

ASHGHAL

Interim Advice Note No. 028/14

Specification for Waterproofing of Concrete Slabs on Highway Structures

Revision No. A1

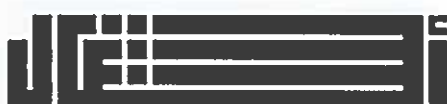
EXW-GENL-0000-PE-KBR-IP-00028

Summary

This Interim Advice Note (IAN) provides information and guidance on the specification to be adopted for waterproofing of concrete slabs on highway structures. This IAN takes immediate effect. The following shall be noted:

- This Interim Advice Note is for use with the existing Qatar Construction Specifications (QCS) 2014 only.
- This IAN does not make any amendments to the existing Qatar Construction Specifications (QCS) 2014.
- This IAN adds a new Section and new Part to QCS 2014, namely Section 101, Part 6, Waterproofing of Concrete Slabs on Highway Structures.

Third parties not working on Ashghal projects make use of this document at their own risk. Paper copies of this document are uncontrolled. Refer to Ashghal's website for the most recent version.



قطر تستحق الأفضل
Qatar Deserves The Best

Rev	Date	Reason For Issue	Auth	Chk	App
A1	May 2016	Issued for All Relevant Infrastructure Projects			

Contents

1. Foreword	3
2. Ashghal Interim Advice Note (IAN) – Feedback Form.....	4
3. Introduction	5
4. Additional Standard	5
5. Implementation	5

Appendix A – QATAR CONSTRUCTION SPECIFICATIONS (QCS) 2014
Additional Section 101, Part 6, Specification for Waterproofing of Concrete Slabs on
Highway Structures

INTERIM ADVICE FOR PWA PROJECTS ONLY

1. Foreword

- 1.1 Interim Advice Notes (IANs may be issued by Ashghal from time to time. They define specific requirements for works on Ashghal projects only, subject to any specific implementation instructions contained within each IAN.
- 1.2 Whilst IANs shall be read in conjunction with the Qatar Highway Design Manual (QHDM), the Qatar Traffic Manual (QTM) and the Qatar Construction Specifications (QCS), and may incorporate amendments or additions to these documents, they are not official updates to the QHDM, QTM, QCS or any other standards.
- 1.3 Ashghal directs which IANs shall be applied to its projects on a case by case basis. Where it is agreed that the guidance contained within a particular IAN is not to be incorporated on a particular project (e.g. physical constraints make implementation prohibitive in terms of land use, cost impact or time delay), a departure from standard shall be applied for by the relevant Consultant / Contractor.
- 1.4 IANs are generally based on international standards and industry best practice and may include modifications to such standards in order to suit Qatar conditions. Their purpose is to fill gaps in existing Qatar standards where relevant guidance is missing and/or provide higher standards in line with current, international best practice.
- 1.5 The IANs specify Ashghal's requirements in the interim until such time as the current Qatar standards (such as QHDM, QTM, etc.) are updated. These requirements may be incorporated into future updates of the QHDM, QTM or QCS, however this cannot be guaranteed. Therefore, third parties who are not engaged on Ashghal projects make use of Ashghal IANs at their own risk.
- 1.6 All IANs are owned, controlled and updated as necessary by Ashghal. All technical queries relating to IANs should be directed to Ashghal's Manager of the Design Department, Infrastructure Affairs.

Signed on behalf of Design Department:

Abdulla Ahn A A Mohd

Manager of Roads Design Department

Design Management (Roads Section)

Public Works Authority



قطر تستحق الأفضل
Qatar Deserves The Best

Tel: 44950653
Fax: 44950666
P.O.Box 22188 Doha - Qatar
Email: aahin@ashghal.gov.qa
<http://www.ashghal.gov.qa>

2. Ashghal Interim Advice Note (IAN) – Feedback Form

Ashghal IANs represent the product of consideration of international standards and best practice against what would work most appropriately for Qatar. However, it is possible that not all issues have been considered, or that there are errors or inconsistencies in an IAN.

If you identify any such issues, it would be appreciated if you could let us know so that amendments can be incorporated into the next revision. Similarly, we would be pleased to receive any general comments you may wish to make. Please use the form below for noting any items that you wish to raise.

