

Test Procedures for Automatable Polywrap Film

Transmittal Letter

USPS-T-3204 CAGE CODE: 27085

Approval Block

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UNITED STATES POSTAL SERVICE DOCUMENT

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1.0 Introduction

This document provides updated information for USPS-T-3204 - Test Procedures for Automatable Polywrap Film sections referenced in the Domestic Mail Manual (DMM) for the U.S. Postal Service (USPS). Requirements identified in the DMM 4.5.1 Polywrap Specifications refer to specific sections for test methods in USPS-T-3204 – Test Procedures for Automatable Polywrap Film. Postal Service Engineering has revised USPS-T-3204, and section numbering has changed. Table 1 shows section numbers referenced in the DMM and the current section numbers in the most recent release for USPS-T-3204.

DMM Property	DMM USPS-T-3204 Rev D	USPS-T-3204 Current
	Section Number	Section Number
1. Kinetic Coefficient of Friction, MD		
a. Film on Stainless Steel with No. 8	USPS-T-3204 Rev D	USPS-T-3204 Rev F
(Mirror) Finish	Section 4.5.2	Section 3.2
b. Film on Film	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.1	Section 3.1
2. Haze	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.3	Section 3.3
3. Secant Modulus, 1% elongation		
a. TD	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.4	Section 3.4
b. MD	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.4	Section 3.4
4. Nominal Gauge	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.5	Section 3.5
5. Static Charge	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.7	Section 3.7
6. Blocking	USPS-T-3204 Rev D	USPS-T-3204 Rev F
	Section 4.5.6	Section 3.6

Table 1: DMM to USPS-T-3204 Document Mapping

Test Procedures for Automatable Polywrap Film

SPECIFICATION

USPS-T-3204 CAGE CODE: 27085

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Revision	Date	Notes	Author
Rev E	01/16/2008	Released in KONFIG	Riley Mayhall
	07/26/2011	ECR-501022 to update contact address Update per Standard 11	B Gryczewski
Rev E.1	07/27/2011	Update to SOW Template 3.3; rebuild doc, reorder sections per Standard 11 Change address per ECR-501022	L Guernsey
Rev E.2	08/01/2011	Change to "automation approved" in Section 1 and Test Report Sample, per Bill Chatfield	Bill Chatfield L Guernsey
	08/05/2011	Review for formatting, language, grammar	L Guernsey
Rev F	08/18/2011	Per Riley Mayhall, accept all changes, approve final document	Riley Mayhall L Guernsey

Revision History

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1.0 Introduction

1.1 Scope

This specification covers the procedures required to test polywrap film used to enclose flat mail pieces for U.S. Postal Service automated sorting operations.

1.2 Purpose

Independent testing laboratories approved by the Postal Service can best perform these tests. The testing laboratories must use the exact procedures described here. Appendix B lists laboratories approved by the Postal Service.

1.3 Background

This specification is a guideline for polywrap manufacturers who want to develop films that meet these requirements. The Postal Service will include polywrap materials that meet these requirements in their list of approved polywrap materials. Approved materials may be used in automated flat mail processing.

2.0 Requirements

2.1 Requirements Description

Materials submitted for testing must meet or exceed all the requirements in 2.1.1 through 2.1.8. Failure to achieve the specified value listed for the test constitutes failure of the test. Materials that do not meet all of the requirements here are unacceptable for Postal Service automated processing. Vendors may not market unacceptable materials to the Postal Service for this purpose.

2.1.1 Coefficient of Friction, Film-on-Film

The film-on-film kinetic coefficient of friction must fall between 0.20 and 0.55, inclusive, when tested per 3.1.

2.1.2 Coefficient of friction, Film-on-Metal

The film-on-metal kinetic coefficient of friction must be less than 0.45 when tested per 3.2.

2.1.3 Haze

The haze value must be less than 70% when tested per 3.3.

2.1.4 1% Secant Modulus, Transverse Direction

The Secant Modulus must be greater than 50,000 psi in the transverse direction when tested per 4.4.

2.1.5 1% Secant Modulus, Machine Direction

The Secant Modulus must be greater than 40,000 psi in the machine direction when tested per 4.4.

2.1.6 Nominal Gauge

The material must have a nominal gauge greater than .001 inches when tested per 3.5.

