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PPP-T-45D
April 14, 1977
SUPERSEDING
Fed. Spec. PPP-T-45C
June 6, 1969

FEDERAL SPECIFICATION

TAPE, GUMMED, PAPER, REINFORCED AND PLAIN, FOR SEALING AND SECURING

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 plain and reinforced paper tapes suitable for sealing, securing, and banding paper products and paperboard containers (see 6.1).

1.2 Classification.

1.2.1 Types, grades and classes. The tapes covered by this specification shall be of the following types, grades and classes as specified (see 6.2).

Type I - Reinforced, asphalt laminated, or asphaltic-type material, laminated.
  Class 2 - Nonstrippable.
Type II - Reinforced, nonasphalt laminated.

  Class 1 - Strippable.
  Class 2 - Nonstrippable.

Type III - Plain, single ply.

  Class 2 - Nonstrippable.

  Grade A - Light duty, for light-weight packages.
  Grade B - Medium duty, for medium-sized packages.
  Grade C - Heavy duty, for heavy, bulky packages.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

FSC 8135

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Federal Specification:

PPP-T-681 - Tape, Gummed, Packaging and Packing of.

Federal Standards:

Fed. Test Method Std. No. 101 - Preservation, Packaging, and Packing Materials: Test Procedures.

Fed. Test Method Std. No. 147 - Tapes, Packaging, Adhesive and Gummed; Methods of Inspection, Sampling and Testing.

(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, US Government Printing Office, Washington, DC 20402.

(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, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, Seattle, WA.

(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.)

Military Standard:

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

(Copies of Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

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Technical Association of the Pulp and Paper Industry (TAPPI) Publications:

T 401 - Fiber Analysis of Paper and Paperboard.
T 402 - Standard Conditioning and Testing Atmospheres For Paper, Board, Pulp Hand-Sheets, and Related Products.
T 404 - Tensile Breaking Strength and Elongation of Paper and Paperboard (Using Pendulum-Type Tester).
T 414 - Internal Tearing Resistance of Paper.

(Application for copies should be addressed to the Technical Association of the Pulp and Paper Industry, One Dunwoody Park, Atlanta, GA 30341.)

American Society for Testing and Materials (ASTM) Standards):

D 36 - Softening Point of Asphalt and Tar Pitches (Ring and Ball Apparatus)

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race St., Philadelphia, PA 19103.)

3. REQUIREMENTS

3.1 Materials.

3.1.1 Paper.

3.1.1.1 Stock. The paper used in fabricating the tape shall be made from 100 percent unbleached or semibleached chemical wood pulp.

3.1.1.2 Basis weight. The basis weight of the paper prior to gumming shall conform to the requirements of table I, when tested as specified in 4.2.1.1.

TABLE I. Basis weight of ungummed paper

Ungummed paper	Basis weight (24 x 36 - 500) pounds, minimum	(g/m^2)
Type I	30	(49)
Type II, Classes 1 and 2	30	(49)
Type III		
Grade A	35	(57)
Grade B	60	(98)
Grade C	90	(146)

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3.1.2 Ahesive. The adhesives used shall not have an offensive odor (dry or wet) and shall be non-toxic.

3.1.2.1 Type II, class 1. The adhesive for type II, class 1 tapes shall be capable of being quickly activated with water. The wetted adhesive shall show prononunced tackiness and shall cause the tape to remain so firmly affixed that it cannot be removed from the test paper without leaving a thin film of paper from the tape on the test paper, when tested as specified in 4.3.2.

3.1.2.2 Type I and Type II, class 2. The adhesive for type I and type II, class 2 tape shall be capable of being quickly activated with water. The wetted adhesive shall show prononunced tackiness and shall cause the tape to remain so firmly affixed that it cannot be removed without failure of either tape or paper, when tested as specified in 4.3.2.

3.1.2.3 Type III, class 2 all grades. The adhesive for type III, class 2 tapes shall conform to the requirements specified in 3.1.2.2.

3.1.3 Reinforcing materials, types I and II. The reinforcing fibers used in fabricating types I and II tapes shall be composed of glass or rayon of such size as to permit the reinforced tape to meet the requirements set forth in table III, when tested as specified in 4.3.2.

