



Standard Classification for Rubber Compounding Materials—Ground Coal¹

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1. Scope

1.1 This classification covers the compounding material known as ground coal. It is generally used in rubber compounds as a filler.

1.2 There are three grades of ground coal based on particle size, ash, and moisture. The selected values for these properties are suitable for use in a rubber compound.

2. Referenced Documents

2.1 ASTM Standards:

C 1070 Test Method for Determining Particle Size Distribution of Alumina or Quartz by Laser Light Scattering²

D 1208 Test Methods for Common Properties of Certain Pigments³

D 3174 Test Method for Ash in the Analysis Sample of Coal and Coke from Coal⁴

D 3175 Test Method for Volatile Matter in the Analysis

¹ This classification is under the jurisdiction of ASTM Committee D11 on Rubber and is the direct responsibility of Subcommittee D11.20 on Compounding Materials and Procedures.

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² *Annual Book of ASTM Standards*, Vol 15.02.

³ *Annual Book of ASTM Standards*, Vol 06.03.

⁴ *Annual Book of ASTM Standards*, Vol 05.06.

Sample of Coal and Coke⁴

D 4371 Test Method for Determining the Washability Characteristics of Coal⁴

3. Significance and Use

3.1 Ground coal is commonly used as an inexpensive filler in rubber compounds as a direct or partial replacement for carbon black or as a diluent in the compound.

3.2 Ground coal is very compatible with most rubbers and is very easily mixed into the compound.

4. Basis of Classification

4.1 Particle size will have a direct effect on the modulus, tensile strength, and tear strength of the finished rubber.

4.2 Ash in the coal will effect the specific gravity and high ash can influence the curing characteristics of the rubber.

4.3 Moisture in the ground coal at levels of 0.5 % and above can cause blisters and scorch.

4.4 Lowering the density (specific gravity) will reduce compounding cost and affect volume loading.

4.5 Ground coal for use in rubber compounds shall conform to the three grades listed in Table 1.

5. Keywords

5.1 filler; ground coal

TABLE 1 Properties of Ground Coal

| Property (Maximum Values) | Grade I | Grade II | Grade III | Test Method |
|---|---------|----------|-----------|-------------------|
| Average particle size (μm) not weighted | 5 | 6 | 7 | C 1070 |
| Top particle size (μm) | 20 | 24 | 28 | C 1070 |
| Retained on 325 mesh (g) | 0.0100 | 0.0450 | 0.0950 | ^A |
| Retained on 100 mesh (g) | 0.0003 | 0.0005 | 0.0010 | ^A |
| Ash, % | 5 | 6 | 7 | D 3174 |
| Alpha quartz, % | 1.0 | 1.50 | 2.0 | X-Ray Diffraction |
| Heat loss, % (moisture) | 0.5 | 0.75 | 1.0 | D 3174 |
| Acidity | 0.02 | 0.02 | 0.02 | D 1208 |
| Volatile matter, % | 20 | 20 | 20 | D 3175 |
| Density (Mg/m^3) (specific gravity) | 1.35 | 1.45 | 1.55 | D 4371 |

^A Method is being letter balloted in Subcommittee D11.11. Values based on 100 g samples.

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