R24 Geotextiles
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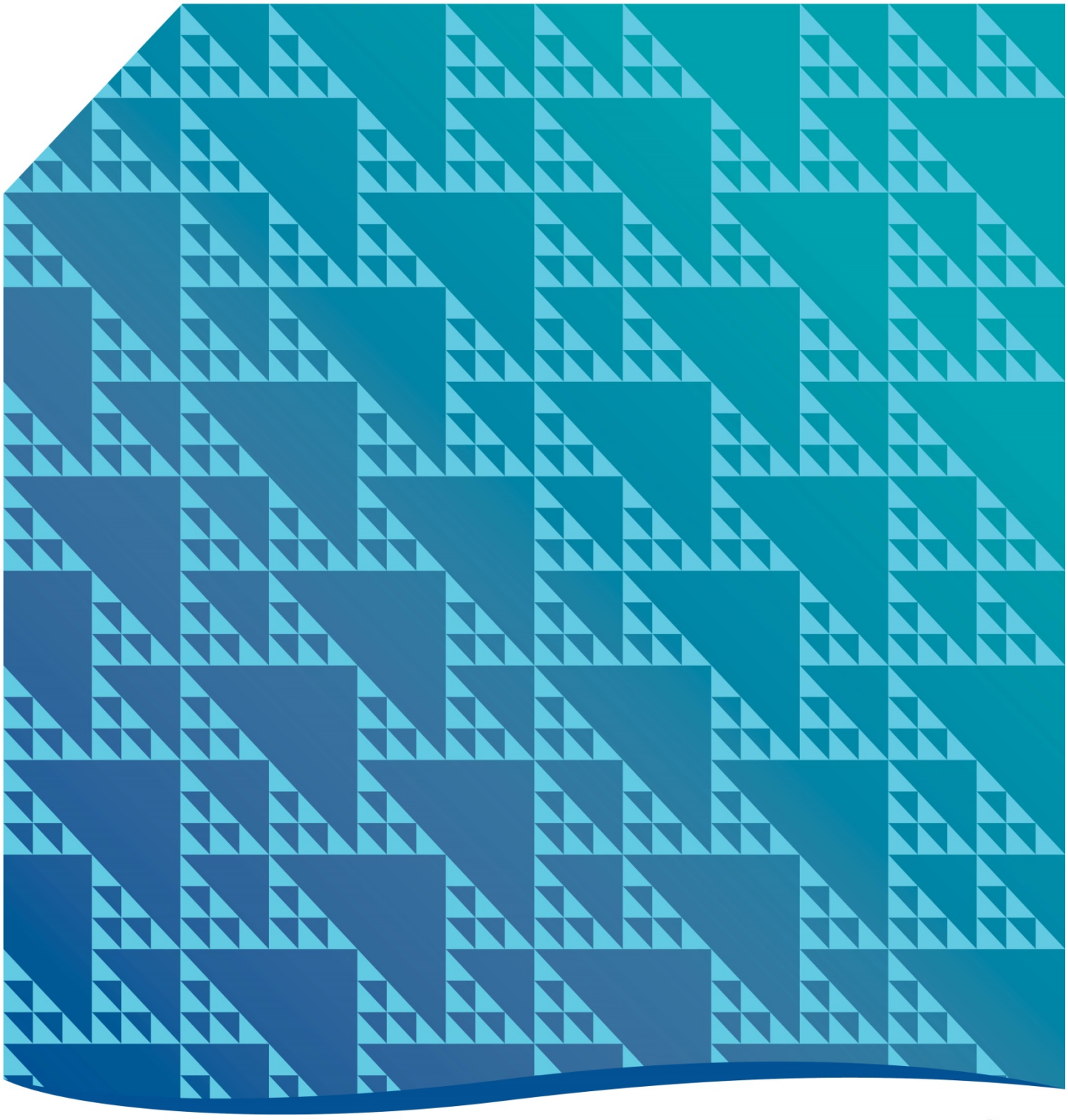
Roadworks Specification



Department of State Growth

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REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1 / Rev 0	All	*'Department of State Growth'* replaces *'DIER'*	BW (MRA)	07.07.14
	R24.1	Clause reworded		
	R24.2	Clause reworded		
	R24.3	References updated		
	R24.7.4	Clause reworded		
	Table R24.3	Class IV, V and VI requirements amended		
	Table R24.4	Filtration and strength classes amended		
	R24.8.2	New wording added		
	Table R24.5	New table added outlining requirements for separation layers		
	Table R24.6	Replaces previous Table R24.5, filtration and strength classes amended		
	Table R24.7	Replaces previous Table R24.6, filtration and strength classes amended		
	R24.9	Wording removed		
	Table R24.8	Replaces previous Table R24.7, new wording added		

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R24.1 SCOPE

This specification sets out the minimum requirements for the supply and installation of geotextile products.

R24.2 OBJECTIVES

This specification aims in conjunction with other nominated Specifications to ensure that:

- materials supplied have been produced under controlled conditions to known and acceptable quality and variability
- production is managed to minimise variability
- materials are stored and handled in a manner that is not detrimental to their immediate or long-term performance
- inspections, sampling and testing are undertaken in a systematic manner by appropriately qualified persons using reliably calibrated equipment
- there is documented evidence, readily available to the Superintendent, which demonstrates that the specified requirements are met.