Please complete all fields necessary to identify the relevant item			
IAN title:			
IAN number:		Appendix letter:	
Page number:		Table number:	
Paragraph number:		Figure number:	
Description comment:			
Please continue on a separate sheet if required:			
Your name and contact details (optional):			
Name:		Telephone:	
Organisation:		Email:	
Position:		Address:	

Please email the completed form to:

<p>Abdulla AAhin AA Mohd Manager of Roads Design Department Design Management (Roads Section) Public Works Authority aahin@ashghal.gov.qa</p>

We cannot acknowledge every response, but we thank you for contributions. Those contributions which bring new issues to our attention will ensure that the IANs will continue to assist in improving quality on Ashghal's infrastructure projects.

3. Introduction

- 3.1 This Interim Advice Note (IAN), which takes immediate effect, provides information and guidance on the Specification for Waterproofing of Concrete Slabs on Highway Structures. This IAN will provide interim guidance prior to issue of a revision to the Qatar Construction Specifications (QCS).
- 3.2 The specification is applicable to all waterproofing membranes applied to concrete slabs of highway structures.

4. Additional Standard

- 4.1 For application to highway structures; Section 101, Part 6 (included in this document) is additional to the existing Qatar Construction Specifications (QCS) 2014.

5. Implementation

- 5.1 This IAN is to be used with immediate effect on projects as follows:
- All Ashghal projects in Design Stage
 - All Ashghal projects in Tender Stage
- 5.2 Ashghal projects at Construction Stage shall be reviewed by the Project Consultant / Contractor and the implications of adoption of this Interim Advice Note discussed with the respective Ashghal Project Manager).
- 5.3 If in doubt, Consultants / Contractors should seek guidance from the respective Ashghal Project Manager or designated Programme Management Consultant (PMC) on a scheme specific basis.

6 Disclaimer

- 6.1 This Interim Advice Note and its recommendations or directions have been provided for application on Ashghal's infrastructure projects within Qatar only and they are not warranted as suitable for use on other roads, highways or infrastructure with Qatar or elsewhere. Should any third party, Consultant or Contractor choose to adopt this Interim Advice Note for purposes other than Ashghal's infrastructure projects, they shall do so at their own risk.

Appendix A

QATAR CONSTRUCTION SPECIFICATIONS (QCS) 2014

**Additional Section 101, Part 6, Waterproofing of Concrete
Slabs on Highway Structures**

INTERIM ADVICE FOR PWA PROJECTS ONLY

Appendix A

QATAR CONSTRUCTION SPECIFICATIONS 2014

Additional Section 101, Part 6, Waterproofing of Concrete Slabs on Highway Structures

6. WATERPROOFING OF CONCRETE SLABS ON HIGHWAY STRUCTURES

6.1 GENERAL

6.2 RELATED SECTIONS

6.3 CODES AND STANDARDS

6.4 SUBMITTALS

6.5 STORAGE

6.6 MATERIALS

6.6.1 General

6.6.2 Primer

6.6.3 Waterproofing Membrane

6.6.4 Not Used

6.6.5 Not Used

6.6.6 Technical Specification

6.7 EXECUTION

6.7.1 General

6.7.2 Protection of Membrane during Construction

6.7.3 Surface Preparation

6.7.4 Limits of Application

6.7.5 Application

6.7.5.1 Primer

6.7.5.2 Waterproofing Systems

6.8 INSPECTION AND TESTING

6.9 WARRANTY

INTERIM ADVICE FOR PWA PROJECTS ONLY

PART 6 WATERPROOFING OF CONCRETE SLABS ON HIGHWAY STRUCTURES

6.1 GENERAL

1. This Section specifies the requirements for waterproofing of concrete slabs on highway structures and shall apply generally to new works and where appropriate to the maintenance and repair of existing works. The waterproofing shall provide long term protection to the concrete from the ingress of water borne chlorides or other deleterious substances.
2. Waterproofing shall only be used in the following locations:
 - (i) Top of buried portal or box structures where fill material is to be placed on top of the structure.
 - (ii) Top of base slabs in tunnels and underpass where mass concrete is to be applied to the top of the slab.
 - (iii) Other concrete slabs such as approach slabs carrying traffic where fill will be placed between the waterproofing and the pavement materials.Under no circumstances shall asphalt (or similar) pavement materials be laid directly on waterproofing material.
3. The waterproofing shall be a spray applied liquid membrane, as specified in the bill of quantities, specifications and/or contract drawings, constructed in accordance with the manufacturer's instructions and specifications or as established by the Engineer. This material will not be subjected to wear and tear from vehicular traffic while in service as it will be applied below mass concrete.
4. The waterproofing system shall consist of the waterproofing membrane. A protective layer of a minimum of 50mm of mass concrete shall be placed above the membrane.
5. Where movement joints to base slabs of tunnels and underpasses are bridged with plates (or components of a similar thickness) to facilitate continuity of the waterproofing membrane across the joint, it is recommended that these plates (or components of a similar thickness) are recessed into the concrete base to ensure that the thickness of the mass concrete protective layer above the membrane is not reduced.
6. The contractor shall be responsible for the following:
 - (i) The preparation of the concrete surface to meet the membrane manufacturer's requirements and sufficient to allow compliance with the tensile adhesion set out in Table 6.6.6 of this specification.
 - (ii) The installation of the membrane and the carrying out of the necessary tests as per specifications.
 - (iii) Ensuring that the membrane bonds to the concrete substrate.
7. Waterproofing of the top of tunnel and underpass base slabs shall be applied directly to the top of the reinforced concrete slab, below mass concrete or other fill material to be placed above the slab..