2.1.7 Blocking

The blocking load exhibited by the material must be less than 15 grams when tested per 3.6.

2.1.8 Static Charge

The material must generate a static charge of less than 2.0 kilovolts when tested per 3.7.

2.2 Independent Laboratory Test Results Report

Record test results for each material tested, using the Test Results Report shown in Appendix C. The independent laboratory must mail completed Test Results Reports to the Postal Service representative at:

Manager, Product Classification U.S. Postal Service 475 L'Enfant Plaza RM 4446 Washington DC 20260-5015

3.0 Test Procedures

Test submitted materials as described in 3.1 through 3.7. Test laboratories must strictly adhere to these procedures so that test results are repeatable and reproducible between laboratories to the highest degree practicable.

3.1 Kinetic Coefficient of Friction, Film-on-Film, ASTM D894

This test procedure supplements, but does not replace, ASTM test method D1894. Test laboratories must understand and comply with all requirements of ASTM D1894 to provide accurate test results.

3.1.1 Equipment

This test requires the following equipment as specified in the ASTM D1894 test method. See Table 1 below.

Item	Description	Notes
Test Apparatus	As shown in ASTM D1894, Figure 1(c)	
Load Recording System	Accurate to $\pm 5\%$ of value as described in method	This test must have an accuracy of ±1 gram to meet this requirement for a friction coefficient of 0.100
Plane	304 stainless steel with a No. 8 mirror finish, conforming to ASTM A240	You may purchase at <u>www.mcmaster.com</u> , Part No. 9785K11, Cage No. 39428
Sled	As described in method including foam wrapping	You may purchase similar foam to that specified at <u>www.mcmaster.com</u> , Part No. 86375K133, Cage No. 39428
Nylon Monofilament	As described in method	The alternate beaded chain is not acceptable

Table 1: Test Equipment for Kinetic Coefficient of Friction, Film-on-Film

3.1.2 Test Specimens

This test requires the following test specimens, listed in Table 2 below. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling or other damage for testing.

Number of	Specimen	Notes
Test Specimens	Size	
5	3 by 5 inches	Cut specimens with the long dimension parallel to the machine direction
5	5 by 8 inches	Cut specimens with the long dimension parallel to the machine direction

Table 2: Test Specimens for Kinetic Coefficient of Friction, Film-on-Film

3.1.3 Conditioning

Condition specimens per section 8.1 of ASTM D1894. Insure that all sides have adequate air circulation.

3.1.4 Test Procedure

- A. Prepare Specimens
 - 1. Cut and condition the number of specimens from the roll per 3.1.2 and 3.1.3. Use care to handle only the edges so that the center of the specimens remains clean and undamaged.
 - 2. Use a felt tipped marker to place the sample identification on the NON-TREATED SIDE of each specimen, if applicable. Mark on the edge of the specimen where it will not alter the test results.
 - 3. Clean the plane with a lint free cloth and alcohol or acetone to remove any residue that may be present from previous samples.
 - a) Make sure the solvent has completely evaporated before proceeding.
 - b) Perform this cleaning between each sample. A sample consists of five specimens of one film material.
- B. Secure Specimens to Test Equipment
 - 1. Tape the ends of a 5 by 8 inch specimen to the plane, treated side up if applicable.
 - a) Do not place any tape at the center in the path of the sled.
 - b) The 8-inch dimension of the specimen must be parallel to the sliding direction of the sled.
 - 2. Place the 3 by 5 inch specimen on a lint free cloth, treated side down if applicable.
 - 3. Place the test sled on the center of the specimen with the nylon towline parallel to the long dimension of the specimen.
 - 4. Cut a slot or a V approximately 1 inch deep into the edge of the film specimen under the nylon monofilament.
 - 5. Wrap the film specimen over the front of the sled so that the nylon monofilament fits into the slot or V cut into the specimen and tape the film to the top of the sled.
 - a) The other end of the film specimen will remain under the test sled and does not need to be taped.
 - b) Do not place any tape on the bottom, sliding surface of the sled.
 - 6. Confirm that the specimen wraps smoothly around the front of the sled so that the leading edges will not drag on the test surface and no wrinkles are present on the bottom surface.
 - 7. Lightly pass a lint free cloth over the treated surface of both specimens to remove any dust or lint that may be present. Do not wipe heavily as it could remove any surface treatment.
- C. Perform the Test
 - 1. Place the sled and specimen gently onto the film covered plane in the test start position. Do not slide the specimen along the plane prior to the start of the test.
 - 2. Run the test at six inches per minute while continuously recording load as the sled slides along the plane. You may stop the test after the sled has traveled a minimum of six inches.
 - 3. Measure five specimens.
- D. Report Test Results
 - 1. Calculate the kinetic coefficient of friction over five inches of travel after excluding the initial peak load. Results from calculation over a shorter or longer distance may not be equivalent.

