

L-F-001641 (GSA-FSS)

January 28, 1971

## INTERIM FEDERAL SPECIFICATION

### FLOOR COVERING TRANSLUCENT OR TRANSPARENT VINYL SURFACE WITH BACKING

This Interim Federal Specification was developed by the Standardization Division, Federal Supply Service, General Services Administration, Washington, D.C. 20406, based upon currently available technical information. It is recommended that Federal agencies use it in procurement and forward recommendations for changes to the preparing activity at the address shown above.

#### 1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers floor covering with a translucent or transparent vinyl plastic wear layer with or without a layer of foam on an organic, inorganic, or filled vinyl backing.

1.2 Classification. Floor covering shall be of the following types and classes as specified (see 6.2).

- Type I - Organic fiber backing treated with asphalt or other moisture-resistant backing.
- Type II - Filled vinyl backing.
- Type III - Inorganic fiber backing saturated with alkali and moisture-resistant materials.

Class - Wearing surface thickness, minimum, inch.

- 1. 0.020
- 2. 0.014
- 3. 0.010

#### 2. APPLICABLE DOCUMENTS

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

##### Federal Specifications:

- UU-P-271 - Paper, Wrapping, Waterproofed Kraft.
- CCC-C-429 - Cloth, Cotton, Osnaburg.
- CCC-C-467 - Cloth, Jute (or Kenaf), Burlap.
- PPP-B-636 - Box, Fiberboard.
  
- PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple Wall.
- PPP-D-723 - Drums, Fiber.
- PPP-P-291 - Paperboard, Wrapping, Cushioning.

##### Federal Standards:

- Fed. Std. No. 102 - Preservation, Packaging, and Packing Levels.
- Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian Agencies).
- Fed. Test Method Standard No. 501 - Floor Coverings Resilient Nontextile: Sampling and Testing.

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks 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, U.S. Government Printing Office, Washington, D.C. 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, D.C., Atlanta, Chicago, Kansas City, Mo., Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, Washington.

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(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Standards:

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military 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 on date of invitation for bids or request for proposal shall apply.

National Motor Freight Traffic Association, Incorporated, Agent:

National Motor Freight Classification.

(Application for copies shall be addressed to the National Motor Freight Traffic Association, Inc., Agent, 1616 P Street, N.W., Washington D.C. 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Tariff Publishing Officer, Room 202 Union Station, 516 W. Jackson Blvd. Chicago, Illinois 60606.)

American Society for Testing and Materials (ASTM) Standard:

- ASTM D-1242 - Tests for Resistance to Abrasion of Plastic Materials.

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

### 3. REQUIREMENTS

3.1 Material. The materials making up the floor covering composite shall be as specified herein. Where a material is not specified, it shall be selected so that the finished floor covering will conform to the requirements of this specification.

3.1.1 Wear layer. The wear layer shall be a translucent or transparent vinyl plastic layer, which can include extender and pigment, stabilized against heat and light deterioration. The binder shall consist of one or more vinyl resins and plasticizers and shall be not less than 90 percent of the weight of the wear layer. Each resin shall be a copolymer of vinyl chloride. The vinyl resin shall be not less than 60 percent by weight of the binder.

3.1.2 Foam layer. The foam layer, when used, shall allow the finished covering to meet the requirements of table I.

3.1.3 Backing. The backing shall be one of the following as applicable for the type specified and use intended (see 6.1):

Type I Organic. Backing shall consist of organic fibers treated with asphalt or other moisture-resistant materials.

Type II Filled Vinyl. Backing shall consist of a plasticized, stabilized and filled vinyl resin.

Type III Inorganic. Backing shall consist of inorganic fibers treated with an alkali resistant and moisture-resistant materials.

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The backing, foam layer (if present) and wear layer shall be firmly bonded between adjacent layers. When an attempt is made to delaminate the product, the failure shall occur in the foam or backing and not at the interface between layers. The exposed side of the backing shall not permanently mar the wear layer or cause sticking where they have been in contact.

3.2 Color and pattern. The color and pattern shall be as specified (see 6.2). The overall color and pattern effect shall be obtained by one of the following methods or a combination thereof:

3.2.1 Printing. A background under the wear layer may be printed with suitably formulated, fade resistant inks, or otherwise prepared to create a pattern or texture.

