

Superseded

Technical Specification

**Transport and Main Roads Specifications
MRTS57 Geotextiles for Geotextile Reinforced Seals**

July 2024



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1 Introduction

This Technical Specification applies to the material and construction requirements for geotextiles used in geotextile reinforced seals.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms used in this Technical Specification shall be as defined in Clause 2 of MRTS01 *Introduction to Technical Specifications*. Further definitions are defined in Table 2. Where indicated in Table 2, a more complete definition is contained in the referenced clause.

Table 2 – Definition of terms

Term	Definition
Asphalt interlayer	A geosynthetic specifically designed for use under asphalt. Refer to MRTS104 <i>Asphalt Geosynthetics for Delaying Pavement Reflective Cracking</i> .
Bitumen retention	The amount of bitumen required (in L/m ²) to completely saturate the geotextile. It shall be determined using Test Method ASTM D6140 <i>Bitumen Retention</i> .
Bond coat	Binder (typically C170) which is sprayed onto the prepared pavement surface, to ensure a good bond between the underlying pavement surface and the geotextile.
Calendering	Calendering is a process that passes the geotextile through one or more heated rollers during the manufacturing process. The surface of the geotextile is modified during this process. Calendering may reduce the ability of the bitumen binder to sufficiently impregnate into the geotextile on the calendered side.
Geotextile	A planar, permeable, polymeric (synthetic or natural) textile material which may be non-woven, knitted or woven and used in contact with soil / rock and/or any other geotechnical or pavement material in civil engineering applications. For geotextiles used in geotextile reinforced seals, refer to the 'paving grade geotextile' definition.
Geotextile reinforced seal (GRS)	A bitumen impregnated paving grade geotextile placed on the surface of a pavement layer that is covered with aggregate to form a durable wearing surface suitable for vehicular traffic.
G-rating	$G - rating = \sqrt{L \times H_{50}}$ Where: L = Burst strength of geotextile material determined in accordance with AS 3706.4, except that if the strain at failure exceeds 80%, the burst strength at 80% shall be used, and H ₅₀ = Drop cone puncture resistance of the geotextile material determined in accordance with AS 3706.5.
Manufacture batch	The amount of geotextile produced under the same standard operating conditions. Each <i>manufacture batch</i> shall have a unique identification code which can be traced to the <i>manufacture sample</i> test reports and the geotextile rolls delivered to Site.
Manufacture sample	A representative sample taken during a <i>manufacture batch</i> . This sample shall be tested in accordance with Clause 9.2.1.

Term	Definition
Melting point	The temperature at which the elastic modulus of the geotextile material changes significantly. It shall be determined using Test Method ASTM D276 or ASTM E794 06 <i>Melting Point</i> .
Non-woven geotextile	A manufactured sheet, web or batt of directionally or randomly orientated fibres, filaments, or other elements mechanically bonded by needle punching.
Onsite sample	A representative sample taken from the geotextile product supplied to the Works. The sample shall be taken in accordance with Clause 9.2.2. The sample shall be tested in accordance with Clause 9.2.3.
Paving grade geotextile	A non-woven, polyester, needle punched geotextile formed from mechanically entangled filaments complying with the requirements of Clause 6.2. As per Table 6.2.1, a <i>Type 1</i> or <i>Type 2</i> paving grade geotextile shall be used for geotextile reinforced seals.
Resistance to ultraviolet (UV)	A measure of a geotextile's durability when exposed to UV light. It shall be determined using Test Method AS 3706.11, ASTM D4355 or EN 12224 <i>Resistance to UV</i> .

3 Referenced documents

Table 3 lists documents referenced in this Technical Specification.

Table 3 – Referenced documents

Reference	Title
AGPT Part 4K	<i>Austroads Guide to Pavement Technology Part 4K: Selection and Design of Sprayed Seals</i>
AS 3705	<i>Geotextiles – Identification, marking and general data</i>
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS11	<i>Sprayed Bituminous Treatments (Excluding Emulsion)</i>
MRTS17	<i>Bitumen and Multigrade Bitumen</i>
MRTS20	<i>Cutback Bitumen</i>
MRTS22	<i>Supply of Cover Aggregate</i>
MRTS50	<i>Specific Quality System Requirements</i>
MRTS104	<i>Asphalt Geosynthetics for Delaying Pavement Reflective Cracking</i>
PRM	<i>Transport and Main Roads Pavement Rehabilitation Manual</i>
PWT53	<i>AfPA Pavement Work Tip 53 Joints in Geotextile Reinforced Seals</i>
TN175	<i>Transport and Main Roads Technical Note Selection and Design of Sprayed Bituminous Treatments</i>
-	<i>Supplier's Installation Guidelines</i>
-	<i>Supplier's Product Specifications</i>

4 Standard Test Methods

The standard test methods listed in Table 4 shall be used in this Technical Specification. Further testing details and requirements are given in Clauses 6 to 9.