R24.3 REFERENCES AND STANDARDS

Geotextiles shall be compatible with the provisions of all Department of State Growth Standard Specifications for Design, Construction and Maintenance, Austroads Guides and Test Methods and Australian Standards, in particular:

Department of State Growth Standard Specifications

- G1 – General Provisions
- G2 – Contract Management Plan
- G9 – Product Quality
- R22 – Earthworks
- R33 – Subsoil Drains
- B1 – Earthworks and Foundations
- B50 – Crib Walls
- B51 – Gabion Boxes and Mattresses
- B52 – Reinforced Soil Walls

Austroads

- AP-C87/10 Glossary of Austroads Terms

Austroads Guides to Pavement Technology

- Part 4G – Geotextiles and Geogrids

Australian Standards

- AS 1348 Glossary of terms – Roads and traffic engineering
- AS 2001.2.3.1 Methods of test for textiles – Physical tests – Determination of maximum force and elongation at maximum force using the strip method
- AS 2001.2.3.2 Methods of test for textiles – Physical tests – Determination of maximum force using the grab method (ISO 13934-2:1999, MOD)
- AS 3704 Geosynthetics – Glossary of terms
- AS 3706 Geotextiles – Methods of test (Parts 1, 3, 4, 5, 7 & 9)

R24.4 DEFINITIONS

Further to the documents referred to in *Clause R24.3*, the following definitions shall apply in respect of terms used to specify the physical and mechanical properties of geotextiles:

C_u: Coefficient of uniformity = D_{60}/D_{10}

D_n: Nominal particle size of material defined as the maximum AS sieve size through which n% by mass of the material 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 3706.7*

G Rating: geotextile strength rating= $(L \times H_{50})^{1/2}$

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% strain shall be used

H_{50}: the drop cone puncture resistance of the geotextile material

Q_{100} = flow rate through the geotextile material, in $L/m^2/s$, under 100mm constant head conditions in accordance with *AS 3706.9*

Ψ: permittivity of geotextile material, in s^{-1}. Determined in accordance with *AS 3706.9* under 100mm constant head conditions.

R24.5 CONTRACT MANAGEMENT PLAN (CMP)

Further to *Standard Specifications G2 Contract Management Plan and G9 Product Quality* the Contractor's Contract Management Plan shall include:

- details of the product including name, manufacturer, country of origin, supplier, test conditions and criteria
- Quality Management System of the Product Manufacturer and Product Supplier
- cross references between site lot numbers and the unique product number.

R24.6 PROPRIETARY PRODUCTS AND PROCESSES

For the purposes of this specification, geotextiles are classed as Proprietary Products.

The Contractor shall provide evidence that all proprietary products used have demonstrated satisfactory field performance for a period of at least three (3) years.

Such evidence shall include full details of the products properties.

R24.7 MATERIALS

R24.7.1 General

Geotextiles shall be woven or non woven.

The geotextile fibres shall be rot proof, chemically stable, have a high U.V. stability and shall have low water absorbency. They shall resist delamination and shall maintain their relative position in the geotextile.

Polyester geotextiles shall not be used in alkaline environments, e.g. under concrete, under cement stabilised materials, and in alkaline soils.

Non woven geotextiles shall have the fibres bonded by needle-punching, heat or chemical bonding processes.

Woven geotextiles shall have the fibres interlaced in two sets, at right angles.

R24.7.2 Test Methods

Test methods are listed in *Table R24.1 – Australian Standard Test Methods*.

Table R24.1 – Australian Standard Test Methods

Property To Be Tested	Method No.
Mean weight	*AS 3706.1*
Grab strength	*AS 2001.2.3*
Tearing strength	*AS 3706.3*
Burst strength	*AS 3706.4*
Drop cone puncture resistance	*AS 3706.5*
EOS	*AS 3706.7*
Flow rate and permittivity	*AS 3706.9*

R24.7.3 Test Criteria

Test criteria shall be:

- % elongation corresponding to max CBR burst strength determined in accordance with *AS 3706.4*
- Grab strength is the 80th percentile characteristic value of the lot when tested in accordance with *AS 2001.2.3.2*
- Tearing strength is the 80th percentile characteristic value of the lot when tested in accordance with *AS 3706.3*
- G Rating calculated on the 80th percentile values of CBR burst strength when tested in accordance with *AS 3706.4* and drop height determined in accordance with *AS3706.5.* Where the strain at failure during the CBR burst strength exceeds 80%, the CBR burst strength at 80% strain shall be used
- acceptance for all tests shall be determined on a 10 lot test with a 50% probability of acceptance based on the equation: x-ks
- where "x" is the mean value and "s" the standard deviation. The Acceptance constant "k" shall be 0.87.

