

MIL-C-13814 (Ord)
 1 December 1954
 SUPERSEDING
 PA-PD-531
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MILITARY SPECIFICATION

CLOTH, IGNITER

1. SCOPE

1.1 This specification covers the following types of cloth for use in the manufacture of igniter pads used in ammunition:

Type I - Silk

Class A - Breaking strength same as Class B of MIL-C-539

Class B - Breaking strength same as Class C of MIL-C-539

Type II - Acrylic

Class A - Breaking strength 60 pounds per inch, minimum.

2. APPLICABLE DOCUMENTS

2.1 The following specifications, and all specifications referenced thereon, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

FEDERAL

CCC-T-191 -Textile Test Methods
 DDD-S-751 -Stitches, Seams and Stitching
 TT-C-595 -Colors; (For) Ready-Mixed Paints

MILITARY

MIL-C-539 - Cloth, Silk, Cartridge-Bag
 MIL-G-2550 -General Specification for Ammunition Except Small Arms Ammunition
 MIL-P-10025 -Packing and Marking for Domestic Shipment of Inert Ammunition Components, General Specification for
 MIL-T-13505 -Thread, Silk, Sewing (For Powder Bags)

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

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3. REQUIREMENTS

3.1 Material.

3.1.1 Type I.-The material used in the manufacture of silk igniter cloth shall be as specified in Specification MIL-C-539

3.1.2 Type II.-Acrylic igniter cloth shall be woven from acrylic yarns spun from acrylonitrile polymer fibers or copolymers of acrylonitrile containing no halogens such as chlorides, bromides, fluorides, or iodides.

3.2 Type I requirements and tests with the exception of weave and color, shall be as specified in Specification MIL-C-539, Class B or C, as applicable (see 1.1). Weave requirements for Type I shall be as specified on the applicable drawing; color requirement and test for Type I shall be as specified herein. Type II requirements and tests shall consist of all requirements and tests specified herein.

3.3 Appearance.-Appearance of the cloth shall be uniform and free of visible imperfections.

3.4 Width.-The width of the cloth shall be specified in the contract or purchase order. A tolerance of 0.25 inch will be permitted.

3.5 Weave.-The cloth, woven one in a dent, shall be a plain single weave having a like number of ends and picks per inch when tested as specified in 4.4. The warp and filling yarns shall be of the same size.

3.6 Slippage.-When determined as specified in 4.5 the slippage value shall be as follows:

Warp, minimum 60

Fill, minimum 60

3.7 Stretch, percent.-When determined as specified in 4.6, the percent stretch shall be as follows:

Warp, maximum 10.0

Fill, maximum 10.0

3.8 Ash.-When determined as specified in 4.7, the percent ash shall be 2.0 percent, maximum

3.9 pH of water extract.-When determined as specified in 4.8, the pH of water extract shall be between 5.0 minimum and 9.0 maximum.

3.10 Acidity or alkalinity.-When determined as specified in 4.9, the acidity or alkalinity shall be as follows:

Acidity determined as acetic acid.-0.1 percent, maximum.

Alkalinity determined as sodium carbonate.-0.1 percent, maximum.

3.11 Ether soluble material.-When determined as specified in 4.10, the ether soluble material shall be 5 percent, maximum.

3.12 Objectionable sizing.-When determined as specified in 4.11, the character and quality of the sizing material shall be such that there shall be no indication of smoldering when the cloth is ignited sufficiently to give a good flame and then extinguished.

3.13 Halogens.-None, when determined as specified in 4.12.

3.14 In addition to the requirements listed above, the finished cloth, when tested as specified in 4.13, 4.14, and 4.15, as applicable, shall comply with the requirements specified in Table I.