Further details of Test Method Numbers and test descriptions are given in Clause 4 of MRTS01 *Introduction to Technical Specifications*.

Table 4 – Standard Test Methods

Property to be tested	Method No	Test description
Bitumen retention	ASTM D6140	Determines the bitumen retention of geotextiles used in road pavement applications.
Burst strength	AS 3706.4	Determines the burst strength and deformation properties of geotextiles using the California Bearing Ratio (CBR) test apparatus for both atmospheric-conditioned and wet-conditioned specimens.
Drop cone puncture resistance	AS 3706.5	Determines the puncture resistance of geotextiles by the drop cone method for both atmospheric and wet-conditioned specimens.
Elongation	AS 3706.2	Determines the tensile properties of geotextiles in both atmospheric and wet conditions.
Mass per unit area	AS 3706.1	Determines the mass per unit area of geotextiles for identification purposes and for use in technical data sheets.
Melting point	ASTM D276 or ASTM E794-06	Identification of fibres in geosynthetic materials.
Sampling of geotextiles	AS 3706.1	Sampling and conditioning procedures for the testing of geotextiles.
Thickness	AS 3706.1	Determines the thickness of geotextiles.
Resistance to ultraviolet (UV)	AS 3706.11, ASTM D4355 or EN 12224	Deterioration of geosynthetics by exposure to light, moisture and heat.
Wide strip tensile strength	AS 3706.2 Method A	Determines the tensile properties of geotextiles in both atmospheric and wet conditions.

4.1 Accreditation of laboratories and technical facilities

All geotextile materials shall be manufactured under controlled conditions and shall have quality assurance to ensure a high standard of long-term performance. Testing under AS / ASTM / EN Test Methods shall be conducted by a laboratory accredited under the following:

- a) National Association of Testing Authorities (NATA)
- b) NATA's partners by Mutual Recognition Arrangements (MRA), or
- c) GAI-LAP.

The requirement for the laboratory to be a registered Construction Materials Testing (CMT) Supplier in accordance with MRTS50 *Specific Quality System Requirements* shall be relaxed.

There is a very limited number of accredited geosynthetic testing laboratories located in Australia, with most laboratories located overseas. Therefore, provided the geosynthetic testing laboratory meets the accreditation requirements of this clause, the requirement for the laboratory to be a registered CMT Supplier can be relaxed.

5 Quality system requirements

5.1 Hold Points, Witness Points and Milestones

General requirements for Hold Points, Witness Points and Milestones are specified in Clause 5.2 of MRTS01 *Introduction to Technical Specifications*.

The Hold Points, Witness Points and Milestones applicable to this Technical Specification are summarised in Table 5.1.

Table 5.1 – Hold Points, Witness Points and Milestones

Clause	Hold Point	Witness Point	Milestone
5.2	1. Acceptance of construction procedures.		Supply of construction procedures (14 days).
6.2.1	2. Acceptance of technical data sheets, test reports and certificates.		Supply of technical data sheets, test reports and certificates (14 days).
6.2.2	3. Calendering laboratory and/or field trial.		
7	4. Acceptance of onsite storage.		Delivery of geotextile material to Site (14 days).
8.3.3		1. Marking out of cracks to be filled.	
8.7.4.1		2. Inspection of geotextile joints and overlaps prior to spraying bituminous surfacing.	
8.7.6		3. Inspection of placed geotextile prior to spraying bituminous surfacing.	
9.2.2		4. Onsite sampling of geotextile material.	
9.3	5. Acceptance.		

5.2 Construction procedures

The Contractor shall prepare documented procedures for all construction processes as defined in Clause 6 of MRTS50 *Specific Quality System Requirements*.

The Contractor shall prepare documented procedures detailing all work described in this Technical Specification.

The Contractor's construction procedure should consider the details provided in the following documents:

- Transport and Main Roads *Pavement Rehabilitation Manual*
- Austroads *Guide to Pavement Technology Part 4K: Selection and Design of Sprayed Seals*

- Transport and Main Roads TN175 *Selection and Design of Sprayed Bituminous Treatments*
- AfPA Pavement Work Tip 53 *Joints in Geotextile Reinforced Seals*
- *Geotextile Supplier's Installation Guidelines*, and
- *Geotextile Supplier's Product Specifications*.

