



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

097.13 DPWH  
05.31.2016

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DEPARTMENT ORDER )


NO. **107** )  
Series of 2016 )

SUBJECT: DPWH Standard Specification for  
Item 418 – Asphaltic Plug Joints  
(APJ) for Bridges

It has been the thrust of the Department to provide effective standard specifications in the implementation of various infrastructure projects. As such, there is a need to set a standard specification for the proper installation of Asphaltic Plug Joints (APJ) for Bridges. The attached **DPWH Standard Specification for Asphaltic Plug Joints (APJ) for Bridges, Item 418** is hereby prescribed for the guidance and compliance of all concerned.

This specification shall form part of the DPWH Standard Specifications for Highways, Bridges and Airports, Volume II, 2012 Edition.

This Order shall take effect immediately.

  
**ROGELIO L. SINGSON**  
Secretary

Department of Public Works and Highways  
Office of the Secretary



WIN6U01298

5.5.2 FET/JFS

## ITEM 418 – ASPHALTIC PLUG JOINTS (APJ) FOR BRIDGES

### 418.1 Description

This work item shall consist of furnishing and installing asphaltic plug joints (APJ) for expansion joint sealing on asphalt overlay and Portland cement concrete decks of bridges. It shall be in accordance with the lines, grades and dimensions in the Plans and Specifications.

### 418.2 Material Requirements

The APJ system is composed of a bridge joint binder, aggregates, steel plate, locating pins and backer rod designed to limit the gap movement of up to  $\pm 25$  mm while maintaining a continuous load bearing surface. Materials, testing and application requirements for APJ shall conform to the applicable requirement of ASTM 6297, Standard Specification for Asphaltic Plug Joints for Bridges.

#### 418.2.1 Binder

The bridge joint binder, also termed as asphaltic binder (AB), shall be thermoplastic polymeric-modified asphalt conforming to the physical properties of Table 1, Section 5.2 of ASTM D6297.

**TABLE 1 Physical Properties**

	<b>ASTM Standards</b>	<b>Required Physical Properties</b>
Softening point, min.	D36	83°C
Tensile adhesion, min.	D5329	700%
Ductility, min. at 25°C	D113	400 mm
Penetration, max. at 25°C 150 g, 5 s	D5329	75 units
Low temperature penetration, min. at -18°C 200 g, 60 s	9.1	10 units
Flow, max. 5 h at 60°C	D5329	3.0 mm
Resiliency, min. - max. at 25°C	D5329	40 – 70%
Asphalt compatibility	D5329	Pass
Recommended application heating temperature range	D5329	182°C - 199°C
Bond 3 Cycles at -7°C 100% Elongation	D5329	Pass
Flexibility, at -23°C	9.2	Pass

#### 418.2.2 Aggregates

The type of aggregate appropriate for the mixture shall either be granite, basalt, gabbro, porphyry or gritstones. The specified aggregate shall be crushed, washed, and dried. Specific size and gradations of aggregate shall be agreed upon by the purchaser and APJ Manufacturer. The aggregate shall be preweighed and packaged to avoid confusion on

the jobsite. It shall be noted that specific sizes of aggregate may be proprietary to certain Manufacturers.

A maximum wear of 40% resulting from a series of tests using AASHTO T96 shall be observed. Test for soundness of aggregate using magnesium sulfate, in accordance with AASHTO T104, shall allow a maximum mass loss of 10%.

#### **418.2.3 Backer Rod**

The closed cell foam expansion joint filler, also termed as backer rod, shall be non-gassing, can withstand the elevated application temperature (199°C) of the Asphaltic Binder (AB), and conforms to the requirements of ASTM D5249, Standard Specification for Backer Material for Use with Cold- and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints.

#### **418.2.4 Steel Backing Plate and Locating Pins**

The plate shall be mild steel conforming to the requirements of ASTM A36, Standard Specification for Structural Steel. Individual sections of plate shall not exceed 400 mm in length. Locating pins used to secure the plate shall be made using hot-dip galvanized steel.

#### **418.3 Construction Requirements**

The following are general guidelines for better installation of APJ:

1. A technically competent representative from the Manufacturer shall supervise the installation on site;
2. Only approved operatives, with issued certificate of training renewed less than every three (3) years, must perform installation;
3. A certificate of satisfactory performance from the Manufacturer; and
4. Joint installation shall be at temperatures between 5°C to 35°C, with no inclement weather forecast for the day.