TABLE I

WEIGHT (oz. per sq. yd.)	BREAKING STRENGTH		THREAD COUNT	
	(Lb. per inch)		(threads per inch)	
	WARP MIN	FILL MIN	WARP MIN-MAX	FILL MIN-MAX
MIM - MAX 3.25 3.75	60	60	40 - 45	40 - 45

3.15 Color (applicable to Type I and Type II, see 3.2).--The cloth shall be scarlet (see 4.16).

3.16 Workmanship.--The cloth shall be uniformly and closely woven and shall be free from defects which might affect the serviceability.

4. QUALITY ASSURANCE PROVISIONS

4.1 Lot.--A lot shall consist of cloth manufactured by one manufacturer, subjected to the same manufacturing conditions and processes submitted for inspection at the same time. Each lot shall contain:

a. cloth of one type and one class only

4.2 Sampling.--Five representative primary samples shall be selected from the bales comprising the lot and all tests shall be performed on each sample. Failure of any sample to comply with all the requirements shall be cause for rejection of the lot.

4.3 Inspection.--Inspection shall be as specified in Specification MIL-G-2550.

4.4 Weave.--Weave shall be determined by visual examination to determine compliance with 3.5.

4.5 Slippage value.--Ten test specimens shall be cut as directed in Method 5420 of Specification CCC-T-191 for use in determining the breaking strength, except that each specimen shall be 16 inches in length. The five specimens having the short dimension parallel to the warp threads shall be used for the determination of warp slippage and the five having the short dimension parallel to the filling threads shall be used for the determination of fill slippage. For making this test, a machine of the standard type specified in Method 5100, Specification CCC-T-191 shall be used in the determination of elongation. The distance between the jaws of the testing machine shall be adjusted to 3 inches. A test specimen shall be folded back on itself so that the distance from the fold to one edge, parallel to the short dimension, measures approximately 5 inches and to the other, at least 10 inches. Care shall be taken to have the fold parallel to the crosswise yarns in the specimen. At 0.38 inch from the fold a seam shall be sewn parallel to the crosswise yarns of the specimen. A seam of the type designated as 301-SSa-1 Specification DDD-S-751 (seam SSa-1 formed with one row of stitch type 301) shall be used. One row of stitch type 301, 12 stitches per inch shall be used to make the seam. In making the seam a suitable needle shall be used and a heavy silk thread conforming to Specification MIL-T-13505, of sufficient strength so that it will not break when the seam is tested for elongation as directed below shall be used (a No. 21 needle and commercial grade H (14-pound) waterproof silk, fishing line thread with a left-hand machine twist has been found satisfactory). The test

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specimen shall be placed, with the 10-inch portion uppermost, symmetrically in the upper jaws so that the long dimension of the 10-inch portion of the specimen is parallel to the direction of application of the load. The specimen shall be clamped in the upper jaws so that the seam is at least 3 inches below the lower jaws. A 6-ounce clamp (see figure 1) shall be attached to the specimen at a point beneath the lower jaws so that a uniform tension of this amount shall be applied to the specimen, and the lower jaws shall be clamped taking care to grip the same yarns in the lower jaws as are gripped in the upper jaws. The clamp shown on figure 1 can be assembled from (a) a metal photographic film clip, (b) a brass or steel rod 6 inches long and 3/16 inch in diameter, and (c) equal brass or steel weights which are sufficient to bring the total weight of the assembly to 6 ounces. The apparatus shall be arranged to obtain a tension-stretch curve up to the breaking strength of the specimen, the stretch being indicated in inches by the vertical component and the tension being indicated in pounds by the horizontal component. The machine shall be started and allowed to apply tension until the specimen breaks. This graphic record shall be designated as the fabric-stretch curve. The same specimen shall be inserted in the jaws of the machine so that the seam is in a position parallel to the jaws and midway between the upper and lower jaws. The specimen shall be clamped in the jaws, applying tension by means of the 6-ounce clamp, as directed above, before tightening the lower jaws. The apparatus shall be arranged so that the graphic record of this test will be made on the same chart and start at the same point. The machine shall be started and tension allowed to be applied to the specimen until either the cloth breaks or the seam fails. This graphic record shall be designated as the seam-stretch curve. The tension at which the vertical distance between the seam-stretch curve and the fabric-stretch curve is equal to the sum of (a) the vertical distance between these curves when the tension is 1 pound, and (b) a vertical distance on the chart equivalent to 0.25 inch on the cloth shall be noted. The slippage value shall be calculated as follows to determine compliance with 3.6:

$$\text{Slippage value} = \frac{100A}{B}$$

where:

- A = tension at which the difference between the seam-stretch curve and the fabric-stretch curve is 0.25 inch plus the difference between these curves when the tension is 1 pound
- B = the minimum breaking strength for the class of cloth being tested as specified in Table I

The average value obtained for the five warp specimens and for the five fill specimens shall be reported.

4.6 Stretch.—From the fabric-stretch curves obtained in the test for slippage as specified in Table I, the percent of stretch for each specimen shall be calculated as follows to determine compliance with 3.7:

$$\text{Percent of stretch} = \frac{100 (A-B)}{C}$$

where:

- A = vertical component of the fabric-stretch curve measured in units equivalent to the distance in inches between the jaws at 30 pound tension.
- B = vertical component of the fabric-stretch curve measured in units equivalent to the distance in inches between the jaws before a just perceptible load is assumed by the specimen.

C = length, in inches, of the portion of the specimen tested before a just perceptible load is assumed by the specimen.

4.7 Ash.--Parts from each of the pieces comprising the sample shall be cut so as to obtain a total of approximately 2 gm, and transferred to a tared platinum or porcelain crucible and moistened with concentrated nitric acid. The crucible shall be heated on a steam bath for 1 hour and then heated carefully over a flame so as to avoid any loss. When the contents of the crucible have been charred it shall be heated to dull redness until all carbonaceous matter has been burned off. The crucible shall be cooled in a desiccator and weighed. The gain in weight shall be calculated to percent ash in the sample as follows to determine compliance with 3.7:

$$\text{Percent ash} = \frac{100 (A-B)}{W}$$

where:

A = weight of crucible and ignited residue
B = weight of crucible empty
W = weight of sample

4.8 pH of water extract.--Ten pieces of cloth, weighing approximately 0.5 gm each shall be cut from various portions of the sample. These pieces shall be combined, weighed, and transferred to 250-ml beaker. One hundred fifty milliliters of freshly boiled, distilled water shall be added to the beaker, covered with a watch glass, and boiled gently for 30 minutes. In case the volume of water becomes less than one-half the original amount during the boiling period, sufficient boiling distilled water shall be added to restore it to the original volume. At the end of 30 minutes the covered beaker and contents shall be removed from the source of heat and the volume brought to 150 ml by adding freshly boiled distilled water. The covered beaker and contents shall be cooled to 25° to 30°C without agitating the contents, to minimize the absorption of carbon dioxide from atmosphere. The pH of the cooled liquid shall be determined, using a glass electrode pH electrometer, within 1 hour after removing the beaker from the source of heat to determine compliance with 3.9. The distilled water used for this test shall be carried through the above operations as a blank, and must show a pH value in the range 6.0 to 7.0.

(Note: If the distilled water does not have a pH of 6.0 to 7.0 after the test specified above, the pH of the water used in this test shall be adjusted by re-distillation or by the addition of approximately 0.1 normal sodium hydroxide or hydrochloric acid until the pH of the distilled water is 6.5 \pm 0.2.)

4.9 Acidity or alkalinity.--The water extract obtained in the determination of pH shall be decanted into a 250 ml beaker. As much absorbed water as possible shall be forced out of the cloth by pressing the cloth against the side of the beaker with the aid of a glass stirring rod. If the pH of the water extract is 7.0 or greater, the solution shall be titrated, with approximately 0.1N hydrochloric acid of known normality, using methyl red as the indicator, to a faint reddish tint. Any alkalinity shall be calculated to percent sodium carbonate as follows to determine compliance with 3.10.