The construction procedure shall include, but not be limited to, the following:

- a) details of the nominated geotextile product(s)
- b) geotextile *manufacture sample* test reports and certificates (refer to Clauses 6.2.1 and 9.2.1)
- c) details of all bituminous materials to be used (refer to Clause 6.1)
- d) details for the transport, handling and onsite storage of the geotextile (refer to Clause 7)
- e) details for the onsite sampling and testing of the geotextile (refer to Clauses 9.2.2 and 9.2.3)
- f) details for all aspects of the geotextile placement Works, including:
 - i. details of all plant and equipment associated with the Works, including the sprayer, application frame and roller(s) to be used to place the geotextile
 - ii. details for the management of construction traffic over the prepared pavement surface, sprayed bond coat and installed geotextile to prevent contamination, damage and/or pick-up
 - iii. where required, details of the laboratory and/or field trial of geotextile with calendaring on one side (refer to Clause 6.2.2)
 - iv. calculation and nomination of the bituminous geotextile reinforced seal design (refer to Clause 8.2)
 - v. procedures for the preparation and inspection of the pavement surface (refer to Clause 8.3)
 - vi. details for the management of pavement surface temperatures (refer to Clause 8.4), and weather conditions (refer to Clause 8.5)
 - vii. calculation and nomination of the bond coat application rate (refer to Clauses 8.2 and 8.6.1)
 - viii. procedures for the transport, handling, spraying and inspection of the bond coat (refer to Clause 8.6.2)
 - ix. placement plan which details the lengths and widths of each geotextile placement run considering the pavement geometry, joint and overlap requirements (refer to Clause 8.7.2)
 - x. procedures for the transport, loading and placement of the geotextile using a suitable application frame (refer to Clause 8.7.2)
 - xi. rolling pattern and estimated number of passes (refer to Clause 8.7.3)

- xii. procedures for joints and overlaps (transverse and longitudinal) of the geotextile (refer to Clause 8.7.4) including:
 - details for staggering or offsetting multiple overlaps which are in the same area
 - overlaps between work shifts, and
 - overlaps at the centreline or crown.
- xiii. any procedures which will supplement the bituminous surfacings construction procedure prescribed in the relevant bituminous surfacing Technical Specification (refer to Clause 8.8), and
- xiv. details for all material and construction compliance testing, including:
 - all materials compliance testing for the *manufacture sample*, and
 - all materials compliance testing for the *onsite sample*.

The proposed construction procedure shall be submitted to the Administrator at least 14 days prior to the commencement of any Works related to the placement of the paving geotextile. **Milestone**

No Works related to the placement of paving geotextile shall commence until the construction procedure has been accepted by the Administrator and the Administrator has given the Contractor permission to proceed. **Hold Point 1**

5.3 Conformance requirements

The conformance requirements that apply to geotextile materials and construction processes covered by this Technical Specification, are given in Clauses 6 to 9.

5.4 Testing frequencies and lot sizes

The maximum lot sizes shall be as specified in Table A1 of Appendix A.

Material compliance testing requirements and minimum testing frequencies shall be as specified in Table A2 and A3 of Appendix A.

6 Material requirements

6.1 Bituminous materials

Polymer modified binder (including crumb rubber modified binder) and bitumen emulsions, shall not be used in any part of the construction of a geotextile reinforced seal. This includes the bond coat and the bituminous surfacing sprayed on top of the geotextile.

Unless otherwise approved by the Administrator, the selection of the bitumen binder class shall be in accordance with MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*.

C170 bitumen is typically used as the binder in geotextile reinforced seals on Transport and Main Roads' projects. In warm and hot environments, M500 multigrade bitumen has also been successfully used as the binder.

Unless otherwise approved by the Administrator, the bitumen binder shall comply with MRTS17 *Bitumen and Multigrade Bitumen*.

Unless otherwise approved by the Administrator, cutback bitumen binder shall comply with MRTS20 *Cutback Bitumen*. Cutback bitumen shall not be used for the bond coat.

6.2 Geotextiles

6.2.1 Property requirements

Geotextiles used in geotextile reinforced seals shall be manufactured from polyester.

The geotextile filaments shall be rot-proof, chemically stable and have low water absorbency. Filaments shall resist delamination and maintain their relative dimensional stability in the geotextile.

Geotextiles shall be free of any flaws which may have an adverse effect on the physical and mechanical properties of the geotextile.

Only geotextiles that are non-woven, needle punched and formed from mechanically entangled filaments shall be used for geotextile reinforced seals. Geotextiles that are knitted, woven and/or heat or resin bonded shall not be used.

The geotextile type to be used in the Works shall be as stated in Clause 1 of Annexure MRTS57.1. Where it is not so stated in the Annexure or shown in the Drawings, it shall be nominated by the Contractor and be *Type 1 or Type 2*.

Identification and traceability information including geotextile type, materials source, Manufacturer, *manufacture batch* identification code, sample date and roll directional markings shall be shown on or attached to the test reports.

Test reports and certificates demonstrating compliance with this Technical Specification shall be provided by the Contractor to the Administrator for each geotextile product to be used in the Works. The testing can be undertaken through the geotextile Manufacturer, geotextile Supplier and/or Contractor.

All *manufacture sample* test reports and certificates (refer to Clause 9.2.1) shall be submitted to the Administrator at least 14 days prior to the commencement of any Works related to the placement of the geotextile. **Milestone**

No geotextile products shall be incorporated into the Works until all *manufacture sample* test reports and certificates (refer to Clause 9.2.1) have been accepted by the Administrator, and the Administrator has given the Contractor permission to proceed. **Hold Point 2**

The geotextile shall conform in all respects to the property requirements listed in Table 6.2.1 and calendaring requirements detailed in Clause 6.2.2.