R24.7.4 Strength Classes

Geotextiles, where required for separation and/or filtration, are referenced by a strength class which shall meet the requirements of *Table R24.2 – Geotextile Strength Class Requirements,* when determined values are tested for as detailed in *Clause R24.7.3.*

Table R24.2 - Geotextile Strength Class Requirements

Strength Class	Elongation	Grab Strength (N)	Tearing Strength (N)	G Rating
A	≥ 30% < 30%	500 800	180 300	900 1350
B	≥ 30% < 30%	700 1100	250 400	1350 2000
C	≥ 30% < 30%	900 1400	350 500	2000 3000
D	≥ 30% < 30%	1200 1900	450 700	3000 4500
E	≥ 30%	1600	650	4500

(Source: Austroads Part 4G: Geotextile and Geogrids – August 2009)

R24.7.5 Filtration Classes

Geotextiles, where required for separation and/or filtration, are referenced by a Filtration Class which shall meet the requirements of *Table R24.3 – Filtration Class Requirements*.

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

Table R24.3 - Filtration Class Requirements

Filtration Class	Flow Rate Q_{100} ($l/m^2/s$)	Permittivity Ψ (S^{-1})	EOS (mm)
Class I	≥50	≥0.5	≤0.12
Class II	≥50	≥0.5	≤0.25
Class III	≥30	≥0.3	≤0.12
Class IV	≥20	≥0.2	≤0.25
Class V	≥10	≥0.1	≤0.12
Class VI	≥10	≥0.1	≤0.25
Class VII	≥5	≥0.05	≤0.30
Class VIII	≥5	≥0.05	≤0.60

R24.8 APPLICATION

R24.8.1 General

This clause sets out the minimum strength and filtration class of geotextiles to be used in earthworks, subsoil drainage and behind structures.

Where a different class of geotextile is required due to any variation in site conditions e.g. use of larger stone in a separation layer, a specific design in accordance with *Table R24.2 – Geotextile Strength Class Requirements, Table R24.3 – Filtration Class Requirements and Austroads Guide to Pavement Technology Part 4G – Geotextiles and Geogrids* shall be provided. This design shall be authorised by a Registered Structural Engineer (NPER or equivalent).

R24.8.2 Earthworks

The minimum strength and filtration class for geotextile in drainage blankets is detailed in *Table R24.4 - Drainage Blankets.*

Table R24.4 - Drainage Blankets

Type of Drainage Blanket	Free-Draining Material	Strength Class	Filtration Class
Sand Drainage Blanket	Sand or gravel, max size 10 mm, less than 10% passing 0.3 mm sieve	B or C	Class IV or V
Rock Drainage Blanket	Stones or crushed rock, max size 150 mm, less than 10% passing 2.36 mm sieve	C	Class II or III

The minimum strength and filtration class for geotextile in separation layers is detailed in *Table R24.5 – Separation Layers.*

Table R24.5 – Separation Layers

Type of Separation Layer	Strength Class	Filtration Class
Unsaturated	B	Class VII or VIII
Saturated	C	Class IV or V

R24.8.3 Subsurface Drainage

The minimum strength and filtration class for geotextile in trench drains is detailed in *Table R24.6 – Subsurface Drainage*.

Table R24.6 – Subsurface Drainage

Type of Drain	Filter Material	Strength Class	Filtration Class
Subsoil and Geocomposite Drains all Depths	Coarse, no-fines gravel, no-fines concrete, screenings or crushed rock with maximum particle size 19 mm and no more than 5% by mass passing the 4.75-mm sieve	A or B	Class IV or V

R24.8.4 Drainage System at Structures

The minimum strength and filtration class for geotextile behind retaining structures is detailed in *Table R24.7 – Drainage and Separation Behind Retaining Structures.*

Table R24.7 – Drainage and Separation Behind Retaining Structures

Type of Structure	Filter Material	Strength Class	Filtration Class
Concrete retaining walls, Segmental block walls, Reinforced soil concrete panel walls	As per relevant Standard Specification	B	Class II or III
Gabion walls, Crib Walls. Rock Filled Mattresses	As per relevant Standard Specification	C	Class II or III

R24.9 INSTALLATION - JOINTING AND OVERLAP REQUIREMENTS

Joints in geotextiles shall be made by overlapping, sewing, or other methods in accordance with the manufacturer's product specification. If the amount of overlap is not specified, it shall be a minimum of 500mm.

R24.10 EVIDENCE OF COMPLIANCE

Further to the requirements of *Standard Specification G9 Product Quality*, the Contractor shall provide a certificate of compliance from the product supplier/manufacturer for each roll of geotextile that identifies the type and strength of the geotextile and its intended use. The certificate shall include full details of the material properties together with all tests results. The certificate must not be more then twelve months old.

R24.11 HOLDPOINTS

Hold Points identified in this Specification are listed in *Table R24.8 – Hold Points.*

Table R24.8 – Hold Points

Reference	Holdpoint	Nominated Work not to proceed	Evidence of Compliance
R24.6	Delivery of Geotextile	Placement of Geotextile	Certificate of Compliance from the Product Manufacturer and Product Supplier including Specific tests results for the product (roll or batch)and nomination of where each product will be used to the satisfaction of the Superintendent

R24.12 PAYMENT

Payment shall be in accordance with the relevant Standard Specification.

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