COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (25-190 micro ohms.cm RESISTIVITY) **ESF-M6A69-A**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (170-350 micro ohms.cm RESISTIVITY) **ESF-M6A69-A2**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (100-500 micro ohms.cm RESISTIVITY) **ESF-M6A69-A3**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (250-2500 micro ohms.cm RESISTIVITY) **ESF-M6A69-A4**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (25-150 micro ohms.cm RESISTIVITY) **WSF-M6A69-A5**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (50-190 micro ohms.cm RESISTIVITY) **ESF-M6A69-A6**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (13-110 micro ohms.cm RESISTIVITY) **WSF-M6A69-A7**

COPPER GRAPHITE ELECTRIC MOTOR BRUSH MATERIAL (8-35 micro ohms.cm) **WSF-M6A69-A8**

1. SCOPE

The materials defined by these specifications are copper graphite for electric motor brushes.

2. APPLICATION

These specifications were released originally for material used as the commutator brush for the heater motors, starter motors etc.

3. REQUIREMENTS

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).

3.1 RESISTIVITY

ESF-M6A69-A	25 - 190 micro ohms.cm
ESF-M6A69-A2	170 - 350 micro ohms.cm
ESF-M6A69-A3	100 - 500 micro ohms.cm
ESF-M6A69-A4	250 - 2500 micro ohms.cm
WSF-M6A69-A5	25 - 150 micro ohms.cm
ESF-M6A69-A6	50 - 190 micro ohms.cm
WSF-M6A69-A7	13 - 110 micro ohms.cm
WSF-M6A69-A8	8 - 35 micro ohms.cm

Date	Action	Revisions
2003 09 30	Revised	Para 3.0 inserted; para 3.5, 3.6 and 4 deleted
1994 03 31	NGA1E10370437003	Released -A8 A.Vallabhanath
1964 01 30	F6-1217	Released

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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 resistivity is defined as follows:

r = (E x A x 1000)/(I x L)

where:

r = resistivity in micro ohms.cm

E = millivolt drop between pointers

A = cross-sectional area, cm^2

I = current in amperes

L = pointer spacing, cm

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

Test Method: Use a voltmeter (or millivoltmeter) with 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 micro ohms.cm = (E x A x 1000)/(I x L)

then r = (E x A x 1000)/(1.97 A x 2)

then r = 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 micro ohms.cm = (E x A x 1000)/(I x L)

then r = (E x W x T x 1000)/(3.94T x W)

then r = 254E

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