

**MIL-T-4117A**

12 FEBRUARY 1960

**SUPERSEDING**

(See section 6)

**MILITARY SPECIFICATION****TAPE, ASBESTOS**

*This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.*

**1. SCOPE**

**1.1 Scope.** This specification covers a range of classes, grades, and types of asbestos industrial tapes having heat and chemical resistance, for use as thermal insulation and for other high temperature applications (see 6.1).

**1.2 Classification.** Asbestos tape shall be of the following classes, grades, and types as specified (see 6.2).

Class 1—Plain (nonmetallic).

- Grade AAAA — 99 percent asbestos, by weight, min.
- Grade AAA — 95 percent asbestos, by weight, min.
- Grade AA — 90 percent asbestos, by weight, min.
- Grade U.G. — 80 percent asbestos, by weight, min.
- Grade C.G. — 75 percent asbestos, by weight, min.

For types see table I.

Class 2—Metallic (wire inserted).

(The same grades of tape as above shall apply.)

For types see table I.

**2. APPLICABLE DOCUMENTS**

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification.

**SPECIFICATIONS****FEDERAL**

- NN-P-515 — Plywood, Container Grade.
- QQ-W-321 — Wire, Brass.
- UU-P-268 — Paper, Kraft, Wrapping.
- UU-P-271 — Paper, Wrapping, Waterproofed Kraft.
- CCC-T-191 — Textile Test Methods.
- PPP-B-566 — Boxes, Folding, Paperboard.
- PPP-B-585 — Boxes, Wood, Wire-bound.
- PPP-B-601 — Boxes, Wood, Cleated-Plywood.
- PPP-B-621 — Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 — Boxes, Fiber.

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PPP-T-76 — Tape, Pressure-Sensitive Adhesive, Paper, Water Resistant.

## MILITARY

MIL-A-140 — Adhesive, Water - Resistant, Waterproof Barrier Material.

## STANDARDS

## MILITARY

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 — Marking for Shipment and Storage.

(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.)

## 3. REQUIREMENTS

## 3.1 Materials.

3.1.1 *Class 1, plain nonmetallic.* Class 1 asbestos tape shall be woven of chrysotile asbestos yarn of uniform size and shall contain no rubber or other filling material, except organic fiber.

3.1.2 *Class 2, wire inserted.* Class 2 asbes-

tos tape shall be woven of wire-inserted yarn. The yarn shall be as specified in 3.1.1 and the wire shall be as specified in 3.2.2.

## 3.2 Composition.

3.2.1 *Asbestos.*

3.2.1.1 *Hygroscopic moisture.* The hygroscopic moisture in the asbestos tape, based on the weight of tape without wire, shall average not more than 5 percent when tested as specified in 4.5.1.1.1.

3.2.1.2 *Asbestos content.* The asbestos content in the tape shall be as specified in 1.2 (see 6.2) when tested as specified in 4.5.1.1.2.

3.2.1.3 *Chemically combined water.* The dry asbestos fiber shall contain not less than 12 percent by weight of chemically combined water (water of crystallization) when tested as specified in 4.5.1.1.3.

3.2.2 *Wire.* Unless otherwise specified, the wire shall be  $0.008 \pm .001$  inch in diameter, and shall be brass conforming to Specification QQ-W-321, composition A (see 4.5.1.2). The wire shall be either 1 or 2 plies as specified in table I.

3.3 *Physical properties.* The physical properties of tape shall be in accordance with the requirements as specified in table I and as otherwise specified herein.

