

L-C-001676 (GSA-FSS)
December 10, 1970

INTERIM FEDERAL SPECIFICATION

CUSHION, CARPET AND RUG, VIRGIN
URETHANE

This Interim Federal Specification was developed by the 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 the requirements for carpet and rug cushion underlay made of virgin urethane foam.

1.2 Classification. The cushion covered by this specification shall be of one type and one of the following classes as specified (see 6.2).

- Class 1 - Firm
- Class 2 - Medium

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issues 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:

- PPP-B-591 - Boxes, Fiberboard, Wood-Cleated.
- PPP-B-601 - Boxes, Wood, Cleated-Plywood.
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
- PPP-B-636 - Box, Fiberboard.
- PPP-B-640 - Boxes, Fiberboard, Corrugated, Triple Wall.

Federal Standards:

- Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).
- Fed. Test Method Std. No. 601 - Rubber: 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, Seattle and Washington.

(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 Specifications:

MIL-L-10547 - Liners, Case, and Sheet Overwrap, Water-Vaporproof or Waterproof, flexible.

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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 from a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on the date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standards:

D 1564 - Testing Slab Flexible Urethane Foam.

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

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the National Motor Freight Association, Inc., Agent, 1616 P Street, N.W., Washington, DC 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, IL 60606.)

3. REQUIREMENTS

3.1 Preproduction sample. When specified (see 6.2), a preproduction sample of the cushion, measuring one foot square, shall be submitted to the contracting officer for approval.

3.2 Material.

3.2.1 Urethane sheets. The sheets shall be made from virgin polyether urethane foam slab stock free from objectionable odors. There shall be no polyester material included. The structure shall consist of a network of open or interconnecting cells with porous surfaces substantially free of voids. The foam may contain materials to enable it to meet the fire resistance requirements specified herein.

3.2.2 Facing. The sheets shall be faced with a woven or nonwoven cloth, plastic sheeting or surfacing, paper or a combination of these.

3.3 Construction. The cushion shall be cut from the urethane sheet material specified in 3.2.1 so that its surfaces are flat and parallel. All edges shall be straight. The cushion shall have a facing, conforming to 3.2.2 herein, applied to one surface which it shall cover entirely.

3.4 Physical requirements. The finished cushion shall conform to the requirements specified in Table I when tested as specified in 4.4.

TABLE I. Physical requirements [1]

Characteristics	Requirement	
	<u>Class 1</u>	<u>Class 2</u>
Indentation loan deflection, lbs. per 50 sq. inch at 25 percent deflection.	44 +/- 5	39 +/- 4
Ratio of indentation loan deflection at 65 percent to that at 25 percent.	1.9	1.9
Compression set, percent of original thickness, maximum at 50 percent deflection.	15.0	15.0
Density, lb. per cu. ft. minimum	2.4	1.9
Fatigue, Procedure A	[1]	[1]
Height loss, percent, maximum	5.0	5.0
Load deflection loss, maximum	25.0	25.0
Steam autoclave test		
Compression set, percent, maximum	20.0	20.0
Fire Resistance	Pass	Pass
Tensile strength, lb. minimum	10	10

[1] There shall be no physical breakdown of the cellular structure by visual examination.

3.5 Size.

3.5.1 Length and width. The cushion shall be furnished in roll form as full length pieces or as individual pieces cut to special sizes. Unless otherwise specified (see 6.2), the full length pieces shall be not less than 30, 50 or 100 feet in length and the widths shall be 54 or 72 inches wide, as specified in the contract or order (see 6.2). The length and width of special cut pieces shall be as specified in the contract or order. The width tolerance for full length rolls shall be + 1/2 inch and minus 1/8 inch. The tolerance for special cut pieces shall be + 1/2 inch and minus 1/8 inch for both width and length. The full length rolls shall be in one piece. Seams on special cut pieces will be allowed only when specified (see 6.2).

3.5.2 Thickness. The thickness of the cushion shall be 5/16, 3/8, 7/16 or 1/2 inch as specified in the contract or order. The tolerance shall be plus or minus 1/32 inch.

3.6 Workmanship. Cushions shall conform to the quality and grade of product established by this specification. They shall be clean, free from objectionable odor, cuts, holes, tears, lumps, cracks, embedded foreign matter and tack. Edges shall be straight.

4. QUALITY ASSURANCE PROVISIONS

4.1 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.

4.2 Preproduction sample inspection. When a preproduction sample is required, inspection shall be made of the completed end item for conformance with all provisions of this specification.

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

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4.3.1 Examination of the end item. The end item shall be examined for defects in accordance with paragraphs 4.3.1.1, 4.3.1.2 and 4.3.1.3.

