



COMMERCIAL TESTING COMPANY

1215 South Hamilton Street • Dalton, Georgia 30720
Telephone (706) 278-3935 • Facsimile (706) 278-3936

Standard Classification of
Wall Covering by Use Characteristics

ASTM F793-10a

21 oz. / 54" Vinyl Wallcovering

Report Number 14-04122.1

Test Number 4502-0530
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US Vinyl
LaFayette, Georgia

Commercial Testing Company

(Authorized Signature)

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INTRODUCTION

This report represents an evaluation of a wall covering submitted for testing by US Vinyl, LaFayette, Georgia. The evaluation was conducted in accordance with ASTM International standard classification F793-10a, *Wall Covering by Use Characteristics*, which covers the classification of wall covering according to its serviceability in use. It recognizes that certain wall covering is designed primarily for decorative effect, while other wall covering is also designed to achieve a high degree of serviceability. The classification provides criteria by which wall covering of appropriate durability characteristics can be chosen for particular residential and commercial decorating applications.

SAMPLING

The sampling was done by the client. One roll of vinyl wall covering was submitted for testing and was identified as **21 oz. / 54" Vinyl Wallcovering**. The client requested testing as a Category V, Type II Commercial Serviceability.

BASIS OF CLASSIFICATION

This classification provides criteria by which wall covering of appropriate use characteristics can be chosen for particular residential and commercial decorating applications. Wall covering is classified based on its performance in tests for: Abrasion resistance; Blocking resistance; Breaking strength; Coating adhesion; Cold cracking resistance; Colorfastness; Crocking resistance; Heat aging resistance; Maximum flame spread index; Maximum smoke developed index; Maximum shrinkage; Scrubbability; Stain resistance; Tear resistance; and Washability. Wall covering is classified as:

- Category I, Decorative Only—Wall covering manufactured for decorative purposes that can be hung without damage in accordance with the manufacturer's instructions.
- Category II, Decorative with Medium Serviceability—Wall covering primarily decorative but more washable and colorfast than Category I wall covering.
- Category III, Decorative with High Serviceability—Wall covering manufactured for medium use, where abrasion resistance, stain resistance, scrubbability, and increased colorfastness are necessary. It must also meet breaking strength and crocking resistance criteria.
- Category IV, Type I Commercial Serviceability—Wall covering manufactured for use where higher abrasion resistance, stain resistance, and scrubbability are necessary in heavy consumer and light commercial use. It must also meet crocking resistance, tear resistance, blocking resistance, cold cracking resistance, heat aging resistance, and breaking strength criteria. Wall covering meets Type I performance as defined by Federal Specification CCC-W-408D.
- Category V, Type II Commercial Serviceability—Wall covering manufactured for use where better wearing qualities are required and exposure to wear is greater than normal. It must meet high abrasion resistance, stain resistance, and colorfastness criteria, in addition to higher crocking resistance, tear resistance, and breaking strength criteria than Categories I to IV. Blocking resistance, cold cracking resistance, coating adhesion, and heat aging resistance tests also apply. Wall covering meets Type II performance defined by Federal Specification CCC-W-408D.
- Category VI, Type III Commercial Serviceability—Wall covering manufactured for use in heavy traffic areas. It must meet highest abrasion resistance, stain resistance, tear resistance, colorfastness, crocking resistance, and breaking strength criteria. Blocking resistance, coating adhesion, cold cracking resistance, and heat aging resistance tests also apply. Wall covering meets Type performance as defined by Federal Specification CCC-W-408D.

ASTM International Test Method E84 is suitable for assessing the flame spread index and smoke developed index of a wall covering. When a wall covering is tested using Test Method E84, it is classified by the codes as follows:

- Class A material exhibits a flame spread index no greater than 25 and a smoke developed index no greater than 450.
- Class B material exhibits a flame spread index greater than 25 but no greater 75 and a smoke developed index no greater than 450.
- Class C material exhibits a flame spread index greater than 75 but no greater than 200 and a smoke developed index no greater than 450.

Wall covering described as peelable shall be capable of having the decorative surface removed as a discrete self-supporting film by a dry method defined by the manufacturer, leaving a surface that is either removable in the conventional manner or able to be left on the wall for rehangng.

Wall covering described as strippable shall be capable of being dry-stripped in accordance with the manufacturer's instructions without leaving appreciable residue or otherwise damaging the wall.

Wall covering described as mildew-resistant shall be protected to resist fungi (mildew) growth on the decorative surface to achieve a rating of 0 or 1 when tested in accordance with ASTM International Standard Practice G21.

