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Standard Practice for Use of Chemical-Resistant Sulfur Mortar¹

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1. Scope

1.1 This practice provides detailed information on the handling, installation, and proper use of chemical-resistant sulfur mortar such as those covered in Specification C 287.

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.* For specific safety precautions, see Section 5.

2. Referenced Documents

2.1 ASTM Standards:

C 267 Test Method for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing²

C 287 Specification for Chemical-Resistant Sulfur Mortar²

C 395 Specification for Chemical-Resistant Resin Mortars²

C 399 Practice for Use of Chemical Resistant Resin Mortars²

C 904 Terminology Relating to Chemical Resistant Non-metallic Materials²

3. Terminology

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

4. Storage

4.1 The sulfur mortar shall be stored in unopened containers and in a clean, dry place to prevent contamination of the product. The mortar is not known to deteriorate in storage.

5. Safety Precautions

5.1 Sulfur mortar must be heated and molten in order to be used.

5.2 Molten sulfur mortar fumes and vapors are irritating to the eyes and mucuous membranes. Adequate ventilation should

be provided wherever sulfur mortars are used.

5.3 If overheated, sulfur mortar ignites and burns with a low, blue flame that generates sulfur dioxide. If this should happen, heating must be stopped and the vessel covered with a tight-fitting lid to smother the flames.

5.3.1 When using sulfur mortar in a confined area, each pail of molten material must be checked before entering the area to ensure that the mortar is not burning.

5.3.2 The areas where the melting and pouring are carried out must be checked for flammable or explosive gases, and a flame permit issued, if required, before melting vessel fires are lit, or the molten sulfur mortar is carried into the area.

5.3.3 Fire extinguishing equipment must be available in order to prevent flame spread.

5.3.4 Water should not be used to extinguish ignited sulfur.

5.4 All workmen must be equipped with suitable eye protection and gloves to protect them from spills and splashes of the molten mortar.

5.4.1 It is recommended that workmen wear flame-retardant clothing. If combustible clothing is worn, care should be taken to ensure that it does not contact the flame used for melting the sulfur mortar.

5.4.2 All surfaces which molten sulfur mortar will contact must be dry to prevent splattering.

6. Equipment

6.1 *Vessel*, made of cast iron, steel, or aluminum, for melting the sulfur mortar. Suitable melting pots may be available from the sulfur mortar manufacturer.

6.2 *Long-Handled Steel Ladle*, for dipping and stirring.

6.3 *Metal Pails*, for transporting and pouring mortar.

NOTE 1—All equipment must be clean and dry.

7. Melting

7.1 Sulfur mortar must be dry at the time of use in order to prevent foaming.

7.2 The ideal temperature range for melting and handling molten sulfur mortar is from 265 to 290°F (130 to 145°C). Within this range the mortar is a smooth, free-flowing liquid with a mirror-bright surface appearance.


7.2.1 If the mortar is maintained below 265°F, some of the liquid will congeal over the top or around the sides of the vessel, or both.

7.2.2 If the mortar is heated above 290°F, the mortar thickens and loses its mirror-bright surface appearance.

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² *Annual Book of ASTM Standards*, Vol 04.05.

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7.3 Fill the vessel not more than one-half full of sulfur mortar.

7.3.1 Heat slowly until the mortar has melted and attained the appearance described in 7.2.

7.3.2 If congealing occurs, increase the temperature gradually until it disappears.

7.3.3 If the mortar is overheated, allow the molten material to cool while stirring frequently. The addition of unmelted sulfur mortar will facilitate cooling.

8. Laying Brick or Tile

8.1 The brick or tile must be dry and preferably at 65 to 85°F (18 to 29°C).

NOTE 2—For an installation that is to be made under unusual environmental conditions, consult the sulfur mortar manufacturer for assistance before beginning the application.

8.2 *Joint Thickness*—Joint thickness should be between $\frac{1}{4}$ in. (6 mm) and $\frac{5}{16}$ in. (8 mm).

