

MANUAL OF CONTRACT DOCUMENTS FOR HIGHWAY WORKS  
VOLUME 1 SPECIFICATION FOR HIGHWAY WORKS

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**SERIES 2000**  
**WATERPROOFING FOR CONCRETE**  
**STRUCTURES**

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# WATERPROOFING FOR CONCRETE STRUCTURES

## 2001 General

1 The surface finish for bridge decks between parapet upstands and to top of buried structures to be waterproofed shall be Class U4 finish in accordance with sub-Clause 1708.4.

2 Immediately before the application of the primer or laying of the waterproofing system or protective layer, the concrete surface or primed surface shall be clean, dry and free from ice, frost, laitance, loose aggregate, dust and other debris and where the adhesion to the concrete would be impaired, free from curing liquids, compounds and membranes. The minimum installation temperature for the waterproofing system shall be 4°C and rising.

3 The thickness of waterproofing membrane shall be a minimum of 2 mm over peaks, arrises and irregularities in the concrete deck.

4 The waterproofing membrane, primer and bonding agents including tack coat shall be compatible with each other.

5 The use of ventilating layers, partial bonding or bond breakers with the waterproofing system is not permitted.

6 An additional protective layer shall be applied immediately above bridge deck waterproofing only to those areas shown on the Drawings and shall comply with this Series.

## 2002 Protection of Bridge Deck Waterproofing During Construction

1 On any structure, providing no damage results, plant and equipment all fitted only with rubber tyres may stand or travel on:

- (i) mastic asphalt waterproofing;
- (ii) proprietary waterproofing systems with the prior approval of the Overseeing Organisation;

solely for the purposes of laying an additional protective layer or surfacing course on that structure.

Rollers shall not be permitted to stand or travel directly on the waterproofing system.

Where it is necessary for plant, equipment or traffic to stand or travel on a bridge deck that has been

waterproofed with a proprietary system before the laying of an additional protective layer, suitable temporary protection shall be provided. All such plant and equipment shall have its tyre treads regularly inspected and any embedded stones removed.

2 Temporary protection shall be provided where damage to the waterproofing, protective layer or additional protective layer could result from particular site traffic.

3 The protective layer of a registered two layer waterproofing system, or any protective layer additional to that included as part of a registered waterproofing system, shall be laid immediately after the waterproofing layer's bonding agent has set or cured.

Where a waterproofing membrane also serves as an adhesive for the protective layer, any additional protective layer shall not be laid until the liquid waterproofing membrane/adhesive has set or cured.

## 2003 Materials for Waterproofing Concrete Bridge Decks

### Primer for Mastic Asphalt

1 Primer for sealing concrete surfaces prior to waterproofing shall be spirit based and compatible with mastic asphalt. The viscosity of the primer shall be such that it penetrates the concrete without forming a skin.

### Mastic Asphalt

2 Unless otherwise described in Appendix 20/2, mastic asphalt for waterproofing shall comply with BS 6925, type R988. Where mastic asphalt for waterproofing complying with BS 6925, type T1097 is required, the hardness number at the time of laying shall not exceed 90 at 25°C.

### Proprietary Waterproofing Systems

3 Proprietary waterproofing systems incorporated in the Permanent Works shall have a current British Board of Agrément Roads and Bridges Certificate and a current PWS (Proprietary Waterproofing System) Data Sheet registered with the Overseeing Organisations.

The Contractor shall furnish the Overseeing Organisation with 3 copies of the PWS Data sheet and Annex 'A', a blank copy of which is shown in

Appendix 20/1. The system shall not be adopted for the Works until the Overseeing Organisation has provided its written acceptance of the complete system, its component materials, their characteristic properties and the preparation and installation instructions all as stated on the PWS Data Sheet and its Annex 'A'. When furnishing the Overseeing Organisation with the PWS Data Sheet, the Contractor shall include for acceptance any additional information or limitation necessary to cater for the conditions at Site including climatic and environmental limitations, compatibility of materials and details at the interface of the waterproofing with the drainage outlets and bridge deck movement joints. No departure from the specified constituent materials as stated on the British Board of Agrément Roads and Bridges Certificate and the PWS Data Sheet shall be permitted.

#### Additional Bituminous Protection

4 Bituminous protection where shown on the Drawings as an additional protective layer, shall comply with BS 594 : Part 1 recipe Type F wearing course mixture Designation 0/3 except that  $5\% \pm 0.5\%$  of the total mix shall be inorganic red oxide and regarded as part of the filler content.

#### 2004 Materials for Waterproofing Below Ground Concrete Surfaces

##### Primer for Tar and Bitumen

1 Primer for sealing concrete surfaces prior to waterproofing shall be compatible with the selected tar or bitumen waterproofing material. The viscosity of the primer shall be such that it penetrates the concrete without forming a skin.

