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Standard Classification of Wall Coverings by Use Characteristics[1]

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1. Scope

1.1 This classification covers the classification of wall coverings by use characteristics, that is, according to their serviceability in use, recognizing that certain wall coverings are designed primarily for decorative effect, while other wall coverings are also designed to achieve a high degree of serviceability.

1.1.1 This classification applies to all wall coverings but some sections apply specifically to vinyl-coated wall covering materials.

1.2 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems has the potential to result in non-conformance with the standard.

1.3 *This standard is used to measure and describe the properties of materials, products, or assemblies to heat and flame under controlled conditions, but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products, or assemblies under actual fire conditions.*

1.4 *This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D618 Practice for Conditioning Plastics for Testing

D685 Practice for Conditioning Paper and Paper Products for Testing

D751 Test Methods for Coated Fabrics

D1308 Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D2486 Test Methods for Scrub Resistance of Wall Paints

E84 Test Method for Surface Burning Characteristics of Building Materials

E2404 Practice for Specimen Preparation and Mounting of Textile, Paper or Polymeric (Including Vinyl) and Wood Wall or Ceiling Coverings, Facings and Veneers, to Assess Surface Burning Characteristics

G21 Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

2.2 *Federal Standards:*[3]

Fed. Std. No. 191A Textile Test Methods (Superseding Fed. Std. No. 191) (Revisions to August 2000)

Fed. Spec. CCC-W-408D Wall Covering, Vinyl-Coated (Dated January 1994, Reinstated December 2003)

2.3 *ICC Codes:*[4]

IBC International Building Code

IFC International Fire Code

IRC International Residential Code

2.4 *NFPA Codes and Standards:*[5]

NFPA 1 Fire Code

NFPA 101 Life Safety Code

NFPA 265 Methods of Fire Tests for Evaluating Room Fire Growth Contribution of Textile Coverings on Full Height Panels and Walls

NFPA 286 Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

NFPA 5000 Building Construction and Safety Code

2.5 *UL Standard:*[6]

UL 723 Test for Surface Burning Characteristics of Building Materials

[1] This classification is under the jurisdiction of ASTM Committee F15 on Consumer Products and is the direct responsibility of Subcommittee F15.15 on Wallcoverings.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, ATTN: NPODS.

[4] Available from International Code Council (ICC), 5203 Leesburg Pike, Suite 600, Falls Church, VA 22041.

[5] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

[6] Available from Underwriters Laboratories (UL), Corporate Progress, 333 Pfingsten Rd., Northbrook, IL 60062.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *abrasion resistance*—ability to withstand mechanical action such as rubbing, scraping, or scrubbing that may progressively tend to remove material from the surface of a wall covering.

3.1.2 *blocking resistance*—ability to resist adhesion or sticking between two surfaces of a wall covering that touch under uniform loading and temperature conditions for a specified time.

3.1.3 *breaking strength*—ability of a wall covering to withstand a pulling force in the plane of the web.

3.1.4 *coating adhesion*—measure of the strength of the bond between the surface coating and the backing or substrate of a wall covering.

3.1.5 *cold cracking resistance*—ability to resist cracking of the coated or decorative surface when a wall covering is folded during exposure to low temperatures.

3.1.6 *colorfastness*—ability to resist change or loss of color resulting from exposure to light.

3.1.7 *crocking resistance*—ability to resist transfer of color from a wall covering surface when rubbed.

3.1.8 *flame spread index*—comparative measure expressed as a dimensionless number, derived from visual measurements of the spread of flame versus time.

3.1.8.1 *Discussion*—Typically the flame spread index is determined in accordance with Test Method E84 (see 1.3).

3.1.9 *heat aging resistance*—ability to resist deterioration of the coated or decorative surface when a wall covering is exposed to elevated temperatures over an extended period.

3.1.10 *mildew-resistant wall covering*—wall covering that has been treated to deter the growth of fungi (mildew) on the decorative surface.

