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DON'T SAY IT --- Write It!

DATE: June 24, 1992

TO: Cathy Massimino - EPA
Dan Duncan - EPA

FROM: ~~XXXXXXXXXX~~ *Steve*

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cc: R. C. Bowman w/o enclosures
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SUBJECT: LINER TEST METHODS

At a teleconference on June 15, 1992, EPA requested that DOE-RL provide them with copies of liner material test methods for testing that was not performed to an ASTM test procedure. Attached are copies of the non-ASTM test methods used in the liner manufacturer's specification information. The vendor has not yet supplied us with a copy of puncture resistance test method (FTMS 101B, Method 2031). This information will be forwarded when received. It is our understanding that a copy of Shelter-Rite procedure on wicking will not be required.

Two weather resistance testing procedures are listed in the specifications section without test method numbers. The Carbon Arc Method is attached as Method 5804. The Weather-O-Meter Method is ASTM test method D-2565, and has not been included.

This is an informal transmittal. A formal transmittal of this information will follow.

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METHOD 5804
July 20, 1978WEATHERING RESISTANCE OF CLOTH;
ACCELERATED WEATHERING METHOD

1. SCOPE

1.1 This method is intended for determining the resistance to deterioration of cloth when subjected to accelerated weathering exposure. It is applicable to cloth of all kinds.

2. TEST SPECIMEN

2.1 The specimen shall be of such form and dimension to provide the material required in the specified evaluation tests.

3. NUMBER OF DETERMINATIONS

3.1 Unless otherwise specified in the procurement document, the number of specimens tested from each sample unit shall be as required in the method of test used for determining the characteristic.

4. APPARATUS

4.1 The weathering machine shall be the XW type or equivalent (see 7.1).

4.1.1 Vertical carbon arc mounted at the center of a vertical cylinder.

4.1.1.1 The arc shall be designed to accommodate either two or three pairs of carbons but shall burn only one pair at a time, automatically transferring from one pair to another as the carbons are consumed.

4.1.1.1.1 The carbons shall be Copper Clad Sunshine Arc Type, No. 22 for the upper pair and No. 13 for the lower pair.

4.1.2 The arc shall be operated on 60 A and 50 V across the arc for alternating current and on 50 A and 60 V across the arc for direct current.

4.1.3 Removable panels (filters) of Corex D glass, or other enclosure having equivalent absorbing or transmitting properties, shall surround the arc.

4.1.4 A rotating rack with holders in which the specimens are suspended vertically and normally to radiation from the arc with the center of the face of the specimen at a radial distance of approximately 18 inches (457 mm) from the arc.

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4.1.5 Water-spray nozzles shall be mounted horizontally (the water-spray assembly vertically) in the test chamber inside the specimen rack and so placed that the water shall strike the specimens evenly over their entire length in the form of a fine spray in sufficient volume to cover specimens immediately on impact. The apparatus shall be so operated that the specimens are exposed to successive cycles of 102 minutes of light without spray and 18 minutes of light with spray.

4.1.6 Means for maintaining the required temperature of water in the spray.

4.1.7 Means for maintaining the required pressure of water entering the spray.

4.1.8 Means for delivering the required quantity of water per spray nozzle to the specimen.

4.1.9 Exhaust fan to ventilate the arc effectively.

4.1.10 Black panel thermometer unit for measuring the temperature within the machine. This unit shall consist of a metal panel to the base of which is attached the sensitive portion of a bimetallic dial type thermometer. The entire base is then coated twice with long lasting baked enamel paint.

4.1.11 The weathering machine shall be located in an area free from drafts with ambient temperature between 70 and 95°F (21 and 35°C) and 40 to 80 percent relative humidity.

5. PROCEDURE

5.1 The number of hours of exposure shall be as specified in the procurement document.

5.2 Unless otherwise specified in the procurement document, the filters shall not be removed during exposure. When exposure without filters is specified, only the Corex D glass filters shall be removed. The stainless steel frames shall remain in place.

5.3 When a standard sample has been established, a specimen of the standard sample shall be exposed at the same time and under the same conditions as the specimens undergoing test.

5.4 When no standard sample has been established, the test specimen shall be exposed and an equal adjacent area of the original material retained but not exposed.

