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Standard Specification for Flexible Cellular Materials—High-Resilience Polyurethane Foam (HR) and Combustion Modified High Resilience (CMHR) Polyurethane Foam¹

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1. Scope

1.1 This specification covers the minimum physical properties and other requirements for high-resilience polyurethane foam (HR) and combustion modified high resilience polyurethane foams (CMHR).

1.2 Combustion modified high resilience polyurethane foams are high resilience foams that have been modified to meet specific flammability requirements.

1.3 This specification includes references to government regulations for burning characteristics of flexible cellular materials used in specific applications (see Table 1).

2. Referenced Documents

2.1 ASTM Standards:

- D 3453 Specification for Flexible Cellular Materials—Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications²
- D 3574 Test Methods for Flexible Cellular Materials—Slab, Bonded, and Molded Urethane Foams²
- D 3675 Test Method for Surface Flammability of Flexible Cellular Materials Using a Radiant Heat Energy Source²

2.2 Other Documents:

- DOT MVSS 302³
- DOC FF 4-72³
- CAL. TB 117⁴
- CAL. TB 133⁴
- NFPA 260⁵
- BSI 5852⁶
- FAA Part 25.853, Paragraph 6, Appendix F³
- FAA Oil Burner Test³

¹ This specification is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.22 on Cellular Plastics.

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² Annual Book of ASTM Standards, Vol 09.02.

³ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁴ Available from California Bureau of Home Furnishings, 3485 Orange Grove Ave., North Highlands, CA 95660.

⁵ Available from National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269.

⁶ Available from British Standards Institute, 2 Park Street, London, England W1A 2B5.

TABLE 1 Applicable Government Regulations for Specified Applications

Types	Application	Regulation
1	Automotive	DOT MVSS 302
2	Mattress and Cushion	DOC FF 4-72
3	Mattress and Cushion	CAL. TB 117
4	Mattress and Cushion	CAL. TB 133
5	Mattress and Cushion	NFPA 260
6	Mattress and Cushion	NFPA 260
7	Mattress and Cushion	BSI 5852
8	Aviation	FAA Part 25.853 paragraph 6 Append. F
9	Aviation	FAA Oil Burner test
10	Miscellaneous	ASTM D3675

3. Classification

3.1 This specification covers two grades of flexible high-resilience polyurethane foam material that may be selected for use according to load-bearing and other minimum physical properties (see Table 2). Generally, Grade HR-I is used for furniture applications and Grade HR-II is used for furniture applications and mattresses.

4. Ordering Information

4.1 Any product represented as complying with this specification shall meet all the requirements listed herein for its particular classification.

4.2 Orders for material under this specification shall include the following information:

- 4.2.1 Type I or II of HR required as listed in this specification,
- 4.2.2 Grade number and quality as listed in Table 1 of Specification D 3453,
- 4.2.3 Dynamic fatigue performance, if required, as listed in Table 2 of Specification D 3453,
- 4.2.4 Dimension of foam, and
- 4.2.5 Combustibility requirements, if any, as listed in Table 1.

5. Physical Requirements

5.1 The material shall conform to the requirements for physical properties prescribed in Table 2.

6. Test Methods

6.1 The physical tests shall be in accordance with Methods D 3574.



TABLE 2 Physical Properties of High-Resilience Polyurethane Slabstock Foam

Physical Property	ASTM Test Method D 3574	Specimen Size	Foam Grade	
			HR-I	HR-II
Indentation force deflection (IFD) at 25 % IFD, N (lbf)	16 to 22	380 by 380 by 100 (15 by 15 by 4)	1La67 (15)	>67 (15)
Density, min, kg/m ³ (lb/ft ³)	9 to 15	50 by 50 by 25 (2 by 2 by 1)	24 (1.5)	40 (2.5)
Resilience, min, % ball rebound	68 to 75 ^A	100 by 100 by 50 (4 by 4 by 2)	55	55
Support factor	16 to 22	380 by 380 by 100 min (15 by 15 by 4)	2.4	2.4
65 % IFD/25 % IFD, min				
Recovery ratio,	16 to 22 ^B	380 by 380 by 100 min (15 by 15 by 4)	75	80
25 % R/25 % IFD, min, %				
Tensile strength, min, kPa (psi)	45 to 52	die shown in Fig. 3 of D3574	50 (7)	70 (10)
Elongation, min, %	45 to 52	die shown in Fig. 3 of D3574	100	100
Tear Strength, min, N/m (lbf/in.)	53 to 60	specimen shown in Fig. 2 of D3574	175 (1)	175 (1)
Compression set, <i>C_t</i>	37 to 44			
max, 50 %,			15	...
max, 75 %,			...	10
Static fatigue	77 to 85	380 by 380 by 100 (15 by 15 by 4)	...	2
Loss in thickness, max, %			...	20
Loss in force deflection at 25 % IFD, max, %			...	
Moisture resistance	113 to 118	50 by 50 by 25		
Compression force deflection loss, max, %	Procedure J ₁	(2 by 2 by 1)	20	20
Constant deflection compression set, max, % (75 % deflection)			15	15

^ASample to be preflexed by standard ASTM preflexing conditions.

^BReturn value should include 1-min hold.

7. Inspection

7.1 Inspection of the material shall be agreed upon in writing between the purchaser and the seller as part of the purchase contract.

7.2 Testing for conformance to requirements shall be done in accordance with the appropriate sections of Methods D 3574. The specific test methods in this reference to be used for each test shall be as listed in Table 2.

8. Retest and Rejection

8.1 If any failure occurs, the materials may be retested to establish conformity in accordance with agreement between the purchaser and the seller.

9. Packaging, Marking, and Labeling

9.1 *Packaging*—The material shall be packed in standard commercial containers, so constructed as to ensure acceptance by common or other carriers for safe transportation at the lowest rate to the point of delivery, unless otherwise specified in the contract or order.

9.2 *Marking*—The shipping container shall be marked with the name, grade, and quality of material in accordance with the

contract or order under which the shipment is made. The shipping container shall also be marked with the name of the manufacturer and the contract or order number.

9.3 *Labeling*—In order that purchasers may identify products complying with all requirements of this specification, producers choosing to produce such products in conformance with this voluntary specification may include a statement in conjunction with their name and address on labels, invoices, sales literature, and the like. The following statement is suggested:

This product conforms to all the requirements for high-resilience polyurethane foam Grade____, and conforms to combustion test(s)____, established in Table 1, Combustion Properties, and Table 2, Physical Properties. Full responsibility for the conformance of this product with the standard is assumed by (name and address of producer or distributor).

10. Keywords

10.1 combustion modified high resilience; flexible cellular polyurethane; high resilience

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