##### Tar

2 Tar shall comply with BS 76 of viscosity grade within the range 30-38°C equi-viscous temperature.

##### Cut Back Bitumen

3 Cut back bitumen shall comply with BS 3690 : Part 1 of viscosity grade 50 seconds.

##### Proprietary Materials

4 Subject to any restrictions specified in Appendix 20/2, proprietary materials may be used.

#### 2005 Workmanship for Waterproofing Concrete Bridge Decks

##### Mastic Asphalt

1 The concrete surface shall be thoroughly sealed with evenly applied primer. The primer shall be well brushed in to avoid ponding in any depressions in the deck.

2 Mastic asphalt shall be laid directly onto the primed surface:

- (i) on horizontal surfaces and sloping surfaces up to 30° to the horizontal in two coats of equal thickness to a total thickness of not less than 20 mm
- (ii) on vertical surfaces and sloping surfaces of over 30° to the horizontal in two or three coats of equal thickness to a total thickness of not less than 20 mm.

3 The method of laying and workmanship shall comply with the recommendations of British Standard Code of Practice CP 144 : Part 4 : 1970, Section 4 except that:

- (i) in addition to sub-Clause 4.6.1 visible blow holes and other defects shall be made good before laying a subsequent coat;
- (ii) sub-Clauses 4.6.2 and 3 and 4.7.1,2,8 and 9 shall not apply; and
- (iii) details described in the Contract shall prevail over any conflicting requirement in the Code of Practice.

4 Joints shall be staggered a distance of at least 150 mm between courses and their position and the sequence of working shall be agreed by the Overseeing Organisation before commencement of the work. The mating edges of all the joints shall be fully bonded. The surfaces of any gullies or other metal features with which the waterproofing will be in contact shall be clean, dry and painted with cut back bitumen.

##### Proprietary Waterproofing Systems

5 Proprietary waterproofing systems shall be installed only by applicators approved by the manufacturers and in accordance with the PWS Data Sheet and its Annex 'A'.

The formation of defects affecting the integrity of the membrane including pinholes (continuous or non-continuous), blowholes and blisters in the waterproofing shall:

- (i) be made good by repair in accordance with the PWS Data Sheet before any subsequent layers are applied; or
- (ii) require the system to be replaced

For sheet membranes bonded with oxidized bitumen the heating and temperature of the bitumen shall comply with the manufacturer's requirements within the limits stated in BS 8000: Part 4.

A means of checking the bitumen temperature shall be provided.

Sheet membranes shall wherever possible be laid in the direction that the additional protective layer or surfacing will be laid and compacted by roller.

6 Unless otherwise specified in the British Board of Agrément Roads and Bridges Certificate, joints between sheets shall be lapped with end laps of at least 150 mm and side laps of at least 100 mm. The joints shall be arranged so that:

- (i) at no point are there more than three thicknesses of sheeting and,
- (ii) water will drain away from the exposed edge.

7 Proprietary waterproofing systems shall be laid to follow the contours of the concrete surface. Laps, ridges and ripples in waterproofing sheeting, and peaks and steps at butt joints in waterproofing boards, shall not be greater than 10 mm in height.

#### Additional Bituminous Protection

8 Bituminous protection complying with sub-Clause 2003.4 shall be laid on the clean and dry substrate, and compacted in accordance with Clause 901 to the areas and thickness shown on the Drawings.

#### Bond Between Additional Protective Layer or Surfacing and the Waterproofing System

9 The additional protective layer or surfacing laid on the waterproofing system shall be fully bonded to the system. Where a tack coat for the additional protective layer or surfacing is not provided as part of the waterproofing system a satisfactory bond to the membrane shall be obtained from:

- (i) a separate compatible tack coat; or
- (ii) the binder within the directly applied additional protective layer or surfacing.

Where the tack coat is of the type activated by the heat of the succeeding bituminous layer the rolling temperature of this layer shall be sufficient to ensure adhesion.

## 2006 Workmanship for Waterproofing Below Ground Concrete Surfaces

### Priming for Tar and Bitumen

1 Unless otherwise described in Appendix 20/2 and prior to the application of the selected tar or bitumen waterproofing, concrete surfaces shall be thoroughly sealed with an evenly applied primer. The primer shall be well brushed in and not allowed to pond in any depressions.

### Tar

2 For tar waterproofing two coats of tar shall be hot applied at a rate of spread per coat of 1 litre/m<sup>2</sup>. The first coat shall be allowed to dry before the second coat is applied.

### Cut Back Bitumen

3 For bitumen waterproofing two coats of cut back bitumen shall be hot applied at a rate of spread per coat of 0.6 litre/m<sup>2</sup>. The first coat shall be allowed to dry before the second coat is applied.

### Proprietary Materials

4 For proprietary materials the method of application, rate of spread, number of coats and other requirements for each system shall be as described in the PWS Data Sheet.

## 2007 Integrity Testing of Concrete Bridge Deck Waterproofing

1 Waterproofing systems to concrete bridge decks shall be tested where required in Appendix 20/2 in accordance with the requirements therein to verify the integrity of the waterproofing.