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AEROSPACE MATERIAL SPECIFICATION

AMS 3810A

Issued 3-1-44
Revised 10-1-82

TAPE, ADHESIVE, CLOTH BACK

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 2-1-56. It is recommended that this specification not be specified for new designs.

This cover sheet should be attached to the "A" revision of the subject specification.

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This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of 10-1-82. By this action, subject specification number and title will be deleted from the active specification index of Aerospace Material Specifications.

This specification is under the jurisdiction of AMS Committee "C".

CANCELED

AERONAUTICAL MATERIAL SPECIFICATION

Society of Aut motiv Engineers, Inc.
29 West 39th Street
New York City

AMS 3810A

Issued 3-1-44
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TAPE, ADHESIVE, CLOTH BACK

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily for effecting water-resistant and reinforcing seals on moisture barriers and shipping containers.

3. MATERIAL:

3.1 Cloth Backing: Shall be sheeting having not less than 60 threads per in. in warp and in filling directions. Thread shall be free from knots, lumps, and irregularities of twist, in conformance with the best manufacturing practices. Sheeting shall be coated on one side with a moisture-resistant resin

3.2 Adhesive: Shall be pressure-sensitive type, useful over the range of 32-149F, and shall be applied to the backing in a smooth, uniform coating, free of pin holes or bare spots. It shall not transfer to, or remove particles of backing from, adjacent layers on a roll.

4. TECHNICAL REQUIREMENTS:

4.1 General:

4.1.1 Color: Shall be as specified on drawing or purchase order.

4.1.2 Corrosion: Material shall not have a corrosive effect on metals and shall not adversely affect organic protective coatings.

4.2 Properties:

4.2.1 Adhesion to Test Panel: Tape shall have an average adhesion not lower than 25 oz per in. width when tested as follows:

4.2.1 1 Test panels shall be 1 x 3 in paper laminated plastic plates consisting of alcohol-soluble phenolic resin or fiber-filled resin, cured between highly polished metal cauls to produce a smooth surface, free of visible scratches, pits or similar defects. Fiber-filled resins shall contain not less than 35% resin by weight. Panels shall not increase in weight more than 3% when immersed 24 hr in water at 70 F ± 2. The panels shall be cleaned with
Ø gasoline and then with methanol, thoroughly dried, and stored in a desiccator until used. A specimen of tape 1 x 6 in. shall be applied, completely covering the panel, with a 1 x 3 in. section of tape extending beyond on end. The tape shall be rolled 5 times in each direction at approximately 12 in. per min. with a 10 lb hard-surfaced hinged roller of approximately 5 in. diameter. Paper may be applied to the adhesive side of the free end of tape to prevent adhesion during rolling. Immediately, the free end of tape shall be doubled back at 180 degrees and 1 in. of tape peeled off the panel at the folded end. This end of the panel shall be clamped in the lower jaw of a tensile testing machine, and the free end of tape clamped in the upper jaw. The machine shall be a pendulum-type instrument operated at 12 in. per minute. The maximum tension required to peel the tape from the panel is the adhesion value. The average of 5 tests shall be reported.

4.2.2 Adhesion to Backing: Tape shall have an average adhesion not lower than 25 oz
Ø per in. width when tested as follows:

4.2.2.1 A strip of sample tape 1 in. wide shall be applied to a test panel described in 4.2.1.1 and pressed firmly. This tape shall be used as the test surface.
Ø Another strip of tape shall be applied directly over the first and stripped off as in 4.2.1.1. The average of 5 tests shall be reported.

4.2.3 Adhesion at Low Temperature: The tape shall retain adhesion to paper and to
Ø its own backing when tested as follows:

4.2.3 1 A specimen shall be prepared by applying a strip of tape 12 in. long to a 14 in. strip of 60 lb kraft wrapping paper slightly wider than the tape. A second strip of tape 10 in. long shall be applied to the backing of the first strip and pressed firmly with the fingers. The specimen shall be
Ø exposed to a temperature of 140 F ± 2 for 24 hr, cooled at room temperature for 2 hr, and placed in a refrigerator at -25 F ± 2 for 2 hours. At th end of this period, the specimen shall be drawn and flexed once over and around a hard, smooth cylindrical surface having a 1.5 in. diameter, the ends of the specimen being held approximately parallel. The flexing shall be done in the refrigerator at the specified temperature and with the paper in contact with the cylindrical surface. The specimen shall then be examined for loss of adhesion of the tape to the paper and to the tape backing.

