

**618.8**

shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all materials, labor, tools, equipment, supplies, and incidentals necessary to complete the work.

**618.8-PAY ITEMS:**

ITEM	DESCRIPTION	UNIT
618001-*	CAST BRONZE EXPANSION PLATES	POUND (KILOGRAM)
618002-*	ROLLED COPPER-ALLOY EXPANSION PLATES	POUND (KILOGRAM)

\* Sequence number

## SECTION 619 WATERPROOFING

**619.1-DESCRIPTION:**

This work shall consist of waterproofing concrete retaining walls, abutments, earth-filled arches, and concrete decks, either in the form of dampproofing (primers with bituminous paint coat) or membrane waterproofing (primers with bituminous membrane fabric, with or without protection course) as specified on the Plans. Dampproofing shall consist of a primer and two coats of bituminous materials. Membrane waterproofing shall consist of a primer, two layers of fabric, and three moppings of hot bituminous material. The work shall be done in accordance with the Specifications and as shown on the Plans.

**619.2-MATERIALS:**

The materials shall conform to the requirement of the several Subsections of Division 700 of these Specifications as follows:

MATERIAL	SUBSECTION	TYPE
Dampproofing Primer	705.4, 705.11 or 705.8	SS-1 or SS-1h CSS-1 or CSS-1h
Dampproofing Agent	705.4, 705.11 705.7	SS-1 or SS-1h CSS-1 or CSS-1h
Membrane Waterproofing	705.8	
Membrane Waterproofing	705.7	
Waterproofing Fabric	715.8	
Reinforcing Steel	709.3	
Hot-Poured Elastic Type Concrete Joint Sealer	708.3	

When the dampproofing agent is SS-1, the primer shall be SS-1 to which shall be added a maximum of 15 percent water by weight.

Membrane fabric shall be stored in a dry, protected place. The rolls shall not be stored on end.

## **CONSTRUCTION METHODS**

### **619.3-PREPARATION OF SURFACE:**

Before applying the primer coat, all rod holes and other voids shall be pointed, and all projections, loose material, and excess dust shall be removed from the surface.

When emulsion is used, the surface may be damp.

When asphalt is used, the surface shall be thoroughly dry. Should the surface be damp, it shall be covered with a 2 in. (150 mm) layer of hot sand which shall be allowed to remain for two hours, after which it shall be swept back, uncovering sufficient surface for beginning of work, and the operation repeated as the work progresses. For surfaces too steep to hold sand, other satisfactory methods to produce a dry surface shall be used. No waterproofing shall be done in wet weather or when the temperature is below 35° F (2° C), without written authority of the Engineer.

### **619.4-DAMPPROOFING:**

The entire surface to be dampproofed shall be covered with the required primer by use of a mop. After this primer has been allowed to cure, two successive moppings with an asphalt cement or asphalt emulsion shall be applied. All coats shall be of uniform thickness throughout, and the total bituminous material used shall be not less than 11 gal. per 100 sq. ft. (4.5 liters per square meter) of surface. Each coat shall be allowed to dry thoroughly before the following coat is applied.

Before dampproofing is started, all construction joints shall be waterproofed in accordance with 619.5, with fabric membranes 24 in. (600 mm) wide for the full length of the joint.

### **619.5-MEMBRANE WATERPROOFING:**

The asphalt primer shall be heated to a temperature between 100 and 125° F (38° C and 52° C), with frequent stirring to avoid local overheating. The asphalt for waterproofing shall be heated to a temperature between 300 and 350° F (150° C and 175° C), with frequent stirring to avoid local overheating. The heating kettles shall be equipped with thermometers.

In all cases, the waterproofing shall begin at the low point of the surface to be waterproofed so that water will run over and not against or along the laps.

The first strip of fabric shall be of half width, the second shall be of full width, lapped the full width of the first sheet, and the third and each succeeding strip shall be the full width and lapped so that there will be two layers of fabric at all points with three-layer lap for a distance not less than 2 inches (50 mm). All

two-layer end laps shall be at least 12 in. (300 mm).