3.1.11 *peelable wall covering*—wall covering from which the decorative surface may be dry-peeled from the substrate, leaving a continuous layer of the substrate on the wall, when the wall covering has been installed and peeled in accordance with the manufacturer's instructions.

3.1.12 *scrubbability*—ability of a wall covering to withstand scrubbing with a brush and a prescribed detergent solution.

3.1.13 *shrinkability*—change in the dimension of the wall covering after wetting it and drying it.

3.1.14 *smoke developed index*—comparative measure expressed as a dimensionless number, derived from measurements of smoke obscuration versus time.

3.1.14.1 *Discussion*—Typically the smoke developed index is determined in accordance with Test Method E84 (see 1.3).

3.1.15 *stain resistance*—ability of a wall covering to show no appreciable change in appearance after application and removal of specified reagents.

3.1.16 *strippable wall covering*—wall covering that can be dry-stripped from the wall after having been installed and stripped in accordance with the manufacturer's instructions, leaving a minimum of product residue on the wall and without damage to the wall surface.

3.1.17 *tear strength*—ability of a wall covering to resist the propagation of an existing tear.

3.1.18 *wall covering*—flexible product designed to cover walls and ceilings for decorative or functional purposes, or both.

3.1.19 *washability*—ability of a wall covering to withstand occasional sponging with a prescribed detergent solution.

4. Significance and Use

4.1 This classification provides criteria by which wall coverings of appropriate use characteristics can be chosen for particular residential and commercial decorating applications.

5. Basis of Classification

5.1 Wall coverings are classified based on their 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 shrinkage
Maximum smoke developed index
Other flammability characteristics
Scrubbability
Stain resistance
Tear resistance
Washability

5.2 Wall coverings shall be classified in accordance with the performance criteria listed in Table 1 when tested in accordance with the appropriate test methods in Section 7.

5.2.1 *Category I, Decorative Only*—Wall coverings manufactured for decorative purposes that can be hung without damage in accordance with the manufacturer's instructions.

5.2.2 *Category II, Decorative with Medium Serviceability*—Wall coverings primarily decorative but more washable and colorfast than Category I wall coverings.

5.2.3 *Category III, Decorative with High Serviceability*—Wall coverings manufactured for medium use, where abrasion resistance, stain resistance, scrubbability, and increased colorfastness are necessary. Category III wall coverings must also meet breaking strength and crocking resistance criteria.

5.2.4 *Category IV, Type I Commercial Serviceability (for Vinyl-Coated Wall Coverings)*—Wall coverings manufactured for use where higher abrasion resistance, stain resistance, and scrubbability are necessary in heavy consumer and light commercial use. Category IV wall coverings must also meet crocking resistance, tear resistance, blocking resistance, cold cracking resistance, heat aging resistance, and breaking strength criteria. Wall coverings shall meet Type I performance as defined by Fed. Spec. CCC-W-408D.

5.2.5 *Category V, Type II Commercial Serviceability (for Vinyl-Coated Wall Coverings)*—Wall coverings manufactured for use where better wearing qualities are required and exposure to wear is greater than normal. Category V wall coverings

