



Standard Specification for Sulfur Polymer Cement and Sulfur Modifier for Use in Chemical-Resistant, Rigid Sulfur Concrete¹

This standard is issued under the fixed designation C 1159; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the requirements for sulfur polymer cement and sulfur modifier for use in rapid setting and high strength applications of chemical-resistant sulfur concrete.

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are provided for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

- C 267 Test Method for Chemical Resistance of Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
- C 904 Terminology Relating to Chemical-Resistant Non-metallic Materials
- D 70 Test Method for Specific Gravity and Density of Semi-Solid Bituminous Materials (Pycnometer Method)

3. Terminology

3.1 **Definitions**—For definitions of terms used in this specification, see Terminology C 904.

4. Types and Composition of Sulfur Concretes

4.1 There are currently two types of commercial sulfur concrete technology in use. Both utilize cyclopentadiene-type hydrocarbons reacted polymerically with sulfur, but the sulfur concrete production processes differ. Each technology is described further in 4.1.1 and 4.1.2.

4.1.1 **Type 1**—Type 1 sulfur concrete uses sulfur polymer cement made by reacting a blend of dicyclopentadiene and oligomers of cyclopentadiene with sulfur. The sulfur polymer cement shall conform to the chemical and physical requirements prescribed in Table 1.

4.1.2 **Type 2**—Type 2 sulfur concrete uses a sulfur modifier made by reacting sulfur with an oligomeric polymer of cyclopentadiene. The sulfur modifier shall conform to the chemical and physical requirements prescribed in Table 2. The sulfur modifier is mixed with elemental sulfur on site during the sulfur concrete production process.

5. Physical Properties

5.1 Particles of sulfur polymer cement and sulfur modifier shall be small enough (generally less than ¼ in. nominal size) to melt efficiently when exposed to heated aggregate while minimizing the amount of dust particles (generally less than 74 µm) to reduce potential dust hazards.

6. Methods of Sampling and Testing

6.1 Sulfur polymer cement and sulfur modifier shall be sampled and tested to determine the properties enumerated in this specification in accordance with the following methods:

6.1.1 **Sampling**—When the purchaser desires that the sulfur polymer cement or sulfur modifier be sampled and tested to verify compliance with this specification, every precaution shall be taken to obtain representative random samples that will show the true nature and condition of the material. Samples shall be taken to represent as nearly as possible an average of the bulk material sampled or to ascertain the maximum variation in characteristics which the material possesses.

6.1.2 Sulfur and carbon contents shall be determined by combustion of a small sample of sulfur polymer cement or sulfur modifier using carbon/sulfur analyzing equipment. Typical equipment is that used for analyzing coal samples.

6.1.3 Hydrogen content shall be determined by combustion of a small sample of sulfur polymer cement or sulfur modifier in an oxygen environment converting the hydrogen to water vapor measured using gravimetric procedures by absorption into calcium chloride.

¹ This specification is under the jurisdiction of ASTM Committee C03 on Chemical-Resistant Nonmetallic Materials and is the direct responsibility of Subcommittee C03.02 on Mortar and Monolithics.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.