Table 6.2.1 – Property requirements of geotextile

Property	Test Method	Unit	Type 1	Type 2
Application	–	–	Geotextile reinforced seal over a pavement without a soft or clay subgrade and without soft or clay materials within it.	Geotextile reinforced seal over a pavement with a soft or clay subgrade, or with soft or clay materials within it.
Material	–	–	Polyester	
Calendering	–	–	Refer to Clause 6.2.2	
Melting point	ASTM D276 or ASTM E794-06	°C	≥ 200	
Elongation	AS 3706.2	%	40 to 70	
Resistance to UV † ¹	AS 3706.11, ASTM D4355 or EN 12224	%	>50	
Mass per unit area	AS 3706.1	g/m ²	130 to 160	170 to 200
Thickness	AS 3706.1	mm	≥ 0.8	≥ 1.2
Wide strip tensile strength † ²	AS 3706.2 Method A	kN	≥ 6.0	≥ 9.0
G-rating † ³	AS 3706.4 and AS 3706.5	–	≥ 950	≥ 1100
Bitumen retention † ⁴	ASTM D6140	L/m ²	≥ 0.9	≥ 1.1

†¹ UV resistance shall be measured and reported at 500 hours of exposure for AS 3706.11 and ASTM D4355, or, at 50 MJ/m² radiant exposure for EN 12224.

†² The characteristic value of wide strip tensile strength shall be used in the calculation of tensile strength (refer to Clause 9.2.4).

†³ Refer to Table 2 for details on calculating the *G-rating*. The characteristic values of the AS 3706.4 *Burst Strength (L)* and the AS 3706.5 *Drop Cone Puncture Resistance (H₅₀)* shall be used in the calculation of *G-rating* (refer to Clause 9.2.4).

†⁴ Testing shall be completed in accordance with ASTM D6140 with the following amendment: where possible, Class 170 bitumen complying with MRTS17 *Bitumen and Multigrade Bitumen* shall be used, and testing shall be undertaken at 160°C.

6.2.2 Calendering requirements

With regards to calendering:

- geotextiles with calendering on both sides shall not be used
- geotextiles with no calendering on either side can be used in all applications, and
- geotextiles with calendering on one side only, may be used provided they comply with the placement requirements of this clause and Clause 8.7.2.

In addition to the requirements of Clauses 6.2.1 and 8.7.2, geotextiles with calendaring on one side only, can be accepted for use, provided that a laboratory and/or field trial is undertaken to prove, to the Administrator's satisfaction, that sufficient bitumen impregnation of the geotextile is achieved. In addition, it must also be demonstrated that there is no excess bitumen trapped beneath the geotextile or on top of the geotextile. If a laboratory and/or field trial cannot demonstrate this, the geotextile shall be removed from the trial section and the trial section rectified, so that the completed Works comply with the requirements of this Technical Specification. **Hold Point 3**

7 Identification, packaging, delivery, storage and protection

Geotextile material shall be delivered to the Site at least 14 days prior to commencement of installation. **Milestone**

14 days has been nominated to allow enough time for onsite sampling and testing as described in Clauses 9.2.2 and 9.2.3 respectively. Where a Contractor has a limited site establishment period (for example, road maintenance activities), the Administrator may choose to reduce the 14 days requirement. However, the Contractor will need to consider the risks of placing the geotextile without confirmation of the onsite sample test results.

The geotextiles used for the Works shall be new and shall not have been exposed to UV radiation or moisture (for example, during transportation or storage). Geotextiles which have been affected by UV radiation or moisture (for example, prior to or during supply and onsite storage) shall not be used. Any geotextiles delivered to the Site which has evidence of prolonged exposure to UV radiation or moisture, shall be removed from Site and replaced with conforming geotextiles at no additional cost to the Principal.

All geotextile rolls delivered to the Site, shall comply with AS 3705 for identification and marking. Each geotextile roll supplied to Site, shall have a unique identification code which identifies the product name and its *manufacturing batch* code. The labelling shall be at increments no greater than 10 m along the total length of the roll. If the geotextile product to be used for the Works has difficulties with labelling / printing, the geotextile Supplier shall propose a method of identification to be considered by the Administrator.

It is imperative that there is clear traceability between the geotextile rolls delivered to Site, its representative *manufacture batch* and the test reports provided to the Administrator.

All geotextiles delivered to the Site, shall comply with AS 3706.1 for packaging and storage requirements. In addition to the requirements of AS 3706.1, geotextiles shall be stored under protective cover or wrapped with a waterproof, opaque UV protective sheeting to avoid any exposure and damage prior to installation.