TABLE 1 Classification Criteria

Property	Section Reference	Category I Decorative Only	Category II Decorative with Medium Serviceability	Category III Decorative with High Serviceability	Category IV Type I Commercial Serviceability	Category V Type II Commercial Serviceability	Category VI Type III Commercial Serviceability
Minimum colorfastness	7.3		23 h	46 h	200 h	200 h	200 h
Minimum washability	7.4		100 cycles	100 cycles	100 cycles	100 cycles	100 cycles
Minimum scrubbability	7.7			50 cycles	200 cycles	300 cycles	500 cycles
Minimum abrasion resistance	7.8				200 cycles (220 grit)	300 cycles (220 grit)	1000 cycles (220 grit)
Minimum breaking strength	7.9				40 lb [18.1 kg]	50 lb [22.7 kg]	100 lb [45.4 kg]
MD (machine direction)					30 lb [13.6 kg]	55 lb [24.9 kg]	95 lb [43.1 kg]
CMD (cross machine direction)							
Minimum crocking resistance	7.6			good	good	good	good
Minimum stain resistance	7.5			Reagents 1 to 9	Reagents 1 to 9	Reagents 1 to 12	Reagents 1 to 12
Minimum tear resistance[A]	7.10				192 gf	800 gf	1600 gf
Maximum blocking resistance	7.11				2	2	2
Minimum coating adhesion	7.12				2 lb/in. [36 kg/m]	3 lb/in. [54 kg/m]	3 lb/in. [54 kg/m]
Minimum cold cracking resistance	7.13				no change	no change	no change
Minimum heat aging resistance	7.14				pass	pass	pass
Maximum flame spread index (Class A)	5.3.2		25	25	25	25	25
Maximum flame spread index (Class B)	5.3.2		75	75	75	75	75
Maximum flame spread index (Class C)	5.3.2		200	200	200	200	200
Maximum smoke developed index (Class A, B, or C)	5.3.2		450	450	450	450	450
Other Flammability	5.3.4 or 5.3.5		No flashover and heat release and smoke release as required by the codes in accordance with NFPA 286 (any wall covering) or NFPA 265 (textile and expanded vinyl wall coverings)				
Maximum shrinkage	7.19						
MD (machine direction)					2	2	2
CMD (cross machine direction)					1	1	1.5

[A] The "gf" is an abbreviation for gram force, consistent with pounds force as lbf.

shall 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 coverings shall meet Type II performance as defined by Fed. Spec. CCC-W-408D.

5.2.6 *Category VI, Type III Commercial Serviceability (for Vinyl-Coated Wall Coverings)*—Wall coverings manufactured for use in heavy traffic areas. Category VI wall coverings shall meet the 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 coverings shall meet Type III performance as defined by Fed. Spec. CCC-W-408D.

5.3 Wall coverings required to exhibit a flammability classification shall be tested and classified as a "Class A, B, or C Interior Finish" in accordance with one of the codes indicated in 5.3.1, using the fire test methods indicated in 5.3.2, 5.3.3, 5.3.4, or 5.3.5, as appropriate.

5.3.1 Sections of codes that classify interior finish materials in accordance with their flammability.

5.3.1.1 Chapter 10 of NFPA 101, Life Safety Code,

5.3.1.2 Chapter 10 of NFPA 5000, Building Construction and Safety Code,

5.3.1.3 Chapter 12 of NFPA 1, Fire Code,

5.3.1.4 Chapter 8 of IBC, International Building Code,

5.3.1.5 Chapter 8 of IFC, International Fire Code,

5.3.1.6 Chapter R3 of the IRC, International Residential Code, and

5.3.1.7 Relevant sections of the applicable local codes, including legacy codes.

5.3.2 Test Method E84 is suitable for assessing the flame spread index and smoke developed index of a wall covering. If wall or ceiling coverings are tested in accordance with Test Method E84, the tests shall be conducted using the specimen preparation and mounting methods contained in Practice E2404. When a wall covering is tested using Test Method E84, it is classified by the codes as follows:

5.3.2.1 A Class A material exhibits a flame spread index no greater than 25 and a smoke developed index no greater than 450,

5.3.2.2 A Class B material exhibits a flame spread index greater than 25 but no greater 75 and a smoke developed index no greater than 450, and

5.3.2.3 A 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.

5.3.3 Tests conducted in accordance with UL 723 are likely to produce results that are consistent with those produced from tests in accordance with Test Method E84.

5.3.4 Tests conducted in accordance with NFPA 286, a room-corner fire test, and exhibiting pass/fail criteria of heat release and smoke release as shown in the codes are permitted to be used wherever interior finish materials (including wall covering materials or ceiling covering materials) are required to meet a classification of Class A, B, or C in accordance with Test Method E84.