3.1.4 Laminating materials.

3.1.4.1 Type I, laminating materials. The laminating material for type I tape shall be asphalt or asphaltic type and shall have a softening point of 180° to 200°F (82° to 93°C), when tested as specified in 4.2.1.3.

3.1.4.2 Type II, laminating materials. The laminating material for type II tapes shall be non-asphaltic, water resistant, flexible and non-staining (see 4.2.1.3).

3.2 Construction.

3.2.1 Types I and II. Types I and II tape shall consist of two strips of paper, in roll form, securely laminated together with reinforcing fibers embedded in the laminant. The reinforced laminated tape shall be completely and uniformly coated on one side with an adhesive.

3.2.1.1 Reinforcing pattern. Types I and II tape shall be reinforced by lengthwise (machine direction) fibers spaced not more than an average of 1/2 inch (13 mm) apart and by crosswise fibers laid approximately perpendicularly to the lengthwise fibers or in a diamond pattern. Cross machine direction fibers

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shall be spaced not less than an average of 2 per inch (25 mm). For crosswise fibers arranged in a diamond pattern, the spacing between the parallel sides of the diamond shall average not more than 1 inch (25 mm).

3.2.2 Type III, all grades. Type III tapes shall consist of one strip of paper in roll form, of the applicable grade, completely and uniformly coated on one side with an adhesive.

3.3 Rolls.

3.3.1 Roll dimensions. Unless otherwise specified, the width and length of the rolls of tape shall be as specified in table II (see 6.2).

TABLE II. Roll dimensions

Type	Width in inches (mm) Tolerance: ± 1/16 inch (1.6 mm)	Length in feet (m) Tolerance: ± 1-1/2 percent
Types I and II	1, 1-1/2, 2, 2-1/2, 3, 4 (25.4, 38.1, 50.8, 63.5, 76.2, 101.6 mm)	375, 450, 750, 1000. (114.3, 228.6, 304.8 m)
Type III		
Grade A	3/4, 1, 1-1/4, 1-1/2, 2, 3, 4 (19.05, 25.4, 31.75, 38.1, 50.8 mm) (76.2, 101.6 mm)	800 when wound gum side in. (243.8 m) 500 when wound gum side out. (152.4 m)
Grade B	1, 1-1/2, 2, 2-1/2, 3, 4 (25.4, 38.1, 50.8, 63.5, 76.2, 101.6 mm)	600 or 1000, as specified (182.9 or 304.8 m)
Grade C	2, 2-1/2, 3, 4 (50.8, 63.5, 76.2, 101.6 mm)	375 (114.3 m)

3.3.2 Roll construction. Unless otherwise specified, the tape shall be evenly and tightly wound on a core, with the gummed side facing in (see 6.2). The core shall have sufficient rigidity to prevent distortion of the roll under normal conditions of transportation and use. The inside diameter of

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the core shall be not less than 1/2 inch (13 mm). When specified, type II tapes shall have the core secured with a plug (see 6.2). Types I and II tapes shall not be required to have cores. The end of the outer leaf of the tape shall be adhered to the next layer to prevent unwinding. The tape in each roll shall be furnished in one continuous length and not more than 3 splices shall be permitted in any one roll. All splices shall be neatly and evenly made with glue.

3.4 Physical properties. The tape shall comply with the physical properties shown in table III when tested as specified in 4.3.2.

TABLE III. Physical properties

Type	Tensile strength pounds/inch width; (kN/m) minimum		Elongation percent, maximum	Tearing resistance grams minimum 2/	
	Machine direction	Cross Machine direction 1/		Machine direction	Cross Machine direction
Types I and II					
Reinforcing material					
Glass	75 (13.1)	45 (7.8)			
Rayon	57 (9.9 X 10^3)	27 (4.7)	15		
Type III					
Grade A	26 (4.5)			55	66
Grade B	45 (7.8)			113	134
Grade C	68 (11.9)			203	224

1/ This requirement shall be waived for types I and II tapes, less than 3 inches (76.2 mm) in width.

2/ This requirement shall not apply to tapes less than 2-1/2 inches (63.5 mm) in width.