Geotextiles shall not be left directly exposed to sunlight. At all times, the Contractor shall make the necessary arrangements to reduce the risk of deterioration of the geotextile material under the action of UV light.

The geotextiles shall not be stored directly on the ground, or in any way that it may be affected by heat or moisture.

Rolled geotextile materials may be laid flat or stood on end.

The method of storage shall be in accordance with any other recommendations set by the Manufacturer and/or Supplier. The *Supplier's Product Specifications* and/or *Installation Guidelines* shall be adhered to with regards to protection and storage.

No geotextile products shall be incorporated into the Works, unless it has been stored correctly onsite and the Administrator has given the Contractor permission to proceed. **Hold Point 4**

8 Construction requirements

8.1 General

Geotextile reinforced seals shall be installed at the locations shown on the Contract and/or Drawings.

8.2 Seal design

Prior to the commencement of sealing operations, the Contractor shall prepare or confirm the geotextile reinforced seal design as per the requirements of MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*.

For preparing the geotextile reinforced seal design, refer to the following documents:

- Transport and Main Roads TN175 *Selection and Design of Sprayed Bituminous Treatments*
- Austroads *Guide to Pavement Technology Part 4K: Selection and Design of Sprayed Seals*, and
- MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*.

8.3 Pavement surface preparation

8.3.1 General

In all cases, the pavement surface shall be adequately prepared prior to spraying the bond coat and placing the geotextile.

Any additional surface preparation as specified in the Contract and/or Drawings, shall be adhered to by the Contractor.

Any additional surface preparation as outlined in the *Supplier's Installation Guidelines*, shall be adhered to by the Contractor.

8.3.2 Preparation

The pavement surface shall be prepared in accordance with MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)*.

The pavement area adjacent or surrounding the construction lot shall also be thoroughly swept to prevent construction traffic dragging contaminants onto the prepared pavement surface, bond coat and placed geotextile.

Manhole covers, gully pits, kerb / channels and other structures shall be identified and have surfaces cleaned free of any extraneous material.

Where applicable, all raised extruded thermoplastic road markings and raised pavement markers (RPMs) shall be removed prior to spraying the bond coat and placing the geotextile.

8.3.3 Crack filling

Cracks wider than 2 mm shall be filled prior to spraying the bond coat and placing the geotextile.

The Contractor shall mark out, in the presence of the Administrator, the extent of crack filling to be carried out. **Witness Point 1**

Prior to filling of cracks, the existing cracks shall be cleaned with compressed air or vacuumed. Cracks shall be filled level with the surrounding surface, using a polymer modified bituminous sealant approved by the Administrator.

Potholes or larger cracks shall be treated with proper backfill and compaction, as per Drawings and/or Contract requirements prior to spraying the bond coat and placing the geotextile.

Excess material shall be disposed of in accordance with the requirements of Clause 10 of MRTS01 *Introduction to Technical Specifications*.

8.4 Pavement surface temperature

Spraying of the bitumen and placement of geotextile shall not commence until the temperature of the pavement surface is above the temperature limits specified in MRTS11 *Sprayed Bituminous Surfacing (Excluding Emulsions)*.

Spraying of the bitumen and placement of the geotextile shall not be undertaken when the pavement surface temperature exceeds 50°C, unless otherwise directed by the Administrator.

Where there are high environmental and pavement temperatures, there is an increased the risk of pick-up and instability during the placement of the geotextile and subsequent spray seal. Additional care and attention is required by the Contractor when completing the Works in hot conditions (for example, undertaking the Works during the cooler periods of day).

8.5 Weather conditions

Spraying of bitumen and placement of geotextile shall not commence until the weather conditions comply with the requirements of MRTS11 *Sprayed Bituminous Surfacing (Excluding Emulsions)*.

8.6 Bond coat

8.6.1 Bond coat application rate

The bond coat application rate shall be submitted as part of the geotextile reinforced seal design (refer to Clause 8.2).

8.6.2 Spraying bond coat

The relevant bitumen spraying requirements detailed in MRTS11 *Sprayed Bituminous Treatments (Excluding Emulsion)* shall be adhered to by the Contractor.

For each spray run, the Contractor shall record all details of the spraying operations on a suitable Spray Sheet and provide it to the Administrator.

The sprayer shall avoid driving through already sprayed bitumen, or undertaking multiple spray runs over the same location.

Precautions shall be taken to protect kerbs, channels, adjoining structures, traffic and parked vehicles from the bitumen spray.

As a guide, the bitumen bond coated surface shall have a 'mirror' effect, which can be observed and assessed by the Administrator.

Figure 8.6.2 – C170 bitumen bond coat being sprayed on a prepared pavement surface



8.6.3 Trafficking the bond coat

The bond coated surface shall not be opened to public traffic. Trafficking of the bond coat shall be restricted to the geotextile placement construction vehicles only.

8.7 Placement of geotextile

8.7.1 General

Placement of the geotextile shall commence immediately following spraying of the bond coat.