5.3.4.1 Codes require that materials tested to NFPA 286 comply with the following criteria:

(1) During the 40 kW exposure, flames shall not spread to the ceiling.

(2) The flame shall not spread to the outer extremity of the sample on any wall or ceiling.

(3) Flashover, as defined in NFPA 286, shall not occur.

(4) The peak heat release rate throughout the test shall not exceed 800 kW.

(5) The total smoke released throughout the test shall not exceed 1000 m^2.

5.3.5 Tests conducted on textile wall coverings or on expanded vinyl wall coverings in accordance with Test Method B of NFPA 265, a room-corner fire test, and exhibiting pass/fail criteria of heat release and flashover as shown in the codes are permitted to be used, with some restrictions, wherever such wall covering materials are required to meet a classification of Class A, B, or C, in accordance with Test Method E84. However, wall covering materials which have been tested only in accordance with NFPA 265 are not permitted to be used as ceiling covering materials.

5.3.5.1 Codes require that materials tested to NFPA 265 comply with the following criteria:

(1) During the 40 kW exposure, flames shall not spread to the ceiling.

(2) The flame shall not spread to the outer extremity of the sample on the 8 by 12 ft. [2440 by 3660 mm] walls.

(3) Flashover, as defined in NFPA 265, shall not occur.

(4) The total smoke released throughout the test shall not exceed 1000 m^2.

5.3.6 Local authorities having jurisdiction, including transportation authorities, are entitled to develop specific flame spread index, smoke developed index, or other flammability criteria, different from those in the codes described.

5.4 Wall coverings 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 rehanging.

5.5 Wall coverings 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.

5.6 Wall coverings 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 Practice G21.

6. Labeling

6.1 Either of the following statements is suggested for use in representing products as conforming to all requirements of this classification:

6.1.1 "This Category __ (descriptive phrase) wall covering conforms to all requirements established in Standard Classification of Wall Coverings by Use Characteristics ASTM F793. Full responsibility for the conformance of this product to the standard is assumed by (name and address of manufacturer or distributor);" or

6.1.2 "Conforms to ASTM F793, Category __ (descriptive phrase) (name and address of manufacturer or distributor)."

6.2 When specified in the purchase order or contract, a producer's or supplier's certification shall be furnished to the purchaser that the material was manufactured, sampled, tested, and inspected in accordance with this specification and has been found to meet the requirements. When specified in the purchase order or contract, a report of the test results shall be furnished.

7. Test Methods

7.1 *General*—The inspection and test procedures contained in this section shall be used to determine the conformance of the product to the requirements of this classification. Each manufacturer who represents a product as conforming to this classification is allowed to 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.

7.2 *Testing Conditions*—Unless otherwise provided, test specimens under standard conditions as set forth in Practice D685 or Practice D618, as appropriate. To determine whether the visual appearance of a test specimen has been appreciably changed by a test, suspend the specimen at eye level in a vertical position, as on the wall, under illumination between 100 to 150 fc [1000 to 1500 lx], and view the specimen from a distance of 4 ft [1.2 m]. An appreciable change is one such as discoloration, change in gloss, blistering, softening, swelling, or loss of adhesion that is noticeable when the tested specimen is compared with a sample of the original specimen.

7.3 *Colorfastness*—Test for colorfastness to light in accordance with Fed. Std. No. 191A, Method 5660.1. The exposed sample shall show no appreciable change after the prescribed hours of exposure.

7.4 *Washability*—Cut a sample of wall covering 6½ by 17 in. [165 by 430 mm] with the longer dimension in the cross direction. Choose an area with as many different printed colors as possible. The test shall include each printed color and the ground surface. For routine quality control it is not necessary for the specimen to be "hung." If the wall covering is a type that cannot be washed, the requisite number of rubs without wrinkling or tearing, hang the specimen or mount it on ⅛-in. [3.2-mm] smooth-finish board and allow it to dry 24 h at room temperature with good air circulation.