2. Report five kinetic friction results and a kinetic friction mean on the test result data sheet.

3.2 Kinetic Coefficient of Friction, Film-on-Metal, ASTM D1894

This test procedure supplements, but does not replace, ASTM test method D1894. Test laboratories must understand and comply with all requirements of ASTM D1894 to provide accurate test results.

3.2.1 Equipment

This test requires the following equipment as specified in the ASTM D1894 test method, Figure 1(c). See Table 3 below.

Item	Description	Notes
Load Recording System	Accurate to $\pm 5\%$ of value as described in method	This test must have an accuracy of ± 1 gram to meet this requirement for a friction coefficient of 0.100.
Plane	304 Stainless Steel with a No. 8 mirror finish, conforming to ASTM A240	You may purchase at <u>www.mcmaster.com</u> , Part No. 9785K11, Cage No. 39428.
Sled	As described in method including foam wrapping	You may purchase similar foam to that specified at <u>www.mcmaster.com</u> , Part No. 86375K133, Cage No. 39428.
Nylon Monofilament	As described in method	The alternate beaded chain is not acceptable.

Table 3: Test Equipment for Kinetic Coefficient of Friction, Film-on-Metal

3.2.2 Test Specimens

This test requires the following test specimens, listed in Table 4. Cut specimens with the long dimension parallel to the machine direction. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling or other damage for testing.

Table 4: Test Specimens for Kinetic Coefficient of Friction, Film-on-Metal

Number of	Specimen
Test Specimens	Size
5	3 by 5 inches

3.2.3 Conditioning

Condition specimens per section 8.1 of ASTM D1894. Insure that all sides have adequate air circulation.

3.2.4 Test Procedure

- A. Prepare Specimens
 - 1. Cut and condition the specimens from the roll per 3.2.2 and 3.2.3. Use care to handle only the edges so that the center of the specimens remains clean and undamaged.
 - 2. Use a felt tipped marker to place the sample identification on the NON-TREATED SIDE of each specimen, if applicable. Mark on the edge of the specimen where it will not alter the test results.
 - 3. Clean the plane with a lint free cloth and alcohol or acetone to remove any residue that may be present from previous samples.
 - a) Make sure the solvent has completely evaporated before proceeding.

- b) Perform this cleaning between each sample. A sample consists of five specimens of one film material.
- B. Secure Specimens to Test Equipment
 - 1. Place the 3 by 5 inch specimen on a lint free cloth, treated side down if applicable.
 - 2. Place the test sled on the center of the specimen with the nylon towline parallel to the long dimension of the specimen.
 - 3. Cut a slot or a V approximately 1 inch deep into the edge of the film specimen under the nylon monofilament.
 - 4. Wrap the film specimen over the front of the sled so that the nylon monofilament fits into the slot or V cut into the specimen and tape the film to the top of the sled.
 - a) The other end of the film specimen will remain under the test sled and does not need to be taped.
 - b) Do not place any tape on the bottom, sliding surface of the sled.
 - 5. Confirm that the specimen wraps smoothly around the front of the sled so that the leading edges will not drag on the test surface and no wrinkles are present on the bottom surface.
 - 6. Lightly pass a lint free cloth over the treated surface of the specimen to remove any dust or lint that may be present. Do not wipe heavily as it could remove any surface treatment.
- C. Perform the Test
 - 1. Place the sled and specimen gently onto the plane in the test start position. Do not slide the specimen along the plane prior to the start of the test.
 - 2. Run the test at six inches per minute while continuously recording load as the sled slides along the plane. You may stop the test after the sled has traveled a minimum of six inches.
 - 3. Measure five specimens.
- D. Report Test Results
 - 1. Calculate the kinetic coefficient of friction over five inches of travel after excluding the initial peak load. Results from calculation over a shorter or longer distance may not be equivalent.
 - 2. Report five kinetic friction results and a kinetic friction mean on the test result data sheet.

