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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Performance Requirements for Child's Plastic Chairs for Outdoor Use[1]

This standard is issued under the fixed designation F 1838; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These standard performance requirements establish nationally recognized performance requirements for Class A (residential) and Class B (nonresidential) child's plastic chairs intended for outdoor use.

1.2 These standard performance requirements are not applicable to chaises, multipositional chairs, upholstered chairs, or other types of furniture.

1.3 These standard performance requirements cover the performance of product regarding aspects of outdoor weathering, impact, static load, and rear leg testing.

1.4 *Products Manufactured from Recycled Plastics*:

1.4.1 Products may be manufactured from recycled plastics as long as the performance requirements are met.

1.5 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.6 *This standard does not purport to address all of the safety concerns, 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:*

D 638 Test Method for Tensile Properties of Plastics[2]

D 2565 Practice for Operating Xenon Arc-Type Light-Exposure Apparatus With and Without Water for Exposure of Plastics[3]

D 4329 Practice for Operating Light and Water Apparatus (Fluorescent UV Condensation Type) for Exposure of Plastics[4]

D 5033 Guide for the Development of Standards Relating to the Proper Use of Recycled Plastics[4]

G 23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials[5]

3. Terminology

3.1 *Definitions:*

3.1.1 *child's plastic chair, n*—for the purposes of these provisional performance requirements, a molded, upright piece of furniture with or without arms, having a back in a fixed position with no moving parts, intended for seating one child, and having a seat height not less than 9 in. (228 mm) and not greater than 15 in. (381 mm); for a chair with arms, having a seat width not less than 10 in. (254 mm) and not greater than 16 in. (406 mm), and for a chair without arms, having a seat width not less than 10 in. (254 mm) and not greater than 16 in. (406 mm) (as shown in Fig. 1).

3.1.1.1 *Discussion*—Class A (residential) child's plastic chairs are intended for outdoor use by the customer around the home.

3.1.1.2 *Discussion*—Class B (nonresidential) child's plastic chairs are intended for outdoor use by the customer in all other areas, including those defined as Class A.

4. Significance and Use

4.1 Tests and criteria as outlined determine the overall usability and stability of chairs in an environment simulating the conditions of use.

4.2 Tests simulate two types of surfaces:

4.2.1 Smooth surfaces such as linoleum, wet pool decks, etc. The glass testing base (see Fig. 2) is used to simulate this surface.

4.2.2 Rough surfaces such as wooden decks, outdoor natural surfaces, etc. The plywood testing base (see Fig. 3) is used to simulate this surface.

5. Apparatus

5.1 *Child's Plastic Chairs*, which have been inspected and have met a manufacturer's internal quality standards.

5.2 *One Heavy-Weight Canvas or Leather Bag*, 9 ± 0.1 in. (228 ± 2 mm) in diameter, which shall be measured prior to testing to determine stretching, having a total measurement not to exceed 10 in. (254 mm), and filled with steel or lead shot (0.09 to 0.12 in. (2.3 to 3.0 mm) in diameter), to a total weight of 60 ± 0.6 lb (27 ± 0.3 kg). The bag shall be fitted with a safety cable or other means to prevent it from hitting the glass

[1] These standard performance requirements are under the jurisdiction of ASTM Committee F-15 on Consumer Products and are the direct responsibility of Subcommittee F15.33 on Outdoor Plastic Lawn Furniture.

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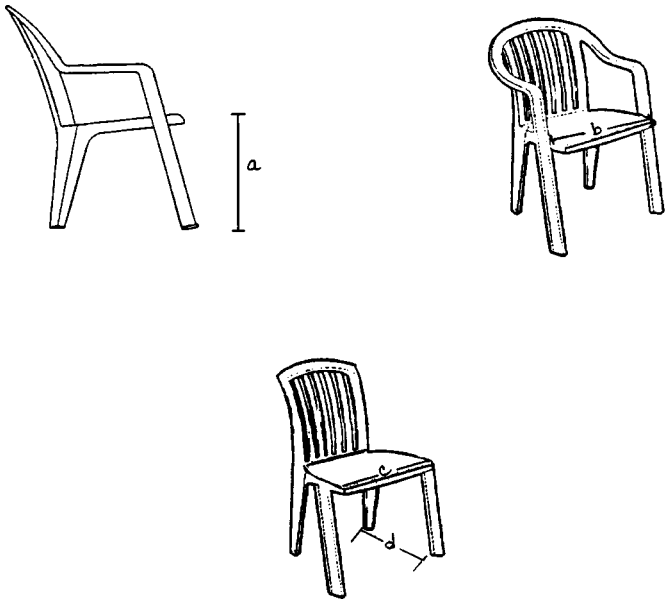
[2] *Annual Book of ASTM Standards*, Vol 08.01.

