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AUSTROADS TECHNICAL SPECIFICATION ATS 2260
Vertical Wick Drains

Contents

1. Scope

1.1 Austroads Technical Specification ATS 2260 sets out the requirements for the supply and installation of vertical Wick Drains.

2. Referenced Documents

2.1 The following documents are referenced in this Specification:

Australian/New Zealand Standards	
AS 1289.3.6.1	Methods of testing soils for engineering purposes – Method 3.6.1: Soil classification tests – Determination of the particle size distribution of a soil – Standard method of analysis by sieving
AS 3706.7	Determination of Pore-size Distribution – Dry-sieving Method
AS 8700	Execution of Prefabricated Vertical Drains
Austroads	
ATS 2160	Geotextiles (Separation and Filtration)

International/European Standards	
ISO 12956	Determination of the Characteristic Opening Sizes
ASTM International	
ASTM D4716	Standard Test Method for Determining the (In-plane) Flow Rate Per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Heads

3. Definitions

3.1 The following definition applies to this Specification.

Wick Drain A prefabricated synthetic geocomposite drain which, when installed vertically in soft compressible soil strata, acts as a drainage medium having the following characteristics:

a) ability to permit porewater in the soil to seep into the drain; and

b) ability to transmit collected porewater along the length of the drain.

4. Quality System Requirements

4.1 The Contractor must prepare and implement a Quality Plan that includes the documentation in Table 4.1.

Table 4.1 Quality Plan

Clause	Description of Document
5.1	Details of the Wick Drains
5.8	Calculation of the estimated water to be extracted from the Wick Drain system
6.1	Details/procedures for installation

HOLD POINT 1	
Process Held	Commencement of installation of the Wick Drains.
Submission Details	The Quality Plan must be provided to the Principal at least 10 working days prior to the commencement of work on site.

5. Materials

General

5.1 The Quality plan must include:

a) details of the Wick Drains, including the manufacturer's instructions and performance data;

b) test results (carried out not more than 6 months before delivery to the Site) evidencing that the Wick Drains comply with this Specification;

c) details of packaging, delivery and method of storage; and

d) if requested by the Principal, a sample of the Wick Drain.

5.2 Wick Drains must consist of a plastic core and a geotextile filter. Wick Drains may be manufactured as a single unit, or the filter may be wrapped around the core and overlapped and sealed to contain the core.

5.3 Wick Drains must be made from polyethylene, polyester, polypropylene or other synthetic material or combination of such materials. Unless otherwise specified on the Drawings, Wick Drains must be 95 mm to 100 mm wide and 3 mm to 5 mm thick. Unless specified otherwise in the Contract documents, round Wick Drains are not permitted.

5.4 Wick Drains must be manufactured from materials which are tough and flexible enough to retain their integrity when subjected to the stresses imposed during storage, installation and subsequent ground settlements. Testing of Wick Drains for various properties must be in accordance with the test methods specified in AS 8700.

5.5 Wick Drains must be able to conform to soil characteristics (e.g. deformation, permeability) without buckling or crimping of the core.

Geotextile Filter Requirements

5.6 The filter jacket for Wick Drains must be a non-woven geotextile which:

a) complies with ATS 2160;

b) has been previously proved effective under similar soil conditions;

c) is in all cases able to prevent excessive migration of soil particles into the core;

d) has a permeability not less than that of the surrounding soil; and

e) have O_{95} less than 120mm and O_{50} less than 75mm, where O_{95} and O_{50} are geotextile opening size corresponding to 95% and 50% by mass of a single size soil which pass the stated opening size respectively.

Certificate of Compliance

5.7 The Contractor must provide a Certificate of Compliance from the Supplier of each batch of Wick Drains to verify that the Wick Drains comply with the requirements of the Contract. The certificate must include the manufacturer's name and the date and place of manufacture.

Discharge Capacity Requirements

5.8 The Contractor must calculate the estimated water to be extracted from the Wick Drain system. The in-plane discharge (flow) capacity of Wick Drains (Q) must not be less than 70 litres per hour when tested in accordance with ASTM D4716 under a hydraulic gradient of 1 and at a lateral confinement test pressure of 250 kPa.

Packaging, Delivery and Storage

5.9 Wick Drains must:

a) be supplied in rolls and securely packed in light proof wrappings and delivered to the Site at least 10 working days prior to the commencement of installation;

b) be clearly labelled showing the manufacturer, the type of Wick Drains and the batch identification number.

c) be stored under protective cover or wrapped with a waterproof, opaque UV protective sheeting to avoid damage prior to installation.

d) not be stored directly on the ground or in a manner in which they may be affected by heat.

5.10 The method of storage must be in accordance with the recommendations set out by the manufacturer.

6. Construction – General Requirements

6.1 The Quality Plan must include details, procedures and/Inspection and Test Plans for the following:

a) installation equipment,

b) site preparation and construction of the working platform;

c) unless included in the relevant Safety Plan, details of:

i) how the site will be controlled to exclude or restrict access;

ii) safe operation of the equipment;

iii) covering of any prebored holes;

d) method of installation of Wick Drains, mandrels and drain anchors and method of recording depth of installation;

e) methodology for assessing the rake of Wick Drain installation equipment to ensure that specification tolerance is achieved;

f) methodology for preboring holes;

g) sequence of construction of Wick Drains; and

h) procedure for discharging water.