3.3 Haze, ASTM D1003

This test procedure supplements, but does not replace, ASTM test method D1003. Test laboratories must understand and comply with all requirements of ASTM D1003 to provide accurate test results.

3.3.1 Equipment

This test requires the equipment specified in the ASTM D1003 test method, procedure A or B.

3.3.2 Test Specimens

This test requires the following test specimens, listed in Table 5. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling or other damage for testing.

Table 5: Samples for Haze

Number of	Specimen
Test Specimens	Size
3	3 by 3 inches or larger

3.3.3 Conditioning

Condition specimens per section 6.1 of ASTM D1003. Insure that all sides have adequate air circulation.

3.3.4 Test Procedure

- A. Prepare Specimens
 - 1. Cut and condition the specimens from the roll per 3.3.2 and 3.3.3. Use care to handle only the edges so that the center of the specimens remains clean and undamaged.
 - 2. Use a felt tipped marker to place the sample identification on the NON-TREATED SIDE of each specimen, if applicable. Mark on the edge of the specimen where it will not alter the test results.
- B. Perform the Test
 - 1. Test the sample per section 8.2 of ASTM D1003.
 - 2. Make sure that the treated side of the film faces away from the integrating sphere.
 - 3. Measure three specimens.
- C. Report Test Results
- D. Report three haze results and a mean for each sample on the test result data sheet.

3.4 1% Secant Modulus, Machine & Transverse Direction, ASTM D 882

This test procedure supplements, but does not replace, ASTM test method D882. Test laboratories must understand and comply with all requirements of ASTM D882 to provide accurate test results.

3.4.1 Equipment

This test requires the following equipment as specified in the ASTM D882 test method. See Table 6 below.

Item	Description	Notes
Grips	Flat faced grips with 800 grit sandpaper taped to the gripping surfaces.	
Load Recording System	Accurate to $\pm 1\%$ of peak load as described in method.	This test must have an accuracy of ± 0.005 pounds force to meet this requirement for a 0.001 inch thick sample with a tensile stress of 500 psi at 1% strain.
Extension Indicator	Accurate to ±1% of peak as described in method	This test must have an accuracy of ± 0.001 inches to meet this requirement at a 1% secant.
Specimen Cutter	Sharp razor blade or razor device as described in method	A cutter that holds two razor blades exactly one inch apart is ideal.
Cutting Mat	Self-healing cutting mat with surface in good condition	You may purchase mat at <u>www.mcmaster.com</u> , Part No. 70875A66, Cage No. 39428.

Table 6: Test Equipment for 1% Secant Modulus, Machine & Transverse Direction

3.4.2 Samples

This test requires the following test specimens, listed in Table 7 below. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling, nicks or roughness along the cut edges or other damage for testing.

Number of	Specimen	Notes
Test Specimens	Size	
5	1 by 12 inches	Cut samples in the machine direction
5	1 by 12 inches	Cut samples in the transverse direction

3.4.3 Conditioning

Condition specimens per section 7.1 of ASTM D882. Insure that all sides have adequate air circulation.

3.4.4 Test Procedure

- A. Prepare Specimens
 - 1. Cut and condition the specimens from the roll per 3.4.2 and 3.4.3. Use a razor blade cutter over a self-healing cutting mat. Do not use dies or other cutting mechanisms as they do not produce a smooth enough cut.
 - 2. Use a felt tipped marker to place the sample identification on each specimen. Mark on the end of the specimen where it will not alter the test results.
- B. Secure Specimens to Test Equipment
 - 1. Set grip spacing on the universal testing machine to 10-inches with a tolerance of ± 0.1 inch.
 - 2. Place the film specimen in the upper grip and carefully align the specimen to remove all wrinkles before closing the lower grip.
 - 3. Verify that the specimen is straight and taut between the grips with no wrinkles and a maximum of 0.05 pounds of load on the specimen.
- C. Perform the Test
 - 1. Run the test at a crosshead speed of 1-inch per minute while continuously recording load and extension.
 - 2. You may stop the test once the specimen is pulled beyond 3% strain (0.3 inches of extension).
 - 3. Adjust for toe compensation as described in Annex A1 of the test method. Essentially the X-axis (strain) needs to be shifted so that the initial portion (after removal of the toe) of the stress-strain curve passes through the origin.
 - 4. Locate the point on the stress-strain curve where it reaches 1% strain on the corrected X-axis and record the corresponding Y-axis value (stress) in psi.
 - 5. Measure five specimens in both the machine and transverse direction.
- D. Report Test Results
 - 1. Calculate the secant modulus at 1% strain by dividing the Y-axis value (psi) found in the last step by 0.01. This calculation is NOT the same as the standard Young's Modulus calculated by most tensile testing software packages.
 - 2. Report five tensile modulus results and a mean for each direction on the test report data sheet.