4.2.4 Resistance to Oil: After oil immersion, tape shall have an average adhesion
not lower than 25 oz per in. width, and no specimen shall have a value lower
Ø than 15 oz per in. width. The average adhesive transfer shall be not more than 25% of the area of tape in contact with the test surface. Test method shall be as follows:

4.2.4.1 Five specimens of tape shall be applied to plastic test panels as specified in 4.2.1.1. The prepared specimens shall be held by the free end and immersed for 5 sec at 75 F ± 2 in a bath containing corrosion preventive compound conforming to AMS 3065. After immersion, specimens shall be removed, excess compound allowed to drain, and specimens stood on end for 24 hr, after which the adhesion shall be determined as in 4.2.1.1.

4.2.5 Resistance to Accelerated Aging: After accelerated aging, tape shall have an average adhesion not lower than 25 oz per in. width, and no specimen shall have a value lower than 15 oz per in. width. The average adhesive transfer shall be not more than 25% of the area of tape in contact with the test surface. Test method shall be as follows:

4.2.5.1 Five specimens of tape shall be applied to plastic test panels as specified in 4.2.1.1. The prepared specimens shall be exposed for 72 hr at 145 F ± 5 in a Weatherometer, or similar device, with the tape backing toward the light source. The specimens shall be sprayed with water for 2 hr of every 20 hr of exposure. After the exposure period, specimens shall be allowed to cool and dry thoroughly, after which adhesion shall be determined as in 4.2.1.1.

4.2.6 Dry Tensile Strength: Shall be not lower than 35 lb per in. width when tested as follows:

4.2.6.1 A strip of tape 1 x 6 in. shall be clamped in the jaws of the tensile test machine used in 4.2.1.1, with jaws at least 4 in. apart, and operated at 12 in per min. until the tape breaks. Values obtained when the tape breaks at the lips of the jaws shall be discarded. The average of 10 tests shall be reported.

4.2.7 Wet Tensile Strength: Shall be not lower than 35 lb per in. width when tested as follows:

4.2.7.1 A strip of tape 1 x 6 in. shall be immersed 6 hr in water at room temperature, removed, excess water blotted, and tested as in 4.2.6.1. The average of 10 tests shall be reported.

4.2.8 Tearing Resistance: Shall be not lower than 450 g in the weakest direction when determined with an Elmendorf tear tester, or equivalent. Powdered soapstone, chalk, or talc may be used to prevent adhesion of tape to the testing machine jaws. The average of 10 tests shall be reported.

4.2.9 Moisture Vapor Transmission Rate: Shall not exceed 1.0 g per 100 sq in. per 24 hr when tested as follows:

4.2.9.1 Humidity Cabinet: Shall be the General Foods Moisture Vapor Transmission Cabinet, or equivalent. The cabinet shall provide a relative humidity of 90 % ± 2 at 100 F ± 0.5, with no condensation on the test dishes or in the space in which the dishes are placed. Circulation over the test dishes shall be negligible.

4 2 9.2 Ø Test Dishes and Brass Template: Shall be made as shown in Figure 1, or be the equivalent.

4 2 9 3 Ø Test Specimen: A smooth aluminum disc, 5.83 in. diameter x 0.0508 in. thick, shall have a rectangular opening in the center, 4 in. long and of such width that the tape to be tested will overlap 0.25 in. on all sides. The opening shall be sealed with the tape to be tested.

4 2.9.4 Procedure:

4 2 9 4.1 Ø A 50 ml beaker shall be filled with 8 mesh anhydrous calcium chloride (min 96% as $CaCl_2$), emptied into a clean test dish, and the calcium chloride spread evenly over the bottom surface of the dish. The test specimen shall be placed with adhesive side of tape down, over the calcium chloride, and concentric with the rim of the dish. The brass template shall be carefully placed over the test specimen.

4 2 9.4 2 Ø A wax mixture consisting of 60% amorphous wax and 40% paraffin wax shall be heated in a porcelain dish to at least 212 F and poured through a 20 mesh screen to remove large impurities. The wax mixture shall be poured into the annular space between the template and the rim of the test dish, filling the space approximately flush with the top of the template. The dish shall then be cooled to harden the wax sufficiently so that the template can be removed. Care shall be taken not to cool the dish so long as to make the wax hard and brittle. The template shall be removed by inserting a screw driver under an ear of the template and giving a slight twist, tending to press the wax against the dish and at the same time raising the template. This shall be done on the three ears of the template. Any difficulty experienced in removing the template from the dish can be overcome by rubbing the edge of the template with petrolatum before pouring the wax.