4.3.1.1 Visual examination. Sample rolls of cushions or pieces of special cut sizes shall be examined for defects listed in Table II. The lot size shall be expressed in terms of yards when rolls are specified and pieces for special cut sizes. The inspection level shall be level II of MIL-STD-105. The sample unit for examination shall be one linear yard for full length rolls and one piece when special cut sizes are specified. The acceptable quality level shall be 4.0 defects per hundred units. The defects listed in Table II shall be counted regardless of their proximity to one another, except where two or more defects represent a single local condition of the cushion, in which case only the more serious defect shall be counted. When the lot consist of less than 5 rolls, an approximate equal number of yards shall be examined on each roll to yield the sample yardage.

TABLE II. Defects

Cut, hole or tear - any size.
 High place or lump.
 Dirty or stained.
 Thin or weak place.
 Objectionable odor
 Tacky.
 Crack or split.
 Imbedded foreign matter.
 Protruding foreign matter.
 Surfaces not flat or parallel.
 Edges not straight.
 Construction of facing not as specified.
 Facing not covering entire surface of cushion.

4.3.3.2 Length and width examination. Each roll or cut piece, as applicable, shall be examined for length and width. Any measurement found to be less than required shall be considered a defect. The sample unit shall be one roll or cut piece. The number of rolls or pieces examined for visual examination (4.3.1.1) shall be the sample size for this examination. The lot shall be unacceptable if one or more defects are found.

4.3.3.3 Examination of preparation for delivery requirements. An examination shall be made to determine whether packaging, packing and marking complies with section 5 requirements of this specification. The sample unit shall be one shipping container, with the exception that it need not be sealed. Defects of closure listed below shall be examined on shipping container fully prepared for delivery. The lot size shall be the number of shipping containers in the end item inspection lot. The inspection level shall be S-2 and the acceptable quality level (AQL) expressed in defects per 100 units shall be 2.5.

Examine	Defect
Marking	Omitted, incorrect, illegible, improper size, location, sequence or method of application.
Materials	Any component missing. Any component damaged.

Workmanship

Inadequate application of components such as:
Incomplete closure of container flaps,
improper taping, loose strapping or
inadequate stapling.
Bulged or distorted container.

4.4 Testing of the end item. Tests shall be performed for the characteristics specified in Table III. Unless otherwise specified, the physical and chemical values specified in section 3 apply to the average of the determinations made on a sample unit for test purposes in the applicable test method. The sample unit shall be 1 square yard for the full length rolls or one piece of the cushion, as applicable. The lot size for purposes of end item testing shall be expressed in units of square yards for full length rolls or pieces of cushions, as applicable. The sample size shall be as specified in level S-2 of MIL-STD-105. The lot shall be unacceptable if one or more units fail to meet any requirement specified. Except as otherwise specified, test methods referenced are ASTM standard D 1564-64T.

TABLE III. End item testing

Characteristic	Requirement reference	Test Method ASTM D-1564
Indentation loan deflection	Table I	Sections 19-25
Compression set	Table I	Sections 12-18 (Calculation 17.1 percent)
Density	Table I	Sections 75-80
Fatigue	Table I	Sections 52-60 (Procedure A)
Steam autoclave	Table I	Sections 5-11
Thickness	3.5.2	Method 12031, Fed. Test Std. No. 601
Fire resistance	Table I	4.4.1
Tensile Strength	Table I	Sections 88-94

[1] Tests should be conducted on foam cushion without facing.

4.4.1 Fire resistance test.

4.4.1.1 Test criterion. A specimen passes the test if the charred portion does not extend to within one inch of the edge of the hole in the flattening frame at any point.

4.4.1.2 Acceptance criterion. If at least seven of the eight specimens meet the test criterion, the material shall be classified as resistant to flammability.

4.4.1.3 Test procedure.

4.4.1.3.1 Apparatus.

(1) Test Chambers

The test chamber shall consist of an open top hollow cube made of noncombustible material (a) with inside dimensions 12x12x12-in. (30.5x30.5x30.5 cm) and a minimum of 1/4-inch (6.4 mm) wall thickness. The flat bottom of the box shall be made of the same material as the sides and shall be easily removable. The sides shall be fastened together with screws or brackets and taped to prevent air leakage into the box during use.

(A minimum of two chambers and two extra bottoms are suggested for efficient operation.)

(2) Flattening Frame

A steel plate, 9x9-in. (23x23 cm), 1/4-in. (6.4 mm) thick with an 8-in (20.3 cm) diameter hole in its center is required to hold the underlay flat during the course of the test. It is recommended that one be provided for each test chamber.