TABLE I. *Asbestos tape*

Properties	Type V class 1	Type VI class 1	Type VII class 2	Type VIII class 2	Type IX class 1	Type X class 2
Weave	Plain	Plain	See fig. 1	See fig. 1	See fig. 1	Plain
Width	$1\frac{1}{2} \pm \frac{1}{16}$	$1\frac{1}{2} \pm \frac{1}{16}$	$3 \pm \frac{1}{8}$	$2 \pm \frac{1}{8}$	$\frac{5}{8} \pm \frac{1}{16}$	$1\frac{1}{2} \pm \frac{1}{16}$
Thickness (inch)	$.063 \pm 0.010$	$.063 \pm 0.010$	$.125 \pm .063$	$.125 \pm .063$	$.125 \pm .032$	$.063 \pm .010$
Thread count:						
Total ground warp ends	$32 \pm 1$	$30 \pm 1$	$91 \pm 3$	$63 \pm 1$	$23 \pm 1$	$30 \pm 1$
Total binder warp ends	...	...	21	15	5	...
Picks (inch)	$10 \pm 1$	$7\frac{1}{2} \pm 1$	$11 \pm 1$	$11 \pm 1$	$11 \pm 1$	$8 \pm 1$
Ply of asbestos yarns:						
Ground warp ends	2	2	2	2	3	2

TABLE I. Asbestos tape—Continued

Properties	Type V class 1	Type VI class 2	Type VII class 2	Type VIII class 2	Type IX class 1	Type X class 2
Blinder warp ends	2	2	2	2	3	...
Filling	2	2	2	2	2	1
Weight (feet per pound)	28±10%	26±10%	3.5±10%	5.8±10%	20.5±10%	22±10%
Ply of wire insertion:						
Ground warp yarn	2	2	2	2	2	2
Binder warp yarn	2	2	2	2	2	2
Filling yarn	2	2	2	2	2	1

TABLE I.—Continued

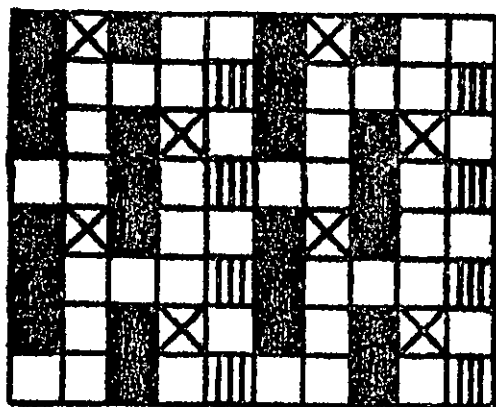
Properties	Type XI class 2	Type XII class 2	Type XIII class 2	Type XIV class 2	Type XV class 2	Type XVI class 2
Weave	Plain	Plain	Plain	Plain	Plain	Plain
Width	2±1/16	1-12±1/16	5/8±1/16	1 1/2±1/16	2±1/16	3±1/16
Thickness (inch)	.063±0.016	.063±0.016	.125±.032	.125±0.032	.125±0.032	.125±0.032
Thread count:						
Total ground warp ends	40±2	32±1	23±1	47±2	61±2	87±2
Total binder warp ends	8±1	10±1	5	11	14	21
Picks (inch)	8±1	10±1	12±1	12±1	12±1	12±1
Ply of yarns:						
Ground warp ends	2	2	2	2	2	2
Binder warp ends	2	2	2	2	2	2
Filling	1	2	2	2	2	2
Weight (feet per pound)	17%±10%	19.6±10%	20.0±10%	9.4±10%	7.2±10%	4.85±10%
Ply of wire insertion:						
Ground warp yarn	2	2	2 <sup>1</sup>	2	2	2
Binder warp yarn	2	2	2	2	2	2
Filling yarn	1	2	2	2	2	2

<sup>1</sup> Or as specified.

TABLE I—Continued

Properties	Type XVII	Type XVIII	Type XIX	Type XX	Type XXI	Type XXII
Weave	Plain	Plain	Plain	Plain	Plain	Plain
Width (inch)	1 1/2±1/16	5/8±1/16	1 1/2±1/16	2±1/16	3±1/16	3±1/16
Thickness (inch)	.063±0.016	.125±0.031	.125±0.031	.125±0.031	.125±0.031	.125±0.031
Thread count:						
Total ground warp ends	34±1	23±1	45±2	61±2	87±2	86±3
Total binder warp ends	10±1	5	10	14	21	21
Pick (inch)	10±1	12±1	12±1	12±1	12±1	11±1
Ply of asbestos yarns:						
Ground warp ends	2	3	3	3	3	3
Binder warp ends	2	3	3	3	3	3
Filling	2	3	3	3	3	3
Weight (feet per pound)	28.0±10%	19.6±10%	9.6±10%	7.0±10%	4.88±10%	4.3±10%

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- — FILLING  
 ■ — FACE WARP  
 ⊗ — BACK WARP  
 ▨ — BINDER WARP

FIGURE 1. Weave diagram asbestos tape types VII, VIII, and IX.

