Highway Structures & Bridges
Contract preparation

CP 488 Instructions for specifiers for CC 488 Waterproofing for concrete structures [Series 2000]

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Contents

Latest release notes

Document Code	Version number	Date of publication of relevant change	Changes made to	Type of change
CP 488	LIVE_2024-09-26	Not available	Core document	Change to policy, major revision, new document development
This document replaces Series NG 2000 Waterproofing for concrete structures.				

Previous versions

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Foreword

This document provides specifier instructions for the production of the works specific requirements for CC 488 Waterproofing for concrete structures [Series 2000].

This document does not form part of the works specification.

The works specification is made up of both the Specification for Highway Works and the works specific requirements completed by the Specifier.

This document is applicable for contracts throughout the UK, complemented by the additional specification requirements and contractual changes of each Overseeing Organisation.

Users are responsible for applying all appropriate documents applicable to their contract.

Users are responsible for archiving contract documentation in accordance with the user's quality management system.

1. General requirements for waterproofing concrete decks and below ground concrete surfaces of highway structures

1.1 The surface finish for concrete decks of highway structures to be waterproofed shall be Class U4 in accordance with "Concreting of structural concrete" in Section 6 of CC 482 [Ref 16.N].

1.2 The surface finish for below ground concrete surfaces of highways structures other than concrete decks shall be Class F1, F2, F3, or F4 in accordance with "Concreting of structural concrete" in Section 6 of CC 482 [Ref 16.N].

1.3 Existing waterproofing systems on concrete decks of highways structures shall be repaired and replaced in accordance with the manufacturer's requirements for the systems.

2. Waterproofing for concrete decks of highway structures

2.1 Waterproofing for concrete decks of highway structures shall be as specified in CC 488/WSR/002.

Waterproofing for concrete decks of highway structures									
Waterproofing area reference	**Structure reference**	**Drawing / model reference**	**Minimum working life**	**Thickness of additional protection layer (APL)**	**Minimum temperature for laying surfacing**	**Minimum asphalt temperature for completion of surfacing compaction**	**Minimum tension adhesion: waterproofing to concrete**	**Minimum shear bond: surfacing to waterproofing**	**Mi te su wa**
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)

a) Enter a unique reference, to provide a unique area of the deck of the structure to be waterproofed.
b) Enter a unique reference, to provide the unique reference for the structure to be waterproofed.

c) Enter a unique reference, to define the drawing or model which shows the area/extents of the deck to be waterproofed.

d) Enter a number in units of , to define the minimum working life for the waterproofing system.

e) Enter a number in units of , to define the maximum thickness of additional protective layer (APL) to be applied on the waterproofing system.

f) Enter a number in units of , to define the minimum temperature at which surfacing is to be laid for activation of tack coat for the waterproofing system.

g) Enter a number in units of , to define minimum asphalt temperature at which compaction of the surfacing is to be completed to ensure tack coat for the waterproofing system remains activated.

h) Enter a number in units of , to define the minimum tension adhesion of the waterproofing system to concrete.

i) Enter a number in units of , to define the minimum shear bond of the surfacing to the waterproofing system.

j) Enter a number in units of , to define the minimum tensile bond of the surfacing to the waterproofing system.

Waterproofing for concrete decks of highway structures (continued)	
Waterproofing area reference	**Other requirement for application, testing and use of the waterproofing system**
(a)	(k)

k) Enter text, to define the requirements for removal of existing surfacing, removal of existing deck waterproofing, removal of additional protective layer, and integrity testing.

Product requirements for concrete deck waterproofing systems

2.2 Waterproofing systems for installation on concrete decks of highway structures shall be compliant with BS EN 14695 [Ref 6.N], ETAG 033 [Ref 15.N] or product acceptance schemes (PAS).

Bitumen sheet waterproofing systems compliant with designated standard

2.3 Bitumen sheet applied waterproofing systems for concrete decks shall be compliant with BS EN 14695 [Ref 6.N].

2.4 The bitumen sheet applied waterproofing systems for concrete decks shall meet the performance characteristics as stated in table 2.5.

2.5 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 14.N] shall apply to bitumen sheet applied waterproofing systems for concrete decks.

