Designation: F3496 – 20

Standard Specification for Polyaromatic Hydrocarbon (PAH) Content in Synthetic Turf Infill[1]

This standard is issued under the fixed designation F3496; 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 This specification applies to the maximum content of eight PAHs (PAH8) in materials used as synthetic turf infill.

1.2 This specification outlines a test method for sample preparation and the method for analyzing the content of the eight PAHs in synthetic turf infill.

1.3 This specification provides guidelines for reporting the content of the eight PAHs in the synthetic turf infill.

1.4 This specification is applicable to any infill material used in synthetic turf.

1.5 The values stated in SI units are to be regarded as standard. No other units are included in this standard.

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

1.7 *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 *EPA Standards:*[2]

EPA 3550C Organic Extraction and Sample Preparation, Ultrasonic Extraction

EPA 8270D Semivolatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)

3. Terminology

3.1 *Definitions:*

3.1.1 *polyaromatic hydrocarbons (PAHs), n*—a group of hydrocarbons (organic compounds containing only carbon and hydrogen) that are composed of multiple aromatic rings (organic rings in which the electrons are delocalized).

3.1.2 *PAH8, n*—a group of eight polyaromatic hydrocarbons listed as restricted chemicals in Entry 50 to REACH Annex XVII. The polyaromatic hydrocarbons and their CAS numbers are:

(a) Benzo[a]pyrene (BaP) CAS No 50-32-8
(b) Benzo[e]pyrene (BeP) CAS No 192-97-2
(c) Benzo[a]anthracene (BaA) CAS No 56-55-3
(d) Chrysene (CHR) CAS No 218-01-9
(e) Benzo[b]fluoranthene (BbFA) CAS No 205-99-2
(f) Benzo[j]fluoranthene (BjFA) CAS No 205-82-3
(g) Benzo[k]fluoranthene (BkFA) CAS No 207-08-9
(h) Dibenzo[a,h]anthracene (DBAhA) CAS No 53-70-3

3.1.3 *reporting limit, n*—the lowest concentration of a constituent that can be reliably measured with accuracy and precision.

3.1.4 *total extractable PAH8 content, n*—the sum of content of each of the individual eight PAHs in mg/kg (ppm).

4. Summary of Test Method

4.1 Polyaromatic hydrocarbons in a synthetic turf infill sample are extracted using a mixture of acetone and hexane.

4.2 A sample of the extract obtained as described in 4.1 is analyzed by using gas chromatography/mass spectrometry.

4.3 The extracted PAH8 compounds are quantified and reported.

4.4 The sum of the eight PAH8 compounds is reported.

5. Significance and Use

5.1 PAHs are carbon compounds with two or more aromatic rings. The International Agency for Research on Cancer (IARC) and the United States Environmental Protection Agency (EPA) have classified some of these compounds as probable human carcinogens. The US EPA and the European Chemical Agency (ECHA) have identified 16 polyaromatic compounds (PAHs) as priority PAHs. The 16 PAHs are of environmental concern because of their potential toxicity in

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[2] Available from United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, http://www.epa.gov.

humans and other organism and their prevalence and persistence in the environment. ECHA has identified eight of these sixteen compounds (PAH8) as representative indicators for the occurrence and toxicity of PAHs.[3,4]

5.2 This standard specification identifies a standard test method for quantifying the PAH8 level in synthetic turf infill.

5.3 The standard specification also establishes a limit for PAH8 compounds in materials used as infill material in synthetic turf.

6. Test Methods

6.1 *Laboratory Qualification:*

6.1.1 The testing shall be conducted by an ISO/IEC 17025 accredited laboratory.

6.1.2 Reporting limits for each of the eight PAHs shall be determined. The reporting limit for each PAH shall be ≤ 0.5 mg/kg (ppm).

6.2 *Preparation of the Sample*—Prepare the sample(s) as outlined in EPA method 3550C. Use the method for low concentrations of organic compounds outlined in EPA 3550C section 11.3. The solvent system used for the extraction shall be a 1:1 mixture of acetone and hexane.

6.3 *Analysis of the Sample:*

6.3.1 Analyze the sample(s) prepared in accordance with 6.2 for each of the PAH8 compounds using gas chromatography/mass spectrometry as outlined in EPA Method 8270D.

6.3.2 Report the concentration of each of the PAH compounds and the sum of the PAH8 compounds in the infill as mg/kg (ppm).

7. Acceptable Levels

7.1 A representable sample of synthetic turf infill shall be tested by the methods described in Section 6. The total extractable PAH8 content shall be less than 20 mg/kg (ppm).

8. Report

8.1 Report the following information:

8.1.1 Infill identification including:

8.1.1.1 Material type.

8.1.1.2 Material source.

8.1.1.3 Date sampled.

8.1.2 Reporting limit for each PAH measured.

8.1.3 Concentration of each of the PAH8 compounds in mg/kg (ppm)

8.1.4 Total concentration of all eight PAH8 compounds in mg/kg (ppm)

9. Keywords

9.1 artificial turf; PAH8; polyaromatic hydrocarbons; synthetic turf; synthetic turf infill

[3] The EFSA Journal (2008) 724, 1-114.

[4] Entry 50 of Annex XVII to REACH Regulation (EC) No 1907/2006, paragraph 5 and 6.