3.5 Nominal Gauge

This test procedure supplements, but does not replace, ASTM test method D374. Test laboratories must understand and comply with all requirements of ASTM D374 to provide accurate test results.

3.5.1 Equipment

This test requires the equipment specified in ASTM D374 test method A, B, C, or D; that meet the standards listed in Table 8.

Measure	Standard				
Accuracy	0.0005 inches or better				
Uncertaintv	0.0010 inches or better				

Table 8: Standards for Test Equipment – Nominal Gauge

3.5.2 Test Specimens

This test requires following test specimens, listed in Table 9. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling or other damage for testing.

Number of Test Specimens	Specimen Size	Notes
Three specimens	0.5 by 0.5 inches or larger	Cut specimens from the roll at least 6 inches from each other and at least 1 inch from the edge of the roll

Table 9: Test Specimens for Nominal Gauge

3.5.3 Conditioning

Condition specimens at $23\pm2^{\circ}$ C (73.4 \pm 3.6°), 50 \pm 5% relative humidity for a minimum of 40 hours prior to testing. Insure that all sides have adequate air circulation.

3.5.4 Test Procedure

- A. Prepare Specimens
 - 1. Cut and condition the number of specimens from the roll per 3.5.2 and 3.5.3. Use care to handle only the edges so that the center of each specimen remains clean and undamaged.
 - 2. Use a felt tipped marker to place the sample identification on the specimen. Mark on the edge of the specimen where it will not alter test results.
- B. Perform the Test
 - 1. Measure three specimens
- C. Report Test Results
 - 1. Report three gauge results and a mean for each sample on the test result data sheet.

3.6 Blocking

This test procedure supplements, but does not replace, ASTM test method D3354. Test laboratories must understand and comply with all requirements of ASTM D3354 to provide accurate test results.

3.6.1 Equipment

This test requires the following equipment as specified in ASTM D3354 test method, Procedure B. See Table 10 below.

Item	Description	Notes
Test Apparatus	Constant rate of separation device, ASTM D3354, section 6.4.	
Load recording	Capacity of 200 grams or more	This test must have an accuracy of ±5 grams or better.
system	above tare weight	This is not specified in the method.
Platens	Upper and lower platens made of aluminum as specified in method	Thickness of platens may be less than the 3.0 inches (76 mm) specified in the test method as long as they are stiff enough not to flex during testing. The upper platen and attachment system should be as light as possible and in no case more than 400 grams. You may roughen blocking surfaces of the aluminum platens with 60 grit sand paper to help the platens separate more smoothly.
Glass Plates	Borosilicate glass, 4 x 4 x 0.125 inches	You may purchase at <u>www.mcmaster.com</u> , Part No. 8476K14, Cage No. 39428
Paper	Copy paper, 20 pound weight, 8.5 by 11 inches	Cut into 4.5 by 7.5 inch rectangles.

Table 10: Test Equipment for Blocking

3.6.2 Test Specimens

This test requires the following test specimens, listed in Table 11. You should cut more specimens than required in case you must re-test. Do not use specimens that show wrinkling or other damage for testing.

Table 11: Test Specimens for Blocking

Number of Test Specimens	Specimen Size	Notes
10	4 by 7 inches	Cut specimens with the long dimension parallel to the machine direction.

3.6.3 Conditioning

Condition specimens per section 8.1 of ASTM D3354. Insure that all sides have adequate air circulation. Each specimen should be separate and not in contact with any other specimen during conditioning.

