

**ITEM P-606 ADHESIVE COMPOUNDS, TWO-COMPONENT FOR SEALING WIRE AND LIGHTS IN PAVEMENT**

DESCRIPTION

**606-1.1.** This specification covers two types of material; a liquid suitable for sealing electrical wire in saw cuts in pavement and for sealing light fixtures or bases in pavement, and a paste suitable for embedding light fixtures in the pavement. Both types of material are two-component filled formulas with the characteristics specified in paragraph 606-2.4. Materials supplied for use with bituminous concrete pavements must be formulated so they are compatible with the bituminous concrete.

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**If the material is to be used on bituminous concrete pavements and it is not formulated for this use, cracking and separation of the material from sawed wireway kerfs and around light fixtures may occur.**

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EQUIPMENT AND MATERIALS

**606-2.1 CURING.** When prewarmed to 77°F (25°C), mixed, and placed in accordance with manufacturer's directions, the materials shall cure at temperatures of 45°F (7°C) or above without the application of external heat.

**606-2.2 STORAGE.** The adhesive components shall not be stored at temperatures over 86°F (30°C).

**606-2.3 CAUTION.** Installation and use shall be in accordance with the manufacturer's recommended procedures. Avoid prolonged or repeated contact with skin. In case of contact, wash with soap and flush with water. If taken internally, call doctor. Keep away from heat or flame. Avoid vapor. Use in well-ventilated areas. Keep in cool place. Keep away from children.

**606-2.4 CHARACTERISTICS.** When mixed and cured in accordance with the manufacturer's directions, the materials shall have the following properties shown in Table 1.

SAMPLING, INSPECTION, AND TEST PROCEDURES

**606-3.1 TENSILE PROPERTIES.** Tests for tensile strength and elongation shall be conducted in accordance with ASTM D 638.

**606-3.2 EXPANSION.** Tests for coefficients of linear and cubical expansion shall be conducted in accordance with ASTM D 1168, Method B, except that mercury shall be used instead of glycerine. The test specimen(s) shall be mixed in the proportions specified by the manufacturer, and cured in a glass tub approximately 2 inches (50 mm) long by 3/8 inch (9 mm) in diameter. The interior of the tube shall be precoated with a silicone mold release agent. The hardened sample shall be removed from the tube and aged at room temperature for 1 week before conducting the test. The test temperature range shall be from 35°F (2°C) to 140°F (60°C).

**606-3.3 TEST FOR DIELECTRIC STRENGTH.** Test for dielectric strength shall be conducted in accordance with ASTM D 149 for sealing compounds to be furnished for sealing electrical wires in pavement.

**TABLE 1. PROPERTY REQUIREMENTS**

<b>Physical or Electrical Property</b>	<b>Minimum</b>	<b>Maximum</b>	<b>ASTM Method</b>
<b>Tensile</b>			
Portland Cement Concrete	1,000 psi (70 kg/sq.cm)		D 638
Bituminous Concrete	500 psi (35 kg/sq.cm)		
<b>Elongation</b>			
Portland Cement Concrete		\ \	D 638
Bituminous Concrete	50%		D 638
<b>Coef. of cub. exp.</b>			
cu. cm/cu. cm/degree C	0.00090	0.00120	D 1168
<b>Coef. of lin. exp.</b>			
cm/cm/degree C	0.00030	0.00040	D 1168
<b>Dielectric strength,</b> short time test			
	350 volts/mil.		D 149
<b>Arc resistance</b>			
	125 secs.		D 495
<b>Adhesion to steel</b>			
	1,000 psi (70 kg/sq.cm)		
<b>Adhesion to portland cement concrete</b>			
	200 psi (14 kg/sq.cm)		
<b>Adhesion to asphalt concrete</b>			
	(no test available)		

\|\ 20% or more (without filler) for formulations to be supplied for areas subject to freezing.

**606-3.4 TEST FOR ARC RESISTANCE.** Test for arc resistance shall be conducted in accordance with ASTM D 495 for sealing compounds to be furnished for sealing electrical wires in pavement.

**606-3.5 TEST FOR ADHESION TO STEEL.** The ends of two smooth, clean, steel specimens of convenient size (1 inch by 1 inch by 6 inches) (25 by 25 by 150 mm) would be satisfactory when bonded together with adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure on a Riehle (or similar) tensile tester. The thickness of adhesive to be tested shall be 1/4 inch (6 mm).

