

SS-C-466a

JULY 15, 1955

~~SUPERSEDED~~

Int. Fed. Spec. SS-C-00466A (DOD-SHIPS)

8 October 1954, and

Fed. Spec. SS-C-466

15 December 1949

FEDERAL SPECIFICATION

CLOTH, THREAD, AND TAPE-ASBESTOS

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope.—This specification covers asbestos cloth, thread, and tape for use as a lagging material or jacket over thermal insulation and as a wrapping on engine exhaust pipes.

1.1.1 Federal specification coverage.—This specification does not cover all types, classes and sizes of asbestos cloth, thread and tape, but only those most generally used by the Federal Government.

1.2 Classification.

1.2.1 Types, grades, and classes.—Asbestos cloth, thread, and tape covered by this specification shall be of the following types, grades, and classes, as specified (see 6.2):

Type I.—Cloth:

Grade A.—80 percent asbestos, blue stripe.

Class 1.—Plain weave, regular weight.

Class 2.—Plain weave, light weight.

Class 5.—Combination asbestos and glass, plain weave.

Grade B.—90 percent asbestos, red stripe.

Class 1.—Plain weave.

Grade C.—95 percent asbestos, wire insertion, no stripe.

Class 1.—Plain weave.

Grade D.—95 percent asbestos, green stripe.

Class 1.—Plain weave, regular weight.

Class 2.—Plain weave, light weight.

Type II.—Thread, sewing, reinforced with wire.

Type III.—Thread, sewing without wire.

Type IV.—Tape.

Class 1.—Plain weave.

1.2.2 Sizes.—The asbestos cloth, thread, and tape shall be furnished in the sizes specified (see 6.2).

2. APPLICABLE SPECIFICATIONS AND STANDARDS

2.1 The following specifications and standards, of the issues in effect on date of invitation for bids, form a part of this specification:

Federal Specifications:

NN-B-591 — Boxes, Fiberboard, Wood-Cleated (for Domestic Shipment).

NN-B-621—Boxes, Wood, Nailed and Lock-Corner.

NN-B-631—Boxes, Wood Wirebound, for Domestic Shipment.

UU-P-268—Paper; Kraft, Wrapping.

CCC-T-191—Textiles Test Methods.

LLL-B-631—Boxes; Fiber, Corrugated (for Domestic Shipment).

LLL-B-636—Boxes; Fiber, Solid (for Domestic Shipment).

PPP-B-601—Boxes, Wood, Cleated-Plywood.

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Military Specifications:

JAN-P-103—Packaging and Packing for Overseas Shipment—Boxes; Wood Cleated; Solid Fiberboard.

JAN-P-106—Packaging and Packing for Overseas Shipment—Boxes; Wood, Nailed.

JAN-P-108—Packaging and Packing for Overseas Shipment—Boxes, Fiberboard (V-Board and W-Board), Exterior and Interior.

MIL-L-10547—Liners, Case, Waterproof.

Military Standards:

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

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

(Activities outside the Federal Government may obtain copies of Federal Specifications and Standards as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.

(Single copies of this specification and other product specifications required by activities outside the Federal Government for bidding purposes are available without charge at the General Services Administration Regional Offices in Boston, New York, Atlanta, Chicago, Kansas City, Mo., Dallas, Denver, San Francisco, Los Angeles, Seattle, and Washington, D. C.

(Federal Government activities may obtain copies of Federal Specifications and Standards and the Index of Federal Specifications and Standards from established distribution points in their agencies.

(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 contracting officer.)

3. REQUIREMENTS

3.1 Material.—Asbestos cloth, thread, and tape shall be made of good-quality chrysotile asbestos and organic fiber.

3.1.1 Asbestos.—The dry asbestos fiber shall contain not less than 12 percent by weight of chemically combined water.

3.2 Hygroscopic moisture.—Hygroscopic moisture shall not exceed 5 percent (see 4.3.1.1 and 4.3.3.1).

3.3 Type I, cloth.

3.3.1 Fabrication.—All cloth shall be woven with plied yarns.

3.3.2 Tolerance in width.—A tolerance of plus or minus $\frac{1}{2}$ inch will be permitted in the specified width of the cloth.

3.3.3 Grade A, 80 percent asbestos, blue stripe.—The cloth shall contain not less than 80 percent asbestos and a stripe of blue cotton shall be woven in each selvage edge.

3.3.3.1 Class 1, plain weave, regular weight.—The construction shall be 18 ± 1 ends by 9 ± 1 picks per inch. The weight shall be 2.25 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I.