3.6.4 Test Procedure 4.5.6.4

- A. Prepare Specimens
 - 1. Cut and condition the number of specimens from the roll per 3.6.2 and 3.6.3. Use care to handle only the edges so that the center of each specimen remains clean and undamaged.
 - 2. Use a felt tipped marker to place the sample identification on the NON-TREATED SIDE of the specimen, if applicable. Mark on the edge of the specimen where it will not alter test results.
 - 3. Lightly pass a lint free cloth over the treated surface of each specimen to remove any dust or lint that may be present. Do not wipe heavily as it could remove any surface treatment.
 - 4. Take two specimens and sandwich them together with the treated sides of each specimen facing inward, if applicable. Repeat with all remaining specimens.
 - 5. Put a 4.5 by 7.5 inch sheet of copy paper between each pair of specimens. Place a sheet of paper on the bottom and top of the stack of specimens. Sandwich the whole stack between two glass plates.

B. Perform the Test

1. Condition Specimens

- a) Pre-heat the oven to $60\pm 2^{\circ}C (140\pm 3.6^{\circ})$
- b) Place the stack onto an oven safe tray. Place a 4-pound weight on the top of the stack resulting in a 0.25-psi stress in the stack. The size of the weight must ensure an even distribution of the load through the glass plate.
- c) Label the top of the stack with the sample identification using a felt tipped marker.
- d) Load the weighted stack and tray into an oven and heat for 24 hours.
- e) Remove the stack from the oven after the 24-hour period and cool for 1 hour. Remove the weight but leave the glass plates in place while cooling.
- f) After one hour remove the specimens from the stack and test them.
 - 1) Make sure to test all specimens between 1 and 2 hours after removal from the oven.
 - 2) If you test several samples at one time, you must stagger the start times so that you can test all specimens between 1 and 2 hours after removal from the oven.
- 2. Secure Specimens to Test Equipment
 - a) Tare the blocking load tester by zeroing the load while the upper platen is hanging freely.
 - b) Place two specimens together onto the lower platen of the blocking load tester. Use care not to disturb any bond between the specimens.
 - c) Align the upper platen the lower platen. Lower the upper platen of the blocking tester onto the two specimens. Prevent the upper block from moving with light hand pressure while performing the next two steps.
 - d) Wrap the ends of the bottom specimen around the lower platen and secure to the platen with tape. Make sure that the film specimens remain in contact with each other and any bond between them is not disturbed during this step.
 - e) Wrap the ends of the top specimen around the upper platen and secure to the platen with tape. Make sure that the film specimens remain in contact with each other and any bond between them is not disturbed during this step.
- 3. Measure the Specimens
 - a) Run the test at 0.2 inch per minute while continuously recording load as the two specimens are pulled apart.
 - b) You may stop the test
 - 1) once the specimens are completely separated;
 - 2) the distance between the platens exceeds 0.75 inch; or
 - 3) the maximum load capacity of the load recording system is exceeded.
 - c) Measure five specimens
- C. Report Test Results
 - 1. Record the maximum load in grams required to separate the specimens. This step is a deviation from the ASTM D3354 method that requires reporting the average load.
 - 2. Report five blocking load measurements and a mean for each sample on the test result data sheet.

3.7 Static Charge

The measurement and analysis of electrostatic charge is a somewhat esoteric science and industrial applications for such measurement and analysis can be unique, as is that found within the US Postal Service. This test procedure is designed to replicate the environmental, operational and mechanical conditions encountered by polywrapped flat mail during automated mail processing, in a controlled laboratory environment within the limitations of a laboratory environment. This procedure is loosely based on ASTM D4470, but that standard test method is only a guide to understanding the underlying principles. You must use the following procedure for this test.

3.7.1 Equipment

This test requires the following equipment and instrumentation. See Table 12 below.

NOTE: You may use a commercially available test system to perform the recommended tests, instead of the test apparatus listed in Table 12 below (Charged Plate Monitor and Detector Plate).

