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REPUBLIC OF THE PHILIPPINES
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS
OFFICE OF THE SECRETARY
MANILA

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DEPARTMENT ORDER)
No. 11)
Series of 2006 02.16.06)
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SUBJECT: **DPWH Standard Specifications for Concrete Joint Sealant (Hot-Poured Elastic and Cold-Applied Types), Item 613**

In line with the mandate of the Department in providing effective standard specifications to be used in the implementation of various infrastructure projects and in view of the need of setting standard specifications for concrete joint sealant, the attached **DPWH Standard Specifications for Concrete Joint Sealant (Hot-Poured Elastic and Cold-Applied Types), Item 613**, are hereby prescribed for the guidance and compliance of all concerned.

These specifications shall form part of the revised edition of the DPWH Standard Specifications (Volume II – Highways, Bridges and Airports).

This Order shall take effect immediately.

HERMOGENES E. EBDANE, JR.
Acting Secretary

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DPWH STANDARD SPECIFICATIONS FOR

ITEM 613 - CONCRETE JOINT SEALANT (HOT-POURED ELASTIC AND COLD-APPLIED TYPES)

613.0 Description

This item shall consist of furnishing and placing joint sealant, composed of a mixture of materials that will form a resilient and adhesive compound capable of effective sealing joints and cracks applied either hot or cold in concrete pavements, bridges and other structures, in accordance with this Specification and to the details shown on the Plans, or as directed by the Engineer.

613.1 Classification

This specification applies to the following types of concrete joint sealant:

a. Concrete Joint Sealant Hot-Poured Elastic Type
b. Concrete Joint Sealant Cold-Applied Type

613.2 Materials Requirements

613.2.1 Sealing Compound

Concrete joint sealant materials shall be homogeneously composed of one substance, or of two or more substances that are to be mixed prior to application. The substance shall be of such a character that a homogeneous preparation can readily be obtained by combining the separate components, when so supplied, by mechanical or manual stirring without heating the blended material above a temperature of 100°F (38°C). The sealing compound, after curing, shall be a resilient and adhesive material that is capable of sealing joints in concrete.

613.2.2 General Requirements

The concrete joint sealant shall be capable of sealing joints and/or cracks against the infiltration of moisture and foreign materials throughout repeated cycles of expansion and contraction with temperature changes, and that will not flow from the joint/crack or be picked-up by vehicle tires on pavement at summer temperature.

The concrete joint sealant shall be capable at being brought to a uniform application consistency suitable for completely filling the joints without inclusion of large air holes or discontinuities and without damage to the material.

The sealing compound, after curing, shall be of such nature that it will adhere to dry but dust-free concrete or to damp concrete free from surface moisture.

613.2.3 Physical Requirements

Sealant materials for Hot-poured elastic type and cold applied type shall conform to the physical requirements as follows:

Properties	Requirements	
	Hot-Poured Elastic Type	Cold-Applied Type
Pour Point	At least 20°F (11°C) lower than the safe heating temperature, which is the maximum temperature to which the material may be heated and still conform this specification's requirements.	The material shall pour or extrude readily at a temperature of 70°F (21°C) immediately after preparation for use and shall remain in a condition suitable for application for at least 1 hour.
Penetration	Non-immersed at 77°F (25°C) and 150 grams for 5 seconds shall not exceed 90 when tested in accordance with ASTM D5329.	The sealing compound, after curing shall have a penetration, at 77°F (25°C) and 150 grams for 5 seconds, not greater than 235.
Flow	At 140°F (60°C) shall not exceed 5 mm when tested for 5 hours in accordance with ASTM D 5329.	The sealing compound, after curing, shall show a flow not in excess of 5 mm.
Bond	Non-immersed of the sealant shall be tested at 0°F (-17.8°C) for 5 complete cycles. The development at any time during the test procedure of a crack, separation, or other opening that at any point is over 6.40 mm deep, in the sealant or between the sealant and the concrete block, shall constitute failure of the test specimen. The measurement for depth of the crack, separation or opening shall be perpendicular to the side of the sealant showing the defect. At least 2 test specimens in a group of 3 representing a given sample of sealant shall meet this requirement for bond when tested in accordance with ASTM 5329.	The sealing compound, after curing, shall not fail in adhesion or cohesion after testing in accordance with ASTM D1851.