3.5 Adhesiveness, type III. In addition to the adhesive tests specified in 3.1.2, 2-(50.8 mm), 2-1/2 (63.5 mm), and 3-inch (76.2 mm), type III, grade B tapes shall have the following minimum adhesion values, respectively: 25, 32, and 40 points, when tested as specified in 4.3.2.

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3.6 Roll identification. When specified (see 6.2), each roll of tape shall be identified in or on the edge of the core with numerals or letters indicating the manufacturer's name and designation of the product, month and year of manufacture, specification number, nomenclature, type, class and grade, as applicable.

3.7 Workmanship. The tape shall be clean and free from folds, sharp creases, tears, cuts, and holes. The adhesive coating shall cover the entire area of the side to which it is applied. The tape shall be cleanly cut without nicks or ragged edges and shall conform to the levels of quality established herein.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure that supplies and services conform to prescribed requirements.

4.1.1 Inspection. Sampling for inspection shall be performed in accordance with MIL-STD-105, except where otherwise indicated herein.

4.1.1.1 Certificate of compliance. When certificates of compliance are submitted the Government reserves the right to check test such items to determine the validity of the certification.

4.2 Component and material inspection. In accordance with 4.1, components and materials shall be tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended or qualified in this specification or applicable purchase documents.

4.2.1 Testing of component materials.

4.2.1.1 Paper. The paper component shall be tested for the applicable characteristics in table IV. The tests shall be performed in accordance with the applicable TAPPI test method or the Fed. Test Method Std. No. 101 method listed in table IV. The lot shall consist of all paper received at one time from one source of supply for use in the fabrication of one type and grade of tape. The lot size shall be expressed in units of pounds. The sample unit shall be 1,000 square inches (.65 m^2) of paper. The sample size shall be drawn at inspection level S-1 and AQL of 4.0 of MIL-STD-105. Test reports shall include all values upon which results are based. There shall be no failure to meet the composite or lot average requirements. A composite shall consist of small portions taken from all sample units and combined in a single sample.

INSTRUCTIONS FOR TESTING OF COMPONENTS TABLE IV

CHARACTERISTIC	Specification Reference		Requirements Applicable To		Number Determinations Per ~~XXXX~~ Sample Unit	Results Reported As		Inspect Level	AQL
	Requirement	Test Method	Individ Unit	Lot Aver		Pass or Fail	Numerically to Nearest		
Paper									
Stock	3.1.1.1	T401*			2 on composite		5 percent		
Basis weight	3.1.1.2	5022**		X	1		pound (.45 kg)		

* Indicates TAPPI test method.

** Indicates Fed. Test Method St. No. 101 test method.

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4.2.1.2 Reinforcing material. The supplier shall submit a certificate of compliance to the contracting officer stating that the composition of the reinforcing material used in types I and II tape is in conformance with the requirements of 3.1.3.

4.2.1.3 Laminating material. The supplier shall furnish a certificate of compliance to the contracting officer stating that asphalt laminant for type I tape conforms to the requirements of 3.1.4.1 when the softening point is determined in accordance with ASTM D 36 or that non-asphaltic laminant for type II tape conforms to the requirements in 3.1.4.2 as applicable. When an asphaltic-type material is used for the laminate for type I tape, the supplier shall certify that the material is equal to the asphalt in water resistance.

4.3 Inspection of the end item. The end item shall be examined for defects set forth in the applicable subparagraphs at the inspection levels and acceptable quality levels (AQL's) set forth in 4.3.1.5. Random samples shall be drawn from each lot of the end item for examination of visual, roll construction, dimensional and preparation for delivery defects. The lot size, for the purpose of determining the sample size in accordance with MIL-STD-105, shall be expressed in units of rolls for examinations in 4.3.1.1, 4.3.1.2 and 4.3.1.3 and in units of shipping containers for examination in 4.3.1.4.

4.3.1.1 Examination for visual defects. The sample unit for this examination shall be one yard of tape the full width of the roll. Only one sample unit shall be taken from any roll. The sample shall be positioned randomly in all rolls examined and the rolls shall be randomly selected from the lot.