**3.4 Put-up.** Unless otherwise specified, the asbestos tape shall be furnished in rolls 95 to 105 feet in length. No more than three rolls in ten shall contain two pieces.

**3.5 Workmanship.** The asbestos tape shall be reasonably free from nap, uneven threads, broken threads, and knots; and shall present a comparatively uniform surface free from excessive irregularities which would affect the serviceability or appearance.

#### 4. QUALITY ASSURANCE PROVISIONS

**4.1** Unless otherwise specified herein the supplier is responsible for the performance of all inspection requirements prior to submission for Government inspection and acceptance. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to the Government. Inspection records of the ex-

aminations and tests shall be kept complete and available to the Government as specified in the contract or order.

**4.2 Lot.** Unless otherwise specified, a lot shall consist of all tape of any one type and grade manufactured as one production run, and offered for delivery at one time.

#### 4.3 Sampling.

**4.3.1 Sampling of rolls.** Rolls of tape for examination of length and workmanship shall be selected at random with the number of rolls in accordance with table II.

TABLE II. Number of samples

Total yards in lot	Number of sample rolls
Up to 1300 <sup>1</sup> .....	3
1300 to 3200 .....	5
3201 to 8000 .....	7
8001 to 22,000 .....	10
22,001 to 110,000 .....	15
110,001 and over .....	25

<sup>1</sup> If a lot contains fewer than 3 rolls, each roll shall be considered a sample.

**4.3.2 Sampling for physical properties.** From each sample roll selected in accordance with 4.3.1 a 1-yard sample shall be taken to determine compliance with the physical requirements of this specification.

#### 4.4 Examination.

**4.4.1 For workmanship.** The rolls of tape selected in accordance with 4.3.1 shall be visually examined to determine compliance with the requirements of workmanship (see 3.5).

**4.4.2 For construction.** Tape selected in accordance with 4.3.2 shall be examined for requirements of construction listed in table III.

TABLE III. Examination for construction

Requirement	Reference	Method
Wire diameter .....	3.2.2	micrometer
Weave .....	Table I	Visual
Thread count .....	Table I	Visual
Ground warp ends		
Binder warp ends		
Filling picks		
Number of yarn plies .....	Table I	Visual
Ground warp ends		
Binder warp ends		
Filling picks		
Ply of wire insert .....	Table I	Visual
Ground warp		
Binder warp		
Filling		

4.4.3 *Packaging, packing, and marking for shipment.* Examination shall be made for compliance with the requirements of section 5 and as required by specifications referenced therein. Except as required by referenced specifications, inspection lots and sampling shall be in accordance with Standard MIL-STD-105 with level of inspection L-7, and an AQL of 4.0 percent defective.

#### 4.5 Tests.

##### 4.5.1 Composition.

4.5.1.1 *Specimen.* From each 1-yard sample of asbestos tape selected in accordance with 4.3.2 a representative specimen of asbestos yarn from which the wire has been removed, and weighing not less than 5 grams, shall be taken for tests.

4.5.1.1.1 *Hygroscopic moisture.* Specimens of asbestos yarn selected in accordance with 4.5.1.1 and each weighing not less than 5 grams, shall be weighed and then dried for 1 hour at 105° to 110°C. (221° to 230°F.), in an electric oven, cooled for 1 hour in a desiccator containing anhydrous calcium chloride, and weighed. The loss in weight is termed the hygroscopic moisture. This weight divided by the weight of the specimen and mul-

tiplied by 100 gives the percentage of hygroscopic moisture in the specimen.

