Department of Transport and Main Roads

Technical Specification

Transport and Main Roads Specifications MRTS27 Geotextiles (Separation and Filtration)

March 2025

(ATS 2160 Geotextiles (Separation and Filtration), Ed 1.1 August 2024)

Queensland Government

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About this document

The document adopts and modifies Austroads Technical Specification ATS 2160 *Geotextiles (Separation and Filtration)* as part of national harmonisation. It sets out the requirements for the supply and installation of geotextiles used as separation and/or filtration elements in the construction of earthworks, pavement and soil structures.

How to use this document

This document includes the national guidance and Queensland-specific advice while following the structure established in Austroads Technical Specifications.

Queensland-specific advice includes practices which vary from national practice because of local environmental conditions (such as geography, soil types, climate); different funding practices; local research; local legislation requirements; and to expand instruction on particular issues.

This document:

- sets out how the Austroads Technical Specification ATS 2160 *Geotextiles (Separation and Filtration)* applies in Queensland
- has precedence over the Austroads Technical Specification ATS 2160 *Geotextiles (Separation and Filtration)* when applied in Queensland
- has the same clause numbering and headings as the Austroads Technical Specification ATS 2160 *Geotextiles (Separation and Filtration)*.

Transport and Mains Roads provides an ancillary document which outlines adopted national and modified Queensland-specific content with tracked changes. To access a copy click on the below link: Ancillary documents for harmonised Technical Specifications.

Terminology

The following general amended definitions apply when reading this document.

Reference to…	Means
Shall	Denotes mandatory requirements
Must	Denotes mandatory requirements
Principal	The State of Queensland acting through the Department of Transport and Main Roads.
Administrator	The Administrator will be responsible for the overall administration of this Contract.

Contents

1 Scope

1.1 This Technical Specification sets out the material properties and construction requirements for the supply and installation of geotextiles used as separator and/or filtration in subsurface drainage system, earthwork and batter protection work. It does not cover:

a) paving fabrics used in bituminous spray sealing applications, or

b) high strength geotextile reinforcement used to improve global stability of earth structures.

1.2 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.

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

2 Referenced documents

2.1 The requirements of the referenced documents listed in Table 2.1 below apply to this Technical Specification. Where there are inconsistencies between this Technical Specification and the referenced documents, the requirements specified in this Technical Specification shall take precedence.

Table 2.1 – Reference documents

Reference	Title
Australian / New Zealand Standards	
AS 1289	*Methods of testing soils for engineering purposes*
AS 1726	*Geotechnical site investigations*
AS 2001.2.13	*Determination of Mass Per Unit Area and Mass Per Unit Length of Fabrics*
AS 3706	*Geotextiles – Methods of test*
AS/NZS ISO 9001	*Quality management systems – Requirements*
Method 1	*General requirements, sampling, conditioning, basic physical properties and statistical analysis*
Method 2	*Determination of tensile properties - Wide strip and grab method*
Method 3	*Geotextiles – Methods of test – Determination of tearing strength – Trapezoidal method*
Method 3.6.1	*Soil classification tests – Determination of the Particle Size Distribution of a Soil – Standard Method of analysis by sieving*
Method 4	*Determination of burst strength - California bearing ratio (CBR) - Plunger method*
Method 5	*Determination of puncture resistance - Drop cone method*
Method 7	*Determination of pore-size distribution – Dry- sieving method*
Method 9	*Determination of permittivity, permeability and flow rate*
Method 11	*Determination of durability – Resistance to degradation by light, heat and moisture*
Method 12	*Determination of durability – Resistance to degradation by hydrocarbons or chemical reagents*

Reference	Title
Method 13	*Determination of durability – Resistance to certain microbiological agents*
Austroads	
AGPT04G-09	*Guide to Pavement Technology Part 4G: Geotextiles and Geogrids*
AP-C87-15	*Austroads Glossary of Terms*
Transport and Main Roads Technical Documents	
MRTS01	*Introduction to Technical Specifications*
MRTS50	*Specific Quality System Requirements*

3 Definitions

3.1 The terms defined in MRTS01 *Introduction to Technical Specifications*, AP-C87-15 and AGPT04G-09 apply to this Technical Specification. Additional terminology relevant to this Technical Specification is defined in Table 3.1 below.