The procedure for applying primer and waterproofing with membrane fabric shall be as follows:

- i. Beginning at the low point of the surface to be waterproofed, the entire surface shall be mopped with a primer of cutback asphalt and allowed to cure.
- ii. A section slightly more than half the width of the membrane fabric and for the full length of the surface shall be mopped with an asphalt cement and a half width of the fabric pressed into place.
- iii. The half width of fabric and an adjacent section of the surface equal to slightly more than half the width of the fabric shall be mopped with an asphalt cement and a full width of fabric pressed into place, completely covering the first strip.
- iv. Slightly more than half of this second strip and an adjacent section of the concrete surface equal to slightly more than half the width of the fabric shall be mopped with an asphalt cement, and the third strip of fabric shingled on so as to lap the first strip more than 2 inches (50 mm). This process shall be continued until the entire surface is covered with two layers of fabric.
- v. The entire surface shall then be given a final mopping with an asphalt cement.

The completed waterproofing shall be firmly bonded membrane composed of two layers of fabric and three moppings of asphalt, together with a coating of primer. Under no circumstances shall one layer of fabric touch another layer at any point, or touch the surface of the structure, unless separated from that layer or surface by one coat of asphalt.

On horizontal surfaces, not less than 13 gal. of asphalt shall have been used for each 100 sq. ft. (5 liters of asphalt shall have been used for each square meter) of finished work; and on vertical surfaces, not less than 16 gal. (6.5 liters) shall have been used. The work shall be so regulated that at the close of a day's work all fabric that is laid shall have received the final mopping of asphalt. Special care shall be taken at all laps to see that they are thoroughly sealed.

#### **619.6-DETAILS:**

At the edges of the membrane and at any point where it is punctured by drain, pipes, etc., suitable provisions shall be made to prevent water from getting between the waterproofing and the surface waterproofed. All flashing at curbs and against girders, spandrel walls, etc., shall be done with separate sheets lapping the main membrane not less than 12 in. (300 mm) Flashing shall be closely sealed either with a metal counter flashing or by embedding the upper edges of the flashing in a groove poured full of joint sealing material.

Joints which are essentially open joints, but which are not designed to provide for expansion, shall first be caulked with oakum and lead wool and then filled with hot joint sealing material.

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Expansion joints, both horizontal and vertical, shall be provided with sheet copper in "U" or "V" form, in accordance with the details shown on the plans, and shall be filled with hot joint filler sealing material. The membrane shall be carried continuously across all expansion or construction joints. At the ends of the structure, the membrane shall be carried well down on the abutments and suitable provision made for all movement.

Care shall be taken to prevent injury to the finished membrane by the passage over it of men, wheelbarrows, etc., or by throwing any material on it. Any damage which may occur shall be repaired by patching. The first layer of the membrane patch shall extend at least 12 in. (300 mm) beyond the outermost damaged portion, and the second ply shall extend at least 3 inches (75 mm) beyond the first ply.

**619.7- PROTECTION COURSE:**

Over the waterproofing membrane constructed as specified above, there shall be placed a protection course which shall be 3 inches (75 mm) of Class A concrete. This concrete shall be reinforced midway between its top and bottom surface with wire mesh having six inch (150 mm) openings each direction and using size # W 1.4 wire. The construction of the protection course shall immediately follow the waterproofing operations and shall conform to the applicable requirements of 601.

**619.8-METHOD OF MEASUREMENT:**

The quantities of work done will be measured in square yards (meters) of "Dampproofing", "Membrane Waterproofing without Protection Course", or "Membrane Waterproofing with Protection Course", as the case may be, complete in place and accented, determined from actual measurement of the work.

**619.9-BASIS OF PAYMENT:**

The quantities, determined as provided above, will be paid for at the contract unit prices bid for the items listed below, which prices and payments shall be full compensation for furnishing all the materials and doing all the work prescribed in a workmanlike and acceptable manner, including all labor, tools, equipment, supplies, and incidentals necessary to complete the work.

**619.10-PAY ITEMS:**

ITEM	DESCRIPTION	UNIT
619001-*	DAMPPROOFING	SQUARE YARD (METER)
619002-*	MEMBRANE WATERPROOFING WITHOUT PROTECTION COURSE	SQUARE YARD (METER)
619003-*	MEMBRANE WATERPROOFING WITH PROTECTION COURSE	SQUARE YARD (METER)

\* Sequence number

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