



CERAMIC POWDER – ALUMINUM OXIDE – PLASMA SPRAYED

ESF-M3L88-A

1. SCOPE

The material defined by this specification is an aluminum oxide ceramic powder (Al_2O_3). It is also referred to as alumina.

2. APPLICATION

This specification was released to define a material to be used in an arc plasma spray application of an alumina coating on the aluminum control plate of the 3rd generation alternator series.

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).

3.2 To be verified on each incoming lot by inspection or certification of compliance from the supplier.

3.2.1 Composition

Shall conform to the following weight percents, determined by methods agreed upon by purchaser and supplier.

The material shall be prepared by a fusion process and be categorized as a low soda alumina.

<u>Compound</u>	<u>Weight Percent (maximum)</u>
SiO_2	0.10
Fe_2O_3	0.10
CaO	0.05
Na_2O	0.10
Other	0.25
Al_2O_3	Remainder (by Difference < 1.0%)
H_2O	

3.2.2 Visual Appearance Of Powder

The powder shall appear white, be free flowing and be free from agglomerates.

Date	Action	Revisions
2003 06 26	Revised	Para 3.0 inserted; Para 3.1, 3.10, 4 deleted
1990 07 11	DE00E00107002060	Revised Para 3.2.1, 3.6, 3.8, Fig. 2
1989 08 22	DE00E00107002031	Released



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3.3 SPECIFIC GRAVITY 3.65 – 3.90
(ASTM C 135)

3.4 PHASE COMPOSITION – DETERMINED BY X-RAY DIFFRACTION

Alpha Alumina 100% (approx.)
Na Beta Alumina Trace

3.5 MICROEXAMINATION

The photomicrograph in Figure 1 is an indication of the appearance of the material.

3.6 PARTICLE SIZE DISTRIBUTION

Shall meet the requirements of Figure 2 when tested by a method mutually agreeable to the purchaser and the supplier. No material will be larger than 53 micrometers (270 mesh screen) with a maximum 5% by weight in the particle size range of 44 to 53 micrometers. Any material having particles less than 10 micrometers shall not exceed 5% by weight of the product and at less than 5.0 micrometers not to exceed 1.0%. The calculated nominal average may range from 20 to 25 micrometers.

3.7 PLASMA SPRAYING

Powder shall be capable of producing acceptable plasma spray coatings to standards agreed upon by purchaser and supplier using the plasma spray parameters defined by purchaser.

3.8 DIELECTRIC BREAKDOWN

The powder shall be capable of producing a plasma spray coating able to withstand a dielectric breakdown when sprayed to a thickness of 0.165 +/- 0.004 mm and subjected to 500 volts DC. Testing shall be carried out in the following manner:

The parts with the coating shall be heated at 100 °C for a minimum of 10 minutes in a suitable oven. Upon removing from the oven and while still at an elevated temperature (if the coatings cool to room temperature, they are to be reheated as described above), an uncoated area of the part shall be connected to the negative electrode from the test stand. The positive electrode shall be used to probe the coating surface, subjecting it to an electrical stress of 500 volts DC. The coating is to remain intact and show a maximum leakage current of 60 microamps through the coating. The specific test stand to be used for this test shall be determined by the purchaser and supplier.

3.9 COATING ADHESION BOND STRENGTH

The powder, when sprayed according to the purchaser's process parameters, will produce a coating with an adhesion bond strength of 5.6 MPa minimum on an aluminum surface. The test procedure will comply with ASTM C633 with any necessary modifications to be agreed upon by the purchaser and supplier.