[3] *Annual Book of ASTM Standards*, Vol 08.02.

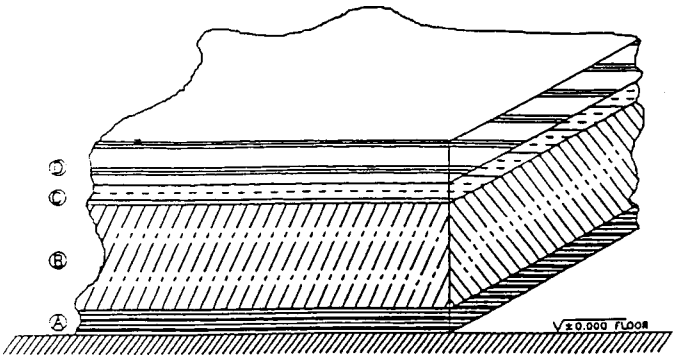
[4] *Annual Book of ASTM Standards*, Vol 08.03.

[5] *Annual Book of ASTM Standards*, Vol 14.02.



NOTE 1—(a) Seat height, chair with or without arms; (b) seat width, chair with arms; and (c) seat width, chair without arms; (d) leg stance, measured from back of front leg to back of rear leg.

FIG. 1 Measurements of a Chair



NOTE 1—(A) Poly(methyl methacrylate) sheet, 0.25 ± 0.03-in. (6 ± 0.1-mm) thickness; (B) AC exterior glue fir plywood sheet, 0.75 ± 0.08 in. (19 ± 0.2 mm) or greater in thickness; (C) polypropylene microfoam sheet; 0.7 ± 0.01-lb/ft^3 (11 ± 0.2-kg/m^3) density and 0.13 ± 0.01-in. (3 ± 0.03-mm) thickness; and (D) glass/tempered sheet, 0.38 ± 0.04-in. (10 ± 0.1-mm) thickness.

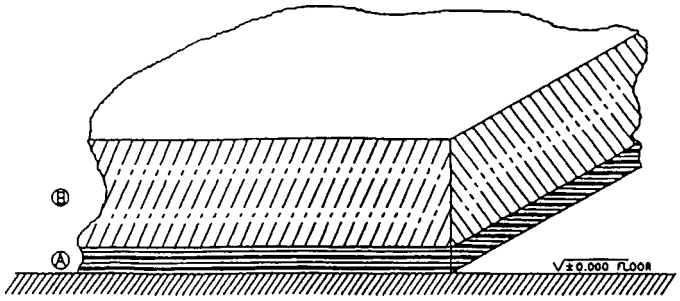
NOTE 2—(A), (B), (C), and (D) shall be roughly the same dimensions, 48 in. (1219 mm) or greater.

FIG. 2 Glass Testing Base

testing base but should not interfere with the test.

5.3 *One Heavy-Weight Canvas or Leather Bag*, identical to the bag described in 5.2; however, the weight is increased by addition to the bag of 60 ± 0.6 lb (27 ± 0.3 kg) of either (*1*) additional steel or lead shot or (*2*) barbell weights distributed evenly on top of the steel or lead shot, for a total weight of 120 ± 1.2 lb (54 ± 0.5 kg).

5.4 *One Heavy-Weight Canvas or Leather Bag*, identical to the bag described in 5.2; however, the weight is increased by addition to the bag of 90 ± 0.9 lb (41 ± 0.4 kg) of either (*1*) additional steel or lead shot or (*2*) barbell weights distributed evenly on top of the steel or lead shot, for a total weight of 150 ± 1.5 lb (68 ± 0.7 kg).



NOTE 1—(A) Poly(methyl methacrylate) sheet, 0.25 ± 0.03-in. (6 ± 0.1-mm) thickness; and (B) AC exterior glue fir plywood sheet, 0.75 ± 0.08 in. (19 ± 0.2 mm) or greater in thickness.

NOTE 2—(A) and (B) shall be roughly the same dimensions, 48 in. (1219 mm) or greater.

FIG. 3 Plywood Testing Base

5.5 *Glass Testing Base*, as shown in Fig. 2.