7.4.1 Place the specimen in a washability machine, equipped with a cellulose sponge, mounted on a plated brass holder (weight 1 lb [454 g]). Distribute 1 tablespoon [15 mL] of detergent solution (Note 1) over the area to be washed. Install the cellulose sponge holder, after it has been soaking in detergent solution for at least 15 min, in the machine, set the counter at zero, and turn the switch to start. At the end of the requisite number of cycles, stop the machine, remove the specimen, rinse it under running water, and set it aside for examination after drying.

NOTE 1—One way of making the detergent solution is by combining the following ingredients in the order given under agitation:

Demineralized water	160 mL

Anhydrous trisodium phosphate	0.14 oz [4 g]
A nonionic surfactant that has a hydrophilic polyethylene oxide chain (on average it has 9.5 ethylene oxide units) and an aromatic hydrocarbon lipophilic or hydrophobic group. The hydrocarbon group is a 4-(1,1,3,3-tetramethylbutyl)- phenyl group	0.28 oz [8 g]
An acid containing cross-linked acrylic emulsion copolymer which serves as a an alkali soluble anionic thickener	0.42 oz [12 g] mixed with
Demineralized water	40 mL
Glacial acetic acid	trace[A]

[A] If necessary to adjust pH to 9.0 to 9.5.

7.4.1.1 If the specimen tears or wrinkles excessively during the washing cycle, terminate the test and repeat it with a new test specimen (Note 2).

NOTE 2—A strip of ⅛-in. [3.2-mm] brass or stainless steel 2½ by 17 in. [64 by 430 mm] placed on the edge of the specimen aids in avoiding wrinkling and tearing. The use of a semi-hard rubber mat, an accessory to an abrasion boat that would fit some washability machines, is another way to help minimize wrinkling.

7.4.2 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 are acceptable.

7.5 *Stain Resistance* (Note 3)—Cut samples of wall covering 6½ by 17 in. [165 by 430 mm] with the longer dimension in the cross direction. Choose an area with as many different printed colors as possible. The test shall include each printed color and the ground surface.

NOTE 3—This method is based upon Test Method D1308.

7.5.1 Lay the specimens horizontally with the decorative surface upward. Measure onto the wall covering surface each of the following reagents, as specified in Table 1 (Note 4):

7.5.1.1 Distilled water, 65 to 75°F [18.3 to 23.8°C],
7.5.1.2 Distilled water, 115 to 125°F [46.1 to 51.6°C],
7.5.1.3 Ethyl alcohol,
7.5.1.4 Vinegar, 3 % acetic,
7.5.1.5 Alkali solution,
7.5.1.6 Hydrochloric acid solution, 5 %,
7.5.1.7 Soap solution,
7.5.1.8 Detergent solution,
7.5.1.9 Pure orange juice,
7.5.1.10 Butter,
7.5.1.11 Catsup, and
7.5.1.12 Tea.

7.5.2 Immediately cover each puddle of reagent with a watch glass and allow to stand for a period of 24 h.

NOTE 4—Specification of additional reagents by agreement between the producer or supplier and the purchaser is acceptable.

7.5.3 Remove the watch glass and clean the reagent from the specimens using, as appropriate, hot or cold distilled water, 50 % ethyl alcohol, or with the detergent solution specified in 7.4.1. Allow the specimens to recover, if necessary.

7.5.4 The specimens shall show no evidence of appreciable change to the decorative surface.

7.6 *Crocking Resistance*—Test for resistance to crocking in accordance with Fed. Std. No. 191A, Method 5651-B. Perform this test dry; the wall covering shall achieve a rating of at least "good."

7.7 *Scrubbability*—Cut a specimen of wall covering 6½ by 17 in. [165 by 430 mm] with the longer dimension in the cross direction. Choose an area with as many different printed colors as possible. The test shall include each printed color and the ground surface. For routine quality control it is not necessary for the specimen to be "hung." If the wall covering is a type that cannot be washed the requisite number of rubs without wrinkling or tearing, hang the specimen or mount it on a ⅛-in. [3.2-mm] smooth-finish board and allow it to dry 24 h at room temperature with good air circulation.