TABLE I.—*Breaking strength of asbestos cloth, minimum, pounds per inch width*

	As received		After heating to 200° Fahrenheit (F.)	
	Warp	Filling	Warp	Filling
Grade A:				
Class 1	90	37	75	30
Class 2	75	35	60	30
Class 5	85	60	80	60
Grade B:				
Class 1	100	35	80	30
Grade D:				
Class 1	110	45	105	40
Class 2	80	40	75	30

3.3.3.2 Class 2, plain weave, light weight.—The construction shall be 19 ± 1 ends by 10 ± 1 picks per inch or 24 ± 1 ends by 12 ± 1 picks per inch. The weight shall be 1.40 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I.



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3.3.3.3 Class 5, combination asbestos and glass, plain weave.—The construction shall be 18 ± 1 ends and 9 ± 1 picks per inch. The yarn shall be 2-ply, composed of one 10-cut asbestos yarn containing not less than 80 percent asbestos, and one continuous filament glass yarn (number 150-2/2). The weight shall be 1.40 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I.

3.3.4 Grade B, 90 percent asbestos, red stripe.

3.3.4.1 Class 1, plain weave.—The cloth shall contain not less than 90 percent asbestos. The construction shall be 18 ± 1 ends by 9 ± 1 picks per inch. The weight shall be 2.25 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I. A stripe of red cotton yarn shall be woven in each selvage edge.

3.3.5 Grade C, 95 percent asbestos, wire insertion, no stripe.

3.3.5.1 Class 1, plain weave.—The cloth shall contain not less than 95 percent asbestos, exclusive of the wire insertion. The construction shall be 18 ± 1 ends by 9 ± 1 picks per inch. The warp and filling yarns shall be two strands of asbestos yarn combined with two strands of nickel-copper alloy wire. The wire shall contain not less than 58 percent nickel and shall be 0.008 ± 0.001 inch in diameter. The weight shall be 3.50 pounds per square yard, plus or minus 7 percent.

3.3.6 Grade D, 95 percent asbestos, green stripe.—The cloth shall contain not less than 95 percent asbestos and a stripe of green cotton yarn shall be woven in each selvage edge.

3.3.6.1 Class 1, plain weave, regular weight.—The construction shall be 18 ± 1 ends by 9 ± 1 picks per inch. The weight shall be 2.25 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I.

3.3.6.2 Class 2, plain weave, light weight.—The construction shall be 19 ± 1 ends by 10 ± 1

picks per inch. The weight shall be 1.4 pounds per square yard, plus or minus 7 percent. The tensile strength shall conform to the requirements shown in table I.

3.4 Type II, thread, sewing, reinforced with wire.—The strands shall be composed of three nickel-copper wires, each of which shall have asbestos yarn spun around it, twisted together to definitely interlock the asbestos and wire. The yarn shall be 10-cut and shall contain not less than 95 percent asbestos. The wire insertion shall contain not less than 58 percent nickel and shall be 0.008 ± 0.001 inch in diameter.

3.5 Type III, thread, sewing, without wire.—The thread shall be made from yarn not heavier than 10-cut, 2-ply, and shall contain not less than 75 percent asbestos. One pound of the thread shall provide not less than 450 yards. The tensile strength of the thread shall be not less than 8 pounds, when tested as specified in 4.3.2.

3.6 Type IV, tape.

3.6.1 Class 1, plain weave.—The tape shall contain not less than 80 percent asbestos. The construction shall be 16 ± 1 ends by 8 ± 1 picks per inch. The warp yarn shall be 10-cut, 3-ply, and the filling shall be 10-cut, 2-ply. The tape shall be of plain weave with woven selvage edges.

3.6.2 Tolerance in width.—A tolerance of plus or minus $\frac{1}{8}$ inch will be permitted in the specified width of tape.

3.7 Workmanship.—The asbestos cloth, thread, and tape shall be reasonably free from nap, broken and uneven threads, and knots.

4. SAMPLING, INSPECTION, AND TEST PROCEDURES

4.1 Sampling.

4.1.1 Lot.

4.1.1.1 Type I, cloth.—For purposes of sampling, a lot shall consist of not more than 1000

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square yards of cloth of the same grade and class produced in one plant under essentially the same conditions and offered for delivery at one time.

4.1.1.2 Types II and III, thread.—For purposes of sampling, a lot shall consist of not more than 1000 pounds of thread of the same type produced in one plant under essentially the same conditions and offered for delivery at one time.

4.1.1.3 Type IV, tape.—For purposes of sampling, a lot shall consist of not more than 10,000 linear feet of tape of the same width produced in one plant under essentially the same conditions and offered for delivery at one time.