##### **418.3.1 Removal of Existing Joint or Pavement**

The Contractor shall consider the following procedure, prior to saw cutting:

1. Identify the exact points/location of the joints beneath the bituminous concrete overlay; and
2. Mark and connect these points/location using duct tape. Established lines extend on both ends, which determine the width of the joint as reflected in the plans and specification. Make sure this section is evaluated and approved by the Project Engineer.

The joint cut shall have a depth enough to completely remove the existing pavement and in accordance with the plans or as required by the Engineer. All concrete, steel and asphalt joint surfaces shall be prepared and treated in accordance with the requirement of the Manufacturer.

### **418.3.2 Cleaning and Drying of Joint**

Moisture and debris accumulated along the joint surfaces shall be removed using hot compressed air (HCA) lance. Make sure joint surfaces are clean and free from debris before the installation. In case undesirable weather conditions occur, same procedure shall govern with necessary repetition until desired result is achieved.

### **418.3.3 Tanking and Bridging Plate Installation**

Plate shall be placed on top of the layers of backer rod immediately beneath AB. Installation and other specifications shall agree with the recommendations given by the Manufacturer.

Equipment for heating requires a continuous agitation system and built-in calibrated thermometer to monitor a consistent temperature all throughout the whole process, without dropping below 176°C. The heated binder shall be applied to the expansion gap, forming a bond between the cut-out and bridging plate.

Immediately after the application of AB, plate shall be placed centered over the expansion gap and butt joint embedded in the binder to cover the entire length. Make sure the plates are pre-drilled with holes and fastened on both joint edges using locating pins, without overlapping. Gaps in between plates shall not exceed 6.25 mm.

### **418.3.4 Joint Filling**

#### **418.3.4.1 Materials Mixed on Site**

The aggregate shall be heated in a mixer to the Manufacturer's specified temperature but not go below 176°C. The aggregates shall be pre-coated with binder in a mixer. After mixing, it will be poured or spread into the joint and then binder is added again.

The temperature of the aggregates shall be monitored using calibrated digital temperature sensor.

#### **418.3.4.2 Premixed Materials**

The premixed aggregate and binder shall either be brought to site at installation temperature in insulated vehicles or brought to site cold and heated to installation temperature.

It shall be placed in layers not exceeding the Manufacturer's recommendations and each layer compacted, also in accordance with the Manufacturer's recommendations.

### **418.4 Delivery, Storage and Handling**

Materials delivered to the site shall be inspected for damage, unloaded and stored at least through proper handling. The Contractor shall designate storage site ready for use before the materials are delivered. Avoid leaving the delivered materials placed unattended on the ground where probable contact and/or exposure to dirt and debris may occur. Materials shall be so handled with utmost care to ensure undamaged condition upon delivery.

#### **418.5 Method of Measurement**

The quantity to be paid for under this item shall be the actual furnished and installed number of asphaltic plug joints including filling of a mixture of thermoplastic polymeric-modifies asphalt, aggregates, steel plate, locating pins and backer rod and saw cutting and cleaning of the existing pavement.

#### **418.6 Basis of Payment**

The quantity as determined in Section 418.5 shall be paid for at unit price stipulated in the Contract's Bill of Quantities. The payment shall constitute the full compensation for furnishing all the necessary materials, providing necessary equipment and tools in installing the APJ, labor cost and all the incidental expenses necessary to complete the work.

Payment will be made under:

Pay Item Number	Description	Unit of Measurement
418	Asphaltic Plug Joint	Each

#### **References:**

1. DPWH Standard Specifications for Highways, Bridges and Airports (Volume II), 2012 Edition
2. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)  
  
ASTM D6297 – Standard Specifications for Asphaltic Plug Joints for Bridges  
ASTM D5249 – Standard Specification for Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints  
ASTM A36M – Standard Specification for Carbon Structural Steel
3. AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)  
  
AASHTO T96 – Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine  
AASHTO T104 – Soundness of Aggregate by Use of Sodium Sulfate or Magnesium Sulfate
4. Internet  
  
[http://www.evolutioncivil.com.au/?page\\_id=790](http://www.evolutioncivil.com.au/?page_id=790)  
  
<http://www.bridgejoints.org.uk/A%20Standard%20for%20Asphaltic%20Plug%20Joints2.pdf>  
  
[http://www.nra.co.za/content/165075\\_v1\\_TD\\_S\\_J\\_401\\_Joints\\_Aspaltic\\_Plug\\_Type\\_Move ment\\_Maximum\\_25mm\\_General\\_Details.PDF](http://www.nra.co.za/content/165075_v1_TD_S_J_401_Joints_Aspaltic_Plug_Type_Move ment_Maximum_25mm_General_Details.PDF)  
  
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