Table 3.1 – Definition of terms

Term	Definition
C_u	Coefficient of Uniformity = D_{60}/D_{10} in accordance with AS 1726.
D_n	Nominal particle size of material defined as the sieve through which n% by mass of the particles will pass when tested in accordance with AS 1289.3.6.1.
EOS	Equivalent opening size of the geotextile material defined as O_{95} taken to be the mean value of the test results obtained in accordance with AS 3706.1 and AS 3706.7.
G Rating	Geotextile Strength Rating, determined in accordance with Appendix B.
Q_{100}	Flow rate through the geotextile material, in L/m²/s, under 100 mm constant head conditions in accordance with AS 3706.9.
Ψ	Permittivity of the geotextile material, in s^{-1}, determined in accordance with AS 3706.9 under 100 mm constant head conditions.

4 Quality system requirements

4.1 The Contractor must prepare and implement a Quality Plan that includes the documentation in Table 4.1. **Hold Point 1** **Record**

Table 4.1 – Quality Plan

Clause	Description of Document
4.2	Evidence of AS/NZS ISO 9001 certification and the product data or a Certificate of Compliance including a Certified Test Report of each proposed geotextile product obtained from the manufacturer.
6	Details (including strength and filtration properties) of the geotextile to be used in the Works are in compliance with Clause 5 of this Technical Specification.
8	Site sampling and testing procedure (where Site Conformance Testing is required).
9	Details / procedures to ensure that the construction process and compaction method does not result in damage to the placed geotextile.

HOLD POINT 1	
Process Held	Placement of order for the geotextile.
Submission Details	The Quality Plan must be provided to the Administrator at least 10 working days prior to ordering of the nominated geotextile product.

4.2 The geotextile must be manufactured under a quality management system independently certified as fully complying with AS/NZS ISO 9001, by an organisation accredited by JAS-ANZ or an affiliated international certification organisation. The manufacturer's Certificate of Compliance together with the NATA endorsed Test Report shall not be more than 12 months old.

5 Materials

General

5.1 The fibres of the geotextile and thread used in joining lengths must consist of long chain synthetic polymers composed of at least 95% by mass of polyolefins or polyesters.

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

5.3 Non-woven geotextiles must have filaments bonded by needle punching, heat or chemical bonding processes.

5.4 Woven geotextiles must have filaments interlaced in two sets, mutually at right angles. One set must be parallel to the longitudinal direction of the geotextile.

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

5.6 The geotextiles must be stabilised against ultraviolet radiation such that when tested in accordance with AS 3706.11 it has a retained strength of at least 50% after 500 hours of test exposure. The Certificate of Compliance (refer Clauses 4.1, 6.9 and 8.15) must include evidence of compliance with this requirement.

5.7 Geotextiles manufactured from recycled materials must conform to the requirements of this Specification, be identified as such on the Certificate of Compliance (refer Clauses 4.1, 6.9 and 8.15), and must be homogeneous with respect to the content of recycled material.

Geotextile Strength Class

5.8 The geotextile, when sampled and tested in accordance with Clause 8, must comply with the relevant requirements of Table 5.8 for the Strength Class specified.

Table 5.8 – Geotextile Survivability Strength Class Requirements

Geotextile Strength Class	Elongation [1]	Minimum Characteristic Grab Strength (N)	Minimum Characteristic Tearing Strength (N)	Minimum G Rating
Test Method or Methodology:	AS 3706.4	AS 3706.2 Method B	AS 3706.3	Appendix B
A	≥ 30%	500	180	900
	<30%	800	300	1,350
B	≥ 30%	700	250	1,350
	<30%	1,100	400	2,000
C	≥ 30%	900	350	2,000
	<30%	1,400	500	3,000
D	≥ 30%	1,200	450	3,000
	<30%	1,900	700	4,500
E	≥ 30%	1,600	650	4,500

Notes:

[1] Elongation, to differentiate between woven geotextiles and nonwoven geotextiles, is the % CBR puncture elongation corresponding to maximum puncture strength determined in accordance with AS 3706.4. In general, woven geotextiles will break at elongations less than 30% while nonwoven geotextiles will break at elongations equal to or greater than 30%.