8. All other partially or fully submerged elements of the structure in direct contact with earth shall receive a waterproofing membrane in accordance with the requirements of IAN 004 and thus do not form part of this Section.
9. A representative of the membrane manufacturer shall be present on site at the commencement of the membrane installation to ensure the quality of the works performed by the contractor is in accordance with the specification and manufacturer's instructions. The manufacturer's representative will ensure he is present to witness the first installation of each element of the membrane system. Furthermore the Engineer reserves the right to ask for the Manufacturer's Representative whenever they deem necessary. All expenses relative to his presence on site shall be borne by the Contractor.
10. The design of the membrane shall address the environment and climate conditions existing in Qatar.
11. Any particular requirements of the approved detailed specifications for the approved proprietary system shall govern over any conflicting or incompatible requirement contained within this section of the specification.
12. It shall be read together with the QCS.

6.2 RELATED SECTIONS

1. Section 1 - General
2. Section 5 - Concrete Works

6.3 CODES AND STANDARDS

1. Unless otherwise specified, the membranes shall comply with the requirements in table 6.3.1.

Table 6.3.1 - Mandatory Standard

DMRB Volumes 1 & 2	Highways Agency (UK) Design Manual for Roads and Bridges
BD 47/99	Waterproofing and Surfacing of Concrete Bridge Decks
IAN 96/07 Rev 1	Highways Agency (UK) Interim Advice Note. Guidance on Implementing Results of Research on Bridge Deck Waterproofing
BS EN ISO 4624	Paints and varnishes. Pull-off test for adhesion

2. The documents listed in Table 6.3.2 are not mandatory, however they are considered to reflect good practice and their recommendations and guidance should be followed wherever reasonably practical.

BA 47/99	Waterproofing and Surfacing of Concrete Bridge Decks
BBA HAPAS GUIDELINES	Guidelines Document for the Assessment and Certification of Waterproofing Systems for Use on Concrete Decks of Highway Bridges
ETAG 033	Guideline for European Technical Approval of Liquid Applied Bridge Deck Waterproofing Kits

3. All of the above and any other documents and specifications referred to in this document shall be the latest edition or superseding document and specification.

6.4 SUBMITTALS

1. The Contractor shall be responsible for the following submittals for approval by the Engineer:
- (i) A copy of the current BBA certificate in accordance with UK Highways Authorities Product Approval Scheme (HAPAS) or equivalent European Technical Approval (ETA) certificate demonstrating suitability for use on concrete decks with a minimum of 25 year design life.
 - (ii) The membrane manufacturer's product data sheets, specifications, installation instructions, test results and other data to show compliance with the requirements of this part of the specification and the contract documents.
 - (iii) Detailed method statement for the future maintenance of the membrane.
 - (iv) The membrane manufacturer will supply a copy of its current product liability insurance certificate issued in the name of the manufacturer. The insured amount shall not be less than the membrane manufacturers material supply contract.
 - (v) At least 10 year proven track record that the proposed membrane system has been used previously and successfully on similar sized highway structures in the Middle East.
 - (vi) Proof that the applicator has a minimum of 5 years successful experience in the installation of the specified material and is approved and trained by the manufacturer.

6.5 STORAGE

1. All materials susceptible to degradation from exposure to the sun shall be kept under protected and covered areas.

6.6 MATERIALS

6.6.1 General

1. The waterproofing membrane for slabs shall comprise of a primer and two separately applied coats of membrane. The membrane shall be protected with a minimum of 50mm of mass concrete.
2. All waterproofing materials including primers etc. shall be supplied by a manufacturer and installer operating the ISO 9001, BS 5750, EN 29001 or similar approved quality assurance schemes.