3.2.2 Coloring. Dye colors, pigments and extenders may be incorporated throughout the wear layer.

3.2.3 Surface texturing. The wear surface may be smooth, embossed, or otherwise textured.

3.3 Dimensions. Unless otherwise specified, the floor covering shall be furnished in 6, 9 or 12-foot width (minus 0 inch) and in the following minimum thicknesses. When tested as specified in table I (the thickness of the foam layer, if present, shall not be included in determining the thickness of either the wear layer or the backing.):

	Total (inch)	Wearing Surface (inch)
Class 1	0.065	0.020
Class 2	0.055	0.014
Class 3	0.055	0.010

The thickness of the backing shall be 0.020 inch, minimum, for all classes.

3.4 Floor covering characteristics. The finished floor covering shall have the characteristics specified in table I when tested as specified therein.

TABLE I. Characteristics of floor covering

Characteristics	Requirement	Test Method	
		Fed. Test Method Standard No. 501	Other
Thickness, inch, minimum	see 3.3	2121, 2151 [1]	----
Residual indentation, inch average maximum at 75 lb. loaded	0.012	3231 [2]	4.4.2 [3]
Flexibility, 1/4-inch diameter mandrel	No crack or break	3111 [4]	----
Dimensional stability, average change in either direction, per maximum	0.3	----	4.4.3
Resistance to oils and chemicals	No more than slight discoloration, softening or other		

degradation of ----- 4.4.1  
surface.

Abrasion resistance

Class 1 - 1.5 gm. zinc loss		
Class 2 - 1.0 gm. zinc loss	No break through of vinyl	ASTM[6]
Class 3 - 0.6 gm. zinc loss	surface [5]	D-1242 Method B

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- [1] Dial micrometer shall have a 6-inch square anvil, flat pressure foot 0.250 inch in diameter and a one ounce weight on plunger.
- [2] This method shall be used when floor covering does not contain a foam layer.
- [3] This method shall be used when floor covering contains a foam layer.
- [4] The wear layer shall be against the mandrel.
- [5] There shall be no point at which vinyl surface is abraded through.
- [6] Add to test method requirements:
  - a. Specimens shall be cut in factory machine direction.
  - b. Specific gravity need not be determined.
  - c. Coarse grit procedure of Note 5 using OE Flint Abrasive Paper shall be applicable.
  - d. Zinc standard shall be weighed prior to start of test.
  - e. Sufficient cycles shall be completed to obtain the required zinc weight loss for the applicable class.
  - f. Specimens shall be observed at the conclusion of the test using a low power magnifying glass.

3.5 Workmanship. The workmanship shall be such as to result in a translucent or transparent wearing surface free from blisters, cracks and firmly anchored to substrates with no evidence of separation of the layers. The color and design shall match a mutually acceptable standard sample and shall conform to the standards of general acceptance of first quality material in the industry.

#### 4. QUALITY ASSURANCE PROVISIONS

##### 4.1 General quality assurance provisions.

4.1.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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.

4.1.2 Government verification. All quality assurance operations performed by the contractor shall be subject to Government verification at unscheduled intervals. Verification shall consist of surveillance of the operations to determine whether the practices, methods, and procedures of the written inspection plan are being properly applied, and Government product inspection, to measure quality of product offered for acceptance. Deviation from the prescribed or agreed upon procedures, or instances of poor practices that might have an effect on the quality of the product will be immediately called to the attention of the contractor. Failure of the contractor to promptly correct the deficiencies discovered shall be cause for suspension of the acceptance until the correction has been made or until conformance of product to prescribed criteria has been demonstrated. To avoid interference with operations, the contractor shall designate a responsible official, or officials, to whom the Government inspector will report such instances.

4.2 Preproduction sample inspection. Examination and testing shall be made on the completely fabricated item for all provisions of this specification.

4.3 Sampling for inspection and acceptance. Sampling and inspection shall be performed in accordance with the provisions set forth in MIL-STD-105, except where otherwise indicated hereinafter.

4.3.1 Inspection of materials and components. In accordance with 4.1, the supplier is responsible for insuring that materials and components used were manufactured, tested, and inspected in accordance with the requirements of referenced subsidiary specifications and standards to the extent specified, or if none, in accordance with this specification.

4.3.2 End item inspection.

4.3.2.1 Visual examination of the end item. The lot size shall be expressed in units of completed end item. The inspection level for purposes of determining the sample size shall be level I of MIL-STD-105. The unit product shall be one completed end item. The defects found during the examinations shall be classified in accordance with table II. The acceptance quality level (AQL) shall be 4.0 for major defects and 6.5 for total defects (major and minor combined) per hundred units.



TABLE II. Classification of defects

Examine	Defect	Classification	
		Major	Minor
Material	Not type specified.	X	
	Color and pattern not as specified.	X	
Workmanship	Edges not straight.		X
	Surface not as specified.		X
	Surface blistered or cracked.	X	
	Embedded matter in surface		X

4.3.2.2 Dimensional examination. The lot size shall be expressed in units of rolls. The inspection level shall be S-2 of MIL-STD-105. The unit of product shall be one roll. Any external overall dimensions that are not within the specified tolerance shall be classified as a defect. The acceptance quality level (AQL) shall be 4.0 defects per hundred units.