Geotextile Filtration Classes

5.9 The geotextile, when sampled and tested in accordance with Clause 8, must comply with the relevant requirements of Table 5.9 for the Filtration Class specified.

Table 5.9 – Geotextile Filtration Class Requirements

Filtration Class [1]	Minimum Characteristic Flow Rate Q100 (l/m²/s)	Minimum Characteristic Permittivity Ψ (s-1)	Maximum Mean EOS (µm) [1]
Test Method:	AS 3706.9	AS 3706.9	AS 3706.9
Class I	50	0.5	120
Class IIa	50	0.5	250
Class IIb	50	0.5	430
Class III	30	0.3	120
Class IVa	20	0.2	250
Class IVb	20	0.2	600
Class V	10	0.1	120
Class VI	10	0.1	300
Class VII	5	0.05	300

Filtration Class [1]	Minimum Characteristic Flow Rate Q100 (l/m²/s)	Minimum Characteristic Permittivity Ψ (s-1)	Maximum Mean EOS (µm) [1]
Class VIII	5	0.05	600

Notes:

[1] Slit film woven type geotextile is not permitted for Filtration Classes I, II, III, IV, V and VI.

6 Selection of Geotextile

General

6.1 If the requirements for Strength Class and Filtration Class are not specified in the Contract documents, the Contractor must determine the requirements for the Strength Class and Filtration Class in accordance with this Clause 6.

6.2 Where the geotextile is used as filter and/or separation layers under or within embankments, it may be a woven or a non-woven type. However, where the geotextile is used under rockfill embankments or placed over rockfill or other uneven surfaces (such as broken mangrove stumps and roots), it must have an elongation greater than 30%. For the purposes of this clause, any material with maximum nominal stone size D_{85} > 200 mm is deemed to be rockfill.

6.3 The Strength Class and Filtration Class must comply with Tables 5.8 and 5.9.

Table 6.3 – Geotextile Application Categories

Application	Strength Class [1, 2]	Filtration Class	
		D_{15} ≤ 0.075 mm (Cohesive soils)	D_{15} > 0.075 mm (Granular soils)
Separation under / within embankments (unsaturated conditions) To prevent mixing of dissimilar soil types during construction for unsaturated soils where CBR > 3	Refer Table 6.4	VII	VIII
Separation under / within embankments (saturated ground) **Working platform / bridging layer applications [4]** To prevent mixing of dissimilar soil types in saturated conditions in working platform / bridging layer applications for soils where CBR ≤ 3 and where filtration is not a critical function	Refer Table 6.4	VI	IVb

Application	Strength Class (1, 2)	Filtration Class		
		D_{15} ≤ 0.075 mm (Cohesive soils)		**D_{15} > 0.075 mm (Granular soils)**
Drainage and separation behind retaining structures including rock filled mattresses and joints of pipes and arches To provide the combined functions of separation and filtration	Refer Table 6.6	III		IIa
Under rock armour revetment layer in embankments (3)	Class D for D_{85} < 200 mm and Class E for D_{85} between 200 and 400 mm	III		IIa
		D_{50} ≤ 0.075 mm (Predominantly silt and clay soils)	**D_{50} > 0.075 mm and D_{15} ≤ 0.075 mm (Predominantly granular soils with low permeability)**	**D_{15} ≥ 0.075 mm (Predominantly pervious granular soils)**
Drainage blankets	Refer Table 6.4	V	IVa	IIb
Drains, including trench drains, edge drains, counterfort and cut-off drains	Refer Table 6.5	V	IVa	IIb

Notes:

(1) Requirements for strength class for installation damage protection are based on a 1.5 m drop height of material for the corresponding maximum nominal stone size.