Item	Description	Notes
Charged Plate Monitor (CPM)	Able to measure at least \pm 5kV	You may use an integrated charged plate monitor or construct one using an electrostatic voltmeter or static field meter in conjunction with a charged plate detector.
Detector Plate	12 x 12 inch stainless steel detector plate	Standard charged plate monitors have a 6 inch x 6 inch aluminum or stainless steel detector plate. This test procedure requires a 12 x 12 inch stainless steel detector plate. Isolate the plate from ground with a resistance to ground greater than 1 x 1013 Ohms. Connect this plate to the CPM plate using Teflon TM wire.
Standard ESD ground strap		
15 pound weights	approximately 8 by 10 inches	You need three weights for each sample to be tested.
18 lined paper tablets	Recycled, glue-top pads, 15 lb paper, 28-pt cardboard backing, 50 sheets per pad	You may use AMPAD EVIDENCE brand, or equivalent; available from office supply stores.

Table 12: Test Equipment for Static Charge

3.7.2 Test Specimens

This test requires the following test specimens, listed in Table 13. You must test each film type with a separate set of 18 specimens.

Table 13: Test Specimens for Static Charge

Number of	Specimen Sizo	Notes
rest specimens	SIZE	
18	15 inch length of film from the roll	You must cut 18 test specimens per film type

3.7.3 Conditioning and Test Environment

Condition and test the specimens in a controlled environment maintained at

- A. 12±3% RH; and
- B. 73±5°F (22±3°C).

3.7.4 Test Procedure

A. Prepare Specimens

- 1. Cut the specimens per 3.7.2.
- 2. Place the tablet of paper on the film with the 8.5-inch side along the 15-inch axis.
- 3. Fold the film around the tablet and secure with a minimum amount of transparent adhesive tape.
- 4. Leave a 1- inch tab at the open end for grasping the sample for the pull test.
- B. Condition Specimens
 - 1. Place the specimens in the conditioned environment a minimum of 48 hours prior to test per 3.7.3.

- 2. Form 3 stacks of 6 specimens each. Place a 15 pound weight on each stack for 24 hours prior to testing.
- C. Perform the Test
 - 1. Turn on test equipment and allow it to warm up per the manufacturer's instructions.
 - 2. Ground the detector plate. The voltage readout should be 0±10V.
 - 3. Remove the weight from the first stack. Place the stack onto the 12 by 12 inch detector plate.
 - 4. Place wrist strap onto the hand not used to pull the samples. The other end should be connected to ground.
 - 5. Remove the ground from the detector plate.
 - 6. Immediately grasp the tab of the top sample and pull it away using a rapid constant motion.
 - 7. Report the absolute value of the peak voltage on the test result data sheet.
 - 8. Ground the plate.
 - 9. Repeat steps 5 through 8 for the next 4 specimens. Do not measure the last specimen in the stack.
 - 10. Repeat the test procedure for the remaining 2 stacks.
- D. Report Test Results
 - 1. Calculate the average of all 30 voltage measurements.
 - 2. Report this value on the test result data sheet.

4.0 Quality Assurance Provisions

4.1 Independent Testing Laboratories

Independent testing laboratories approved by the Postal Service can best perform the tests in this specification. The testing laboratories must use the exact procedures described here. Appendix B lists laboratories approved by the Postal Service. The Postal Service may conduct periodic audits of the approved laboratories to insure they comply with the requirements of this specification. A Postal Service representative may observe actual testing as part of an audit.

4.2 Responsibility for Testing

Polywrap manufacturers must submit a polywrap formulation to approved laboratories for testing. The Postal Service will include approved polywrap formulations in the List of Approved Polywrap. Each individual formulation must meet the characteristics in this specification to be approved. The submitting manufacture may select any of the approved laboratories from the list found in appendix B.

4.3 Submission of Materials for Testing

Polywrap manufacturers must submit polywrap film materials to the independent laboratory, packaged as follows. Film submitted in any other way is unacceptable. Laboratories must not test film that is incorrectly packaged.

- A. Machine-wrap film on a 3-inch inside diameter fiberboard core.
- B. Include a minimum of 500 feet of film.
- C. Package the roll to prevent any damage to the film in shipping.
- D. Clearly indicated treated surfaces.

4.4 Corona Treated and Non-Treated Films

Polywrap manufacturers must submit corona-treated and non-treated films of an individual formulation separately. The laboratory must test each one separately with the complete battery of tests. Approval of film in one condition in no way implies approval of the other.