It is recommended that the first geotextile placement lot should be a small trial area to check and refine the bond coat and geotextile placement procedure. This small trial area can be used to demonstrate to the Administrator that the correct construction procedures and processes are in place.

8.7.2 Placing geotextile

As part of the Contractor's construction procedure (refer to Clause 5.2), a placement plan shall be prepared which considers the pavement geometry (lane widths, grades, crossfalls and so on), joints and overlaps.

The geotextile shall be placed in accordance with the lines and grades as shown on the Drawings and/or Contract. The geotextile shall be oriented such that the roll length runs parallel to the road direction.

Placement shall be undertaken mechanically, using a specialised application frame capable of handling full roll widths. The application frame shall be designed and operated such that the geotextile is uniformly tensioned during application, to minimise the risk for wrinkles and folds.

Using inappropriate plant and application frames, will result in an unsuccessful placement of the geotextile.

Typically, the applicator is a lightweight frame attached to a multi-tyred roller (or other similar plant), with an application frame (or spindle) to hold the roll of geotextile. Brooms, brushes and/or rubber bars attached to the application frame are used to help press the geotextile into the surface.

Figure 8.7.2 – Installation of geotextile using application frame attached to multi-tyred roller



Manual hand installation shall be carried out only in areas where it is impractical to use machinery.

Where a geotextile with calendaring on one side is used, the non-calendared side shall be placed onto the bond coat. The calendared side shall face upwards, after the geotextile has been applied to the bond coat.

Geotextile material shall be laid flat and smooth directly on the prepared pavement surface and bond coat. A roller (or rollers) shall follow the placement of the geotextile, to ensure a flat and smooth product and adequate impregnation of the bond coat into the geotextile (refer to Clause 8.7.3).

Geotextile shall be installed by the Contractor as to avoid wrinkles and folds. Wrinkles and folds that form during the laying process, shall be removed by brooming and/or cutting. Wrinkles and folds large enough to cause laps and folds of greater than 25 mm in length or height, shall be cut, laid flat and lapped. Additional bitumen binder shall be sprayed over the lapped area at a rate equal to the bitumen absorption rate of the geotextile. All wrinkles and folds rectification Works shall be completed by the Contractor at no additional cost to the Principal.

8.7.3 Rolling geotextile

A roller (or rollers) shall follow the placement of the geotextile to ensure a flat and smooth product and adequate adhesion to the underlying bond coat / prepared pavement surface.

Rolling of the geotextile into the bond coat, shall be carried out with a multi-tyred roller weighing less than 15 tonnes. The geotextile shall be rolled in a longitudinal direction only. Rolling shall commence along the centreline of the placed geotextile and gradually move towards the edge of the geotextile.

Rolling shall be enough to ensure that the bond coat is sufficiently impregnated into the geotextile, while being less than that required to cause bleeding of the bitumen through the geotextile and pick-up of the geotextile by construction plant tyres.

As a guide, the black boot prints of workers over the freshly installed geotextile can be considered as good indication the sufficient bond coat has impregnated into the geotextile.

Figure 8.7.3(a) – Rolling geotextile using a multi-tyred roller to help impregnate the bitumen into the geotextile.



Figure 8.7.3(b) – Bitumen impregnated to the geotextile during rolling



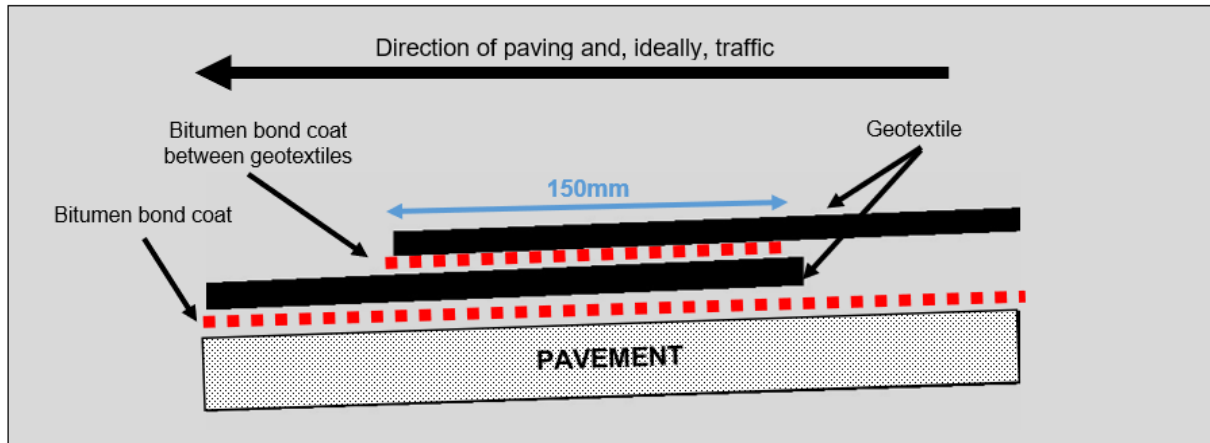
8.7.4 Joints and overlaps

8.7.4.1 General

Joints and overlaps shall be of the 'cut and lap' type. All joints shall be overlapped by a minimum distance of 150 mm (refer to Figure 8.7.4.1). After application of the first geotextile, an additional bond coat shall be applied to the top of the lower geotextile over the area of overlap. Application of the additional bond coat may be carried out using a hand-held sprayer or vehicle sprayer. Irrespective of the method used, the additional bond coat shall be sprayed at a rate equal to the bitumen absorption rate of the geotextile.