613.2.4 Backer Material

Backer material when used shall conform to ASTM D 5249.

Backer material or bond breaker in the bottom of the joint to be filled with concrete joint sealer shall be used to control the depth of sealant and achieve the desired shape factor, and to support the sealant against indentation and sag. Backer materials shall be compatible with the concrete joint sealer. It shall be compressible without extruding the sealant, and shall recover to maintain contact with the joint faces when the joint is open.

613.3 Construction Requirements

613.3.1 Joint Sealant Cold-Applied Type

613.3.1.1 Equipment

Heavy-duty air-operated pumps, capable of continuously feeding the compound under pressure, and capable of completely filling the joint space without discontinuities and without the formation of voids or entrapped air shall be used for the installation or extrusion of the joint sealer. Other methods of application to be used shall require the approval of the Engineer.

613.3.1.2 Cracks or Joints Preparation / Cleaning and Sealant Application

Joints shall be sealed soon after completion of the curing period and before the pavement is opened to traffic. Pavement joints in new construction for application of sealing material should be dry, clean of all scales, dirt, dust, curing compound, and other foreign matter. For resealing of cracks and joints that have previously contained either similar or dissimilar materials, it is recommended that the joint be dry, cleaned thoroughly with a plow, router, wire brush, concrete saw, or other suitable tool or tools designed for the purpose of neatly cleaning the pavement joints. The sidewall of the cracks or joints should be thoroughly sandblasted, blown free of loose sand and other foreign matter by high-pressure air. A backer material or bond breaker at the bottom of the joint to be filled with material is recommended to control the depth of sealant, achieve the desired shape factor, and to support the sealant against indentation and sag, or as approved by the Engineer.

The pouring shall be done in such a manner that the material will not be spilled on the exposed surfaces of the concrete. The use of sand or similar material as a cover for the seal will not be permitted.

Care shall be taken in the application of sealant to avoid overfilling of the joint space. Sealant material shall therefore be filled in the joints in a neat workmanlike manner from flush to 5 mm (or 3/16 in.) below the adjacent pavement surface. Any excess material should be immediately scraped from the pavement surface with suitable tools.

613.3.1.3 Maintenance

Procedures for the repair of concrete defects and replacement of sealants:

1. At Joints

Minor touch up of small gaps and soft or hard spots in field-molded sealant shall be made with the same sealant. However, where the failure is extensive, it is necessary to remove the sealant and replace it. Where the sealant has generally failed but has not come out of the sealing joints it can be removed using hand tools, or on larger projects such as concrete pavements, by routing or plowing with suitable tools. Alternatively, especially where widening is required to improve the shape factor, sawing can enlarge the joints.

Minor edge spalls to concrete joint spaces shall be repaired with suitable repair materials, an essential operation if a compression seal is being used.

2. At Cracks

Where cracks have occurred because of a nonworking or absent of joint, or because of unanticipated deformation of the structure, they shall be routed out and sealed with a suitable field-molded sealant to prevent damage to the structure.

An additional problem occurs where water is flowing through the crack and the upstream face cannot be reached for sealing. Before sealing can be successfully undertaken, the water flow must be stopped. If the source of water cannot be cut off by dewatering, then depending on the circumstances one of the many alternatives such as cutting back the crack deeper and plugging with a quick setting or dry-pack mortar or cement, chemical or epoxy resin grouting may be tried. External plates are sometimes bolted to the concrete, or keyed grooves are filled with mortar to hold the sealant in case water pressure redevelops as the joint moves.