Table 2.5 Performance characteristics and requirements of bitumen sheet applied waterproofing systems for concrete decks		
Essential characteristics	Sub characteristic	Performance requirement
Watertighness		Pass when tested in accordance with BS EN 14694 [Ref 9.N]without pre-treatment. No penetration.
Bond strengths		Minimum strength values as given in Table 6.4 of CD 358 [Ref 17.N]
Adhesion strength		Minimum strength values as given in Table 6.4 of CD 358 [Ref 17.N]
Shear strength		Greater than or equal to manufacturer's limiting value when tested in accordance with BS EN 13653 [Ref 10.N]
Crack bridging ability		Pass temperature lower than or equal to manufacturer's limiting value when tested in accordance with BS EN 14224 [Ref 8.N].
Compatibility by heat conditioning		Greater than or equal to manufacturer's limiting value when tested in accordance with BS EN 14691 [Ref 7.N]

Cold bending behaviour		Less than or equal to the manufacturer's limiting value when tested in accordance with BS EN 1110 [Ref 5.N].
Resistance to heat impact		Less than or equal to the manufacturer's limiting value when sheet behaviour is tested in accordance with BS EN 14693 [Ref 11.N].
Resistance to perforation (compaction)		Pass when tested in accordance with BS EN 14692 [Ref 12.N]
Durability	Water absorption	Less than or equal to the manufacturer's limiting value when tested in accordance with BS EN 14223 [Ref 13.N]. And specimen weight
	Thermal ageing behaviour	Flow resistance at elevated temperature to lie within the manufacturer declared tolerance value when tested in accordance with BS EN 1110 [Ref 5.N]
	Compatibility by heat conditioning	Greater than or equal to the manufacturer's limiting value when determined in accordance with BS EN 14691 [Ref 7.N]
Dangerous substances		No asbestos or coal tar constituents

Liquid applied waterproofing systems

2.6 Liquid applied waterproofing systems for concrete decks in accordance with ETAG 033 [Ref 15.N] shall be compliant with the :-.

1. test methods and performance requirements in Appendix B of CD 358 [Ref 17.N] ; and,
2. product conformity assessment certification scheme in Section 13 of GC 101 [Ref 14.N].

Waterproofing systems compliant with product acceptance schemes (PAS)

2.7 The requirements for "Product acceptance schemes" in Section 12 of GC 101 [Ref 14.N] shall apply to waterproofing systems which are not in accordance with BS EN 14695 [Ref 6.N] or ETAG 033 [Ref 15.N].

2.8 Waterproofing systems in accordance with the Product Acceptance Schemes (PAS) shall be compliant with the test methods and performance requirements in Appendix B of CD 358 [Ref 17.N].

Additional protective layer (APL)

2.9 Bituminous protection required as APL for the waterproofing system shall be compliant with BS EN 13108-4 [Ref 3.N].

2.10 The bituminous protection required as APL shall meet the performance characteristics as stated in table 2.11.

2.11 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 14.N] shall apply to bituminous protection required as APL.

Table 2.11 Performance characteristics and requirements of bituminous protection required as APL

Characteristic	Performance requirement
Mix designation	Type F surface course mix designation 15/10F Class 4 in accordance with Table 5 of BS EN 13108-4 [Ref 3.N].
Binder content	Minimum binder content 9%
Maximum thickness	20 mm

Bituminous surfacing

2.12 Bituminous binder course shall comply with "Bituminous mixtures overlaying waterproofing on concrete bridge decks" in Section 20 of CC 202 [Ref 4.N].

Installation requirements for concrete deck waterproofing systems

General requirements for installation of concrete deck waterproofing systems.

2.13 Deck waterproofing systems shall be installed in accordance with the manufacturer's instructions.

2.14 Surface preparation of decks shall be in accordance with the waterproofing system manufacturer's instructions.

2.15 Surfaces for waterproofing shall be dry, clean and free from dust or loose particles.

2.16 Waterproofing systems shall be laid to the contours of the concrete surface.

2.17 Waterproofing systems, protective layer or APL shall be temporarily protected from damage during the works.

2.18 Plant and equipment shall not cause damage to the waterproofing system, protective layer or APL during or after installation.

2.19 The primed surface of the concrete deck shall be free from entrapped aggregates or debris.

2.20 Damage to the primed area of the deck shall be made good using the primer applied and allowed evaporation and cure time in accordance with the manufacturer's instructions..

2.21 Bituminous protection shall be laid on clean and dry substrate.

2.22 There shall be no blistering of the waterproofing layer and the APL.

2.23 Bituminous protection shall be laid in accordance with "Bituminous mixtures overlaying waterproofing on concrete bridge decks" in Section 20 of CC 202 [Ref 4.N].

Bitumen sheet waterproofing systems

2.24 For sheet membranes bonded with oxidised bitumen the heating and temperature of the bitumen shall comply with the manufacturer's limits for installation of the waterproofing membrane system.

2.25 Joints between waterproofing sheets shall be lapped with end laps of at least 150mm and side laps of at least 100mm unless otherwise stated by the product manufacturer.