6.6.2 Primer

1. A suitable primer shall be applied to the substrate before application of the waterproof membrane.
2. Choice of primer will depend on compatibility of primer to waterproofing system and range of substrate temperature and/or season and shall be recommended by the manufacturer of the waterproofing system. It is important to observe requirements for primer and limitations of use for specific waterproofing systems in accordance with the relevant BBA certificate.

6.6.3 Waterproofing Membrane

1. The membrane shall be a two coat rapid curing and liquid spray waterproofing membrane applied in two coats having a current Highways Agency/BBA Roads and Bridges Agrément Certificate. The membrane shall be applied using a proportioning spray pump system. Each coat of membrane shall be applied in accordance with the manufacturer's guidelines to a minimum dry film thickness of 1.0mm in order to produce a minimum total membrane dry film thickness of 2mm, including peaks and arises in the concrete slab, but shall not be greater than 3mm. One coat systems will not be accepted.
2. The membrane shall be resistant to water and chloride ion penetration, embrittlement, abrasion, UV degradations, pedestrian traffic, indentation by hot or cold aggregates and the effect of placing pavement materials.
3. The membrane shall easily accommodate the need for day joints and patch repairs as a result of testing for adhesion or coating thickness, if required by the Engineer.
4. An aggregate shear key shall be provided between the membrane and the mass concrete above it. This shall be applied strictly in accordance with the waterproofing manufacturers specifications and instructions.
5. The aggregate shall applied uniformly to ensure that there is a uniform shear key to the mass concrete. The waterproofing manufacturer shall provide a satisfactory QA/QC regime adapted to this type of application in order to ensure the waterproofing system is compliant with the specification requirements.

6.6.4 Not Used

6.6.5 Not Used

6.6.6 Technical Specification

TABLE 6.6.6 - TECHNICAL SPECIFICATION OF WATERPROOFING MEMBRANE SYSTEM

Property	Test Method	Requirement
Thickness	As approved by the Engineer	2mm minimum, 3mm maximum
Tensile adhesion strength	BS EN ISO 4624 (minimum 1 per 50m ²)	To concrete >1.0 MPa
Moisture Vapour transmission rate	BS3177	8.1 g/m ² /maximum
Water penetration	BD47	Zero
Crack bridging ability	BD47 (modified)	2.0mm static 1.0mm dynamic
Chemical resistance	TRL Research Report 248	Resistant
Chloride penetration	BD47	Pass
Resistance to high temperature from concrete surface (70°C)	BD47	Pass
Holidays (pin holes)	Electronic detection	Any holes detected to be repaired.
Blisters	Visual inspection	No blisters.
Resistance to abrasion	SNCF Taber Method H/22 wheel	High abrasion resistance
Resistance to embrittlement	UK Department Transport Technical Memorandum BE27 90° Mandrel Test at 0°C	No cracking
Resistance to chisel impact	BD47	Pass
Specific Gravity of cured membrane	BS3900 Part A12	>1.0g/cc@23°C
Peel adhesion of mass concrete to waterproofing system	ISO8510-1 (E) for 90° peel	>750N/m
Identification Tests	BS903:A2 (ISO37)	To manufacturer's specification

INTERIM APPROVAL

6.7 EXECUTION

6.7.1 General

1. Variations to the following recommended methods of installation of the membrane and its elements shall be supported with the appropriate documentation and be subject to the approval of the Engineer.

6.7.2 Protection of membrane during construction

1. On any structure, providing no damage results, only plant and equipment fitted with rubber tyres may stand or travel on the waterproofing membrane with the prior approval of the Engineer solely for the purposes of laying mass concrete above the membrane.
2. Rollers shall not be permitted to stand or travel directly on the waterproofing membrane and drum vibration must not be used during compaction of material on the structure.
3. Where it is necessary for plant, equipment or traffic to stand or travel on a slab that has received a water proofing membrane before the placing of mass concrete, suitable temporary protection shall be provided to the satisfaction of the Engineer. All such plant and equipment shall have its tyre treads regularly inspected and any embedded stones removed. Temporary protection shall be provided where damage to the waterproofing could result from particular site traffic.
4. The mass concrete protective layer above the membrane shall be placed as soon as possible after the membrane has been applied..