#### **606-3.6 ADHESION TO PORTLAND CEMENT CONCRETE**

**a. Concrete Test Block Preparation.** The aggregate grading shall be as shown in Table 2.

The coarse aggregate shall consist of crushed rock having a minimum of 75% of the particles with at least one fractured face and having a water absorption of not more than 1.5%. The fine aggregate shall consist of crushed sand manufactured from the same parent rock as the coarse aggregate. The concrete shall have a water-cement ratio of 5.5 gallons (21 liters) of water per bag of cement, a cement factor of 6, plus or minus 0.5, bags of cement per cubic yard (0.76 cubic meter) of concrete, and a slump of 2-1/2 inches, plus or minus 1/2 inch (60 mm plus or minus 12 mm). The ratio of fine aggregate to total aggregate shall be approximately 40% by solid volume. The air content shall be 5.0%, plus or minus 0.5%, and it shall be obtained by the addition to the batch of an air-entraining admixture such as vinsol resin. The mold shall be of metal and shall be provided with a metal base plate. Means shall be provided for securing the base plate to the mold. The assembled mold and base plate shall be watertight and shall be oiled with mineral oil before use. The inside measurement of the mold shall be such that several 1-inch by

2-inch by 3-inch (25 by 50 by 75 mm) test blocks can be cut from the specimen with a concrete saw having a diamond blade. The concrete shall be prepared and cured in accordance with ASTM C 192.

**TABLE 2. AGGREGATE FOR BOND TEST BLOCKS**

Type	Sieve Size	Percent Passing
Coarse Aggregate	3/4 inch (19.0 mm)	97 to 100
	1/2 inch (12.5 mm)	63 to 69
	3/8 inch (9.5 mm)	30 to 36
	No. 4 (4.75 mm)	0 to 3
Fine Aggregate	No. 4 (4.75 mm)	100
	No. 8 (2.36 mm)	82 to 88
	No. 16 (1.18 mm)	60 to 70
	No. 30 (600 micro-m)	40 to 50
	No. 50 (300 micro-m)	16 to 26
	No. 100 (150 micro-m)	5 to 9

**b. Bond Test.** Prior to use, oven-dry the test blocks to constant weight at a temperature of 220 to 230°F (104°C to 110°C), cool to room temperature, 73.4 plus or minus 3°F (23°C plus or minus 1.6°C), in a desiccator, and clean the surface of the blocks of film or powder by vigorous brushing with a stiff-bristled fiber brush. Two test blocks shall be bonded together on the 1-inch by 3-inch (25 by 75 mm) sawed face with the adhesive mixture and allowed to cure at room temperature for a period of time to meet formulation requirements and then tested to failure in a Riehle (or similar) tensile tester. The thickness of the adhesive to be tested shall be 1/4 inch (6 mm).

**606-3.7 COMPATIBILITY WITH ASPHALT CONCRETE.** Test for compatibility with asphalt in accordance with ASTM D 5329.

**606-3.8 ADHESIVE COMPOUNDS - CONTRACTOR'S RESPONSIBILITY.** The Contractor shall furnish the vendor's certified test reports for each batch of material delivered to the project. The report shall certify that the material meets specification requirements and is suitable for use with [portland cement concrete] [bituminous concrete] pavements. The report shall be delivered to the Engineer before permission is granted for use of the material. In addition the Contractor shall obtain a statement from the supplier or manufacturer that guarantees the material for one year. The supplier or manufacturer shall furnish evidence that the material has performed satisfactorily on other projects.

**606-3.9 APPLICATION.** Adhesive shall be applied on a dry, clean surface, free of grease, dust, and other loose particles. The method of mixing and application shall be in strict accordance with the manufacturer's recommendations.

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**Installation methods such as surface preparation, mixing ratios, and pot life are as important to satisfactory performance as the properties of the material itself. Therefore, the Engineer may wish to require a manufacturer's representative to be present during the initial installation of the material to ensure the installation procedures are in accordance with the manufacturer's directions.**

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METHOD OF MEASUREMENT

**606-4.1** The adhesive compound shall be measured by the [pound (kg)] [gallon (l)] of adhesive as specified, in place, complete and accepted. When required in the installation of an in-runway lighting system or portion thereof,

no measurement will be made for direct payment of adhesive, as the cost of furnishing and installing shall be considered as a subsidiary obligation in the completion of the installation.

#### BASIS OF PAYMENT

**606-5.1** Payment shall be made, where applicable, at the contract unit price per [pound (kg)] [gallon (l)] for the adhesive. This price shall be full compensation for furnishing all materials, and for all preparation, delivering, and application of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Item P-606-5.1 Adhesive Compound - per [pound (kg)] [gallon (l)]

#### TESTING REQUIREMENTS

- ASTM C 192 Making and Curing Concrete Compression and Flexure Test Specimens in the Laboratory.
- ASTM D 149 Tests for Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulating Materials at Commercial Power Frequencies.
- ASTM D 495 Test for High-Voltage, Low-Current, Dry Arc Resistance of Solid Electrical Insulation Materials
- ASTM D 638 Test for Tensile Properties of Plastics
- ASTM D 1168 Test for Hydrocarbon Waxes Used for Electrical Insulation
- ASTM D 5329 Joint Sealants, Hot-poured, for Concrete and Asphalt Pavements

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**END OF ITEM P-606**

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