(2) Geotextile Strength Class to ensure survivability for the given application. Geotextile survivability refers to the ability of the geotextile to withstand the installation stresses during construction. It is related to construction method, subgrade condition, backfill material including stone size and other factors.

(3) Where the maximum drop height of the rock armour exceeds 1.5 m, an aggregate layer with a nominal maximum stone size of less than 75 mm must be placed as an initial layer prior to the placement of larger revetment rock armour, to protect the geotextile.

(4) Separation under saturated ground may encounter circumstances where filtration could become a critical function; for example, shallow height embankments where foundation pumping can occur during the life of the roadway. In these circumstances, the selection of geotextile must also satisfy the filtration requirements of drains.

6.4 The Strength Class for mechanical separation of soil layers, including drainage blanket, must comply with Table 6.4.

Table 6.4 – Minimum Strength Class for Mechanical Separation of Soil Layers and Drainage Blankets

D_{85} of Material (mm) (1)	**Strength Class (Mechanical Separation of Soil Layers)**		**Strength Class (Drainage Blanket)**	
	CBR ≤ 3 (2)	**CBR > 3 (2)**	**CBR ≤ 3 (2)**	**CBR > 3 (2)**
≤ 37.5	C	A	C	B
≤ 75	C	B	D	C
≤ 200	D	C	E	D
≤ 400 (3)	E (4)	D	E (4)	E
≤ 600 (3)	Not applicable (5)	E	Not applicable (5)	Not applicable (5)

Notes:

(1) Applies to the layer to be placed over geotextile.

(2) Applies to the material on which the geotextile is placed.

(3) For cushioning purposes, a minimum thickness of 150 mm of material with a D_{85} < 75 mm must be used for the initial lift to protect the geotextile.

(4) Not applicable for geotextiles with elongation < 30%.

(5) Specialist design advice must be sought. As an alternative, a layer of fill material with a nominal maximum stone size of less than 75 mm may be used for the initial and final layer of the drainage layer, to prevent damage to the geotextile.

6.5 The Strength Class for trench drain applications must comply with Table 6.5.

Table 6.5 – Minimum Strength Class for Trench Drain Applications

D_{85} of Material (mm) (1)	**Strength Class**	
	Trench Depth < 2 metres	**Trench Depth < 3 metres**
≤ 37.5	A	B
≤ 75	B	C
≤ 200	C	D

Notes:

(1) Applies to layer to be placed over geotextile.

6.6 The Strength Class for drainage and separation behind retaining structures must comply with Table 6.6.

Table 6.6 – Minimum Strength Class for Drainage and Separation Behind Retaining Structures

Type of Structure	Strength Class
Concrete retaining walls Segmental block walls Reinforced soil concrete panel walls	B
Gabion walls Crib walls Rock filled mattresses Joints of pipes and arches	C

Limitations

6.7 The filtration class requirements of Table 6.3 are not applicable to any of the following circumstances for applications which require the geotextile to function as a filter:

a) The water flow may undergo reversal.

b) Highly dispersive clay soils, gap graded soils, fine silt soils and artificially derived soils such as fly ash are used.

6.8 If Clause 6.7 applies, the Contractor must determine the necessary properties of the geotextile and the need for additional granular filters or any special construction techniques. This may require additional soil / geotextile testing. Special consideration is required if the C_u of the insitu material is less than 3.

Certification

6.9 Prior to delivery of each consignment of geotextile to the Site, the Contractor must submit a certificate to the Administrator which certifies that the properties of the selected geotextile complies with Clause 5. **Hold Point 2** **Record**

HOLD POINT 2	
Process Held	Delivery of each consignment of geotextile to the Site.
Submission Details	Manufacturer's Certificate of Compliance including NATA endorsed Test Report comply with Clause 5 must be submitted to the Administrator at least 3 working days prior to the delivery of each consignment of the geotextile to the Site.