(3) Standard Igniting Source

No. 1588 methenamine timed burning tablet. These tablets shall be stored in a desiccator over a desiccant for 24 hours prior to use. (Small quantities of sorbed water may cause the tablets to fracture when first ignited. If a major fracture occurs, any results from that test shall be ignored, and it shall be repeated.)

(4) Test Specimens

Each test specimen shall be a 9x9-in (23x23 cm) section of the underlay to be tested. Eight specimens are required.

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(5) Circulating Air Oven

A forced circulation drying oven capable of removing the moisture from the specimens when maintained at 105C for two hours (b).

(6) Desiccating Cabinet

An air moisture-tight cabinet capable of holding the floor covering specimens horizontally without contacting each other during the cooling period following drying, and containing an efficient desiccant, such as calcium chloride or silica gel.

(7) Glove

A non-hygroscopic glove (rubber, polyethylene, etc.) for removing loose surface matter on specimens prior to testing.

(8) Hood

A hood capable of being closed and having its draft turned off during each test and capable of rapidly removing the products of combustion following the test. The front or sides of the hood should be transparent to permit observation of the tests in progress.

(9) Mirror

A small mirror mounted above each test chamber at an angle to permit observation of the specimen from outside of the hood.

4.4.1.3.1 Sampling.

(1) Selection of Samples

If there is an applicable material specification, take a lot sample. If not, select a sample of the material representative of the lot and large enough to permit cutting 8 specimens 9x9-in. (23x23 cm), free from creases, fold marks, delaminations or other distortions.

If the cushion has had a fire-resistant treatment, the selected sample shall be washed, ten times in a manner normally used in service prior to cutting the specimens.

(2) Cutting

Cut eight 9 +/- 1/4-in. (23 +/- 0.6 cm) square specimens of each underlay to be tested.

4.4.1.3.3 Conditioning. Clean each specimen with the vacuum cleaner. (c)

Place the specimens in the drying oven in a manner that will permit free circulation of the air at 105C around them for two hours (d). Remove the specimens from the oven and place them horizontally in the desiccator free from contact with each other until cooled to room temperature, but in no instance less than one hour.

4.4.1.3.4 Testing. Place the test chamber in the draft-protected environment (hood with draft off) with its bottom in place. Remove a specimen from the desiccator, brush its surface with a gloved hand. Place the specimen on the center of the floor of the test chamber, exercising care that the specimen is horizontal and flat. Place the flattening frame on the

specimen and position a methenamine tablet on one of its flat sides in the center of the 8-in. (20.3 cm) hole.

Ignite the tablet by touching a lighted match or an equivalent igniting source carefully to its top (e).

Continue each test until one of the following conditions occurs:

(1) The last vestige of flame or glow disappears. (This is frequently accompanied by a final puff of smoke.)

(2) The flaming or smoldering has approached within one inch of the edge of the hole in the flattening frame at any point.

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When all combustion has ceased, ventilate the hood and measure the shortest distance between the edge of the hole in the flattening frame and charred area. Record the distance measured for each specimen.

Remove the specimen from the chamber and remove any burn residue from the floor of the chamber. Before proceeding to the next test, the floor must be cooled to room temperature or replaced with one that is at room temperature.

4.4.1.3.5 Report. The number of specimens of the eight tested in which the charred area does not extend to within one inch of the edge of the hole in the flattening frame shall be reported.

4.4.1.3.6 Interpretation of Results. If the charred area does not extend to within one inch of the edge of the hole in the flattening frame at any point for at least seven or eight specimens, the underlay meets the acceptance criterion.

4.4.1.3.7 Footnotes.

(a) 1/4-inch (6.4 mm) cement asbestos board is a suitable material.

(b) Option 1 of ASTM D 2654-67T, Methods of Test for Amount of Moisture in Textile materials," describes a satisfactory oven. (1969 Book of ASTM Standards, Part 24, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103)

(c) The vacuum cleaning described is not intended to simulate the effects of repeated vacuum cleaning in service.

(d) If the specimens are moist when received, permit them to air-dry at laboratory conditions prior to placement in the oven. A satisfactory pre-conditioning procedure may be found in ASTM D 1776-67, "Conditioning Textiles and Textile Products for Testing." (1969 Book of ASTM Standards, Part 24, published by the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pa. 19103)

(e) Care must be exercised to avoid igniting the underlay prior to the tablet. If more than two minutes elapse between the removal of the specimen from the desiccator and the ignition of the tablet, the conditioning must be repeated.

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A, B or C as specified (see 6.2).

5.1.1 Level A or B. Each length of cushion, of like description shall be tightly rolled, wrapped and headed with extensible kraft wrapping paper, minimum 90 pounds basis weight. When specified, items 6 feet wide or more shall be individually rolled on a pole or spirally wound core, commonly used for the purpose.