4.3.3 Inspection of preparation for delivery requirements. An examination shall be made to determine that packaging, packing, and marking requirements of section 5 of this specification are complied with. Defects shall be scored in accordance with table III. The sample unit shall be one shipping container, fully packed, selected just prior to the closing operation. Closed shipping containers shall be examined for closure defects. The lot size shall be expressed in number of shipping containers. The inspection level shall be S-2 of MIL-STD-105 and the acceptable quality level (AQL) shall be 4.0 defects per hundred units.

TABLE III. Preparation for delivery defects.

Examine	Defect
Markings (exterior and interior)	Incorrect; incomplete, illegible; omitted; of improper size, location, sequence, or method of application.
Materials	Any nonconforming component; component missing, damaged or otherwise defective.
Workmanship	Inadequate application of components: such as incomplete closure of container, loose or inadequate sealing, strapping or stapling; bulged or distorted containers.

4.4 Test methods. All tests shall be performed on samples which have been conditioned in accordance with method 1041 of Fed. Test Method Std. No. 501. Sampling for tests shall be in accordance with para. 4.2.3.2 of Section 5 of Fed. Test Method Std. 501.

#### 4.4.1 Resistance to oils and chemicals.

Apparatus. The apparatus shall consist of the following:

- (a) A number of 3-inch diameter watch glasses, paraffin, 25-cc graduated

cylinder, soft and absorbent tissue, and spatula.

(b) Solvents. The solvents shall be:

Isopropyl alcohol, TT-I-735, grade A.

Beef tallow.

Cottonseed oil having the following characteristics:

Specific gravity at 77 deg. F . . . . . 0.915 to 0.917

Iodine number . . . . . 105 to 114

Acid number . . . . . 1.0 maximum

Mineral oil, TT-S-735, type IV.

A 5% acetic acid solution.

A 5% sodium hydroxide solution.

A 5% sulfuric acid solution.

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Procedure. Cut 14 specimens (6 inches square) from each sample to be tested. Two specimens are to be used for each solvent. Deposit 15 cc of the particular solvent from the above list onto the top wearing surface of each of the 2 specimens. Immediately cover the specimen with a watch glass and seal the perimeter of the watch glass with the paraffin wax. The specimens are to remain exposed to the solvent for a period of 46 hours +/- 1/4 hour at a temperature of 23.0 +/- 1.1 deg. C (73.4 +/- 2.0 deg. F).

At the end of the exposure period, the specimen shall be blotted (not rubbed) with a soft absorbent tissue. The exposed area shall then be probed with a spatula to ascertain whether or not degradation of the wear layer has occurred. The exposed area is also to be observed for color change.

#### 4.4.2 Residual indentation.

Equipment. Armstrong Indentation Machine, Model CS-71-HL, with 0.75-inch diameter hemispherical pressure foot, loaded to give 50 pounds pressure. A Federal Caliper Dead Weight Gage, #691-B, with no loading on plunger and with a 6-inch square flat steel anvil. Two feet are needed: 1/4-inch flat tip and an 1/4-inch hemispherical tip.

Procedure. Condition all samples (not less than 4 inches square), 24 hours at 72 F and 50% relative humidity. Tests are run under the same conditions. Measure total thickness on Federal Caliper Gage equipped with the 1/4-inch flat foot. Samples shall be face up and held so that it lies flat upon the anvil. The area selected shall be within 0.003 inch of average thickness and then circled with a marker. Adjust dial indicator on Armstrong Indentation Machine so that it is set at zero with no sample and then raise foot. Insert sample under the 0.75-inch hemispherical foot, making sure that it is immediately over the circled area. Lower the weight slowly until it just touches the surface, with no depression. Lower the foot quickly until free from ball bearing ring. After a 5-minute dwell read the thickness remaining and immediately remove load by turning wheel in proper direction. The initial indentation is calculated by finding the difference between total thickness as measured above and thickness remaining after the 5-minute dwell of weighted plunger. The thickness of the indented area after recovery is determined by use of the 1/4-inch hemispherical tip on the Federal Caliper Gage. After 1-hour recovery measure the caliper of the indented area, being sure to find the lowest spot.

Reported value. The residual indentation is calculated by finding the difference between original thickness and thickness after 1 hour recovery, and is reported in thousandths of an inch.