7 Storage and Delivery

7.1 Geotextiles must be stored under a protective cover or wrapped with a waterproof, opaque UV protective sheeting to avoid any damage prior to installation.

7.2 Geotextiles must not be stored directly on the ground or in any manner in which they may be affected by heat. The method of storage must be in accordance with any other recommendations set by the manufacturer.

7.3 The protected geotextile rolls must be clearly labelled showing manufacturer, type of geotextile and batch number identification number.

7.4 If Site Conformance Testing is required, the geotextile must be delivered to the Site at least 10 working days prior to commencement of installation.

8 Site Sampling, Testing and Acceptance

General

8.1 Site sampling and testing of geotextile delivered to the project Site shall be carried out in accordance with this Clause 8.

8.2 The Contractor shall carry out control testing on each Lot of geotextile delivered to Site, which requires site sampling and testing, to verify conformity of the properties specified in Table 5.8 and Table 5.9.

8.3 Acceptance will be based on testing samples from each Lot which requires site sampling and testing. Geotextiles which have not been verified by site sampling and testing to prove compliance with strength and filtration requirements must not be used for the Works.

8.4 The Administrator may accept Test Certificates for tests carried out for other projects in accordance with this Clause 8 that verify compliance with Clause 5, provided that the Contractor's quality system ensures the specified minimum frequency of testing is maintained and ensures traceability of material to the same manufacturing batch.

8.5 Unless specified otherwise in the Contract documents or directed by the Administrator, site sampling and testing requirements specified in Table 8.5 must be used.

Table 8.5 – Site Sampling and Testing Requirements

Quantity of Geotextile used on the Site for the Specified Application	Application	
	Geotextile used for earthworks, separation and/or filtration	**Geotextile used for applications other than earthworks (such as behind retaining walls and sub-soil drains)**
< 5,000 m²	Refer Clause 8.6	Not required
≥ 5,000 m²	Site Conformance Testing	Not required

8.6 Where the total area of geotextile supplied under this Contract is less than 5,000 m², Factory Conformance Testing may be used, provided that the nominal strength of the geotextile supplied is 20% higher than the design Strength Class and the nominal filtration properties are 20% lower than the design Filtration Class requirements. Otherwise, Site Conformance Testing will apply.

Site Sampling

8.7 Site sampling must be carried out at the frequency specified in Table 8.7.

Table 8.7 – Site Sampling Frequency

Batch or Order Size Defined as the Lot Size (m²)	Number of Rolls to be Sampled Representing the Lot
Initial 10,000 or part thereof	1
Each subsequent 20,000 or part thereof	1

8.8 A representative sample covering approximately 15 m² of geotextile must be cut from each sampled roll, but not within two metres of the start or end of the roll. Where directed by the Administrator, samples must also be cut and supplied to the Administrator. **Witness Point 1**

WITNESS POINT 1	
Process	Sampling of geotextile (where Site Conformance Testing applies).
Notification Period	At least 1 working day before the sampling.

8.9 Each sample must be clearly marked with a large arrow showing the longitudinal direction of the geotextile. This is termed the warp direction for woven geotextiles. The directional marking is required to identify strength tests in both longitudinal and transverse directions. This applies to both woven and non-woven geotextiles.

8.10 At least 10 test specimens must be cut from the longitudinal direction and at least 10 specimens must be cut from the transverse direction of the sampled roll of geotextile for carrying out grab and tearing strength tests. For all other tests, a minimum of 10 test specimens is required.

Testing and Acceptance

8.11 The geotextile sample shall be tested by the Contractor for the range of properties specified in Table 5.8 and Table 5.9. The mass per unit area of the geotextile shall also be determined in accordance with AS 3706.1 and AS 2001.2.13.

8.12 All testing must be performed by a laboratory which is accredited by a body that is a signatory to the International Laboratory Accreditation Cooperation Mutual Recognition Arrangement (ILAC MRA). The National Association of Testing Authorities (NATA) and International Accreditation New Zealand (IANZ) are signatories to ILAC MRA.