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5.5 The rack shall rotate about the arc at a uniform speed of one revolution per minute.

5.6 The temperature of water in the spray shall be $80^{\circ} \pm 10^{\circ}\text{F}$ ($27^{\circ} \pm 5^{\circ}\text{C}$).

5.7 The pressure of the water entering the spray shall be 12-18 psi (83-124 kPa).

5.8 The quantity of water delivered to the specimens shall be 0.9 to 1.2 gallons, (3.4 to 4.5 L) per hour per spray nozzle.

5.9 The black panel temperature at the exposure plane of the specimen rack shall be $155^{\circ} \pm 10^{\circ}\text{F}$ ($68^{\circ} \pm 5^{\circ}\text{C}$) when the filters are in place and $175^{\circ} \pm 10^{\circ}\text{F}$ ($79^{\circ} \pm 5^{\circ}\text{C}$), when the filters are removed when measured in the following manner:

5.9.1 Before reading the temperature, the racks in the machine shall be fully loaded with specimens except for the black-panel and shall be in operation long enough for thermal equilibrium to be established.

5.9.2 The black panel shall be mounted in the test-panel rack and readings taken at the point where water spray is not striking the panel.

5.10 The specimen shall be suspended on the rack without tension and in such a way that the ends or corners cannot curl.

5.10.1 The warp direction of the specimen shall be in the vertical position and shall be indicated on the reverse side of the cloth.

5.10.2 No test portion of the specimen shall be more than 7 inches (178 mm) above or below the horizontal plane of the arc.

5.11 Unless otherwise specified in the procurement document, the filters shall be in place and the spray shall be operating.

5.12 The specimen shall be exposed to normal radiation from the arc for the required period of time.

5.13 The filter frames shall be numbered 1 through 8 with permanent numbers. The filters shall be thoroughly cleaned after each cycle. One filter shall be removed and discarded after each 250 hours of operation; that is filter #1 should be removed and replaced with a new filter after 250 hours, filter #2 after 500 hours, filter #3 after 750 hours, filter #4 after 1,000 hours, until all filters have been changed. The procedure shall then be repeated. A record shall be maintained showing when filters were changed.

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5.14 At the end of the required exposure period, the specimen shall be removed from the machine and allowed to dry.

5.15 The characteristics and methods for determining the resistance to deterioration shall be specified in the procurement document. The evaluation tests shall be made only on that part of the specimen which was fully exposed and not protected by the frame or damaged when secured to the rack.

5.15.1 Standard sample. When no standard sample has been established, the same tests shall be conducted on the weathered material undergoing test and on the weathered standard.

5.15.2 No standard sample. When no standard sample has been established, the same tests shall be conducted on the weathered and unweathered specimens for the purpose of comparison in determining the degree of deterioration of the exposed cloth.

5.16 Calculation of results. Percent change in the characteristic shall be calculated as follows:

$$\text{Change in characteristic, percent} = \frac{O-E}{O} \times 100 \quad \text{or} \quad \frac{E-O}{O} \times 100$$

Where: O = value before weathering deterioration.

E = value after weathering deterioration.

6. REPORT

6.1 The number of hours of exposure shall be reported.

6.2 Exposure unprotected by filters shall be reported.

6.3 Standard sample. Unless otherwise specified in the procurement document, when a standard has been established, resistance to weathering shall be reported as "Satisfactory" or "Unsatisfactory".

Satisfactory: When the percent change in characteristic of the sample unit is equal to, or less than, or more than, as applicable, the percent change in characteristic of the standard.

Unsatisfactory: When the percent change in characteristic of the sample unit is greater than, or less than, as applicable, the percent change in characteristic of the standard.

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METHOD 5804

6.4 No standard sample. When no standard sample has been established the change in the characteristic shall be reported as specified in the applicable test method or procurement document.

7. NOTES

7.1 A machine of the type described in this method may be obtained from Atlas Electric Devices Company, 4114 N. Ravenswood Avenue, Chicago, IL 60613.

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INCH-POUND

MIL-T-52983F
16 October 1991
SUPERSEDING
MIL-T-52983E
1 November 1989

MILITARY SPECIFICATION

TANKS, FABRIC, COLLAPSIBLE: 3,000, 10,000,
20,000, AND 50,000 GALLON, FUEL

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

1. SCOPE

1.1 Scope. This specification covers fuel tanks, fabric, collapsible: 3,000, 10,000, 20,000, and 50,000 gallon, complete with fittings, berm liner, accessories, and repair items packed in a box.