4.1.2 Sampling for visual and dimensional inspection.—A random sample of rolls of cloth, balls, reels or tubes of thread, or rolls or tubes of tape, shall be taken by the Government inspector in accordance with table II from each lot offered for Government inspection of visual and dimensional characteristics with lot acceptance based on inspection requirements in accordance with Military Standard MIL-STD-105.

TABLE II.—*Sampling for visual and dimensional inspection AQL (approx.) = 2.5 percent defective*

Number of rolls of cloth, balls, reels or tubes of thread, or rolls or tubes of tape in lot	Number of rolls of cloth, balls, reels or tubes of thread, or rolls or tubes of tape in sample	Acceptance number (defective)	Rejection number (defectives)
15 and under ..	5	0	1
16 to 40	7	0	1
41 to 65	10	0	1
66 to 110	15	1	2
111 and over	25	1	2

NOTE.—Approximately 7 yards shall be unrolled from the rolls of cloth, and 7 feet from the rolls or tubes of tape.

4.1.3 Sampling for lot acceptance tests.—A random sample of cloth, thread, or tape shall be taken by the Government inspector in accordance with table III from each inspection lot of

material, and shall be subjected to the tests specified in 4.2.2.

TABLE III.—*Sampling for lot acceptance tests*

Number of rolls of cloth, balls, reels or tubes of thread, or rolls or tubes of tape in lot	Number of rolls, balls, reels, or tubes in sample ¹
8 and under	2
9 to 15	3
16 to 40	4
41 to 65	5
66 and over	6

¹ From each sample roll of cloth a sample strip of cloth 20 inches in length and the full width of the roll, or a 6-ounce ball, reel, or tube of thread, or 2 feet of tape the full width of the roll shall be taken.

4.2 Inspection and tests.

4.2.1 Visual and dimensional inspection.—Each of the sample rolls, balls, reels, or tubes taken in accordance with 4.1.2 shall be visually and dimensionally inspected by the Government inspector to verify compliance with this specification. Any roll, ball, reel or tube in the sample containing one or more visual or dimensional defects shall be rejected, and if the number of defective rolls, balls, reels, or tubes in any sample exceeds the acceptance number for that sample, the lot represented by the sample shall be rejected. Rejected lots may be offered again for Government inspection provided the contractor has repaired or removed all nonconforming material. The Government inspector shall again examine samples from such resubmitted lots to verify compliance with this specification.

4.2.2 Lot acceptance tests.—The sample selected in accordance with 4.1.3 shall be subjected to the applicable tests specified in 4.3. If the sample tested is found to be not in conformance with this specification, the lot which it represents shall be rejected. Rejected lots may be offered again for testing only after the contractor, after being informed of the reasons for rejection, has so reworked the entire lot as to remove all nonconforming material.

4.3 Tests.

4.3.1 Cloth.



4.3.1.1 Hygroscopic moisture.—Five test specimens, 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 in a desiccator for one hour and again weighed. The loss in weight is termed the hygroscopic moisture. This weight divided by the weight of the sample and multiplied by 100 gives the percentage of hygroscopic moisture in the sample of cloth.

4.3.1.2 Asbestos content.—Five test specimens, each weighing not less than 5 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 shall be placed in a furnace and heated for not less than 1 hour at 800° to 810°C. (1470° to 1490°F.). After removal from the furnace, they shall be cooled in a desiccator for 1 hour and then weighed. The weight of the residue shall be divided by 0.86¹ to determine the original weight of the asbestos content. 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 five determinations shall be taken as the asbestos content. The percentage of organic material equals 100 minus the percentage of asbestos. The asbestos content of glass-reinforced or wire-inserted cloth shall be determined after the glass or wire has been removed.

4.3.1.3 Chemically combined water.—Certified samples of well-opened asbestos of the type used in the manufacture of the asbestos cloth shall be supplied to the Government inspector to make determinations of chemically combined water. This test shall be made on five samples, each weighing approximately 5 grams. The hygroscopic moisture shall be removed as specified in 4.3.1.2, the weight recorded, and the dried material ignited in an electric furnace at 800° to 810°C. (1,470° to 1,490°F.) for 1 hour. The difference between the dried weight and the residual weight of the ignited specimen, divided by the dried weight of the specimen and multiplied by 100, gives the percentage of chemically combined

¹The factor 0.86 is based upon an average theoretical value of 14 percent chemically combined water.

water in the asbestos fiber. The average of the five determinations shall be taken as the percentage of chemically combined water in the asbestos fiber.