8.13 Identification information including geotextile manufacturer's name, full product name, sample roll number, Lot number, sampling date and roll direction markings shall be shown or attached to the test reports. The results of all tests undertaken must be included in the test report for each Lot.

8.14 Statistical techniques in accordance with MRTS01 *Introduction to Technical Specifications* shall be used to calculate the characteristic values of the strength attributes.

8.15 The characteristic value of the grab strength and tearing strength shall be calculated from the results of tests carried out on a minimum of 10 test specimens cut from the longitudinal direction and a minimum of 10 test specimens cut from the transverse direction of the sampled roll of geotextile. The characteristic value of the grab strength and tearing strength in the weaker direction shall be used to assess Lot conformity.

8.16 In determining the characteristic value for CBR Burst Strength and Drop Cone Puncture Resistance, a minimum of 10 test specimens is required for each test to assess Lot conformity.

8.17 The characteristic value of G Rating shall be determined in accordance with Appendix B of this Technical Specification.

8.18 For conformance with the relevant Strength Class, the characteristic value of the grab strength, tearing strength and the calculated G Rating must be greater than or equal to the relevant limits specified in Table 5.8.

8.19 For conformance with the relevant Filtration Class, the characteristic value of the flow rate and permittivity shall be greater than or equal to the relevant limits specified in Table 5.9 and the mean value of the EOS shall be less than or equal to the relevant limits specified in Table 5.9.

8.20 A Lot shall be deemed to achieve conformance if all rolls tested conform with the specified limits. If the test results show that a Lot does not meet the properties required for the specified use, the roll or rolls which were sampled will be rejected. For each sampled roll that is tested and failed, two additional rolls from the same Lot will be selected for sampling and retesting. The contractor shall sample the rolls in the presence of the Administrator. If the retesting shows that any of the additional rolls tested do not meet the required properties, the entire Lot will be rejected. If the test results from all the rolls retested meet the required properties, the entire Lot minus the roll(s) that failed will be accepted. All geotextiles that have defects, deterioration, or damage, as determined by the Administrator, will also be rejected. **Witness Point 1**

WITNESS POINT 1	
Process	Sampling of geotextile (where Site Conformance Testing applies).
Notification Period	At least 1 working day before the sampling.

8.21 Geotextile Lot that requires site testing must not be placed prior to the release of Hold Point 3. **Hold Point 3** **Record**

HOLD POINT 3	
Process Held	Placement of Geotextile.
Submission Details	For each consignment, a Certificate of Compliance and the NATA endorsed Site Test Report must be provided to the Administrator at least 3 working days prior to: • Commencement of the placement of geotextile (where Site Conformance Testing is required).

Audit Testing

8.22 The Administrator may select samples from the Site for audit testing.

9 Construction requirements

9.1 This Clause 9 specifies the general requirements for the installation of geotextiles. For additional installation requirements which are specific to a particular application (such as earthworks, behind a reinforced soil wall or sub-soil drainage), refer to the applicable Technical Specification.

9.2 Geotextiles must be installed as specified in the Contract documents and the manufacturer's instructions. The area on which the geotextile is to be placed shall be prepared by clearing and grading and all protruding sharp objects and large stones shall be removed. Cut trees and shrubs shall not protrude above the ground surface. The topsoil and vegetation mat may remain unless otherwise specified.

9.3 Geotextiles must not be damaged during installation or subsequent construction work. Any manufacturing defects, tears or punctures must be repaired so that the performance of the geotextile is not adversely affected or the geotextile must be replaced with conforming geotextile.

9.4 Joints in geotextiles must be made by overlapping, sewing, or other methods recommended by the manufacturer. Sewing, where carried out must have seam strengths, as measured in accordance with AS 3706.2, equal or greater than 100% of the specified grab strength. Flat or “prayer” seams, J or Double J type or “butterfly” seams are permitted with a minimum number of two parallel rows of stitching required. If the amount of overlap is not specified, it must be a minimum of 600 mm at all longitudinal and transverse joints except for subsoil drain applications which shall be overlapped a minimum of 300 mm. Sewing must be carried out using a suitable portable industrial sewing machine and a suitable durable polyester or polyester/cotton blend sewing thread, the thread to have minimum breaking load of 20 kg.