1.2 Classification. Tanks are of the following capacities as specified (see 6.2):

- 3,000 - gallon
- 10,000 - gallon
- 20,000 - gallon
- 50,000 - gallon

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards 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).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research, Development, and Engineering Center, ATTN: STRBE-TSE, Fort Belvoir, VA 22060-5606 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 5430

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210 lbs @ 70°F
105 lbs @ 160°F

needed:
MIL-T-52983E
4.5.2.19
2" seam overlap

MIL-T-52983F

both the initial and after fuel or water adhesion values on the same specimen. If seam construction involves the use of binding thread, then the peel specimens shall be prepared with threads removed. Chafing patches shall be tested for peel only. Nonconformance to 3.6.1 and table III shall constitute failure of this test. Specimens to be immersed in distilled water shall be extracted and dried in accordance with 4.5.2.22 prior to immersion in the water.

4.5.2.19 Dead load shear resistance. The test specimens shall be 1 inch, ± 0.020 inch wide, (parallel to the seam) and coated fabric shall extend a minimum of 3 inches (perpendicular to the seam) on each side of the seam. One index mark shall be scribed on each side of the seam to facilitate observation and measurement of slippage. Each specimen shall be subjected to a constant (dead load) tension force of 65 ± 0.50 pound, at 180 ± 5 °F. After 8 hours examine each specimen while still under tension for sign of slippage or separation. Three specimens shall be tested for each determination. Slippage, by any specimen, greater than specified in table III shall constitute failure of this test.

4.5.2.20 Strength of bonded fittings. Specimens shall be prepared by cutting through the aluminum flange so that parallel 1-inch wide sections are obtained from the straight portion of the oval fitting and 1-inch wedge shaped sections are obtained from the vent (or drain) and the curved portion of the oval fitting. The 1-inch shall be measured as a chord passing through the midpoint between the inside and outside diameters of the flange for the wedge shaped sections.

4.5.2.20.1 Initial bond strength. The coated fabric flanges shall be fastened together in one jaw of the test machine so that the jaw will be at least 1 inch from the nearest part of the aluminum flange. The aluminum flange shall be secured in the other jaw of the test machine and this jaw shall clamp on the aluminum and shall not compress the embedded part of the coated fabric flanges. The jaws shall be separated at a rate of 2 inches per minute at 73 ± 5 °F and 65 ± 2 percent humidity. The average of three test specimens shall be recorded as initial bond strength in pounds per inch of width. Nonconformance to 3.6.4.1 and table IV shall constitute failure of this test.

4.5.2.20.2 Bond strength after fluid immersion. Three test specimens shall be immersed for the appropriate durations in each test fluid specified in table IV. No part of the specimens shall be covered or coated during immersion. Specimens from both the oval and vent/drain fittings shall be included in each test fluid. The test specimens shall be cooled in the immersion fluid to 73 ± 5 °F, for up to 60 minutes. The specimens shall be removed from the test fluid, one at a time and tested as in 4.5.2.20.1. Each test shall be completed within 3 minutes after removal from the test fluid. The average of three tests for each fluid shall be reported as bond strength after immersion in pounds per inch of width. Nonconformance to 3.6.4.1 and table IV shall constitute failure of this test. Specimens to be immersed in distilled water shall be extracted and dried in accordance with 4.5.2.22 prior to immersion in the water.

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to 5 warp and 5 fill. Leaching of specimens is unnecessary. The specimens shall be exposed to the soil for eight weeks.

3.6. Tank construction. The tank shall be fabricated from single ply coated fabric as specified herein. The configuration and dimensions of the tank and the location of the fittings and handles shall be as shown in figures 1 through 4. For both tank interior and exterior, all coated fabric edges (seams, chafing patches, fabric/flanges of fittings) shall be covered to a thickness of not less than 10 mils, with coated fabric or coating compound used to fabricate the tank. Coated fabric panels may be spliced together to make up the length required for a tank panel; however, all splices in adjacent panels shall not coincide.