6.7.3 Surface Preparation

1. Concrete substrates shall be designed and built in accordance with the QCS. All new concrete substrates shall be a minimum of seven days old. A U4 concrete finish as defined in Section 5 Part 9 of the QCS is required.
2. The following requirements shall be adhered to:
 - (i) All surfaces must be clean, dry, and free from laitance, oil, grease, curing compounds, shutter release oils on vertical formed surfaces, loose particles, friable matter, moss, algae growth, bitumen, dirt and other contaminants.
 - (ii) Where curing agents are to be used, avoid curing agents that leave a permanent film on the concrete which can lead to poor adhesion. If curing agents are to be used the contractor will consult the membrane manufacturer to determine if there are possible compatibility issues.
 - (iii) The contractor will use mechanical surface preparation such as diamond grinding, vacuum blasting or grit blasting to provide a laitance free substrate. All blowholes and voids are to be repaired with an appropriate concrete repair material prior to application of the waterproofing system. Mechanical preparation may be omitted if the Adhesion tests as set out in table 6.6.6 show compliance with the specification and with the approval of the Engineer.
 - (iv) All other voids, irregularities and defects in the slab shall be repaired and levelled with a compatible repair material or by grinding off as necessary. All repairs to the substrate shall be supported by a methodology statement detailing the proposed repair material, procedure of repair and sketches if required to describe the work

where defects are deep and reinforcement may be affected. The contractor will check with the membrane manufacturer the compatibility of any repair materials to be used. All repairs will be subject to the approval of the engineer prior to carrying out the work

- (v) Not used.
 - (vi) For all other substrates compatibility must be checked with the manufacturer of the waterproofing system.
3. Following completion of the substrate preparation and before application of the primer layer, adhesion of the waterproofing system to the slab shall be measured.
 4. Adhesion testing shall be carried out by the contractor in accordance with BS EN ISO 4624 and at a rate of 1 per 50m² to ensure specified values are obtained and laitance has been removed
 5. The completed and/or prepared slab surface shall be jointly inspected and approved as suitable for acceptance as sound substrate before application of any waterproof membrane material by a representative of the membrane manufacturer and the Engineer.

6.7.4 Limits of Application

1. Limits of application shall be agreed with the Engineer before commencement of application of waterproof membrane material.
2. A neat finish with well-defined boundaries and straight edges shall be provided.

6.7.5 Application

6.7.5.1 Primer

1. The primer shall be mixed or prepared in accordance with the manufacturer's instructions.
2. The primer shall be applied using a suitable airless spray, brush or roller.
3. Rate of coverage of primer shall be dependent on the porosity of the slab and shall be limited to avoid ponding of primer material. All surplus material shall be removed or evenly dispersed by brushing
4. Application shall be undertaken until a light gloss or sheen is observed on the substrate surface. Any dry or patchy areas, where the concrete has absorbed all the primer, shall be given an additional application.
5. The primer shall be fully cured before application of the waterproof membrane which shall be strictly within the time limits specified by the membrane manufacturer. The cured surface shall be dry, clean and free of loose material and other contaminants.
6. Vehicular traffic shall be avoided on any part of the system.

6.7.5.2 Waterproofing Systems

1. Proprietary waterproofing systems shall be installed only by applicators approved by the manufacturers and the Engineer and in accordance with the approved installation procedures.
2. The liquid membrane shall be applied in two separately sprayed coats.
3. The manufacturer shall confirm that the components within the system can bond to the next element of the system within two hours of application and after any length of time between applications with no detriment to the intercoat adhesion. It is important to observe requirements for primer and limitations of use for specific waterproofing systems in accordance with the relevant BBA certificate. The material manufacturer shall ensure that such limitations are strictly adhered to on site during application and if exceeded the appropriate measures, shall be recommended by the membrane manufacturer and if approved by the Engineer, shall be taken prior to the application of the second coat.
4. During application of the first coat the wet film thickness shall be checked every 10m² using a gauge pin or comb type thickness gauge to ensure that a minimum wet film thickness of 1.2mm and the corresponding minimum dry film thickness of 1.0mm is achieved, and a maximum dry film thickness of 1.5mm is not exceeded
5. Before the application of the second coat the fully cured surface of the first coat shall be examined and any visible defects made good in accordance with the manufacturers guidelines and in compliance with the membrane's BBA certification.
6. Only after this QA/QC inspection is completed may the second coat be applied.
7. During application of the second coat the wet film thickness shall be checked every 10m² using a gauge pin or comb type thickness gauge to ensure that a minimum wet film thickness of 1.2mm and the corresponding minimum dry film thickness of 1.0mm is achieved, and a maximum dry film thickness of 1.5mm is not exceeded.
8. Following application of the second coat, the membrane will be checked for pinholes by performing electrical holiday detection tests over the full surface area of waterproofing. If any defects are found they shall be repaired in accordance with the manufacturer's guidelines and in accordance with the membranes BBA certification.
9. The maximum dry film thickness of the completed two coat membrane shall not exceed 3.0mm.
10. Where joining to an existing membrane or at a joint from a previous section of application is required a lap of minimum 50mm shall be provided. The existing surface shall be clean and free from contaminants before application of the new membrane. If the membrane to be jointed has exceeded its critical over-coating period, it must be cleaned and prepared in accordance with the membranes BBA certification.

