



ELECTROGRAPHITE BRUSH MATERIAL, 2500 - 6500 micro ohm.cm SPECIFIC RESISTANCE

ESF-M99G150-A

1. SCOPE

The material defined by this specification is an electrographite brush.

2. APPLICATION

This specification was released originally for material used as an electrographite brush in alternators for long life trucks.

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 SPECIFIC RESISTANCE

2500 - 6500 micro ohm.cm

Test Method: The apparatus consists of 2 jaws which can be closed firmly against the ends of the test specimen. The jaws should be faced with silver-plated copper gauze, backed with resilient pads to insure uniform current distribution into the ends of the piece. The size of the test specimen is immaterial, providing it fulfills the following requirement for accurate results. The length should be at least 4 times the width and thickness dimensions and the spacing between pointers should be no more than 1/2 the length of the specimen.

For a test specimen the specific resistance is defined as follows:

$$r = \frac{E \times A}{I \times L} \times 1000$$

where:

r = specific resistance in micro ohm.cm

E = millivolt drop between pointers

A = cross-sectional area, cm²

I = current in amperes

L = pointer spacing, cm

Date	Action	Revisions
2006 09 26	Revised	Inserted 3.0; Deleted 3.1, 3.6 & 4
2000 09 25	Revised	Updated
1987 12 01	Released	CF4R RD 107002-87



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The convenient method for obtaining readings of specific resistance that are a multiplier of the potential drop in millivolts is to proceed as follows:

For SI units, use voltmeter (or millivoltmeter) pointers that are accurately spaced 2 cm apart. Set the current at 1.97 times the value of the cross-sectional area of the specimen in square centimeters:

$$r \text{ (micro ohm.cm)} = \frac{E \times A}{I \times L} \times 1000 =$$

$$\frac{E \times A}{1.97A \times 2} \times 1000 = 254E$$

If the specimen is not long enough to use a 2 cm spacing between pointers, another method is to make the pointer spacing equal to the width of the specimen, and the current setting 3.94 times the thickness, then:

$$r \text{ (micro ohm.cm)} = \frac{E \times A}{I \times L} \times 1000 =$$

$$\frac{E \times W \times T}{3.94T \times W} \times 1000 = 254E$$

3.3 SCLEROSCOPE HARDNESS

45 - 85

Test Method: Use a Shore Scleroscope instrument with a diamond-pointed steel hammer standardized for carbon. Mount and level the instrument on a firm support. The anvil of the instrument must be kept clean at all times. The material is placed on the anvil, and the tube is lowered firmly against the test piece. At least 6 readings (in different areas) should be taken on each specimen to obtain average hardness.

3.4 APPARENT DENSITY

1.60 - 1.90 g/cm³

Test Method: The apparent density is the density of the mass, including the voids or pores, and is expressed in the following manner:

$$\text{Apparent Density} = \frac{\text{Weight in Air}}{\text{Weight in Air} - \text{Weight in Water}}$$

The specimen to be tested must first be coated with a thin coating of grease to prevent water absorption. The piece is then weighed in air and the value recorded. It is then weighed while completely submerged in water, with special care being taken to eliminate all air bubbles from the specimen.

Alternate Method: Finish the specimen to such a shape that the volume can be accurately measured. Then, if the specimen is weighed (g) and such weight divided by the volume (cm³) the result is numerically equal to the apparent density by the formula:

$$\text{Apparent Density} = \frac{\text{Weight, g}}{\text{Volume, cm}^3}$$