3.6.1 Seams. All tank seams including end closures, handle patches, and fabric flanges of fittings shall conform to the requirements of table III. Seams between adjacent panels of coated fabric shall be constructed as to prevent wicking through the nylon fabric.

TABLE III. Characteristics of seams.

Test property	Requirements tank capacity (gallons)				Test paragraph, test method of FED-STD-191, or ASTM test method
	3,000	10,000	20,000	50,000	
Breaking strength, initial, lb/in, min.	400	400	550	550	D 751, meth B 1/, 4.5.2.18
After immersion in fuel 2/ at 160 °F for 14 days, lb/in, min.	290	290	400	400	D 751, meth B, 4.5.2.18
After fuel extraction 3/, dried, and immersion in distilled water at 160 °F for					& D 471 (15.2) 4.5.2.22, 4.5.2.18,
14 days, lb/in, min.	325	325	450	450	D 471 (15.2),
42 days, lb/in,	290	290	400	400	& D 751 meth B
Dead load shear resistance under 50 lb/in stress at 180 °F for 8 hours	0.125 in slippage (max)				4.5.2.19
Seam peel adhesion initial, lb/in, min.	30	30	30	30	D 413 machine method
After fuel immersion 2/ for 14 days at 160 °F lb/in, min.	20	20	20	20	D 471 (15.2), D 413 machine method

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TABLE III. Characteristics of seams - continued.

Test property	Requirements tank capacity (gallons)				Test paragraph, test method of FED-STD-191, or ASTM test method
	3,000	10,000	20,000	50,000	
After fuel extraction ^{3/} , dried, and immersion in distilled water at 160 °F for following durations:					D 413 machine meth, 4.5.2.18, D 471 (15.2), 4.5.2.22
14 days, lb/in, min.	20	20	20	20	
42 days, lb/in, min.	15	15	15	15	

1/ All specimens must break in the coated fabric. Failure of any specimen in a seam area shall constitute failure of this test.

2/ Immersion test fluid shall be diesel fuel conforming to MIL-F-46162.

3/ JP-5/JP-8 ST conforming to MIL-T-5624 will be used as extraction media.

3.6.2 Handles. The handles shall be 1 to 1-1/2-inch wide U-shaped straps fabricated from nylon webbing or cloth and fastened to a coated fabric patch similar to the tank body material. The two ends of each strap shall be attached to each patch at points 12 inches, ±1 inch, apart. The length of the strap between the two points of attachment shall be 16 inches, ±1 inch. The patch and strap assembly shall be bonded to the bottom of the tank just below the peripheral fold line. Handles shall be located a minimum of 1 inch away from the seams exclusive of end closure seam. The bonds between each handle patch assembly and the tank fabric shall be capable of withstanding perpendicular loads of 1,500 pounds without damage to the tank. They shall be the same color as the tank. The number of handles and the position of each handle shall be as shown in figures 1 through 4, as applicable. Handle assembly color shall approximate tan 686.

3.6.3 Chafing patches. The interior and exterior of the tank, opposite the location of each fitting shall be provided with bonded coated fabric chafing patches as shown in figures 1 through 4. The chafing patches shall be the same coated fabric used to fabricate the tank, or shall be of similar coated fabric. Chafing patch material shall not have deleterious effect on tank material. Chafing patch color shall approximate color number tan 686.

3.6.4 Fittings.

3.6.4.1 Fitting type. The access door fitting and the vent drain flange attachment shall be bonded to the coated fabric flange and shall be as specified herein and shall conform to the requirements of table IV. Fittings

METHOD 5872
July 20, 1978

TEMPERATURE, HIGH; EFFECT ON CLOTH BLOCKING

1. SCOPE

1.1 This method is intended for determining the resistance of films and coated cloth to blocking.

2. TEST SPECIMEN

2.1 The specimen shall be a square of cloth 8 by 8 inches (203 by 203 mm).

3. NUMBER OF DETERMINATIONS

3.1 Unless otherwise specified in the procurement document, three specimens shall be tested from each sample unit.

4. APPARATUS

4.1 Glass plates. Two glass plates approximately 4-1/2 by 4-1/2 by 1/8 inches (114 by 114 by 3 mm).

4.2 Four-pound weight (1.8 kg).

4.3 Circulating air oven. Circulating air oven capable of maintaining the required temperature within $\pm 2^\circ\text{F}$ ($\pm 1^\circ\text{C}$).