2.26 The joints between waterproofing sheets shall be arranged so that water drains away from the exposed edge.

2.27 Laps, ridges and ripples in waterproofing sheeting, and peaks and steps at butts joints in waterproofing boards shall not be greater than 10mm in height.

2.28 The joints between waterproofing sheets shall be arranged so that at no point are there more than three thicknesses of sheeting.

2.29 Sheet membranes shall be laid in the direction that the APL or surfacing is laid and compacted by roller.

2.30 Defects on sheet applied waterproofing systems shall :-.

1. be repaired in accordance with the method statement in the product certification before application of the subsequent waterproofing layer; or,
2. the system completely removed and replaced.

Liquid applied waterproofing systems

2.31 Liquid applied waterproofing membranes for deck waterproofing systems shall be applied to form a film of uniform thickness and complete area coverage.

2.32 The APL or surfacing shall be fully bonded to the waterproofing membrane.

2.33 The bond between the APL or surfacing and the waterproofing system shall be achieved by either:-.

1. the binder within the directly applied bituminous APL or surfacing; or,
2. a separate tack coat compatible with the waterproofing system.

2.34 The temperature of the surfacing to be laid on the installed deck waterproofing system shall be above the activation temperature of the waterproofing system at all times.

Documentation requirements for bridge deck waterproofing systems

2.35 The following Documentation shall be submitted for liquid applied waterproofing systems compliant with ETAG 033 [Ref 15.N] prior to the commencement of deck waterproofing works: Declaration of Performance for the waterproofing system as set out in CD 358 [Ref 17.N].

Verification requirements for the installation of bridge deck waterproofing systems

2.36 Verification shall be undertaken for compliance of the deck preparation with the waterproofing system manufacturer's requirements by inspection.

2.37 The frequency of inspection of deck preparation shall be once for each area of the concrete deck prepared for application of the waterproofing system.

2.38 The requirements for "Verification" in Section 14 of GC 101 [Ref 14.N] shall apply to inspection of each area of the deck prepared for waterproofing.

2.39 Verification shall be undertaken for heating and temperature of oxidised bitumen bonded with sheet membranes by taking temperature measurements.

2.40 The frequency of heating and temperature measurement of oxidised bitumen shall be recorded continuously.

2.41 The requirements for "Verification" in Section 14 of GC 101 [Ref 14.N] shall apply to heating and temperature measurement of oxidised bitumen.

2.42 Verification shall be undertaken for the integrity of installed waterproofing systems in accordance with the testing and inspection methods in the product certification.

2.43 The frequency of testing and inspection shall be minimum once for each area of the deck in accordance with the testing and inspection methods agreed with the certification body.

2.44 The requirements for "Verification" in Section 14 of GC 101 [Ref 14.N] shall apply to integrity testing and inspection of deck waterproofing system.

2.45 Verification for the integrity of waterproofing systems in accordance with product acceptance schemes (PAS) shall be undertaken by an accredited testing laboratory in compliance with "Accredited laboratory" in Section 16 of GC 101 [Ref 14.N].

2.46 The following Documentation shall be submitted for the verification of the integrity of the waterproofing system in accordance with product acceptance schemes (PAS) prior to the commencement of the application of the bituminous APL or surfacing or the separate tack coat: report of testing results.

3. Waterproofing below ground concrete surfaces

3.1 Waterproofing for below ground concrete structures shall be cut back bitumen, in accordance with BS EN 15322 [Ref 2.N], or cationic emulsion bitumen, in accordance with BS EN 13808 [Ref 1.N].

3.2 Waterproofing for below ground concrete surfaces shall be as specified in CC 488/WSR/003.

Waterproofing for below ground concrete surfaces			
Structure reference	**Drawing / model reference**	**Waterproofing area reference**	**Number of coats of waterproofing required**
(a)	(b)	(c)	(d)

a) Enter a unique reference, to define the structure where waterproofing for below ground concrete surfaces is required.
b) Enter a unique reference, to define the drawing or model which shows the area/extents of the below ground concrete surface to be waterproofed.

c) Enter a unique reference, to define the areas of the structure where waterproofing for below ground concrete surface is required.

d) Enter a number, to define the number of coats of waterproofing to be applied to the below ground surface to be waterproofed.

Product requirements for waterproofing below ground concrete surfaces

3.3 Cut back bitumen for waterproofing below ground concrete surfaces shall be compliant with BS EN 15322 [Ref 2.N].

3.4 The cut back bitumen shall meet the following performance characteristics: Viscosity Class 4 in accordance with Table 3 of BS EN 15322 [Ref 2.N]and efflux time of 50 seconds.

3.5 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 14.N] shall apply to cut back bitumen.