TEST PROCEDURES

The following test procedures are used to determine the conformance of a material to the requirements of this classification. Each manufacturer who represents a product as conforming to this classification may use statistically based sampling plans that are appropriate for each particular manufacturing process, but shall keep such essential records as are necessary to document with a high degree of assurance the claim that the requirements of this classification have been met.

Colorfastness—Colorfastness to light is determined in accordance with Fed. Std. No. 191, Method 5660.1. The exposed sample shall show no appreciable change after the prescribed hours of exposure.

Washability—A sample from an area with as many different printed colors as possible, as well as the ground, is tested using a Gardner Abrasion tester equipped with a specified cellulose sponge and a specified detergent solution. After the requisite number of cycles, the machine is stopped, the specimen removed, rinsed under running water, and set aside for examination after drying. After drying, the specimen shall show no evidence of appreciable change to the printed or ground surface. Areas of localized wear clearly related to wrinkles is ignored.

Stain Resistance —A sample from an area with as many different printed colors as possible, as well as the ground, is exposed to the following reagents: (1) Distilled water, 65 to 75°F; (2) Distilled water, 115 to 125°F; (3) Ethyl alcohol; (4) Vinegar, 3 % acetic; (5) Alkali solution; (6) Hydrochloride, 5 %; (7) Soap solution; (8) Detergent solution; (9) Pure orange juice; (10) Butter; (11) Catsup; and (12) Tea. Immediately after application, the reagent is covered with a watch glass and allowed to stand for a period of 24 hours. After removal of the watch glass, the wall covering is cleaned using, as appropriate, hot or cold distilled water, 50 % ethyl alcohol, or with the specified detergent solution. The specimen shall show no evidence of appreciable change to the decorative surface.

Crocking Resistance—The test for resistance to crocking is done in accordance with Federal Standard No. 191, Method 5651-B, dry only. The wall covering shall achieve a rating of at least "good."

Scrubbability—A sample from an area with as many different printed colors as possible, as well as the ground, is tested in a washability machine equipped with a nylon bristle brush saturated with the specified detergent solution. At the end of the requisite number of cycles, the machine is stopped, the specimen removed, and rinsed under running water. After drying, the specimen shall show no evidence of appreciable damage to the printed or ground surface. Areas of localized wear clearly related to wrinkles is ignored.

Abrasion Resistance—Specimens are tested using a Wyzenbeek Precision Wear Tester using a tension of 6 pounds force and a load of 2 pounds force. The abradant is 220-grit silicon carbide-coated abrasive sheet. After the requisite number of cycles, wall covering in Categories III and IV shall show no evidence of appreciable change to the decorative surface. Wall covering in Categories V and VI shall show no evidence of fiber show-through or damage to the supporting substrate.

Breaking Strength—The test for breaking strength is conducted in accordance with ASTM International Test Method D751, Breaking Strength, Procedure A. The test for grab tensile strength is done in both the machine and the cross direction.

Tear Resistance—The test for tear resistance is done in accordance with Method A (Pendulum) of ASTM Test Method D751. The material is tested in both the machine and the cross directions.

Blocking Resistance—The test for blocking resistance is done in accordance with Federal Standard No. 191, Method 5872.

Coating Adhesion—The strength of the bond between the coating and the substrate is determined in accordance with ASTM Test Method D751. The test for coating adhesion is not applicable to wall covering from which a coating cannot be separated.

Cold Cracking Resistance—A specimen and a 0.50-inch mandrel are conditioned at $20 \pm 4^\circ\text{F}$ for a period of 30 min. The specimen is bent 180° around the mandrel with the uncoated side of the wall covering contacting the mandrel. The specimen is removed and a visual inspection done to detect cracks. To pass, the wall covering must not crack during testing.

Heat Aging Resistance—The test for resistance to heat aging is done in accordance with ASTM International Test Method D751, Accelerated Heat Aging (Oven Method). The exposure temperature is 158°F and the exposure time is 7 days. At the conclusion of the test, the specimen is visually inspected. To pass, the wall covering shall show no evidence of appreciable change to the decorative surface.

Flame Spread and Smoke Developed — The Flame Spread and Smoke Development are determined in accordance with ASTM Test Method E84, *Surface Burning Characteristics of Building Materials*. The test sample was prepared in accordance with ASTM Standard Practice E2404–13e1, *Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) Wall or Ceiling Coverings, and of Facings and Wood Veneers Intended to be Applied on Site Over a Wood Substrate, to Assess Surface Burning Characteristics*, Section 8.3. Wall or Ceiling Coverings Intended to be Applied over Gypsum Board. Three test panels, each measuring two feet wide by eight feet in length, were prepared by adhering the wallcovering to 5/8-inch Type X gypsum board using Gardner-Gibson Dynamite 111 Heavy Duty Wallcovering Adhesive. After dead stacking overnight, the prepared samples were transferred to storage racks and conditioned to equilibrium in an atmosphere maintained at $71 \pm 2^\circ\text{F}$ and at 50 ± 5 percent relative humidity. For testing, the prepared panels were placed end to end on the ledges of the furnace and the test conducted with no auxiliary support mechanism.