5. PROCEDURE

5.1 The specimen shall be folded double, face to face, then back to back, making a 4 by 4 inch (102 by 102 mm) square, and placed between the two glass plates. The 4-pound (1.8 kg) weight shall be placed on the top plate in a position to insure even pressure.

5.2 Unless otherwise specified in the procurement document, the specimen shall be placed in the oven for 30 minutes at a temperature of $180^\circ \pm 2^\circ\text{F}$ ($82^\circ \pm 1^\circ\text{C}$).

5.3 At the end of the exposure period the test assembly shall be removed from the oven and the specimen immediately taken from between the plates and allowed to cool (1 hour for films and 5 minutes for coated fabrics). The specimen shall then be slowly unfolded and, at the same time, carefully examined for evidence of adhering or peeling of the coating.

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METHOD 5872

5.4 The resistance of the specimen to blocking shall be evaluated by the scale below:

- (1) No blocking: Cloth surfaces are free.
- (2) No blocking: Cloth surfaces adhere slightly.
- (3) Slight blocking: Cloth surfaces must be lightly peeled to separate.
- (4) Blocking: Cloth surfaces separate with difficulty, or coating is removed during separation.

6. REPORT

6.1 Resistance to blocking shall be reported as rated in 5.4.

9 3 1 2 9 3 6 0 5 3 0

METHOD 5306
July 20, 1978ABRASION RESISTANCE OF CLOTH; ROTARY PLATFORM,
DOUBLE-HEAD (TABER) METHOD

1. SCOPE

1.1 This method is intended for determining the abrasion resistance of cloths in terms of percent change in breaking strength, or breaking strength after a given period of abrasion, or the number of abrasion cycles required to produce a specified state of destruction. It is used to evaluate cloth durability when the specimen is subjected to rotary rubbing action under controlled conditions of pressure and abrasive action.

2. TEST SPECIMEN

2.1 The specimen shall be a 5-inch (127 mm) square or circle of fabric, and not greater than 1/4 inch (6 mm) in thickness. The specimens shall be taken from areas of the fabric not represented by the same warp or filling yarns. A 1/4 inch (6 mm) diameter hole shall be punched in the center of the specimen.

3. NUMBER OF DETERMINATIONS

3.1 Unless otherwise specified in the procurement document, 10 specimens from each of the warp and filling directions shall be tested from each sample unit.

4. APPARATUS AND METHOD CITED

4.1 Apparatus. (Figure 5306)

4.1.1 Rotary platform, double head abramer. An abrasion machine comprising in general of a housing of compact design, a removable flat circular specimen-holder, a pair of pivoted arms to which are attached the abrasive wheels, a motor for rotating the platform and specimen, a fan for cooling the motor, and a counter for indicating the revolutions of the specimen-holder is so mounted as to produce a circular surface travel of an essentially flat specimen in the plane of its surface. The abrasive wheels, which are attached to the free end of the pivoted arms, rotate and have, when resting on the specimen, a peripheral engagement with the surface of the specimen, the direction of travel of the periphery of the wheels and of the specimen at the contacting portions being at acute angles and the angle of travel of one wheel periphery being opposite to that of the other. Motion of the abramer wheels, in opposite directions, is provided by rotation of the specimen and the associated friction therefrom.

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METHOD 5306

4.1.1.1 Specimen holder. The specimen-holder is supported by an adapter which is motor-driven and provides motion for the circular travel of the specimen-holder.

4.1.1.2 Load adjustment weights. A load adjustment for varying the load of the abraser wheels on the specimen. The pivoted abraser arms without auxiliary weights or counterweights apply a load against the specimen of 500 grams (1.1 lbs) per wheel. Addition of weights by the manufacturer increases the load to 1,000 grams (2.2 lbs). A counterweight attachment permits reduction of load against the specimen to 250 grams (0.55 lb) and 125 grams (0.27 lb) per wheel.

4.1.1.3 Clamping rings. Clamping rings for securing the specimen to the specimen-holder, one for use with lighter weight fabrics, and a larger one for use with heavier fabrics.