8.2.1 Spacer chips, $\frac{1}{4}$ to $\frac{5}{16}$ in. (6 to 8 mm) thick, made of sulfur mortar conforming to Specification C 287, are available.

8.2.2 Alternatively, wood buttons approximately $\frac{1}{4}$ -in. (6-mm) thick by $\frac{5}{8}$ -in. (16-mm) diameter, may be substituted for the sulfur chips.

8.2.3 Horizontal joints may be formed by resting each brick or tile on three spacers which are placed in a triangular pattern.

8.2.4 Spacers may also be used to maintain the thickness of vertical joints.

8.3 *Walls with Bed and Joints of Sulfur Mortar*—Brick should be laid running bond (staggered joints). Use muslin or heavy kraft paper, saturated with sodium silicate solution (water glass), over the face of the brick or tile to retain the molten sulfur mortar until it congeals. (If muslin is used, it may then be stripped, resaturated, and reused.)

8.3.1 Form and pour only one course of brick or tile at a time.

8.3.2 The pouring containers should be large enough, and sufficient workmen used, to keep an entire pour fluid.

8.3.3 Fill the vertical joints to within 1 in. (25 mm) of the top of the course. This will provide a key in the mortar for the subsequent course.

8.4 *Walls with Bed of Sulfur Mortar and Joints of Resin Mortars*—Beginning at a distance between $\frac{1}{4}$ to $\frac{5}{16}$ in. (6 to 8 mm) away from the vertical substrate, construct a wall with resin mortar by buttering one long and one short dimension of the brick.

8.4.1 Lay only one course of brick at a time, and pour the bed (back) joint with sulfur mortar as described in 8.3 above.

8.4.2 For additional information regarding the selection and use of resin mortar, see Specification C 395 and Practice C 399.

NOTE 3—When dual cements are used for the walls, the entire floor is installed with bed and joints of resin mortars.

8.5 *Floors with Sulfur Bed Joint*—The floor shall be given a skim coat of sulfur mortar prior to installing brick or tile.

8.5.1 The purpose of the skim coat if asphalt membrane is used is to prevent the brick or tile from forcing spacer chips into the membrane.

8.5.2 If elastomeric linings are used, the purpose of the sulfur mortar skim coat is to provide a true plane on top of which the brick or tile will be subsequently installed.

8.5.3 Brick or tile are laid on three spacer chips to form the horizontal bed joint with spacing between the brick or tile maintained at $\frac{1}{4}$ to $\frac{5}{16}$ in. (6 to 8 mm).

8.5.4 Pour molten sulfur mortar between brick or tile and fill the vertical joints to $\frac{1}{2}$ in. (13 mm) from the top.

8.5.5 After the sulfur mortar has solidified but is still warm, fill the balance of the joint by flooding the floor and squeegeeing the molten mortar over the surface of the brick or tile. Suitable squeegees are box board, fiber board, etc.

9. Cleaning Mortar from Brick or Tile

9.1 Various compounds and application methods are available from mortar manufacturers for masking the brick or tile to keep sulfur mortar from adhering to them.

10. Curing

10.1 Sulfur mortar congeals in a few minutes and has its full chemical resistance and about 65 % of its ultimate strength in 30 min at a temperature of $73 \pm 4^\circ\text{F}$ ($23 \pm 2^\circ\text{C}$). Sulfur mortar should be allowed to set for 2 h after congealing before placing in service.

11. Chemical Resistance

11.1 The chemical resistance of sulfur mortars may be determined by Test Method C 267.

11.2 A general guide to chemical resistance of sulfur mortars may be found in Table 1 of Specification C 287.

12. Service Temperature

12.1 Sulfur mortars should not be used in installations that will be subjected to temperatures above 190°F (88°C).

13. Keywords

13.1 brick; chemical-resistant; sulfur mortar; tile

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