3.6 Cationic bituminous emulsions for waterproofing below ground concrete surfaces shall be compliant with BS EN 13808 [Ref 1.N].

3.7 The cationic bituminous emulsions shall meet the following performance characteristics: Viscosity Class 6 in accordance with Table 2 of BS EN 13808 [Ref 1.N] and efflux time of 50 seconds..

3.8 The requirements of "Designated standards" in Section 10 of GC 101 [Ref 14.N] shall apply to cationic bituminous emulsions.

3.9 Primer for sealing below ground concrete surfaces shall be compatible with the selected waterproofing based on manufacturer's instructions.

Installation requirements for waterproofing below ground concrete surfaces

Application of cut back bitumen for waterproofing below ground concrete surfaces

3.10 Below ground concrete surfaces to be waterproofed shall be prepared in accordance with the manufacturer's instructions for the waterproofing system.

3.11 Below ground concrete surfaces to be waterproofed shall be free from oil, dirt, dust or loose debris.

3.12 The primer shall be brushed in and not allowed to pond in any depressions.

3.13 The method of application for each waterproofing system shall be in accordance with the manufacturer's instructions.

3.14 For cut back bitumen waterproofing a minimum two coats shall be hot applied at a minimum rate of spread per coat of 0.6 litre/m^2.

3.15 To achieve the required protective coating thickness on the waterproofed surface, the first coat of waterproofing shall be allowed to dry before a subsequent coat is applied.

Verification requirements for waterproofing for below ground concrete surfaces

3.16 Verification shall be undertaken for preparation of below ground concrete surfaces to be waterproofed by visual inspection.

3.17 The frequency of inspection shall be for once each area of below ground concrete surface prior to application of waterproofing.

3.18 The requirements for "Verification" in Section 14 of GC 101 [Ref 14.N] shall apply to inspection of below ground concrete surfaces prepared for waterproofing with cut back bitumen.

3.19 Verification shall be undertaken for the below ground concrete surfaces protected with waterproofing after application by visual inspection to confirm coverage of the protected surfaces in accordance with the manufacturer's recommendations.

3.20 The frequency of inspection shall be once for each area of below ground concrete surface waterproofed after application.

3.21 The requirements for "Verification" in Section 14 of GC 101 [Ref 14.N] shall apply to the application of waterproofing on below ground concrete surfaces.

3.22 The following Documentation shall be submitted for the application of waterproofing on below ground concrete surfaces prior to the commencement of infill around below ground concrete surfaces: verification of inspection records.

4. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref.	Document
Ref 1.N	BSI. BS EN 13808, 'Bitumen and bituminous binders. Framework for specifying cationic bituminous emulsions (Designated Standard - CPR)'
Ref 2.N	BSI. BS EN 15322, 'Bitumen and bituminous binders. Framework for specifying cut-back and fluxed bituminous binders (Designated Standard - CPR)'
Ref 3.N	BSI. BS EN 13108-4, 'Bituminous mixtures. Material specifications. Hot Rolled Asphalt (Designated Standard - CPR)'
Ref 4.N	National Highways. CC 202 'Flexible pavement construction'
Ref 5.N	BSI. BS EN 1110, 'Flexible sheets for waterproofing. Bitumen sheets for roof waterproofing. Determination of flow resistance at elevated temperature'
Ref 6.N	BSI. BS EN 14695, 'Flexible sheets for waterproofing. Reinforced bitumen sheets for waterproofing of concrete bridge decks and other trafficked areas of concrete. Definitions and characteristics (Designated Standard - CPR)'
Ref 7.N	BSI. BS EN 14691, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Compatibility by heat conditioning'
Ref 8.N	BSI. BS EN 14224, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of crack bridging ability'
Ref 9.N	BSI. BS EN 14694, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of resistance to dynamic water pressure after damage by pre-treatment'
Ref 10.N	BSI. BS EN 13653, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of shear strength'
Ref 11.N	BSI. BS EN 14693, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of the behaviour of bitumen sheets during application of mastic asphalt'
Ref 12.N	BSI. BS EN 14692, 'Flexible sheets for waterproofing. Waterproofing of

	concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of the resistance to compaction of an asphalt layer'
Ref 13.N	BSI. BS EN 14223, 'Flexible sheets for waterproofing. Waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles. Determination of water absorption'
Ref 14.N	National Highways. GC 101, 'General requirements for the Specification for Highway Works'
Ref 15.N	EOTA. ETAG 033, 'Guideline for European Technical Approval of Liquid Applied Bridge Deck Waterproofing Kits'
Ref 16.N	National Highways. CC 482 'Structural concrete [Series 1700]'
Ref 17.N	National Highways. CD 358, 'Waterproofing and surfacing of concrete bridge decks'