5.1.2 Level C. The cushion shall be packaged in accordance with the supplier's commercial practice.

5.2 Packing. Packing shall be level A, B, or C, as specified (see 6.1).

5.2.1 Level A. Cushions of like description, packaged as specified in 5.1.1, shall be packed in a box conforming to PPP-B-591, Class II; PPP-B-601,

overseas type; or PPP-B-621, Class 2. The box shall be lined with a water-proof case liner conforming to MIL-L-10547, sealed in accordance with the appendix thereto. The box shall be closed and strapped in accordance with the appendix to the applicable box specification.

5.2.2 Level B. Cushions, of like description, shall be packed in a box conforming to PPP-B-636, class domestic or PPP-B-640, class 1, The box shall be closed and strapped in accordance with the appendix to the box specification. The gross weight shall be subject to the weight limitations of the box specification.

5.2.3 Level C. The cushions, packaged as specified in 5.1, shall be packed to insure carrier acceptance and safe delivery to destination at lowest rates, in containers complying with the Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

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5.3 Marking. In addition to markings required by the contract or order, the shipping containers shall be marked in accordance with Fed. Std. No. 123 or MIL-STD-129, as applicable.

6. NOTES

6.1 Intended use. The cushion described in this specification is intended for the use under carpets and rugs on floors below grade, at grade or suspended grade.

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

- (a) Title, number and date of this specification.
- (b) Class required (1.2).
- (c) When preproduction sample is required (3.1).
- (d) Length and width required (3.5.1).
- (e) Thickness required (3.5.2).
- (f) When seams are allowed on special cut pieces (3.5.1).
- (g) When pole or spirally wound core required (5.1.1).
- (h) Selection of applicable levels of packaging and packing (5.1 and 5.2).

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 AMENDMENT-1
 September 7, 1971

AMENDMENT

TO

INTERIM FEDERAL SPECIFICATION

CUSHION, CARPET AND RUG, VIRGIN

URETHANE

This amendment was developed by the Standardization Division, Federal Supply Service, General Services Administration, Washington, D. C. 20406, based upon currently available technical information. The General Services Administration has authorized this amendment as a part of Interim Federal Specification L-C-001676 (GSA-FSS) dated December 10, 1970.

PAGE 1

Title of specification, delete the word "VIRGIN" and substitute "PRIME".

Paragraph 1.1, line 2, delete the word "virgin" and substitute "prime".

PAGE 2

Paragraph 3.2.1, line one, delete the word "virgin" and substitute "prime".

PAGE 3

Table I, under the column titled "Requirement" for class 1, delete " 44 +/- 5" and substitute " 25 - 31, class 2, delete " 39 +/- 4" and substitute " 21 - 27." Under the column titled "Characteristic" delete "Density, lb. per cu. ft. minimum" and substitute "Density, urethane polymer, lb. per cu. ft. minimum." Under "Tensile strength", delete "lb." and insert "pounds/sq. inch,".

Paragraph 3.5.2, line 1, delete "5/16".

PAGE 4

Paragraph 4.4, line 9, delete "64T".

PAGE 5

Delete Table III and Footnote 1 in their entirety and substitute:

TABLE III. End item testing

Characteristic	Requirement Reference	Test Method ASTM D-1564 [1]
Indentation load deflection	Table I	Load Deflection, Method A
Compression set	Table I	Compression Set, Method B Calculation for Ct
Urethane Polymer density [2]	Table I	Density Test, Suffix W

Fatigue	Table I	Fatigue Test, Suffix H Procedure A
Steam autoclave Thickness	Table I 3.5.2	5 Hrs. at 121 deg. C (as printed)
Fire resistance [3]	Table I	4.4.1
Tensile strength	Table I	Tension test, Suffix T

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- [1] All tests except fire resistance shall be conducted on foam cushion without facing.
- [2] Apparent density as determined above shall be corrected in the following manner:

Ash content, as determined in ASTM Method D297, subtracted from 100, multiplied by apparent density shall equal the minimum values listed in Table I.
- [3] Tests shall be conducted with facing and at least 2 determinations shall be made.

PAGE 6

Paragraph 4.4.1.3.1, delete in its entirety the paragraph beginning "If the cushion has had a fire-resistant treatment, etc."

PAGE 8

Add the following paragraph:

6.3 Definition of prime foam. Prime foam is a flexible cellular urethane product made by the suitably controlled reactions of an hydroxyl-terminated compound with an isocyanate compound, containing all new material, and subsequently fabricated into the desired dimensions without incorporation of reworked material.

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