Examine	Defect
Form	Not type or grade specified.
Adhesive coating	Not coated on one side only. Not uniform; bare spot or lumps. Does not cover entire area. Has offensive odor (dry or wet).
Construction (types I and II only)	Tape not securely laminated, any blister or ply separation.
Workmanship	Any dirt, foreign matter, or slime spot. Any hole, tear, cut, fold or sharp crease.

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4.3.1.2 Examination for defects in roll construction. The sample unit for this examination shall be one roll.

Examine	Defects
Assembly of roll	Adhesive side of tape does not face in (unless otherwise specified). Outer end of tape not glued to adjacent layer. Material not evenly and tightly wound causing soft edges or telescoping of the roll. Edges not clean cut, ragged, nicked or uneven.
Core	Core missing, broken, crushed, collapsed or mutilated. Core plug missing, when specified.
Marking for identification	Identification on core missing when specified.
Unwinding of roll	Roll not wound evenly causing sharp creases or folds within roll. While being unwound, tape sticks together to the extent that unwinding causes injury to surface or adhesive separates from backing. Roll not continuous, any tear or break within roll. More than 3 splices per roll. Splices not neatly and evenly made with glue. Splice adheres to adjacent layers of tape.

4.3.1.3 Examination for defects in dimensions. The sample unit for this examination shall be one roll.

Examine	Defect
Roll:	
Width	Varies from width specified by more than ± 1/16 inch (1.59 mm).
Length	Varies from length specified by more than ± 1-1/2 percent.

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Examine	Defect
Core:	
Inside diameter	Less than 1/2 inch (13 mm).
Reinforcing fibers (types I and II only)	Machine direction fibers more than an average of 1/2 inch apart (13 mm). Cross direction fibers less than an average of 2 per inch (25 mm) or parallel sides of diamond average more than 1 inch (25 mm).

4.3.1.4 Examination of preparation for delivery. Packaging, packing, and marking shall be examined in accordance with the quality assurance provisions in PPP-T-681.

4.3.1.5 Inspection levels and acceptable quality levels (AQL's) for examination. The inspection levels, for purposes of determining the sample size, and acceptable quality levels (AQL's) expressed in defects per 100 units shall be as follows:

Examination paragraph	Inspection level	AQL
4.3.1.1	S-4	4.0
4.3.1.2	S-4	4.0
4.3.1.3	S-2	2.5

4.3.2 Testing of end item. The end item shall be tested for the applicable characteristics in table V. The lot size for the purpose of determining the sample size shall be expressed in units of rolls of one type, grade, class and size. The sample unit shall consist of a sufficient length of tape to perform all the tests. The first three layers of tape shall be removed from the rolls before taking any specimens for test. The sample size shall be drawn at inspection level S-1 and AQL of 4.0 of MIL-STD-105. Test results shall include all values upon which results are based. There shall be no failure to meet the sample unit or lot average requirements. The tape shall be conditioned in accordance with TAPPI test method T 402 for all tests except adhesiveness.

INSTRUCTIONS FOR TESTING OF THE END ITEM — TABLE V

CHARACTERISTIC	Specification Reference		Requirements Applicable To		Number Determinations Per Unit Sample Unit	Results Reported As		Inspect Level	AQL
	Requirement	Test Method	Individ Unit	Lot Aver		Pass or Fail	Numerically to Nearest		
Adhesiveness									
Qualitative,									
Tackiness in 5 seconds	3.1.2	4.4.1.2.2	X		1	X			
Adhesion after 2 hours	3.1.2	4.4.1.2.2	X		1	X			
Quantitative, type III, grade B, as applicable	3.5	4.4.1.2.3	X		24		point		
Tensile strength									
Types I and II									
Machine direction	3.4	4.4.2		X	10		pound (kN/m^2)		
Cross direction	3.4	4.4.2		X	10		pound (kN/m^2)		
Type III									
Machine direction	3.4	4.4.2		X	10		pound (kN/m^2)		
Elongation, rayon thread reinforced, types I and II	3.4	4.4.2		X	10		percent		
Tearing resistance, type III, grades A, B, and C									
Machine direction	3.4	T414		X	10		gram		
Cross direction	3.4	T414		X	10		gram		

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4.4 Test procedures.