613.3.2 Joint Sealant Hot-Poured Elastic Type

613.3.2.1 Equipment

For installation of the joint sealer, hot-poured elastic type, all equipment necessary for the satisfactory performance of this construction shall be on the project site and approved by the Engineer before work will be permitted to begin.

613.3.2.2 Joints Preparation

Pavement joints in new construction for application of concrete joint sealer shall be dry, clean of all scale, dirt, dust, curing compound, and other foreign matter. The sidewalls of the joint space to be sealed shall be thoroughly cleaned, blown free of loose sand by high-pressure air.

For maintenance or resealing of joints that have previously contained either similar or dissimilar sealing material, the joint shall be dry, cleaned thoroughly with a plow, router, wire brush, concrete saw, or other suitable tools designed for the purpose of neatly cleaning pavement joints. Loose material shall be blown out. The sidewalls of the joint space to be sealed shall be thoroughly cleaned, blown free of loose sand with high-pressure air.

Backer materials unless otherwise applicable shall be in accordance with Sub-section 613.2.4.

613.3.2.3 Heating

The concrete joint sealer shall be heated within the manufacturer's specified application temperature range, in a kettle or melter, constructed as a double boiler, with the space between the inner and outer shells filled with oil or other heat transfer medium. Positive temperature control, mechanical agitation, and recirculating pumps shall be provided. The Engineer shall approve other methods of indirect heating. Direct heating shall not be used.

The manufacturer shall certify that the material is capable of being reheated satisfactorily at least once and specifically designate any limits to the number of reheating times for the material.

613.3.2.4 Application

Concrete Joint sealer shall be applied to joint using a melter-applicator. Joint shall be filled in a neat workmanlike manner from flush to 5mm below the adjacent pavement surface.

The joint sealer shall be protected from traffic until it is fully cured.

Restriction on joint width and pavement temperature at the time of joint sealer application shall be shown on the plans. In the absence of temperature range, applications above 32°C shall not be permitted.

613.4 Delivery and Storage

Joint sealer shall be delivered in manufacturer's original unopened containers and packaging, with labels clearly identifying product name and manufacturer. The joint sealer shall be stored in dry and shaded area in accordance with manufacturer's instructions. Containers shall be sealed until it is ready for use. Expired joint sealer shall be removed from the site.

613.5 Sampling and Testing

Sampling shall be taken at the plant or warehouse prior to delivery or at the time of delivery. If sampling is done prior to shipment, the Engineer shall have the access to the materials to be sampled. The Engineer shall be provided all reasonable facilities for inspection and sampling shall be conducted so as not to interfere unnecessarily with the operation of the works.

Samples shall consist of one of the manufacturer's original sealed containers selected at random from the lot or batch of finished material that was manufactured simultaneously or continuously, as a unit between the time of compounding and the time of packaging or placing in shipping containers.

Obtain the hot-poured type sealant portion for testing from the selected manufacturer's original sealed container in accordance with ASTM D5167. The sample portion added to and heated in the melter shall weigh 800 $\pm$ 50 g.

Heat the material in accordance with ASTM D5167.

Testing for hot-poured type sealant shall be in accordance with ASTM D5329.

Samples for testing of cold application type shall consist of sufficient quantities of each component to provide 3.785 liters (1 gal) of sealant material. Testing shall be in accordance with ASTM D1851.

613.6 Method of Measurement

The quantity to be measured and paid for will be the number of kilogram of any joint sealant applied in the accepted pavement or structure.

613.7 Basis of Payment

The accepted quantity measured as prescribed in Section 613.6, Method of Measurement shall be paid for at the contract unit price of the joint sealant which price and payment shall be full compensation for furnishing and placing all materials, including all labor, equipment, tools and incidentals necessary to complete this item.

Payment will be made under:

Item Number	Description	Unit of Measurement
613 (1)	Concrete Joint Sealant (Hot-Poured ElasticType)	Kilogram
613 (2)	Concrete Joint Sealant (Cold-Applied Type)	Kilogram