The Administrator shall inspect the completed geotextile joints and overlaps. **Witness Point 2**

Figure 8.7.4.1 – Geotextile overlaps



Further guidance on joints and overlaps can be found in AfPA Pavement Work Tip 53 *Joints in Geotextile Reinforced Seals*.

8.7.4.2 Longitudinal

Geotextile widths shall be selected and the geotextile shall be placed in such a manner that joints of parallel rolls occur at a centreline, lane line, edge line or in the shoulder. Joints shall not be located underneath wheel paths.

8.7.4.3 Transverse

Transverse joints shall be lapped in the direction of paving to prevent edge pick-up by construction traffic and/or paver. The geotextile shall also be placed in the same direction as the traffic flow, unless the Contractor can demonstrate to the Administrator, to the Administrator's satisfaction, that it is not practical to do so.

8.7.5 Trafficking the geotextile

Trafficking of the installed geotextile shall be restricted to essential construction traffic only. Sharp braking and turning on the geotextile shall be avoided.

The pavement shall not be opened to public traffic until after the bituminous surfacing has been placed on the bitumen impregnated geotextile.

8.7.6 Inspection of the geotextile

Prior to placement of the bituminous surfacing, the geotextile shall be inspected by the Administrator to ensure that the geotextile is installed as per this Technical Specification's requirements.

Witness Point 3

Any damaged or incorrectly installed geotextile shall be removed and replaced by the Contractor, at no additional cost to the Principal, prior to spraying the overlying bituminous surfacing.

8.8 Bituminous surfacings

Sprayed bituminous surfacings shall comply with the requirements of MRTS11 *Sprayed Bituminous Surfacing (Excluding Emulsions)*, MRTS22 *Supply of Cover Aggregate* and any other relevant Technical Specifications.

Cover aggregate shall comply with the requirements of MRTS11 *Sprayed Bituminous Surfacing (Excluding Emulsions)*, MRTS22 *Supply of Cover Aggregate* and any other relevant Technical Specifications.

9 Compliance testing

9.1 General

Conformance testing on geotextile delivered to the Site, shall be undertaken by the Contractor in accordance with the requirements of Clause 9.

Compliance testing of geotextiles shall be undertaken on a lot basis in accordance with MRTS01 *Introduction to Technical Specifications*.

For each lot, the Contractor is responsible for undertaking sufficient testing, to ensure that the geotextile complies in all regards with the requirements of this Technical Specification.

The Contractor shall ensure that sufficient, clearly documented construction compliance records are provided to the Administrator to ensure that traceability of the geotextile from its manufacture to the constructed pavement.

Maximum lot sizes, minimum test frequencies and the minimum number of tests required, are specified in Appendix A.

9.2 Compliance testing requirements

9.2.1 Testing requirements for manufacture sample

A representative sample shall be taken during a *manufacture batch* and tested. The *manufacture batch* and corresponding test results shall be clearly traceable to the geotextile rolls supplied to the Works.

The following properties of the *manufacture sample* shall be tested as per the requirements of Appendix A Table A2:

- wide strip tensile strength
- elongation
- G-rating
- melting point
- mass per unit area
- thickness
- bitumen retention, and
- resistance to UV.

Refer to Table 6.2.1 for the minimum requirements for the abovementioned property tests.

The testing can be undertaken through the geotextile Manufacturer, geotextile Supplier and/or the Contractor.

Identification and traceability information including geotextile type, materials source, Manufacturer, *manufacture batch* identification code, sample date and roll directional markings shall be shown on or attached to the test reports.

All *manufacture sample* test reports and certificates shall be provided to the Administrator, as per the requirements of Clause 6.2.1 (Hold Point 2).

9.2.2 Onsite sampling

Where the total required batch size for the Contract is less than 2000 m², the requirements for onsite sampling and subsequent testing shall be relaxed by the Administrator, provided the following criteria is met:

- all *manufacture sample* test reports and certificates (refer to Clause 9.2.1) comply with the requirements of Table 6.2.1
- the nominal wide strip tensile strength of the geotextile supplied is 20% higher than the requirements shown in Table 6.2.1 for the appropriate application, and
- calendering requirements comply with Clause 6.2.2.