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If the pH of the water extract is 6.9 or less, the solution shall be titrated with approximately 0.1N sodium hydroxide solution of known normality using phenolphthalein indicator to the first permanent pink color. Any acidity shall be calculated to percent acetic acid as follows to determine compliance with 3.10.

4.10 Ether soluble material.--Ten pieces of cloth, weighing approximately 0.5 gm each shall be cut from various portions of the sample. These pieces shall be weighed together and transferred to the extraction chamber of the Soxhlet extraction apparatus having ground-glass connections. The extraction chamber shall be assembled to a tared receiving flask and then transferred to the extraction chamber until the sample is covered and the ether siphons over into the flask. Approximately 25 ml more ether shall be added to the extraction chamber, a condenser shall be assembled to it and the assembled apparatus shall be placed on a steam bath. The extraction shall be allowed to proceed for 1.5 hours. Heating shall be discontinued at a time when the ether content of the extraction chamber is nearly sufficient to cause the ether to siphon over into the receiving flask. The flask, containing the oily extract shall be heated on a steam bath until the ether is removed. The flask and residue shall be dried in an oven at $100^{\circ} \pm 2^{\circ}\text{C}$ for 1 hour, cooled in a desiccator and weighed. The weight of residue shall be calculated to percent ether extract to determine compliance with 3.11.

4.11 Objectionable sizing.

4.11.1 Apparatus.--A Mackey test apparatus (see figure 2) consisting of a cylindrical water jacketed metal oven of the following dimensions shall be prepared; Outside, 8 inches high and 6 inches in diameter; inside, 7 inches high and 4 inches in diameter. The vessel shall be sealed with a lid lined with nonconducting material having three holes, one at the center for a thermometer, and two diametrically opposite near the rim. These holes receive copper tubes of 1/2-inch diameter so arranged that when the lid is in place, one tube enters the oven to a depth of 6 inches while the other rises to an equal height above the lid. These tubes assure a constant draft of air through the instrument. On a common vertical axis with the central hole, a cylinder of wire gauze, 6 inches long and 1 1/2 inches in diameter, shall be supported within the oven.

4.11.2 Procedure.--A 12 \pm 1 gm sample cut into 1/4-inch to 1/2-inch squares shall be placed within the wire cylinder, compressing it to occupy the upper 4 1/2 inches. The thermometer shall be arranged so that the bulb is in the center of this mass. The water shall be heated to the boiling point then the cylinder and thermometer shall be introduced, allowing the latter to protrude through a cork placed in the central hole in the lid. The water shall be allowed to boil and the temperature shall be recorded at frequent intervals for 1 1/2 hours to determine compliance with 3.12. The material shall be considered to fail with respect to the presence of objectionable sizing if the fabric attains a temperature of 100°C within 1 hour, or if it reaches a temperature of 120°C within 1 1/2 hours.

4.12 Halogens.--A copper wire shall be heated in a Bunsen flame until all green coloration disappears. The wire shall be removed from the flame, and strands of yarn taken from the filling of the fabric shall be wound around the hot end of the wire and again the wire shall be introduced into the flame. The presence of green coloration in the flame which persists for more than 3 seconds indicates the presence of halogens in the fabric. The above procedure shall be repeated using strands of yarn taken from the warp of the fabric. Determine the absence of halogens

for compliance with 3.12.

4.13 Weight.-Weight shall be determined in accordance with Method 5040 of Specification CCC-T-191, to determine compliance with 3.14.

4.14 Breaking strength.-The breaking strength shall be determined concurrently with the slippage value and shall be read from the fabric-stretch curve of the graphic record. The breaking strength is that point where there is no further increase in tension. The breaking strength of the warp yarns is taken as the maximum tension in pounds per inch recorded on the fabric-stretch curve for the fill slippage specimen. The breaking strength of the fill yarns is taken as the maximum tension in pounds per inch recorded on the fabric-stretch curve for the warp slippage specimens. Report the average of 5 values obtained in each direction as the breaking strength in that direction to determine compliance with 3.14.

