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Standard Specification for Loose-Fill Rubber for Use as a Playground Safety Surface under and around Playground Equipment¹

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INTRODUCTION

Recycled rubber used in loose-fill applications is found in a wide variety of products, including landscaping mulch, equestrian surfacing, artificial turf in-fill, and resilient playground surfacing. The goal of this specification is to provide test methods and performance requirements for loose-fill rubber playground-surfacing products. It is intended to complement existing ASTM International standards for determining the shock attenuation and accessibility of a playground surface. This specification will assist playground designers and specifiers, owner/operators, and playground-surfacing suppliers in evaluating loose-fill rubber products for playground use.

1. Scope

1.1 This specification establishes test methods and performance requirements for particle size distribution, extractable hazardous metal content, total lead content, tramp metal content, and sharp tramp metal content for loose-fill rubber that is intended to be used as a playground surface.

1.2 This specification does not contain test methods or performance requirements for the accessibility of loose-fill rubber playground surfacing. The specification also does not establish test methods or performance requirements to characterize the release of organic chemicals from loose-fill rubber intended to be used as a playground surface. **Appendix X1** and **Appendix X2** contain additional information on these topics.

1.3 If loose-fill rubber which meets the requirements of this standard is to be installed in the use zone of playground equipment, it must also comply with Specification **F1292**.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

¹ This specification is under the jurisdiction of ASTM Committee **F08** on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee **F08.63** on Playground Surfacing Systems.

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1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

C136 Test Method for Sieve Analysis of Fine and Coarse Aggregates

D1193 Specification for Reagent Water

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E1613 Test Method for Determination of Lead by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES), Flame Atomic Absorption Spectrometry (FAAS), or Graphite Furnace Atomic Absorption Spectrometry (GFAAS) Techniques (Withdrawn 2021)³

F963 Consumer Safety Specification for Toy Safety

F1292 Specification for Impact Attenuation of Surfacing Materials Within the Use Zone of Playground Equipment

2.2 U.S. EPA Standards and Methods:⁴

EPA Method 3050B Acid Digestion of Sediments, Sludges and Soils; **SW 846**, Test Methods for Evaluating Solid

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 The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available from the U.S. EPA, Office of Resource Conservation and Recovery, (5305P), 1200 Pennsylvania Ave., N.W., Washington, DC 20460.

Waste, Physical/Chemical Methods

EPA Method 3051A Microwave Assisted Acid Digestion of Sediments, Sludges and Soils; SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

EPA Method 6010B Inductively Coupled Plasma-Atomic Emission Spectrometry; SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

EPA Method 7470A Mercury in Liquid Waste (Manual Cold-Vapor Technique); SW 846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods

2.3 Federal Standards:⁵

16 CFR 1500.48 Technical Requirements for Determining a Sharp Point in Toys and Other Articles Intended for Use by Children Under 8 Years of Age

3. Terminology

3.1 Definitions:

3.1.1 *hazardous metal, n*—metal that could have the potential to cause harm to humans

3.1.2 *organic chemical, n*—chemical compound containing carbon and hydrogen.

3.1.3 *particle size distribution, n*—list of values that defines the relative amounts of particles present in a mixture.

3.1.4 *sieve analysis, n*—procedure used to determine the particle size distribution of a granular material.

3.1.5 *tramp metal, n*—unwanted metal that finds its way into loose-fill rubber, generally steel.

3.1.6 *use zone, n*—area beneath and immediately adjacent to a play structure or playground equipment that is designated for unrestricted circulation around the equipment and on whose surface it is predicted that a user would land when falling from or exiting the equipment.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *buffing, rubber, n*—elongated rubber strand.

3.2.1.1 *Discussion*—The approximate dimensions (0.039 to 0.375 inches thick (1 to 9.5 mm), 0.039 to 0.50 in. (1 to 12.7 mm) wide, 0.079 to 3.0 in. (2 to 76.2 mm) long) of buffings used in loose-fill rubber playground surfacing differ from those of buffings used in poured-in-place rubber playground surfacing.

3.2.2 *loose-fill rubber, n*—rubber particles in the form of nuggets or buffings.

3.2.3 *nugget, rubber, n*—rubber granule, irregular in shape, with maximum dimension of approximately $\frac{3}{8}$ to $\frac{7}{8}$ in. (9.5 to 22.2 mm).

4. Performance Requirements

4.1 Loose-fill rubber represented as complying with this specification shall meet all applicable requirements specified herein. Anyone representing compliance with this specification shall keep such records as are necessary to document any claim that the requirements within this specification have been met.

4.2 Sieve Analysis:

4.2.1 *Nuggets*—When a sample of loose-fill rubber in the form of nuggets is tested in accordance with Section 7, the minimum and maximum passing through the two sieves shall be as in Table 1.

4.2.2 *Buffings*—When a sample of loose-fill rubber in the form of buffings is tested in accordance with Section 7, the minimum and maximum passing through four sieves shall be as in Table 2.

4.3 *Hazardous Metal Content*—When the sample is analyzed using the procedure described in Section 8 (including the correction for statistical errors as described in 8.4.6), the maximum content of hazardous metals shall not exceed the concentrations shown in Table 3.

4.4 *Tramp Metal Content*—When tested in accordance with the procedure described in Section 9, there shall be no tramp metal particles with any dimension of 0.50 in. (12.7 mm) or greater or rubber particles which contain exposed metal that has any dimension of 0.50 in. (12.7 mm) or greater.

4.5 *Sharp Tramp Metal Content*—When tested in accordance with the procedure described in Section 9, there shall be no tramp metal particles with any dimension of 0.20 in. (5 mm) or greater which are determined to have sharp points; or rubber particles that contain exposed metal which has any dimension of 0.20 in. (5 mm) or greater which is determined to have sharp points.

4.6 *Total Metal Content*—When tested in accordance with the procedure outlined in Section 9, the total exposed metal content, ferrous and non-ferrous, shall not exceed 0.1 % as measured by weight.

4.7 *Total Lead Content*—When tested according to the procedure described in Section 10, total lead content shall not exceed 100 ppm.

4.8 The tests required to determine compliance with the foregoing performance requirements shall be conducted not more than five years before the date of the installation of the loose-fill rubber playground surface.

5. Sampling

5.1 Five 3-yd³ (2.3-m³) sample piles of loose-fill rubber are required. A smaller sample of loose-fill rubber is taken from these sample piles using the procedure in 5.2 and 5.3.

NOTE 1—The standard container size for bulk recycled loose-fill rubber is 3 yd³ (2.3 m³).

5.2 Eight 2-dry qt (2.2-L) samples are drawn from each 3-yd³ (2.3-m³) sample pile, taking two 2-dry qt (2.2-L) samples from each quadrant of the pile, digging 1 to 2 ft (0.3 to 0.6 m) into the pile. Each of the two probes (in each quadrant) shall be in different locations (in vertical and horizontal directions) in the quadrant.

TABLE 1 Sample of Loose-Fill Rubber in the Form of Nuggets Tested in Accordance with Section 7

Sieve Size	Minimum %	Maximum %
$\frac{7}{8}$ in.	99	100
No. 4	0	5

⁵ Code of Federal Regulations, available from U.S. Government Printing Office, Washington, DC 20402.