4.5 Films of Varying Gauge

For an individual film formulation manufactured in various gauges, manufacturers must submit the thinnest gauge film for testing. If the laboratory approves the thinnest film, the Postal Service will list the product as approved for all thicknesses that meet the gauge requirement in Section 2.1.6. Should the thinnest gauge fail testing, the manufacturer may submit successively thicker gauge film until successful test results are achieved. The Postal Service will only list film as approved that has a thickness equal to or greater than the successfully tested material.

5.0 Appendix A - References

5.1 Referenced Documents

The following specifications, standards, handbooks and other referenced documents form a part of this specification. Unless otherwise indicated, the issue in effect on the date of solicitation for bid or request for proposal shall apply. The supplier is responsible for acquiring the applicable documents. Suppliers must meet all specified requirements of documents cited in this specification, whether or not they are listed here.

5.2 Order of Precedence

If there is a conflict between the text of this document and the references cited here, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations.

5.3 Commercial and Organization Specifications and Standards

5.3.1 American Society for Testing and Materials (ASTM)

You may obtain copies of ASTM documents from the American Society of Testing and Materials at:

100 Barr Harbor Drive West Conshohocken, PA 19428-2959 610-832-9585 www.astm.org

ASTM D374	Standard Test Method for Thickness of Solid Electrical Insulation
ASTM D882	Standard Test Method for Tensile Properties of Thin Plastic Sheeting
ASTM D1003	Standard Test Method for Haze and Luminous Transmittance of Transparent Plastics
ASTM D1894	Standard Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting
ASTM D3354	Standard Test Method for Blocking Load of Plastic Film by the Parallel Plate Method
ASTM D4470	Standard Test Method for Static Electrification

6.0 Appendix B - Test Laboratories

The Postal Service has approved the following independent testing laboratories to perform the tests in this specification as indicated.

6.1 Approved Laboratories - Requirements 2.1.1 through 2.1.7

Plastics Technology Laboratories Inc. 50 Pearl Street Pittsfield, MA 01201 (413) 499-0983 www.ptli.com

Advanced Plastic and Material Testing Inc. 42 Dutch Mill Road Ithaca, NY 14850 (607) 257-8378 www.apmtesting.com

Plastiscience LLC 73 Artisan Drive Smyrna, DE 19977 (302) 659-3032 www.plastiscience.com

Datapoint Labs 95 Brown Road, #102 Ithaca, NY 14850 (607) 266-0405 www.datapointlabs.com

6.2 Approved Laboratories - Requirement 2.1.8

Electro-Tech Systems Inc. 3101 Mt. Carmel Ave. Glenside, PA 19038 (215) 887-2196 www.electrotechsystems.com

Fowler Associates, Inc 3551 Moore-Duncan Hwy. Moore, SC 29369 (864) 574-6415 www.**sfowler**.com

7.0 Appendix C - Test Report Format

Use the following test result data sheets to report test results per section 3 of USPS-T-3204.

USPS									
Approved Polywrap Program									
Independent Laboratory									
	Conformance Lest Results								
Instructions: Use these data sheets to report test results per section 3 of USPS-T-3204. Perform the procedures in section 3 and record the data requested below. Mail copies to the Postal Service address in section 2.2 and the material manufacturer. Archive the original for at least 2 years							and		
Testing Laboratory Name a	nd Addres	s:	Test C	onducted l	ру:	D	ate:		
			Report	Approved	by:	D	ate:		
Material Manufacturer's Name and Address:		dress:	Material Designation:						
			Manufacturer's Contact and Phone #:						
TEST		Dete	ermina	rmination			Result		
PROCEDURE	1	2	3	4	5	wear	Ρ	F	
Coefficient of Friction Film on Film	Coefficient of Friction Film on Film								
Coefficient of Friction Film on Metal									
Haze									
Page 1 of 2									

USPS								
Approved Polywrap Program								
Independent Laboratory								
Conform	nance	e Tes	t Res	ults,	Conti	nued	I	
TEST		Det	ermina	tion	1	Moon	Res	sult
PROCEDURE	1	2	3	4	5	Mean	Ρ	F
1% Secant Modulus Transverse Direction								
1% Secant Modulus Machine Direction								
Nominal Gauge								
Blocking								

Static Charge			
PULL	Stack 1	Stack 2	Stack 3
1			
2			
3			
4			
5			
		MEAN	
			Page 2 of 2