4.5.1.1.2 *Asbestos content.* Specimens used in 4.5.1.1.1 shall be used to determine the asbestos content. Specimens, each weighing not less than 4 grams, after drying for 1 hour at 105° to 110°C. (221° to 230°F.) shall be placed in a desiccator for 1 hour, again weighed, and then placed in a furnace and heated for not less than 1 hour at 800° to 810°C. (1472° to 1490°F.). After removal from the furnace, the specimens shall be cooled for 1 hour in the desiccator containing anhydrous calcium chloride, and then again weighed. The weight of the residue shall be divided by 0.86 to determine the original weight of the asbestos content. (The factor 0.86 is based upon an average theoretical value of 14 percent chemically-combined water. Chemically-combined water subtracted from 100 should yield the proper factor for determination.) The weight of the asbestos content shall be divided by the weight of the dried specimen and the quotient multiplied by 100 to obtain the percentage of asbestos. The average of the determinations shall be taken as the asbestos content.

4.5.1.1.3 *Chemically combined water.* When specified, samples of asbestos fiber represen-

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tative of the lot shall be used to make determinations of chemically combined water. Each sample of asbestos shall weigh approximately 5 grams. The hygroscopic moisture shall be removed as specified in 4.5.1.1.1, the weight recorded, and the dried material ignited in an electric furnace at 800° to 810°C. (1472° to 1490°F.) for 1 hour and the weight again recorded. The percentage of chemically-combined water shall be calculated as follows:

$$\text{Percentage of chemically - combined water} = \frac{(A - B) \times 100}{A}$$

A = Weight of dried specimen

B = Residual weight of ignited specimen

4.5.1.2 *Wire*. The supplier shall keep on file affidavits to certify that the wire in the lot meets the requirements of Specification QQ-W-321. These affidavits shall be made available to the procuring agency. A copy of this analysis shall be certified to and signed by a responsible agent of the contractor.

4.5.2 *Test methods*. Sample rolls of tape for test of weight and length shall be selected in accordance with 4.3.1. Sample yards of tape for all other tests shall be selected in accordance with 4.3.2. Tests shall be made in accordance with Specification CCC-T-191 and the method specified in table III.

TABLE III. *Test methods*

Characteristic	Specification requirement	Test method
Width .....	Table I	5020
Thickness .....	Table I	5030
Weight .....	Table I	5040
Hygroscopic moisture .....	3.2.1.1	4.5.1.1.1
Asbestos content .....	3.2.1.2	4.5.1.1.2
Chemically combined water .....	3.2.1.3	4.5.1.1.3
Wire composition .....	3.2.2	See 4.5.1.2
Length .....	3.4	5010

4.6 **Rejection and retest**. Failure of any sample of asbestos tape to conform to any one of the requirements of this specification shall be cause for the rejection of the lot represented. Tape which has been rejected may be reworked or replaced to correct the defect and resubmitted for acceptance. Before resubmitting, full particulars concerning previous rejection and the action taken to correct the defects found in the original shall be furnished to the procuring agency.

## 5. PREPARATION FOR DELIVERY

5.1 **Application of requirements for preparation for delivery**. The requirements speci-

fied herein apply only to direct purchases by or direct shipment to the Government.

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

### 5.2.1 *Level A*.

5.2.1.1 *Unit packaging*. Unless otherwise specified in the invitation for bids, contract, or order, each unit of asbestos tape shall be individually wrapped in kraft paper having a base weight of not less than 30 pounds (24 by 36/500) conforming to Specification UU-P-268, and shall be individually packaged in a snug-fitting folding carton conforming to



Specification PPP-B-636 type 2, class 2; or a number of individual units depending upon the weight, may be packaged in a carton conforming to Specification PPP-B-566. Each carton shall be sealed in accordance with the appendix of its respective specification.