4.4.1 Adhesiveness.

4.4.1.1 Standard test paper. The test paper shall be a kraft paper conforming to the requirements of table VI. The supplier shall furnish a certificate of compliance to the contracting officer covering these requirements.

TABLE VI. Requirements applicable to test paper

Characteristic		Requirement
Basis weight, (24 x 36 - 500), pounds		90 ± 4.5 (146 ± 7 g/m^2)
Thickness, inch		0.0070 ± 0.0005 (0.178 ± 0.013 mm)
Smoothness, Gurley R.C.	T.S.	40 ± 15
	W.S.	60 ± 20
Smoothness, Sheffield	T.S.	210 ± 50
	W.S.	130 ± 30
Bursting strength, points		75 - 105
Water resistance, average, seconds		120 ± 30

4.4.1.2 Testing procedure.

4.4.1.2.1 Testing conditions. This test shall be performed in an atmosphere maintained at standard conditions as specified in TAPPI method T 402. The test paper shall be conditioned to equilibrium with these conditions prior to testing. The tape specimens shall not be conditioned prior to testing.

4.4.1.2.2 Qualitative. Cut a tape test specimen 6 inches long by the full tape width. Moisten the adhesive using the moistening device specified in method 19 of Fed. Test Method Std. No. 147. Fold over one inch of the end of the tape so that the adhesive sides are together to form a one-inch tab. At the end of 15 seconds, apply the tape to a piece of standard test paper, cut 6 by 9 inches (152 X 229 mm) with the grain lengthwise. Roll once in each direction with a soft-rubber covered hinged iron roller, weighing 16 pounds (7.26 kg), 3-1/2 inches (89 mm) wide and having an overall diameter of 5 inches (127 mm). Within 5 seconds after the tape is pressed on the paper, gently lift the tab to expose not more than one inch of tape and observe the tackiness of the gum. After two hours time, determine the ease of removal of the tape from the test paper. The adhesive quality shall be considered satisfactory if the tape cannot be removed without failure of either the tape or the paper. Class 1 tapes shall be considered satisfactory only if the tape can be removed from the test surface so that a thin film of paper from the tape remains on the test paper.

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4.4.1.2.3 Quantitative. This test shall be performed in accordance with method 19 of Fed. Test Method Std. No. 147 except that the test paper specified in 4.4.1.1 shall be used.

4.4.2 Tensile strength and elongation. Tensile strength and, as applicable, elongation test shall be performed under the atmospheric conditions specified in TAPPI method T 402 and in accordance with TAPPI method T 404. For types I and II tapes, the specimen used for the determination of both machine and cross direction tensile strength shall be 3 inches (76 mm) in width. The jaw separation on the tensile machine shall be 3 inches (76 mm) when making the machine direction test and one inch when making the cross direction test. Three inch jaws shall be used for testing types I and II tapes.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging, packing and marking shall be in accordance with PPP-T-681 to the degree of protection required (see 6.2).

6. NOTES

6.1 Intended use (see 1.1)

6.1.1 Types I and II. Types I and II tapes covered by this specification are intended for use in so called "single strip" closure under the Uniform Freight Classification Rule 41, Section 7. Types I and II tapes are used for closure of fiberboard boxes for domestic shipment and storage and in securing wrappers of packages, Type II tape shall be used on food products.

6.1.1.1 Class 1 and 2 tapes. Class 1 tape is intended for use where ease of opening of containers and removal of tape are required. Class 2 tape is intended for use where it is not necessary to remove tape from boxes for reuse.

6.1.2 Type III. Type III tapes covered by this specification are intended for use in general sealing of cartons and fiberboard boxes, wrappers of packages and banding of paper and paper products.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents.

(a) Title, number, and date of this specification.
(b) Type, grade, and class required (see 1.2.1).
(c) Length and width required (see 3.3.1).
(d) If tape is to be wound gummed side out (see 3.3.2).
(e) When core plugs are required (see 3.3.2).
(f) When roll identification is required (see 3.6).
(g) Selection of applicable level of protection (see 5.1).

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