4.1.1.4 Wheels.

4.1.1.4.1 Types. Abraser wheels of the rubber-base or vitrified-base types. Both types of wheels are manufactured in different grades of abrasive quality. The wheels shall be leadbushed, 1/2 inch (13 mm) thick and approximately 2 inches (51 mm) in diameter. The wheels customarily used for testing textiles are the rubber-base resilient type composed of abrasive grains encushioned in rubber. Consequently, they are distorted during operation of the abraser. Accordingly, the wheels are mounted so as to compensate for this distortion and it is important that they be set as prescribed in 4.1.1.5.1.

Vitrified-base wheels are the hard abrasive type. They may be cut with a diamond point to alter the roughness of the wheel, the stroke of cut determining the degree of grit. The position of these wheels is not critical but it is recommended that they be set as prescribed in 4.1.1.5.1.

4.1.1.4.2 Selection for test. Since there exists variation in abrasive quality between and within rubber-base wheels of the same grade, a method shall be followed in the selection of wheels for a particular test that will reduce this variation. All rubber-base wheels shall be tested individually on a selected reference fabric. They shall be grouped in sets of three pairs such that the average abrasiveness of the three falls within a specified tolerance. The wheels shall then be used in sets as established. The specimens of fabric shall be grouped in three sets, the members of the set being selected at random from the whole area of the sample. Each set shall be abraded with one of the three pairs of wheels, and the report shall be based on the average for the three sets.

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In the use of vitrified-base wheels, both wheels of the pair to be used shall be similar in abrasion characteristics. This shall be checked on a selected reference fabric. Once a satisfactory pair is obtained, it may be used for an indefinite period of time without changing its abrasive quality. Experience has shown that a single pair can be used for at least 1 year in constant use without changing in abrasive quality.

4.1.1.4.3 Resurfacing and cleaning. Due to uneven wear and clogging of the surface crevices with fiber particles, sizing, finishing materials, and the like, the abrading wheels shall be resurfaced or cleaned at established intervals during tests, the frequency of which depends on the type of material being tested and the type of wheel used. Rubber-base wheels wear unevenly during use and clog up as abrading progresses, thus requiring resurfacing and cleaning at appropriate intervals. Resurfacing disks (carborundum-coated paper) of various degrees of coarseness are available for this purpose. These are mounted on the resurfacing platform which replaces the specimen-holder on the center shaft. A stiff brush may be used for removing loose particles from the surface of the wheels. A resurfacing and cleaning schedule shall be adopted for tests on various materials. The specimen shall be abraded for 2 specified number of revolutions of the table, such as 300 (or some other number, depending on the surface being abraded), after which the wheels shall be resurfaced for a specified number of revolutions of the table, such as 30, with the abrasive paper and then brushed clean. The specimen shall again be replaced and the sequence of abrading and resurfacing shall be continued to completion of the test. The resurfacing disks should be used for a definite number of revolutions of the table and discarded. On rubber-base wheels of medium coarseness, it has been found that 6 or 7 resurfacings of 30 revolutions of the table each were the limit of utility of the disks.

Vitrified-base wheels do not wear unevenly and consequently require no resurfacing unless the surface is accidentally chipped or otherwise marred. The crevices of the surface clog during use and, during the test, should be cleaned of loose particles at specified intervals, such as every 300 revolutions of the table. Compressed air has been found to be most suitable for this purpose and is recommended. Vitrified-base wheels are not recommended for use on fabrics with surface coatings which clog the wheels too rapidly and cannot be removed with ease. If such material requires special solvents for removal or necessitates resurfacing of the wheels, such practice would not be recommended and the wheels should not be used.

4.1.1.5 Machine adjustments.

4.1.1.5.1 Wheels. In mounting rubber-base wheels, their position with respect to the center of the specimen-holder is critical. The lateral distance from the left-hand wheel-mounting flange to the center of the specimen-holder shall be 1-1/64 inches (25.8 mm) and from the same point to the right-hand wheel-mounting flange the distance shall be 1-5/64 inches (27.4 mm).

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METHOD 5306

The position of vitrified-base abrasive wheels with respect to the center of the specimen-holder shall be equally spaced on both sides 1-3/64 inches (26.6 mm) from the wheel-mounting flange to the center of the specimen-holder.