4.15 Thread count.-Thread count shall be determined in accordance with Method 5050 of Specification CCC-T-191 for compliance with 3.14

4.16 Color (applicable to Type I and Type II).-In all instances the cloth shall be dyed scarlet. The scarlet dye shall produce a color closely approximating the color of a Quartermaster standard cloth sample equivalent to red color No. 1105 of Specification TT-C-595. The dyestuffs used shall be either of the following or a blend of the two:

Sodium salt of ditolyl-disazo-bis(4-naphthylamine-4 sulfonic acid
 $C_{34}H_{26}N_6O_6S_2Na_2$

(Note: The color index number is 448 - Society of Dyers and Colorists.)

Sodium salt of 4 sulfo-1-naphthalene-AZO-B-naphthol
 $C_{20}H_{13}N_2O_4SNa$

(Note: The color index number is 176 - Society of Dyers and Colorists.)

4.17 Resubmission and retests.-If the sample subjected to tests, fails to pass the tests, the lot shall be rejected. The contractor shall have the option of having a partial or complete analysis made on samples taken from all or any of the bales in the lot at no expense to the Government. The contractor may then remove the defective portion of the lot, and resubmit the lot for acceptance. The resubmitted lot shall be accepted, provided new samples, selected in accordance with 4.2, pass all the tests required by this specification and that three primary samples pass any test or tests failed by the material on original submission.

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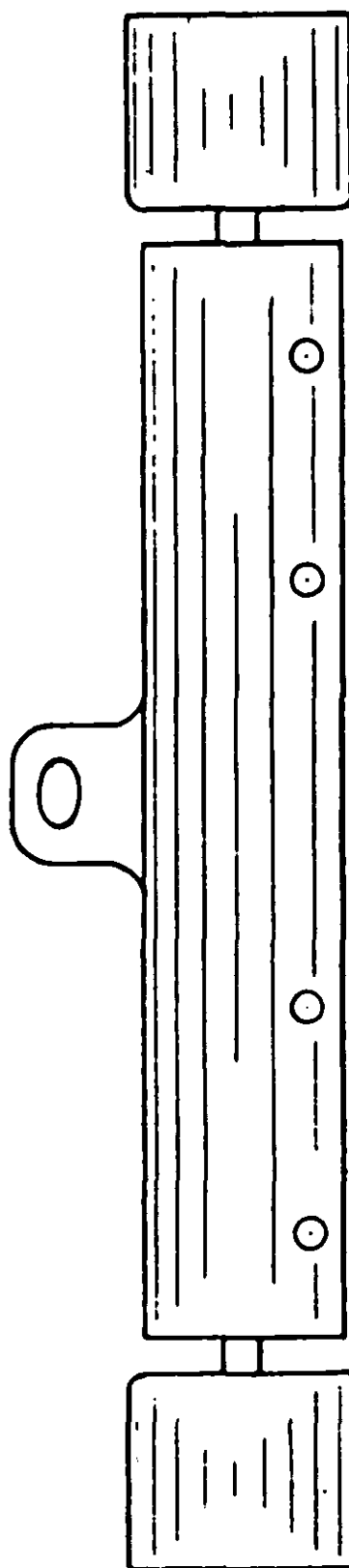
5. PREPARATION FOR DELIVERY

5.1 Packing, labeling, and marking.-Packing, labeling, and marking shall be in accordance with Specification MIL-P-10025.