#### 4.4.3 Dimensional stability.

Apparatus. The apparatus shall include an eight inch trammel (5/16-inch square mild steel bar with two tapered holes drilled eight inches +/- 0.020 apart and hard phonograph needles set in holes to protrude about 3/16 inch), a microscope fitted with a reticle calibrated in mils, 60X magnification and a circulating air oven equipped with temperature controls which is capable of maintaining 180 deg. F.

Procedure. After conditioning samples (8.5 inches square) at 73 deg. F +/- 2 deg. F, 50% + 4% relative humidity, place the eight inch trammel on the face of the sample of the floor covering. Hold the bar of the trammel parallel to machine direction. Puncture the surface with the two pins simultaneously making sure that the material is flat. Repeat with the bar parallel to across machine direction. Mark the location and identify the punctures.

Place the samples face up in the oven supporting the samples on flat plates. After 1 hour at 180 deg. F remove the samples and condition for 1 hour at 73 deg. +/- 2 F 50 +/- 4% R.H.

Place one pin of the trammel in one of the original holes and make a scratch with the other pin so that the scratch passes through a point of nearest approach to the original hole. The sample should be flat while this scratch is being made. Using the microscope measure the least distance from the center of the hole to the center of the scratch.

Reported values. The average of the two machine direction readings and also for the two cross machine direction readings are figured separately, and noted whether they show expansion or contraction. These are then converted into percentages and reported as such.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging. Unless otherwise specified (see 6.2), commercial packaging will be acceptable.

5.2 Packing. Packing shall be level, A, B, or C, as specified (see 6.2).

5.2.1 Level A. Unless otherwise specified (see 6.2), each roll of floor covering shall be packed in boxes conforming to PPP-B-636, type CF, class weather-resistant, V3c, style RSC, or in boxes conforming to PPP-B-640, class 2. The boxes shall be closed with a waterproof adhesive applied to the entire area of contact between the flaps. The gross weight of each box shall not exceed the weight limitation of the box specification. Each box shall be strapped in accordance with the appendix to the box specification. When specified (see 6.2), each roll of floor covering shall be packed in a drum conforming to PPP-D-723, type II, grade A. Closure and sealing of the drum head shall be in accordance with the drum specification.

5.2.2 Level B. Unless otherwise specified (see 6.2), each roll of floor covering shall be packed in boxes conforming to PPP-B-636, type CF, class weather-resistant with a minimum 200 pounds burst strength, or in boxes conforming to PPP-B-640, class 1. The boxes shall be closed with a waterproof adhesive applied to the entire area of contact between the flaps. The gross weight of each box shall not exceed the weight limitation of a box specification. Strapping shall not be required. Alternatively, when specified (see 6.2), each roll of floor covering shall be packed in a drum conforming to PPP-D-723, type I, grade A. Closure and sealing of the drum head shall be in accordance with the drum specification. Alternatively, each roll shall be wrapped in corrugated fiberboard conforming to PPP-P-291, type II. The wrap shall extend not less than 1 inch beyond the ends of the roll, and completely encircle the roll, overlapping 3 inches. The wrap shall be secured in place with tape or by tying with ties of cord or twine, applied twice and around the roll, approximately 12 inches from the end and spaced approximately 12 inches apart. The wrapped roll shall be enclosed in waterproofed paper conforming to UU-P-271, class B-2. All laps and folds shall be sealed with pressure-sensitive tape or a waterproof roll shall be placed in a tube or bag made from osnaburg cloth conforming to CCC-C-429, type I, class 2, or burlap conforming to CCC-C-467, class 1. The ends of the tubing or bag shall be closed with ties or galvanized wire not less than 6 inches long by 0.072 inch thick.

5.2.3 Level C. The floor covering shall be packed to insure carrier acceptance and safe delivery to destination in containers conforming to the rules and regulations applicable to the mode of transportation.

5.3 Marking.

5.3.1 Civil agencies. In addition to markings required by the contract or order, the shipping containers shall be marked in accordance with Fed. Std. No. 123.

5.3.2 Military agencies. In addition to markings required by the contract or order, the shipping containers shall be marked in accordance with MIL-STD-129.

## 6. NOTES

6.1 Intended use. The vinyl floor covering described herein is intended for use in both dwellings and commercial buildings.

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 and class required (see 1.2).
- (c) Color and pattern required (see 3.2).
- (d) Width required (see 3.3).
- (e) Level of packing required (see 5.2).
- (f) When alternative packing is required (see 5.2.1 and 5.2.2).

6.3 Abrasive paper. Paper for the abrasion test may be obtained from the same company which produces the testing machine specified.