4.1.1.5.2 Platform. The vertical distance from the center of the pivot point of the abraser arms to the top of the specimen-holder shall be approximately 1 inch (25 mm). This measurement is specified to prevent the possibility of errors incurred by installing a thrust bearing or the like to support the specimen-platform. Such adaptations shall be made so that the platform will remain at the above specified level. The specimen-platform shall rotate in the plane of its surface.

If it fails to do so and exhibits a tendency to wobble, the holder and adapter shall be replaced or a thrust bearing installed to support the specimen-holder.

4.1.1.5.3 Load. In order to reduce the load of the abraser wheels on the specimen, a counterweight attachment is provided. The use of this counterweight is not recommended, since studies in this regard have indicated variability in results due to the unequal counter-weighting of the individual arms.

4.1.1.5.4 Abraser wheel bearings. The abraser wheel bearings, that is, the two pair of bearings installed in the free end of the pivoting arms to support the abraser wheels, should not stick when caused to spin rapidly by a quick driving motion of the forefinger. The degree of freedom of rotation of these bearings, however, is not critical.

4.1.2 A means of removing dust, lint, and any disintegrated or worn away cloth from the test specimen by brushing or by vacuum, shall be specified in the procurement document.

4.1.3 A counter for recording the number of rotations of the specimen-platform.

4.2 Method Cited.

Method 5100, Strength and Elongation, Breaking of Woven Cloth;
Grab Method.

5. PROCEDURE

5.1 Unless otherwise specified in the procurement document, the speed of the specimen-platform shall be 70 revolutions per minute.

5.2 The number and type of abrasive wheel and the magnitude of the counterweights shall be as specified in the procurement document.

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5.3 Unless otherwise specified in the procurement document, the face surface of the specimen (weave face, finished side, coated side, etc.), shall be the surface to abrade.

5.4 The end point of the abrasion shall be (1) the number of rotations of the specimen-platform or (2) the state of destruction, as specified in the procurement document.

5.5 The test specimen shall be placed over the rubber mat on the specimen-holder. The ring clamp shall be placed over the specimen with the screw of the clamp at one end of the warp diameter and then pressed halfway down on the specimen-holder, the screw partly tightened, the clamp then pressed down as far as possible, and the screw tightened firmly. The washer and knurled nut shall then be secured in place to hold the center of the specimen.

5.6 The specimen-platform shall be rotated at the required speed and the specimen abraded to the required end point.

5.6.1 The specimen shall be cleaned of lint and abrasive particles on a scheduled basis as with the resurfacing and cleaning of the abraser wheels. The specimen shall not be removed from the specimen-holder until the entire test is completed. The rubber mat shall be wiped clean after each test.

5.7 When the number of rotations is specified as the end point, the abrasion resistance in each of the warp and filling direction shall be determined by the residual breaking strength or the change in breaking strength as specified in the procurement document.

5.8 When the residual breaking strength is required, the breaking strength of the abraded specimen shall be determined and when the change in breaking strength due to abrasion is required, the breaking strength of the original and abraded materials shall be determined in each of the warp and filling directions. The breaking strength shall be determined by Method 5100 except that the gage length shall be 1 inch (25 mm) and the abrasion path shall be placed midway between the jaws.

5.9 When the state of destruction is required, the number of rotations required to produce specified destructions shall be read from the counter.

6. REPORT

6.1 When the end point is a specified number of cycles, the abrasion resistance of the sample unit shall be expressed as residual breaking strength or change in breaking strength.

6.1.1 Residual breaking strength shall be the average of the results obtained from the specimens tested in each of the warp and filling directions and shall be reported separately to the nearest 1 pound (to the nearest 1 N).

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6.1.2 Change in breaking strength shall be the average of the results obtained from the specimens tested in each of the warp and filling directions respectively and shall be reported separately to the nearest 1.0 percent.

$$\text{Change in breaking strength, percent} = \frac{O - A}{O} \times 100$$

where:

O = breaking strength before abrasion.

A = breaking strength after abrasion.

6.2 When the end point is a required state of destruction, the abrasion resistance of the sample unit shall be the average of the number of cycles obtained from the specimens tested in each of the warp and filling directions respectively and shall be reported to the nearest 10 cycles.