4.3.1.4 Breaking strength.—The breaking strength of the cloth shall be determined by the method No. 5100 of Federal Specification CCC-T-191. For determining the breaking strength after heating, an oven with automatic temperature control shall be used. Ten specimens 4 inches by 6 inches shall be cut; five with the 6-inch dimension parallel to the warp and five with the 6-inch dimension parallel to the filling. The specimens shall be supported on a wire screen or perforated metal plate at least 0.5 inch above the floor of the oven, and not more than five specimens shall be superimposed upon one another. The oven thermocouple shall be centrally located not more than 0.5 inch above the topmost specimen. The specimens shall be introduced into the ventilated oven with the temperature at 200°F. They shall remain in the oven for 2 hours, after which they shall be removed, allowed to cool to room temperature, and tested for breaking strength as specified above.

4.3.1.5 Cloth construction.—The number of warp yarns and number of filling yarns shall be determined by method No. 5050 as specified in Federal Specification CCC-T-191.

4.3.1.6 Weight.—The weight shall be determined in accordance with method No. 5041 of Federal Specification CCC-T-191.

4.3.2 Thread.

4.3.2.1 Breaking strength.—The breaking strength of the asbestos thread shall be determined on a standard textile tension testing machine. All tests shall be made on single strands. The single strands shall be broken after conditioning the tubes (or bobbins) for 12 hours in a standard atmosphere having a relative humidity of 65 percent and a dry-bulb temperature of 70°F., and the tension test shall be made under the above atmospheric conditions. A single-strand testing machine of proper capacity, with the clamps set 10 inches apart, and having a speed of pulling clamp of $12 \pm \frac{1}{2}$ inches per minute, shall be used. The clamp or device for



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holding the individual strand of material shall be of the flat grip, capstan, drum, or other type, and shall be deemed to be satisfactory provided that not more than 25 percent of the specimens break at a point within 0.5 inch of the point of contact with the clamp or holding device. The average of four breaks from each of 10 tubes (or bobbins), taken at random from each case of 300 pounds or less, shall be the average breaking strength.

4.3.3 Tape.

4.3.3.1 Hygroscopic moisture, asbestos content, and chemically combined water.—The sample tape shall be tested for hygroscopic moisture, asbestos content, and chemically combined water as specified in 4.3.1.1, 4.3.1.2, and 4.3.1.3, respectively.

4.3.3.2 Tape construction, number of ends and picks in woven tape.—(See method No. 5050 of Federal Specification CCC-T-191.) When possible, in determining the ends per inch, the count shall be started $\frac{1}{4}$ inch in from selvage and this number shall be divided by the width over which the count was made. Otherwise, the number of ends per inch shall be determined by counting the warp yarns in the full width of the tape and dividing the total number of ends by the inches of width. The number of picks shall be the average of the count made in three 5-inch lengths taken from each end and the middle of a 24-inch sample.

5. PREPARATION FOR DELIVERY

5.1 Packaging.

5.1.1 Domestic shipment, immediate use.—Unless otherwise specified, commercial packages will be acceptable.

5.1.2 For domestic shipment and storage or overseas shipment.

5.1.2.1 Cloth.—Cloth in lengths and widths as specified in the contract or order shall be packaged in rolls. Each roll shall be completely wrapped with kraft paper, grade B, 60-pound-

basis-weight (24 by 36—500) conforming to Federal Specification UU-P-268.

5.1.2.2 Thread.—Thread shall be furnished in balls, reels, or tubes and in lengths, as specified in the contract or order. Each ball, reel, or tube shall be wrapped with kraft paper conforming to Federal Specification UU-P-268.

5.1.2.3 Tape.—Tape shall be wound on tubes or rolls in lengths and widths as specified in the contract or order. Each tube or roll shall be wrapped with kraft paper conforming to Federal Specification UU-P-268.

5.2 Packing.

5.2.1 Domestic shipment—immediate use.—The material packaged as specified in 5.1 shall be packed in substantial commercial containers of the type, size, and kind commonly used for the purpose in such manner as to insure acceptance and safe delivery to the designated point by common or other carrier at the lowest rate of the carrier.

5.2.2 For domestic shipment and storage.—Material packaged as specified in 5.1.2 shall be packed in wood cleated fiberboard, wood cleated plywood, nailed wood, wirebound wood or fiberboard boxes conforming to Federal Specification NN-B-591, PPP-B-601 (domestic type), NN-B-621, NN-B-631, or the special requirements of Federal Specification LLL-B-631 or LLL-B-636. Boxes shall be closed in accordance with the applicable container specification. The gross weight of wood boxes shall not exceed 500 pounds.