5.6 *Plywood Testing Base*, as shown in Fig. 3.

6. Conditioning

6.1 Precondition all chairs for a minimum of 48 h at 65 to 75°F (18 to 24°C) and a relative humidity of 50 ± 15 %, and test subsequently under the same conditions.

7. General Requirements

7.1 All chairs meeting these standard performance requirements shall be made from polymeric materials that meet the requirements for outdoor weathering given in Section 8 for Class A (residential) or Section 9 for Class B (nonresidential).

8. Test Procedure—Class A (Residential)

8.1 *Initial Inspection*—Inspect each chair thoroughly for breaks, fractures, cracks, or other structural damage prior to testing. Any chairs exhibiting structural damage shall not be tested.

8.2 Separate chairs may be used to conduct the tests listed in 8.4-8.9 to comply with 11.1 and 11.2.

8.3 *Weatherability Test*:

8.3.1 Polymeric material used outdoors shall be exposed for weatherability using accelerated weathering chambers and shall retain at least 70 % of its original tensile strength.

8.3.2 Specimens to be tested shall be normal 0.125 ± 0.01-in. (3.2 ± 0.03-mm) thick Type 1 tensile test bars injection molded from the same material used in finished chairs or tensile bars cut from finished parts, as described in Test Method D 638.

8.3.3 *Tensile Test*—Test exposed and non-exposed (control samples) tensile bars, in accordance with Test Method D 638, at a testing rate of 2 in. (51 mm)/min.

8.3.4 The specimens are to be exposed according to one of the following procedures: (*1*) 1000 h in accordance with Procedure B of Practice D 2565, using a Type B or BH xenon-arc apparatus; (*2*) 720 h in accordance with Practice G 23, using a Type E carbon-arc weathering device; (*3*) 1000 h in accordance with Cycle A of Practice D 4329, using UVB-313 bulbs; or (*4*) 2000 h in accordance with Cycle A of Practice D 4329, using UVA-340 bulbs. For Practice D 2565 or Practice G 23, the test cycle shall consist of 102 min of light followed

by 18 min of light and spray. For Practice D 4329, the test cycle shall consist of 8 h of light followed by 4 h of dark with condensation. If Practice G 23 is used, the blackbody temperature shall be 145 ± 5°F (63 ± 3°C).

8.4 *Static Load Test No. 1*:

8.4.1 Position the chair on the glass testing base (see Fig. 2) as near as possible to the center of the glass.

8.4.2 Apply the 120 ± 1.2-lb (54 ± 0.5-kg) bag at a speed not to exceed 6 in. (152 mm)/s to the geometrical center of the seat.

8.4.3 Withdraw the weight from the seat after 10 ± 1 s.

8.4.4 Allow 10 ± 1 s of recovery time.

8.4.5 Repeat the steps given in 8.4.2-8.4.4 eight additional times.

8.4.6 Repeat the step given in 8.4.2 one time, allowing the weight to remain on the seat for 30 min ± 10 s, and then withdraw the weight from the seat.

8.4.7 Observe and report any breaks, cracks, fractures, or other structural damage.

8.5 *Static Load Test No. 2*:

8.5.1 Position the chair on the plywood testing base (see Fig. 3) as near as possible to the center of the plywood.

8.5.2 Repeat the steps given in 8.4.2-8.4.7.

8.6 *Impact Test No. 1*:

8.6.1 Position the chair on the glass testing base (see Fig. 2) as near as possible to the center of the glass.

8.6.2 Position the 60 ± 0.6-lb (27 ± 0.3-kg) bag at a height of 6 ± 0.1 in. (152 ± 2.5 mm) above the center of the chair seat, at rest.

8.6.3 Allow the bag to free-fall onto the center of the chair seat.

8.6.4 Repeat the steps given in 8.6.2 and 8.6.3 nine additional times.

8.6.5 Observe and report any breaks, cracks, fractures, or other structural damage.

8.7 *Impact Test No. 2*:

8.7.1 Position the chair on the plywood testing base (see Fig. 3) as near as possible to the center of the plywood.

8.7.2 Repeat the steps given in 8.6.2-8.6.5.

8.8 *Rear Leg Test No. 1*:

8.8.1 Place the chair on the glass testing base (see Fig. 2) as near as possible to the center of the glass.

8.8.2 Position the chair with the rear legs unrestrained and the front legs resting but not restrained on wooden blocks, of width suitable to accommodate the chair legs.