6.2 Wick Drains must be provided with an outer casing or mandrel of rhomboidal or rectangular cross section for the purpose of installation and an anchor in accordance with Clause 10.

6.3 Mandrels must possess adequate strength and stiffness and be suitably guided during penetration into the ground. The cross sections of mandrels must be as small as practicable. Unless approved otherwise, the circumference of mandrels must not exceed 0.45 m.

7. Site Preparation

Clearing and Grubbing

7.1 Where specified under the Contract, clearing and grubbing of the embankment foundation area defined for Wick Drain installation must be carried out to provide a safe and stable work area. Furrows or undulations exceeding 0.3 m deep must be filled and trimmed. Grass and topsoil may be left in place to minimize disturbance to the vegetation root system or underlying soil profile.

Working Platform

7.2 Prior to commencing the installation of the Wick Drains, the Contractor must construct a working platform at the designated area to ensure that the equipment can operate safety and to provide a horizontal drainage path to dissipate the water.

7.3 Unless specified otherwise on the Drawings, the working platform must comprise the following:

a) a bottom layer of non-woven geotextile complying with Strength Class C and Filtration Class V of ATS 2160;

b) biaxial geogrid layer(s) placed above the geotextile; and

c) a drainage blanket layer of thickness 400mm (–0 mm, +100 mm), consisting of material meeting the properties in Table 7.3 when tested in accordance with AS 1289.3.6.1.

Table 7.3: Property of Drainage Banket for Wick Drains Installation

Percentage Passing Sieve	Criterion (% by mass)
4.75 mm	90 – 100
1.18 mm	40 – 85
300 µm	2 – 30
150 µm	0 – 7
75 µm	0 – 3

7.4 Any other requirements which are specified for the construction of drainage blankets for earthworks or pavement construction do not apply to drainage blankets provided for the purpose of Wick Drain installation.

7.5 The drainage blanket layer must extend past the outer edges of the base of the embankment to provide a clear drainage path across the whole foundation area.

7.6 The drainage blanket material must be placed and spread in such a way to avoid segregation and to ensure that it is not contaminated with foreign materials. This layer may be placed without compaction.

8. Installation

8.1 Wick Drains must be installed at the locations shown on the Drawings, and through the working platform into the underlying soil to the required depths.

8.2 Each Wick Drain must be installed in one continuous length without joints, and with minimum disturbance to the surrounding ground and smearing of soil around the drain.

8.3 The installation equipment must incorporate provision for adjustment of the rake of the mandrel. A Wick Drain must not be installed if the rake of the mandrel and supporting leaders exceeds 1 in 100. The rake of the mandrels for the Wick Drains installed along the three adjacent rows at both sides of the proposed instrumentation lines must be checked and installed.

8.4 The installed locations of Wick Drains at the ground surface must be within 100 mm of the specified locations on plan and the rake of the drains must be within 2% from the vertical.

8.5 The depth of Wick Drains must be as shown on the Drawings or as directed by the Principal based on the resistance of the soil to penetration during installation. The Contractor must notify the Principal immediately of any sudden change in the penetration resistance to the mandrel.

9. Preboring

9.1 The Contractor must prebore holes at locations where the soil conditions could impede the installation of Wick Drains. The diameter of the prebored hole must not exceed 300 mm.

9.2 Prebored holes must not be left open for more than 48 hours. The Contractor must implement measures to prevent the ingress of water and ensure that there is a safe work environment in the vicinity of the holes.

9.3 The prebored hole must be completely backfilled with clean dry sand as soon as practicable (and in no case more than 24 hours) after the installation of a Wick Drain, The backfilled hole must be free of voids. The sand at the ground surface must be tamped down to a level slightly above the surrounding ground to ensure discharge of water without ponding.

10. Anchoring and Finishing

10.1 Each vertical drain must be anchored at the specified depth by securing the Wick Drain to a disposable shoe or by another technique included in the approved Quality Plan.

10.2 After the mandrel is fully withdrawn, and the Wick Drain is anchored at the specified depth, the Wick Drain must be cut off at least 300 mm above the surface of the working platform and secured at the surface by suitable means so that the Wick Drain remains vertical and straight after backfilling.

11. Records

11.1 At the completion of the work, the Contractor must submit a Completion Report to the Principal which includes:

a) test results for material used in the drainage blanket;

b) evidence that the location, depth and rake of each Wick Drain complies with this Specification; and

c) records of the depth, diameter and location of any preboring.

Annexure A: Summary of Hold Points, Witness Points and Records

The following is a summary of the Witness Points/Hold Points that apply to this Specification and the Records that the Contractor must submit to the Principal to demonstrate compliance with this Specification.

CLAUSE	HOLD POINT	WITNESS POINT	RECORD
4.1	1. Installation of the Wick Drains.		Quality Plan
5.7			Certificate of Compliance
11.1			Completion Report

Amendment Record

Amendment no.	Clauses amended	Action	Date
-	New specification	New	January 2025

Key

Format	Change in format
Substitution	Old clause removed and replaced with new clause
New	Insertion of new clause
Removed	Old clauses removed