9.5 Where overlapping is used, subsequent construction work must not reduce the overlap to less than the minimum specified amount.

9.6 Construction equipment must not stand or travel directly on the laid geotextile. The initial layer of cover material must be placed over the geotextile prior to any construction equipment travelling over the area concerned. The cover material shall be placed on the geotextile to provide the minimum uncompacted initial layer thickness as specified below prior to compaction:

a) Separation under / within embankments (unsaturated conditions, CBR > 3) – Minimum thickness of the initial layer is 150 mm.

b) Separation under / within embankments (saturated conditions, CBR < 3) and Drainage blankets – Minimum thickness of the initial layer is 300 mm.

The thickness of the uncompacted initial layer shall not be less than twice the D_{85} of the fill material. Vibratory and heavy compaction plant shall not be used on the initial lifts of fill materials to avoid damage to geotextiles. Turning of vehicles / compaction machinery on the initial lift above the geotextile shall also not be permitted.

9.7 The geotextile shall be laid smooth without excessive wrinkles. Once placed, geotextiles must be covered by the specified construction materials or suitable protective sheeting within 48 hours.

Appendix A: Summary of Hold Points, Witness Points, Milestones and Records

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

The Hold Points, Witness Points, Milestones and Records that the Contractor must submit to the Administrator to demonstrate compliance with this Technical Specification, are summarised in Table A. There are no Milestones defined.

Table A – Hold Points, Witness Points, Milestones and Records

Clause	Hold Point	Witness Point	Milestone	Record
4.1	1. Ordering the geotextile product			Quality Plan
6.9	2. Delivery of each consignment of geotextile product to the Site			Certification that certifies that the properties of the Lot to be delivered to site comply with all requirements of Clause 5
8.8 and 8.20		1. Sampling of geotextile (where Site Conformance Testing applies)		
8.21	3. Placement of Geotextile Lot that requires Site Conformance Testing			Certificate of Compliance and NATA endorsed Site Test Report

Annexure B: Determination of the Geotextile Strength Rating (G Rating) of a Geotextile

The G Rating must be determined by the following process:

a) For each property to be tested, obtain a minimum of 10 test specimens cut the sampled roll in accordance with AS 3706.1.

b) Determine the CBR burst strength (L) of at least 10 specimens in accordance with AS 3706.4. However, if the strain at failure exceeds 80%, the burst strength at 80% strain must be used.

c) Determine the Drop Cone Puncture Resistance (h_{50}) of at least 10 specimens in accordance with Equation A7 of Appendix A of AS 3706.5.

d) Calculate the following:

   i. the characteristic values of CBR burst strength (L_c) of the Lot tested (i.e. mean CBR Burst Strength – 0.83 x standard deviation).

   ii. he characteristic value of Drop Cone Puncture Resistance (h_{50c}) of the Lot tested (i.e. mean Drop Cone Puncture Resistance – 0.83 x standard deviation).

   iii. the Geotextile Strength Rating (G Rating) for each Lot, as follows:

$$\text{G Rating} = \sqrt{L_c \times h_{50c}}$$

Note: The above characteristic strength calculations are for the sampled roll, from which 10 test specimens were cut and tested.

The following must be reported:

a) Manufacturer's name.

b) Product identification and geotextile type.

c) The order represented by the sample.

d) The identifying roll / batch number and any roll directional markings.

e) Sampling date and date of test.

f) For each specimen tested, the CBR burst strength and Drop Cone Puncture Resistance.

g) Other parameters as required by relevant parts of AS 3706.

h) Mean, standard deviation and characteristic value of CBR burst strength (L_c) and Drop Cone Puncture Resistance (h_{50c}).

i) G Rating, to the nearest 10 units.