7.7.1 Place the sample in a washability machine, equipped with a brush, nylon bristle, or equal (0.012-in. [0.3-mm] bristle tufts wired in a staggered 5/4 pattern). If the brush is new, level off the bristles in accordance with 6.2 of Test Method D2486. It is recommended that test equipment also include a rubber mat and holder (weight 1 lb [454 g]). Soak the brush in the detergent solution defined in 7.4.1 for at least 15 min before the start of the test, and store in a pan of the same detergent solution between tests. Immediately prior to performing the test, remove the brush from the pan of detergent and shake off excess solution. Holding the brush with bristles pointing upward, distribute 1 tablespoon (15 mL) of the detergent solution over the face of the brush and immediately position the brush in the machine. Stir the detergent solution before each use. Set the cycle counter at zero and start the machine. At the end of the requisite number of cycles, stop the machine, remove the specimen, rinse it under running water, and set it aside for examination after drying.

7.7.1.1 If the specimen tears or wrinkles excessively during the washing cycle, terminate the test and repeat it with a new test specimen (Note 5).

NOTE 5—A strip of ⅛-in. [3.2-mm] brass or stainless steel 2½ by 17 in. [64 by 430 mm] placed on the edge of the specimen aids in avoiding wrinkling and tearing. The use of a semi-hard rubber mat, an accessory to an abrasion boat that would fit some washability machines, is another way to help minimize wrinkling.

7.7.2 After drying, the specimen shall show no evidence of appreciable damage to the printed or ground surface. Ignore areas of localized wear clearly related to wrinkles.

7.8 *Abrasion Resistance*—Cut a specimen of wall covering 2 by 8 in. [50 by 200 mm] with the shorter dimension in the cross direction. Take the specimen no nearer the selvage than one tenth the width of the wall covering. Secure greige duck, No. 8, or 220-grit silicon carbide-coated abrasive sheet, as specified in Table 1, 9½ by 12 in. [240 by 300 mm] by two clamp bars to the oscillating drum of a precision wear test meter. Ensure that the short dimension is parallel to the machine direction of the abrasive sheet. Ensure that the abrasive sheet is neither wrinkled nor slack. The clamping mechanism shall allow the least possible loosening of the abrasive sheet while in use.

7.8.1 Fasten wall covering specimens in the specimen clamps in such a manner that their length is closely parallel to the direction of the drum movement, and set the tension so that

it is equal across each specimen. Center the specimen laterally under the pressure pad.

7.8.2 Lower the sample clamp arm into position, set the tension at 6 lbf [27 N], and set the force at 2 lbf [9 N]. Level the tension scale bar and pressure scale bar by means of their adjusting screws while holding the spirit level on top of them. Raise and lower the clamp arm after leveling, and recheck and repeat the adjustment as often as necessary to avoid inaccuracy caused by friction in the pressure pad-sample-abrasive assembly. Also check and level the base of the instrument.

7.8.3 In the determination of finish wear resistance, change the abrasive at intervals of 10 000 cycles.

7.8.4 Wall coverings in Categories III and IV shall show no evidence of appreciable change to the decorative surface after the requisite number of cycles. Wall coverings in Categories V and VI shall show no evidence of fiber show-through or damage to the supporting substrate.

7.9 *Breaking Strength*—Test for breaking strength in accordance with Test Methods D751, Breaking Strength Procedure A. Run the test for grab tensile strength in both the machine and the cross-machine directions.

7.10 *Tear Resistance*—Test for tear resistance in accordance with Method A (Pendulum) of Test Methods D751. The specimen shall be one ply 2½ by 4 in. [64 by 100 mm], tested dry with 1-in. [25-mm] jaws, run in both the machine and the cross directions.

7.11 *Blocking Resistance*—Test for blocking resistance in accordance with Fed. Std. No. 191A, Method 5872.