Shrinkage—The test for shrinkage is conducted in accordance with Federal Specification CCC–W–408D.

CLASSIFICATION CRITERIA

Property	Category I Decorative Only	Category II Decorative Medium Serviceability	Category III Decorative High Serviceability	Category IV Type I Commercial Serviceability	Category V Type II Commercial Serviceability	Category VI Type III Commercial Serviceability
Colorfastness	1	23 h	48 h	200 h	200 h	200 h
Washability	2	100 cycles	100 cycles	100 cycles	100 cycles	100 cycles
Scrubability	3		50 cycles	200 cycles	300 cycles	500 cycles
Abrasion Resistance	4			200 cycles	300 cycles	1000 cycles
Breaking Strength, MD	5			≥ 40 lb	≥ 50 lb	≥ 100 lb
Breaking Strength, CMD	6			≥ 30 lb	≥ 55 lb	≥ 95 lb
Crocking Resistance	7		Good	Good	Good	Good
Stain Resistance Reagents	8		1 to 9	1 to 9	1 to 12	1 to 12
Tear Resistance	9			≥ 192 gf	≥ 400 gf	≥ 800 gf
Blocking Resistance	10			≤ 2	≤ 2	≤ 2
Coating Adhesion	11			≥ 2 lb/in	≥ 3 lb/in	≥ 3 lb/in
Cold Cracking Resistance	12			No Change	No Change	No Change
Heat Aging Resistance	13			Pass	Pass	Pass
Flame Spread, Class A	14	≤ 25	≤ 25	≤ 25	≤ 25	≤ 25
Smoke Development	15	≤ 450	≤ 450	≤ 450	≤ 450	≤ 450
Shrinkage, MD	16			≤ 2	≤ 2	≤ 2
Shrinkage, CMD	17			≤ 1	≤ 1	≤ 1.5

TEST DATA AND TEST RESULT

The purpose of this evaluation was to determine compliance with requirements for a Category V Type II material. The test results are presented below.

Test Data

Characteristic	Category V Type II Requirement	Test Data	Test Result
Colorfastness to Light	≥ 200 h	200 hours	Pass
Washability	≥ 100	100 cycles	Pass
Scrubability	≥ 300	300 cycles	Pass
Abrasion Resistance	≥ 300	300 cycles	Pass
Breaking Strength, Machine Direction	≥ 50 lbf	99 lbf	Pass
Breaking Strength, Cross Machine	≥ 55 lbf	120 lbf	Pass
Crocking, Dry	Good	Excellent	Pass
Stain Resistance to Reagents	1-12	(See Note 1)	Pass
Tear Resistance, Machine Direction	≥ 400 gf	3200 gf	Pass
Tear Resistance, Cross Machine	≥ 400 gf	2957 gf	Pass
Blocking Resistance	≤ 2	2	Pass
Coating Adhesion (MD), lbs/inch	≥ 3	3.2	Pass
Coating Adhesion (CMD), lbs/inch	≥ 3	3.4	Pass
Cold Crack Resistance	No Change	No Change	Pass
Heat Aging Resistance	Pass	Pass	Pass
Flame Spread	≤ 25	25	Pass
Smoke Development	≤ 450	70	Pass
Shrinkage, Machine Direction	≤ 2%	- 1.0%	Pass
Shrinkage, Cross Machine Direction	≤ 1%	+ 0.3%	Pass

Note 1 — Stain Resistance

Reagent	Rating	Reagent	Rating
(1) 75°F distilled water	5	(7) standard soap solution	5
(2) 120°F distilled water	4.5	(8) detergent solution	4
(3) 50% ethyl alcohol	4	(9) orange juice	5
(4) vinegar	4	(10) butter	4.5
(5) 1% NaOH solution	4.5	(11) catsup	4
(6) 5% HCl	4.5	(12) tea	4

The rating system is based on the AATCC *Nomenclature for Subjective Rating Processes* in which a rating of 5 = negligible or no staining, 4 = slight staining, 3 = noticeable staining, 2 = considerable staining, and 1 = severe staining. A rating of less than 4 is considered “appreciable” in relation to severity of change.

CLASSIFICATION

The material tested, **21 oz. / 54" Vinyl Wallcovering**, is classifiable as a Category V, Type II material in accordance with ASTM F793-10a.