Notice.-When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, The United States Government thereby incurs no responsibility nor any obligation whatsoever, and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

Army-Ordnance Corps



CLAMP, 6-OUNCE (FOR USE IN SLIPPAGE TEST)

FIGURE 1

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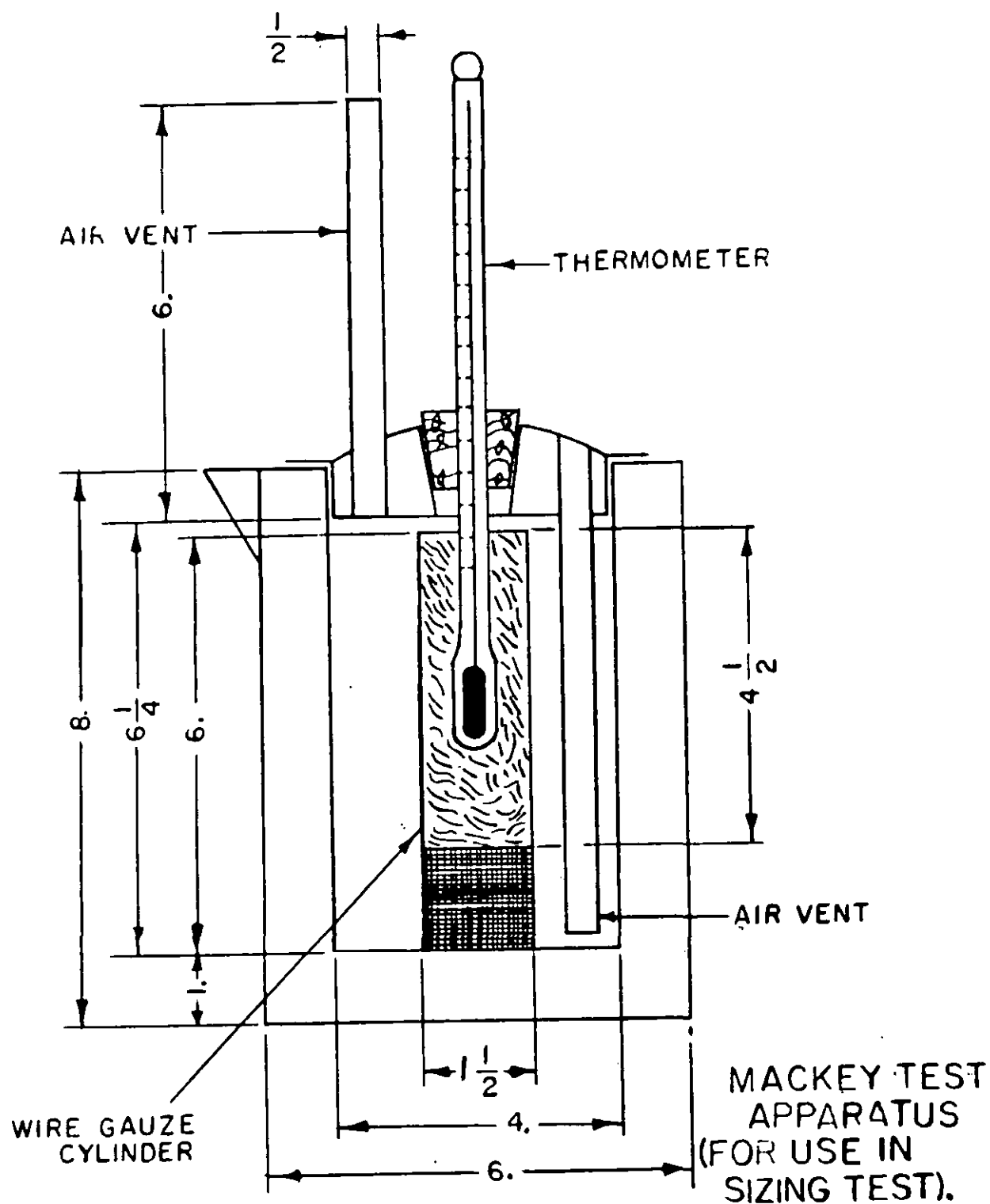


FIGURE 2

S/N 0102-014-1802