5.2.3 For overseas shipment.—Material packaged as specified in 5.1.2 shall be packed in wood cleated fiberboard, wood cleated plywood, nailed wood or fiberboard boxes conforming to Military Specification JAN-P-103, Federal Specification PPP-B-601 (overseas type), Military Specification JAN-P-106 or JAN-P-108. Boxes shall be closed and strapped in accordance with the applicable container specification and appendix thereto. Wood or wood-cleated boxes shall be lined with a sealed waterproof caseliner conforming to Military Specification MIL-L-10547. The gross weight of boxes shall not exceed 200 pounds.

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5.3 Marking.

5.3.1 Nonmilitary agencies.—Shipping containers shall be marked with the name of the commodity, the type, grade, class, size, specification number, and the quantity contained therein, as defined by the contract or order under which shipment is made, the name of the contractor, and the number of the contract or order.

5.3.2 Military agencies.—In addition to any special marking required by the contract or order, marking for shipment shall be in accordance with Military Standard MIL-STD-129.

6. NOTES.**6.1 Intended use.**

6.1.1 Type I, grade A cloth and type IV tape.—Type I, grade A cloth, and type IV tape are intended for use as the jacketing material over insulation where the temperature of the insulated surface is more than 125°F. (52°C.), except that they are not to be used on fittings and flanges, nor where they will be in contact with heated metal.

6.1.2 Type I, grade B cloth.—Type I, grade B cloth is intended for use as the outside surface on removable and replaceable covers for flanges and fittings where the temperature of the insulated surface does not exceed 500°F. (260°C.) or for the wrapping of engine exhaust pipes where the temperature of the metal in contact does not exceed 500°F. (260°C.).

6.1.3 Type I, grade C cloth.—Type I, grade C cloth is intended for use as the inside surface on removable and replaceable covers for flanges and fittings, or for the wrapping of engine exhaust pipes where the temperature of the metal in contact is over 500°F. (260°C.).

6.1.4 Type I, grade D cloth.—Type I, grade D cloth is intended for use as the outside surface on removable and replaceable covers for flanges and fittings where the temperature of the insulated surface is more than 500°F. (260°C.), or

for the wrapping of exhaust pipes where the temperature of the metal in contact exceeds 500°F. (260°C.).

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

- (a) Title, number, and date of this specification.
- (b) Types, grades and classes required (see 1.2.1).
- (c) Size required (see 1.2.2).
- (d) Whether for domestic shipment, immediate use, domestic shipment and storage or overseas shipment (see 5.1 and 5.2).

6.3 Commercial sizes.

6.3.1 Cloth.—Asbestos cloth is normally available in a width of 40 inches. It is commonly supplied in rolls of 50 yards, plus or minus 5 yards, and can be supplied in rolls of 25 and 100 yards. Ten percent of the total number of rolls may contain two pieces.

6.3.2 Thread.—Sewing thread is normally available in 1-pound and 2-pound tubes.

6.3.3 Tape.—Asbestos tape is normally supplied in 50-foot rolls and in widths of 1, 1¼, 1½, 2, 2½, and 3 inches. Tape can be supplied in rolls of 100 feet in 2, 2½, and 3-inch widths, if desired.

6.4 Commercial style numbers.—Commercial style numbers of the various grades and classes of cloth are as follows:

Grade A:

Class 1—style 36P10.

Class 2—style 22P16 and style 22P18.

Class 5—style 22P10G.

Grade B:

Class 1—style 36P10.

Grade C:

Class 1—style 56M10.

Grade D:

Class 1—style 36P10.

Class 2—style 22P16.

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6.5 Transportation description.—Transportation description applicable to this item is:

Type I.—Grades A, B, and D:

Asbestos Cloth, not otherwise indexed by name.

Carload minimum weight 30,000 pounds.

Truckload minimum weight 30,000 pounds.

Type I.—Grade C:

Asbestos Cloth, wire reinforced.

Carload minimum weight 30,000 pounds.

Truckload minimum weight 30,000 pounds.

Types II and III:

Thread, other than cotton.

Carload minimum weight 30,000 pounds.

Truckload minimum weight 30,000 pounds.

Type IV:

Tape, insulating, not otherwise indexed by name.

Carload minimum weight 30,000 pounds.

Truckload minimum weight 30,000 pounds.

Minimum weights shown apply when material is transported at Classification ratings. They will vary when material moves on commodity rates. When in doubt consult General Services Administration Regional Traffic Manager.

Patent 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.

MILITARY INTEREST:

Army—Q C E M O

Navy—Sh Or Y

Air Force.