8.8.3 Height of the wooden blocks is determined by the distance of leg stance (see Fig. 1).

Leg Stance	Block Height
Up to 11 in. (280 mm)	2.25 ± 0.03 in. (57 ± 0.6-mm)
Over 11 in. (280 mm)	3.0 ± 0.03 in. (76 ± 0.8 mm)

8.8.4 Lower the 120 ± 1.2-lb (54 ± 0.5-kg) bag slowly onto the front of the seat of the chair and, while supporting the back of the chair, slide the bag to the rear of the seat, to a position touching the back of the chair.

8.8.5 Remove the load after 60 ± 1 s.

8.8.6 Observe and report any breaks, cracks, fractures, or other structural damage.

8.9 *Rear Leg Test No. 2*:

8.9.1 Place the chair on the plywood testing base (Fig. 3).

8.9.2 Repeat the steps given in 8.8.2-8.8.6.

9. Test Procedure—Class B (Nonresidential)

9.1 *Initial Inspection*—Inspect each chair thoroughly for breaks, fractures, cracks, or other structural damage prior to testing. Any chairs exhibiting structural damage shall not be tested.

9.2 Separate chairs may be used to conduct the tests listed in 9.4-9.9 to comply with 11.1 and 11.3.

9.3 *Weatherability Test*:

9.3.1 Repeat the steps given in 8.3.1-8.3.4.

9.4 *Static Load Test No. 1*—Repeat the steps given in 8.4.1-8.4.7 using a 150 ± 1.5-lb (68 ± 0.7-kg) bag.

9.5 *Static Load Test No. 2*—Repeat the steps given in 8.5.1 and 8.5.2 using a 150 ± 1.5-lb (68 ± 0.7-kg) bag.

9.6 *Impact Test No. 1*—Repeat the steps given in 8.6.1-8.6.5 using a drop height of 8 ± 0.1 in. (203 ± 2.5 mm).

9.7 *Impact Test No. 2*—Repeat the steps given in 8.7.1 and 8.7.2 using a drop height of 8 ± 0.1 in. (203 ± 2.5 mm).

9.8 *Rear Leg Test No. 1*—Repeat the steps given in 8.8.1-8.8.6 using a 150 ± 1.5-lb (68 ± 0.7-kg) bag.

9.9 *Rear Leg Test No. 2*—Repeat the steps given in 8.9.1 and 8.9.2 using a 150 ± 1.5-lb (68 ± 0.7-kg) bag.

10. Report

10.1 Report the following information:

10.1.1 Manufacturer's name and manufacturing lot number, if available.

10.1.2 Model name or model number, or both, if available.

10.1.3 Date tested.

10.1.4 Number of chairs tested.

10.1.5 Initial observations (8.1 or 9.1).

10.1.6 Dimensions (see Fig. 1).

10.1.7 Observations and noted structural damage, if any.

10.2 For Class A (residential), also include the results obtained following the outdoor weathering test (8.3), static load test No. 1 (8.4), static load test No. 2 (8.5), impact test No. 1 (8.6), impact test No. 2 (8.7), rear leg test No. 1 (8.8), and rear leg test No. 2 (8.9) in the test report.

10.3 For Class B (nonresidential), also include the results obtained following the outdoor weathering test (9.3), static load test No. 1 (9.4), static load test No. 2 (9.5), impact test No. 1 (9.6), impact test No. 2 (9.7), rear leg test No. 1 (9.8), and rear leg test No. 2 (9.9) in the test report.

11. Performance Criteria

11.1 If the chair collapses at any point during the testing procedure, it shall be reported as a failure, regardless of whether it recovers, and no further testing is required.

11.2 *Class A (Residential)*—There shall be no collapse or any visible evidence of structural damage such as breaks, fractures, or cracks after all of the chairs have been tested in accordance with 8.4-8.9.

11.3 *Class B (Nonresidential)*—There shall be no collapse or any visible evidence of structural damage such as breaks, fractures, or cracks after all of the chairs have been tested in accordance with 9.4-9.9.

12. Precision and Bias

12.1 Insufficient data are currently available to determine the interlaboratory and intralaboratory reproducibility of these test procedures. Following the publication of these standard performance requirements, it is expected that sufficient laboratories will become involved and a round robin will be initiated.

13. Keywords

13.1 casual furniture; child's plastic chair; outdoor furniture; patio furniture; recycled plastics; resin furniture