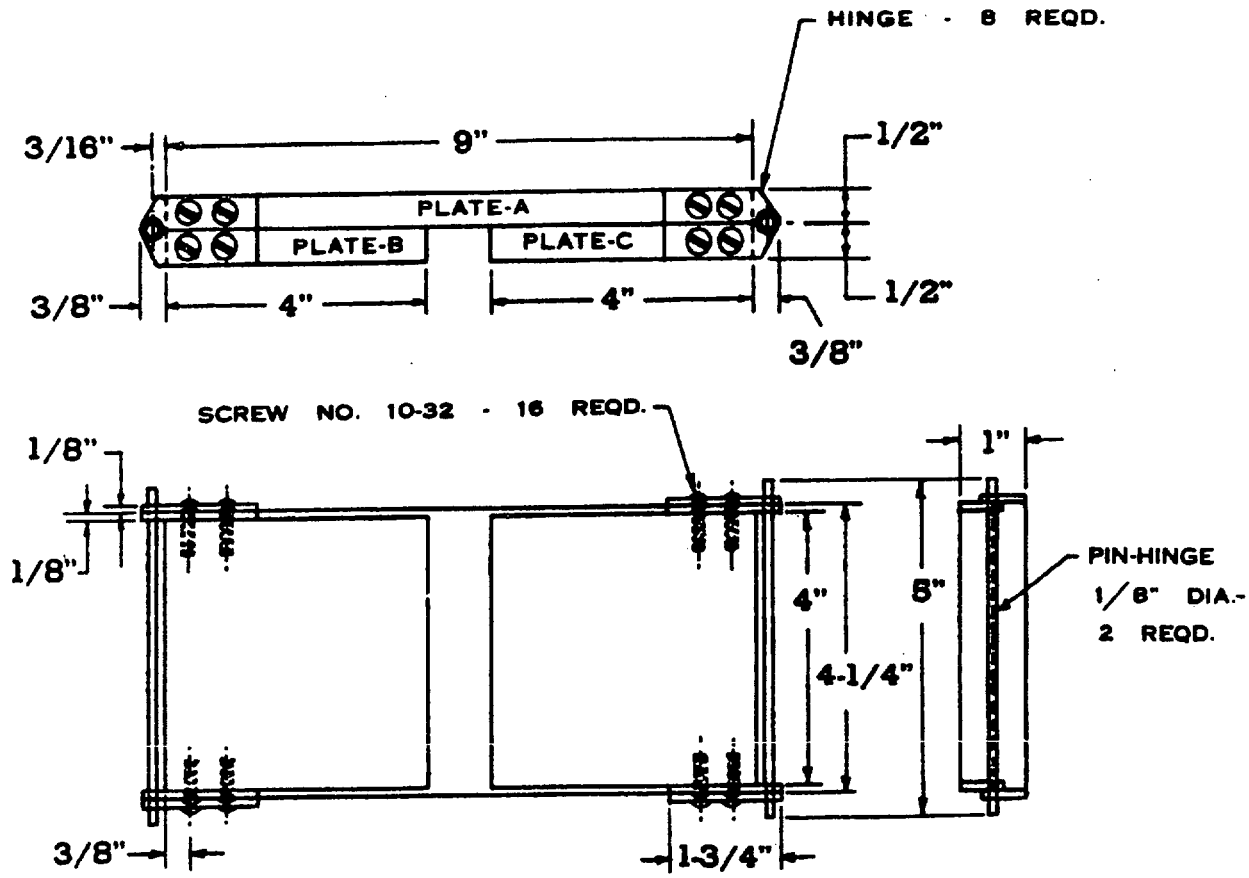
EXPLODED VIEW OF HEAT REFLECTIVITY TEST APPARATUS

FIGURE 1



FLEXING DEVICE – END VIEW

Figure 2



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

JIG ASSEMBLY—RESISTANCE TO LOW TEMPERATURE TEST

Figure 3

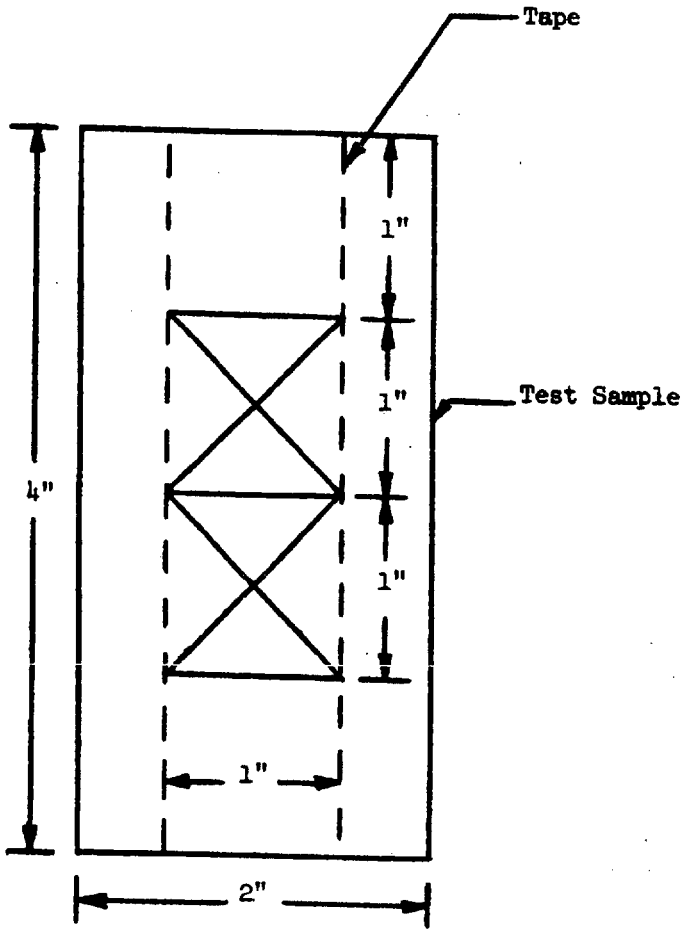


Figure 4 - Showing "x" and horizontal cuts for adhesion of coating test

NOTE: Solid lines indicate cut lines

FOLD

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DOCUMENT IDENTIFIER *(Number)* AND TITLE

MIL-C-82278B Cloth, Coated, Asbestos/Aramid, Plain Weave, Aluminized and Chloroprene Coated

NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER

☐ VENDOR ☐ USER ☐ MANUFACTURER

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