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AMENDMENT-2  
September 24, 1982

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Superseding  
Amendment-1  
September 8, 1971

AMENDMENT

TO

INTERIM FEDERAL SPECIFICATION

FLOOR COVERING TRANSLUCENT OR TRANSPARENT  
VINYL SURFACE WITH BACKING

This amendment was developed by the Furniture Commodity Center, Office of Personal Property, General Services Administration, Washington, D.C., 20406, based upon currently available technical information. The General Services Administration has authorized Specification L-C-001641 (GSA-FSS), dated January 28, 1971.

Page 1

The approved item name for this document is FLOOR COVERING, VINYL RESIN

Paragraph 1.1, following the word "inorganic" insert "or filled fibrous composition (non-asbestos formulated).":

Paragraph 1.2, delete in its entirety and substitute:

1.2 Classification. Floor covering shall be of the following types and classes as specified (see 6.2).

- Type I - Organic fiber backing treated with asphalt or other moisture-resistant materials.
- Type II - Filled vinyl backing.
- Type III - Inorganic fiber backing saturated with alkali and moisture-resistant materials or filled fibrous composition (non-asbestos formulated) backing saturated with alkali and moisture-resistant materials.

Class - Average Wear Layer Thickness, inch.

- 1. 0.020
- 2. 0.014
- 3. 0.010

Page 2

Paragraph 3.1.1, line 4, delete the third sentence in its entirety and substitute: "Each resin shall be poly (vinyl chloride) or a copolymer of vinyl chloride."

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Paragraph 3.1.3, Type III, delete in its entirety and substitute:

Type III Inorganic or filled fibrous composition (non-asbestos formulated). Backing shall consist of inorganic fibers treated with an alkali resistant and moisture-resistant materials or filled fibrous composition (non-asbestos formulated) treated with an alkali and moisture-resistant materials.

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Paragraph 3.2.3, following the word "wear" insert the word "layer".

Paragraph 3.3, delete the first sentence and substitute: "Unless otherwise specified, the floor covering shall be furnished in 6, 9, or 12 foot width (plus 1 inch, minus 0 inch) and in the following thicknesses."

Change the title of the two columns to read: "Average Total Thickness, inch" and "Average Wear Layer Thickness, inch". Delete the sentence describing the thickness of the backing and substitute: "The average thickness of the backing shall be 0.020 inch, for all classes."

Delete Table I and footnotes in their entirety and substitute:

TABLE I. Characteristics of floor covering

Characteristics	Requirement	Test Method	
		Fed. Test Method Standard No. 501	Other
Average total thickness, inch	see 3.3	2121 [1]	----
Average wear layer thickness, inch	see 3.3	2151	----
Average residual indentation, inch	0.012	3231 [2]	4.4.2 [3]
Flexibility, 1/4-inch diameter mandrel	No crack or break	3111 [4]	----
Dimensional stability, average change in either direction, percent maximum	0.3	----	4.4.3
Resistance to oils and chemicals	No more than slight discoloration, softening or other degradation of surface.	----	4.4.1



TABLE I. Characteristics of floor covering (continued)

Characteristics	Requirement	Test Method	
		Fed. Test Method Standard No. 501	Other
Abrasion resistance			
Class 1 - 1.5 gm. zinc loss			
Class 2 - 1.0 gm. zinc loss	No break through of vinyl surface [5]	----	ASTM [6] D-1242 Method B
Class 3 - 0.6 gm. zinc loss			

- [1] Dial micrometer shall have a 6-inch square anvil, flat presser foot 0.250 inch in diameter and a one ounce weight on plunger.
- [2] This method with a 75 pound load shall be used when floor covering does not contain a foam layer.
- [3] This method shall be used when floor covering contains a foam layer.
- [4] The wear layer should be against the mandrel. After the specimen is bent over the mandrel, it shall be straightened and the wear layer examined for cracks and breaks.
- [5] There shall be no point at which vinyl surface is abraded through.
- [6] Add to test method requirements:
- Specimens shall be cut in factory machine direction.
  - Specific gravity need not be determined.
  - Coarse grit procedure of Note 5 using OE Flint Abrasive Paper shall be applicable.
  - Zinc standard shall be weighed prior to start of test.
  - Sufficient cycles shall be completed to obtain the required zinc weight loss for the applicable class.
  - Specimens shall be observed at the conclusion of the test using a low power magnifying glass.

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Paragraph 6.1, delete in its entirety and substitute:

6.1 Intended use. The vinyl floor covering described herein is intended for use as follows:

Class	Traffic Application
1	A, B, C
2	B
3	B

- A - For public spaces in multi-family housing.  
 B - Within living units, residential.  
 C - Commercial Buildings.