6.8 INSPECTION AND TESTING

1. The Contractor shall submit for the approval of the Engineer a regime of compatible tests to check the integrity of the waterproofing system that he proposes to use in order to substantiate fitness of purpose. The test methods shall be those which have been assessed by the British Board of Agreement (BBA) for use with waterproofing system.

The following tests are at least required:

- (i) Electrical holiday pinhole detection tests shall be carried out over the full surface area of waterproofing.
 - (ii) A minimum of 1 tensile adhesion test shall be carried out every 50m².
2. Manufacturer's application guidelines and BBA method statements will include inspection and testing procedures. Set out below, are some essential elements, which shall be included:
 - (i) Prior to mobilisation of the waterproofing contractor when a sufficient area of slab has been prepared to be representative, the waterproofing contractor shall be visually inspect and carry out tensile adhesion tests. At this time the slab can be provisionally accepted or rejected. If rejected actions to rectify the slab can be agreed without delay costs for contractors standing.
 - (ii) Notwithstanding the above it is necessary to determine the adhesion to substrate prior to applying any part of the system. In the event that contamination or laitance are found or that the adhesion values are low, one can then carry out additional preparation without removal of primer etc. Measuring adhesion once the system has been applied is not recommended, as this is too late.
 - (iii) Before application of primer commences air temp, slab temperature and relative humidity have to be measured and dew point calculated. This shall be monitored regularly throughout the application. Dew point calculations are necessary to prevent installation onto condensation that occurs on the substrate. For systems with critical overcoating times the time of application start and finish as well as ambient conditions must be recorded. The slab temperature must be a minimum of 2°C above dew point before any component of the waterproofing membrane can be installed.
 - (iv) For systems with critical over-coating requirements, if the primer is not overcoated within four hours of being applied additional tensile adhesion tests must be conducted to ensure that primer will still bond to subsequent layers. If the primer is left overnight then it is likely to have been exposed to moisture as slab temperatures can drop below dew point and so adhesion tests must again be conducted before any further components of the system are applied and procedures stated in the relevant BBA certificate shall be followed.
 - (v) During application of the first coat of membrane regular wet film gauge tests shall be carried out to ensure that the membrane does not fall below the minimum thickness or exceed its specified maximum thickness by more than 50%. Consumption of liquid components of the system shall be monitored and

recorded by means appropriate to the system being used. Time of application and temperature shall be recorded to ensure overcoating times are achieved.

- (vi) The inspection and repair of the first coat is designed to stop any recurrence of pin-holes or defects that may allow substrate outgassing, to cause a pin-hole within the second coat. For this to happen the repair must take place before the second coat is applied.
- (vii) If the first coat of membrane is contaminated or if any doubt exists as to whether over-coating time has been exceeded further adhesion tests shall be carried out. Adhesion between coats shall be greater than 1.0 MPa.
- (viii) During application of the second coat of membrane regular wet film gauge tests shall be carried out to ensure that the membrane does not fall below the minimum thickness or exceed its specified maximum thickness by more than 50%.
- (ix) Not used.
- (x) On completion of a second coat the membrane shall be inspected visually and electronically using high voltage holiday detection equipment. This test should only be carried out once (repeated testing can damage the membrane) and voltage settings shall be set in accordance with manufacturers recommendations (around 8Kv for most membranes). Pinholes identified shall be marked and repaired in accordance with BBA agreed methods.

6.9 WARRANTY

1. The waterproofing membrane shall be guaranteed by the Contractor to perform in the manner described in this part of the specifications and the contract documents for a period of 10 years from the date of its application on the structure.
2. The performance guarantee shall be submitted with the tender and shall fully outline the conditions, limitations, exclusions and owners obligations.
3. The warranty shall ensure that repairs to defects shall be completed in a timely manner at no extra costs to the Owner.
4. The warranty shall apply from the date of application of the original coating only and is not required to be extended beyond this period in the event of repairs being completed under the Warranty.