5.2.1.2 *Intermediate packaging.* Unless otherwise specified, unit containers conforming to Specification PPP-B-566 and containing 10 or more units shall be overpacked in intermediate containers conforming to Specification PPP-B-636 type 2, class 2. Intermediate package closure shall be taped with material conforming to Specification PPP-T-76. Unit containers conforming to Specification PPP-B-636 type 2, class 2 will require no intermediate packaging.

5.2.2 *Level C.* Each unit of asbestos tape shall be packaged in accordance with the supplier's standard practice.

5.3 *Packing.* Shipping containers in-so-far as possible shall contain identical number of unit or intermediate packages of like items, and shall be snugly packed. The gross weight of the fully packed exterior container shall not exceed 200 pounds. Packing shall be level A, B, or C as specified (see 6.2).

5.3.1 *Level A.* Intermediate packages shall be overpacked in wirebound boxes, cleated-plywood boxes, or nailed wooden boxes conforming to Specification PPP-B-585 type II class 3, Specification PPP-B-601, overseas type or Specification PPP-B-621 style 4, class 2. Plywood if used shall be type A or B, condition 1 of NN-P-515. When specified each exterior container shall be furnished with a sealed case liner fabricated from barrier material conforming to Specification UU-P-271. All seams and closures shall be completely sealed with a continuous seam at least  $\frac{3}{4}$  inch wide of adhesive conforming to Specification MIL-A-140.

5.3.2 *Level B.* Intermediate packages shall be packed in exterior containers conforming

to Specification PPP-B-585, class 1; PPP-B-601 domestic type; or PPP-B-621 style 4, class 1. The gross weight shall not exceed 200 pounds.

5.3.3 *Level C.* Packing shall be in accordance with commercial practice adequate to ensure acceptance and safe delivery by the carrier for the mode of transportation employed.

#### 5.4 Marking.

5.4.1 *Rolls.* Each roll of asbestos tape shall have a ticket securely attached with not finer than five-fold cotton string doubled to not less than 8 inches long. The ticket shall be made of heavy cardboard and be provided with a reinforced eyelet for attaching the tying cord. The ticket shall be marked in accordance with MIL-STD-129.

5.4.2 *Shipping containers.* Each unit, intermediate and exterior container shall be durably and legibly marked in accordance with the applicable requirements of Standard MIL-STD-129.

### 6. NOTES

6.1 *Intended use.* The asbestos tape covered by this specification is intended for use in connection with insulation where the temperature encountered would exceed the temperature that the normal textile fibers could withstand. Class 1 tape is suitable for insulation where a covering resistant to heat and chemicals is required, and class 2 where additional wear-resisting qualities are essential. As a rule, class 1 tape of the indicated grades will be applicable for service temperatures as follows:

Grade	Temperature °F
AAAA	900
AAA	800
AA	600
U.G.	450
C.G.	350

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

- (a) Title, number, and date of this specification.
- (b) Class, grade, and type of tape required (see 1.2).
- (c) Quantity in linear yards required.
- (d) Put-up if other than that specified (see 3.4).
- (e) Selection of applicable levels of packaging and packing (see 5.2 and 5.3).

**6.3 Supersession data.** This specification supersedes the tape requirements of MIL-C-4117, dated 8 May 1950. The cloth requirements of MIL-C-4117 are included in MIL-C-10316B. This specification also supersedes Specification USAF 16209, dated 20 May 1949.

**Custodians:**

Army—Ordnance Corps  
Navy—Bureau of Yards and Docks  
Air Force—Mobile Air Materiel Area

**6.4 Electrical insulation tapes.** Electrical insulation tapes for use where electrical insulation is required are included in Specification MIL-I-3053.

**6.5 Commercial sizes.** Tape  $\frac{1}{16}$  inch in thickness is normally supplied in 100-foot rolls and tape  $\frac{1}{8}$  inch in thickness in 50-foot rolls. The commercial widths of tape are  $\frac{5}{8}$ , 1,  $1\frac{1}{4}$ ,  $1\frac{1}{2}$ , 2,  $2\frac{1}{2}$ , and 3 inches, and as specified.

**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 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.

**Preparing activity:**

Army—Ordnance Corps