Where the total size supplied for the Works is more than 2000 m², onsite sampling shall be carried out in accordance with AS 3706.1 at the frequency stated in Appendix A Table A3.

Upon delivery of the geotextile to the Site (refer to Clause 7), a representative sample shall be taken from the roll(s) to be tested in accordance with AS 3706.1. The representative sample shall be no less than four linear metres along the roll for the full production width, but not within two metres of the start or end of the roll. **Witness Point 4**

Each sample shall be clearly marked with a large arrow showing the longitudinal direction of the geotextile. The directional marking shall be used to identify the direction of samples for strength tests in both longitudinal and transverse directions.

The Administrator may select additional samples to be taken at the Site for audit testing (refer to Clause 9.4).

9.2.3 Testing requirements for onsite samples

The following properties of the *onsite sample* geotextile shall be tested as per the requirements of Appendix A Table A3:

- wide strip tensile strength
- elongation
- G-rating
- mass per unit area
- thickness, and
- bitumen retention.

The following representative test results shall be calculated from the results of tests carried out on a minimum number of 10 test specimens cut from the sampled roll of geotextile:

- a) the characteristic value of the wide strip tensile strength as determined in accordance with AS 3706.2 Method A
- b) the characteristic value of the burst strength as determined in accordance with AS 3706.4
- c) the drop cone puncture resistance as determined in accordance with AS 3706.5
- d) mass per unit area as determined in accordance with AS 3706.1

- e) thickness as determined in accordance with AS 3706.1, and
- f) the mean value of bitumen retention as determined in accordance with ASTM D6140.

Refer to Table 6.2.1 for the minimum requirements for the abovementioned property tests.

The testing can be undertaken through the geotextile Supplier and/or the Contractor.

All *onsite sample* test reports and certificates shall be provided to the Administrator as soon as practical.

9.2.4 Characteristic value

The characteristic value of the strength properties listed in Table 6.2.1 shall be calculated in accordance with the requirements of Clause 12 of MRTS01 *Introduction to Technical Specifications*, except that the acceptance constant k shall be taken as 0.83.

9.3 Acceptance

A geotextile supply and placement lot shall be deemed to achieve conformance and be accepted by the Administrator, if all material and construction requirements comply with this Technical Specification. **Hold Point 5**

If a geotextile lot fails to comply with the properties defined in Table 6.2.1, this will constitute a Nonconformance under the Contract. As part of the corrective action, the geotextile lot can be re-sampled in accordance with Clause 9.2.2 and retested in accordance with Clause 9.2.3 to verify whether the lot conforms or not. If upon retesting the geotextile lot fails to achieve conformance, then the lot should be rejected.

For spray sealing Works, any Nonconformances are to be raised and actioned as per the relevant Technical Specifications.

9.4 Audit testing

The Administrator may select samples from the Site and make arrangements for audit testing to be carried out, regardless of the quantity of the geotextile material supplied.

10 Supplementary requirements

The requirements of this Technical Specification are varied by the supplementary requirements specified in Clause 2 of Annexure MRTS57.1.

Appendix A: Maximum lot sizes and minimum testing frequencies
Table A1 – Maximum lot size requirements

Construction Activity	Maximum Lot Size
Supply of geotextile (refer to <i>onsite sample</i> Clause 9.2.2)	10,000 m ²
Placement of geotextile	The area (in m ²) of placement achieved during a single work period

Table A2 – Material testing compliance requirements for manufacture samples

Material Property	Test Method	Normal Testing Level	
		Minimum Testing Frequency	Minimum No. of Tests
Wide strip tensile strength	AS 3706.2	The currency of test reports and certificates shall be no older than 12 months from the date of the supply to the Works.	1 test on the manufacturing batch for the rolls supplied to the Works.
Elongation	AS 3706.2		
G-rating	AS 3706.4 and AS 3706.5		
Mass per unit area	AS 3706.1		
Thickness	AS 3706.1		
Melting point	ASTM D276 or ASTM E794-06		
Bitumen retention	ASTM D6140		
Resistance to UV	AS 3706.11, ASTM D4355 or EN 12224	The currency of test reports and certificates shall be no older than 5 years from the date of the supply to the Works.	1 test on a manufacturing batch which is representative of the rolls supplied for the Works.

Table A3 – Material testing compliance requirements for onsite samples

Material Property	Test Method	Normal Testing Level		Reduced Testing Level	
		Minimum Testing Frequency	Minimum No. of Tests	Minimum Testing Frequency	Minimum No. of Tests
Wide strip tensile strength	AS 3706.2	1 test per 5,000 m ²	1 test per lot	1 test per 10,000 m ²	1 test per lot
Elongation	AS 3706.2				
G-rating	AS 3706.4 and AS 3706.5				
Mass per unit area	AS 3706.1				
Thickness	AS 3706.1				
Bitumen retention	ASTM D6140				

Superseded

Superseded