6.3 Each individual value used to calculate the average shall also be reported.

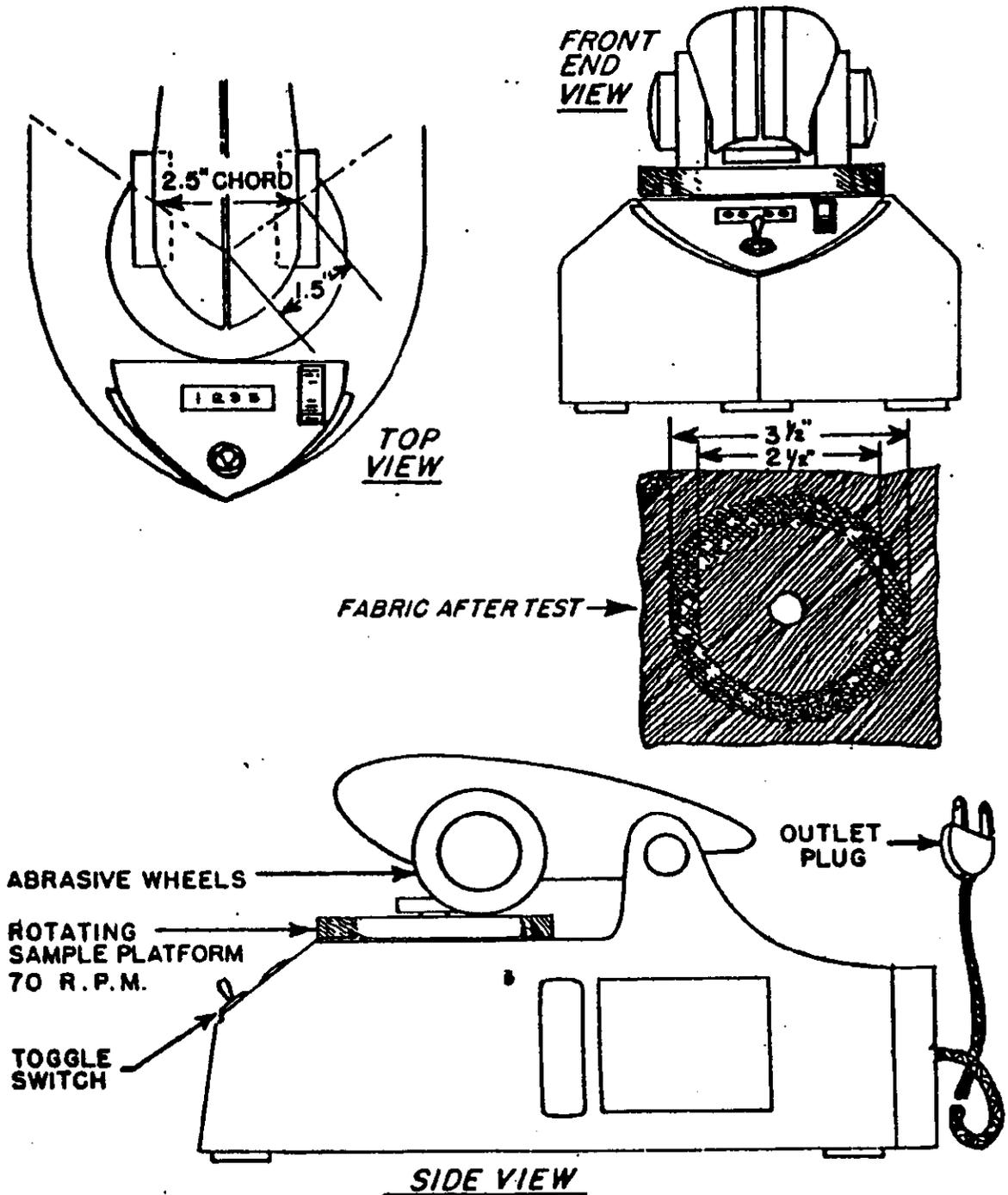
7. NOTES

7.1 An abrasion machine of the type described may be obtained from Taber Instrument Co., 455 Bryant Street, North Tonawanda, NY 14120.

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ROTARY ABRASION, DOUBLE HEAD



9 3 1 2 9 3 6 0 5 8 7

FIGURE 5306