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

7.13 *Cold Cracking Resistance*—Condition a specimen 2 by 8 in. [50 by 200 mm] and a ½-in. [12.5-mm] mandrel at 20 ± 4°F [–7 ± 2°C] for a period of 30 min. Maintain the conditioning temperature and quickly bend the specimen 180° around the mandrel with the uncoated side of the wall covering contacting the mandrel. Remove the specimen and perform a visual inspection to detect cracks. To pass, the wall covering must not crack during testing.

7.14 *Heat Aging Resistance*—Test for resistance to heat aging in accordance with Test Methods D751, Accelerated Heat Aging (Oven Method). The exposure temperature shall be 158 ± 4°F [70 ± 2°C] and exposure time shall be seven days. At the conclusion of the test, visually inspect the specimen. To pass, the wall covering shall show no evidence of appreciable change to the decorative surface.

7.15 *Flammability*—Test for flammability characteristics in accordance with Test Method E84, NFPA 286, or NFPA 265, as appropriate. See 5.3 for further details. See also the caveat in 1.3.

7.16 *Peelability*—Perform the test for peelability using a hanging surface of ⅜-in. [9.5-mm] drywall plaster board prepared in accordance with the wall covering manufacturer's instructions. It is not necessary to use a new surface for each test, provided the surface is washed thoroughly to remove paste residue before each use. Discard the panel if its surface becomes scored, fractured, or delaminated through use.

7.16.1 The specimen shall be at least 4 by 12 in. [100 by 300 mm] with the longer dimension in the machine direction. Three sets of specimens are required from the bolt being tested. Take one set from near the start of the bolt. Take the second set of specimens from near the middle of the bolt, and the third set from near the end of the bolt. Each set shall consist of three specimens cut across the web, one sample from each side and one from the middle of the web. The outside edge of the specimens taken from the sides of the web shall be at least 2 in. [50 mm] from the selvage.

7.16.2 Mount the specimen in accordance with the wall covering manufacturer's instructions and allow to dry at least one week at 73 ± 3°F [23 ± 2°C] at a relative humidity of 20 to 70 %.

7.16.3 Remove the decorative surface of the specimen as a discrete self-supporting film in accordance with the wall covering manufacturer's instructions and examine the substrate for conformity with 5.3.

7.17 *Strippability*—Perform the test for strippability using a hanging surface of ⅜-in. [9.5-mm] drywall plaster board prepared in accordance with the wall covering manufacturer's instructions. It is not necessary to use a new surface for each test, provided the surface is washed thoroughly to remove paste residue before each use. Discard the panel if its surface becomes scored, fractured, or delaminated through use.

7.17.1 The specimen shall be at least 4 by 12 in. [100 by 300 mm] with the longer dimension in the machine direction. Three sets of specimens are required from the bolt being tested. Take one set from near the start of the bolt. Take the second set of specimens from near the middle of the bolt, and the third set from near the end of the bolt. Each set shall consist of three specimens cut across the web, one specimen from each side and one from the middle of the web. The outside edge of the specimens taken from the sides of the web shall be at least 2 in. [50 mm] from the selvage.

7.17.2 Mount the specimen in accordance with the wall covering manufacturer's instructions and allow to dry at least one week at 73 ± 3°F [23 ± 2°C] at a relative humidity of 20 to 70 %.

7.17.3 Strip the specimen in accordance with the wall covering manufacturer's instructions and examine the substrate for conformity with 5.4.

7.18 *Mildew Resistance*—Test for mildew resistance in accordance with Practice G21. A rating of 0 or 1 must be achieved.

7.19 *Shrinkage*—Conduct the test for shrinkage in accordance with Fed. Spec. CCC-W-408D.

8. Keywords

8.1 abrasion resistance; blocking resistance; breaking strength; coating adhesion; cold cracking resistance; colorfastness; crocking resistance; flame spread index; flammability characteristics; heat aging resistance; shrinkage; scrubbability; smoke developed index; stain resistance; tear resistance; washability; wall covering