4 2 9 4.3 Ø After the template has been removed, the assembly shall be inspected for loose pieces of wax, etc., and examined for flaws in the seal. It shall then be conditioned in the humidity cabinet for 24 hr, removed, cooled for 15 min. in a room maintained at 70-85 F and 50% relative humidity, weighed on an analytical balance, and returned to the humidity cabinet. This procedure shall be repeated, with exposure periods of not less than 48 hr each, until the transmission rate becomes constant. The transmission rate shall be calculated as follows:

$$\text{Transmission Rate} = \frac{(W_2 - W_1) \times 2400}{T \times A}$$

Where:

W_1 = weight in grams before exposure
W_2 = weight in grams after exposure
T = exposure period in hours
A = Area of opening in disc in square inches

The average of 3 tests shall be reported

4.2.10 Water Penetration Rate: Shall not exceed 30 g per 100 sq in. per 24 hr when Ø tested as follows:

4.2.10.1 Approximately 20 g of calcium chloride shall be placed in the bottom of a Thwing-Albert Vapometer, or equivalent. Sample tape shall be placed over the open top of the cap with adhesive side facing the calcium chloride, and Ø the annular ring screwed down tightly. Melted beeswax or similar wax having a melting point of 130-160 F shall be brushed on the flanged edges of the vapometer to further improve the seal. The unit shall be weighed accurately and placed in a desiccator dish. Distilled water at 100 F ± 2 shall be added to the desiccator dish until the surface of the tape is submerged under 1 in. of water. The desiccator dish shall be sealed and exposed to air temperature of 100 F ± 2 for 48 hours. Throughout this period, the surface of the tape shall be kept continuously under a head of 0.9-1.0 in. of water. At the end of this period, the vapometer shall be removed, wiped dry, further dried in an oven at 100 F ± 2 for 30 min., and reweighed. The water penetration rate shall be calculated as follows:

$$\text{Water Penetration Rate} = \frac{(W_2 - W_1) \times 2400}{T \times A}$$

Where:

W_1 = weight in grams before exposure
W_2 = weight in grams after exposure
T = exposure time in hours
A = area of exposed surface in square inches

Any tape which in two successive tests shrinks away from the edges of the cup so as to make the determination impossible to perform as specified shall be rejected. The average of 3 tests shall be reported.

4.2.11 Weathering: Specimens of tape shall be firmly pressed on strips of freshly polished steel, aluminum, brass, and copper, and exposed to ultraviolet light in a Weatherometer, or similar device, for 24 hr at 145 F ± 5. The specimens shall be immersed in distilled water for 5 min. immediately before Ø exposure, and after 3 and 7 hr of exposure. At the end of the exposure period, the specimens shall be removed and examined for fading by visual comparison with unexposed specimens. The pieces of tape shall be removed from the metal strips and the strips cleaned by wiping with a cloth wet with gasoline to determine the adhesive solubility. The average adhesive transfer shall be not more than 10% of the area of tape in contact with the test surface. The cleaned test surfaces shall be examined for evidence of corrosion, discoloration, and pitting. The tape shall be creased sharply and examined for cracking.

5. QUALITY: Material shall be uniform in quality and condition, clean, smooth, and free from foreign materials and from defects detrimental to its performance.

6 TOLERANCES: Unless otherwise specified, the following tolerances apply:

Nominal Width Inch	Tolerance, Inch Plus and Minus
1 and under	0.031
Over 1	0.063

7 REPORTS: Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product meets the requirements of the specification. This report shall include the purchase order number, material specification number, vendor's identification, width, and quantity.

8. PACKAGING AND MARKING:

8.1 Tape shall be supplied in lengths of not less than 60 yd, and shall be wound on a core of approximately 3 in. diameter. Rolls shall be packed in a carton of sufficient size to prevent contact of the carton with the periphery of the rolls. A support which passes through the center of the rolls shall be provided. Precautions shall be taken to prevent objectionable adherence of adjacent rolls. Shipping containers shall contain rolls of only one type, grade, color, and width.

8.2 The following marking shall appear on at least one side and one end or edge of each shipping container:

TAPE, ADHESIVE, CLOTH BACK
AMS 3810A
COLOR _____
WIDTH _____
NUMBER OF ROLLS _____
GROSS WEIGHT _____
MANUFACTURER'S NAME _____
PURCHASE ORDER NUMBER _____
DATE OF MANUFACTURE _____
CAUTION: STORE IN COOL PLACE

9. APPROVAL:

9.1 To assure adequate performance characteristics, material shall be approved by purchaser before material for production use is supplied, unless such approval be waived. Results of tests on production material shall be essentially equivalent to those on the approved sample.

9.2 Vendor shall use the same materials and manufacturing processes for production material as for approved sample material. If necessary to make any change in materials or processing, vendor shall obtain written permission from purchaser prior to incorporating such change.

10. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.