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INTERNATIONAL
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SURFACE VEHICLE STANDARD

SAE J997

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Submitted for recognition as an American National Standard

Spark Arrester Test Carbon

1. ***Scope—***This SAE Standard establishes physical properties required of SAE Coarse Test Carbon and SAE Fine Test Carbon and establishes test methods to ensure that these requirements are met.

1.1 **Purpose—**The purpose of this document is to establish specifications for test carbon to be used when performing the tests described in SAE J335, J342, and J350.

2. ***References***

2.1 **Applicable Publications—**The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J335—Multiposition Small Engine Exhaust System Fire Ignition Suppression
SAE J342—Spark Arrester Test Procedure for Large Size Engines
SAE J350—Spark Arrester Test Procedure for Medium Size Engines

2.1.2 ASTM PUBLICATIONS—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA19428-2959.

ASTM D 2854—Standard Test Method for Apparent Density of Activated Carbon
ASTM D 2862—Test Method for Particle Size Distribution of Granular Activated Carbon
ASTM D 3467—Test Method for Carbon Tetrachloride Activity of Activated Carbon
ASTM D 3802—Standard Test Method for Ball-Pan Hardness of Activated Carbon
ASTM E 11—Standard Specification for Wire Cloth Sieves for Testing Purposes

2.1.3 USDA FOREST SERVICE PUBLICATION—Available from USDA Forest Service, Technology and Development Center, 444 East Bonita Avenue, San Dimas, CA 91773-3198.

Spark Arrester Test Carbon Replacement Study, January 1991, USDA Forest Service

3. Test Carbon Requirements

3.1 Form—The test carbon shall be granular in form.

3.2 Size—The size distribution of particles of test carbon shall be as follows:

3.2.1 COARSE CARBON

a. Pass through U.S. Standard No. 8 (2.36 mm) Sieve—100% by mass
b. Retained on U.S. Standard No. 12 (1.70 mm) Sieve—60% by mass
c. Retained on U.S. Standard No. 16 (1.18 mm) Sieve—40% by mass

3.2.2 FINE CARBON

a. Pass through U.S. Standard No. 16 (1.18 mm) Sieve—100% by mass
b. Retained on U.S. Standard No. 20 (850 µm) Sieve—70% by mass
c. Retained on U.S. Standard No. 30 (600 µm) Sieve—30% by mass

3.2.3 MIXING—Before use, mix screened fractions by pouring from one container to another at least five times.

3.3 Activity—The test carbon shall conform to the commercial definition of "activated carbon."

3.4 Apparent Density—0.450 to 0.520 g/mL when vibrated to a minimum volume (see 4.1).

3.5 Hardness—97.0% minimum (see 4.2).

3.6 Carbon Tetrachloride Activity—60% minimum (see 4.3).

4. Test Methods

4.1 Apparent Density—Determine the apparent density of the test sample, in accordance with ASTM Test Method D 2854.

4.2 Hardness—Determine the carbon particle hardness of the test sample, in accordance with ASTM Test Method D 3802.

4.3 Carbon Tetrachloride Activity—Determine the carbon tetrachloride activity of the test sample, in accordance with ASTM D 3467.

PREPARED BY THE SAE SPARK ARRESTER STANDARDS COMMITTEE

APPENDIX A

***A.1 Carbon Size*—**Experience has shown that commercial suppliers cannot consistently supply carbon that meets this document. For this reason, it is suggested that the user perform the final sieving of the carbon to obtain samples for test use. The following commercially available "rough-screened" carbon sieve analyses have proven to be satisfactory for final crushing and screening:

A.1.1 For Coarse Carbon—See Table A1.

TABLE A1—SUPPLIERS COARSE CARBON ROUGH SCREEN ANALYSIS SPECIFICATION

Retained on U.S. Standard Sieve No.	Mass %
8 (2.36 mm)	0–10
12 (1.70 mm)	40–60
16 (1.18 mm)	30–40
20 (850 µm)	0–10
Pan	0–1

A.1.2 For Fine Carbon—See Table A2.

TABLE A2—SUPPLIERS FINE CARBON ROUGH SCREEN ANALYSIS SPECIFICATION

Retained on U.S. Standard Sieve No.	Mass %
14 (1.40 mm)	0–0.5
16 (1.18 mm)	10–30
20 (850 µm)	50–70
30 (600 µm)	0–25
Pan	0–5

A.2 Carbon Final Screening

A.2.1 Coarse Carbon—A quantity of rough-screened material may be sieved through a system of U.S. Standard Sieves 8 (2.36 mm), 12 (1.70 mm), and 16 (1.18 mm) (or their equivalent). Material retained on the No. 12 (1.70 mm) and No. 16 (1.18 mm) sieves is combined in the proportions specified under 3.2.1.

A.2.2 Fine Carbon—A quantity of rough-screened material may be sieved through a system of U.S. Standard Sieves 16 (1.18 mm), 20 (850 µm), and 30 (600 µm) (or their equivalent). Material retained on the No. 20 and No. 30 (600 µm) sieve is combined in the proportions specified under 3.2.2.

A.2.3 Shaking—If a motorized vibrator shaker is used, material should be shaken in small quantities for approximately 10 min. If hand shaken, a longer shake period should be observed to assure that size segregation is complete.

***A.3 Alternate Hardness Determination Method*—**One alternate method, which has been used to determine hardness, utilizes a cyclonic separator. This is acceptable if it provides equivalent hardness, +2%, to the method described in 4.2.

A.4 ***Used Carbon—***Current practice forbids the use of carbon more than once, though this requirement is not contained in this document. Used carbon may be reused provided it is rescreened and meets all the requirements of this document, and in addition, at least three replicate tests are made using new and used carbon with spark arresters with the same flow rating, +10%. The results of these replicate tests shall yield identical spark arrester effectiveness, +5%, or the used carbon shall be rejected. Used carbon may be mixed with new carbon in a proportion up to one-third, without replicate testing, provided that the mixture meets all of the requirements of this document.

A.5 ***Reference Materials—***Refer to SAE J335, J342, and J350 for spark arrester test techniques. The standard screens used are described in ASTM E 11.

A.6 ***Test Carbon—***A spark arrester test carbon has been identified for use in the “Spark Arrester Test Carbon Replacement Study” January 1991, conducted by the USDA Forest Service. This carbon is manufactured from Nucon International, Inc. of Columbus, Ohio, with the following physical properties: Apparent density, per ASTM D 2862, of 0.450 to 0.520 g/mL; Hardness, per ASTM D 3802, of 97% minimum; and a Carbon tetrachloride activity, per ASTM D 3467, of 60% minimum.