DEVELOPMENT CONSTRUCTION SPECIFICATION

C230

SUBSURFACE DRAINAGE GENERAL

Amendment Record for this Specification Part

This Specification is Council's edition of the AUS-SPEC generic specification part and includes Council's primary amendments.

Details are provided below outlining the clauses amended from the Council edition of this AUS-SPEC Specification Part. The clause numbering and context of each clause are preserved. New clauses are added towards the rear of the specification part as special requirements clauses. Project specific additional script is shown in the specification as italic font.

The amendment code indicated below is 'A' for additional script 'M' for modification to script and 'O' for omission of script. An additional code 'P' is included when the amendment is project specific.

Amendment Sequence No.	Key Topic addressed in amendment	Clause No.	Amendment Code	Author Initials	Amendment Date
EXAMPLE 1	*Provision for acceptance of nonconformance with deduction in Payment*	*XYZ.00*	*AP*	*KP*	*2/6/97*
A	AS/NZS 1477	C230.04	M	MD	11/12/2013

SPECIFICATION C230 : SUBSURFACE DRAINAGE - GENERAL

GENERAL

C230.01 INTRODUCTION

1. This is the general specification common and applicable to all types of subsurface drainage and shall be read in conjunction with subsurface drainage specifications: ***Purpose***

C231	-	Subsoil and Foundation Drains
C232	-	Pavement Drains
C233	-	Drainage Mats

as applicable to particular contracts.

C230.02 SCOPE

1. The work to be executed under this Specification consists of:

   (a) preparation for subsurface drainage construction;

   (b) siting of subsurface drainage facilities;

   (c) the supply of all materials associated with the provision of the subsurface drainage system;

   (d) all activities and quality requirements associated with the supply, placement and compaction of filter material;

   (e) the provision of a detailed record of all subsurface drain installations;

   (f) the marking on the ground of the location of all subsurface drains.

C230.03 EXTENT OF WORK

1. Details of the work are shown on the Drawings or as directed by the Principal Certifying Authority and Geotechnical Engineer.

C230.04 REFERENCE DOCUMENTS

Documents Standards Test Methods

1. Documents referenced in this specification are listed in full below whilst being cited in the text in the abbreviated form or code indicated.

(a) Council Specifications

C213	-	Earthworks
C271	-	Minor Concrete Works

(b) Australian Standards

AS 1141.11	-	Particle size distribution by dry sieving.
AS 1141.22	-	Wet/dry strength variation.
AS 1289.E5.1	-	Determination of minimum and maximum dry density of a cohesionless material.
AS/NZS 1477	-	Unplasticised PVC (UPVC) pipes and fittings for pressure applications
AS 2439.1	-	Perforated drainage pipe and associated fittings
AS 2758.1	-	Aggregates and rock for engineering purposes - Concrete aggregates
ASTM-D2434-68		Test method for permeability of granular soils (constant head)

b) **Other**

Soil & Water Management Plan

C230.06 SITING OF WORK

Amendments to Planned Work

1. The Principal Certifying Authority may amend the locations or designed levels or the lengths to suit actual site conditions.

Proposed Changes by Contractor

2. Should the Contractor propose changes to the location, length, designed levels, conditions of installation or cover to suit the Contractor's construction procedures, the Contractor shall present the proposed set-out in addition to the designed set-out for consideration by the Principal Certifying Authority. No changes shall be made unless the prior written approval of the Principal Certifying Authority is obtained.

C230.07 EXCAVATION

Safety

1. The Contractor shall provide shoring, sheet piling or other stabilisation of the sides necessary to comply with statutory requirements.

Approval by Public Utility Authorities

2. Where service utilities exist in the vicinity of drainage works the Contractor shall obtain the approval of the relevant authority to the method of excavation before commencing excavation.

Excavation Level

3. Trenches shall be excavated to the line, grade, width and depth shown on the Drawings or as directed by the Principal Certifying Authority. The bottom of the trench shall be constructed so that no localised ponding can occur. All loose material shall be removed by the Contractor.

4. Any material at the bottom of the trench or at foundation level which the Principal Certifying Authority deems to be unsuitable shall be removed and disposed in accordance with the Specification for EARTHWORKS by the Contractor and replaced with backfill material in accordance with the requirements of this Specification. The bottom of the excavated trench or foundation, after any unsuitable material has been removed and replaced, shall be parallel with the specified level or grade of the pipe. ***Unsuitable Material***

C230.08 BACKFILLING

1. Backfilling shall be carried out in accordance with the requirements of the relevant subsurface drainage structures Specifications. ***Detail***

C230.09 OUTLET STRUCTURES FOR SUBSURFACE DRAINAGE

1. Subsurface drainage pipes shall be connected to discharge into gully pits or to outlet structures as shown on the Drawings or as directed by the Principal Certifying Authority. ***Discharge***

2. Outlets shall be spaced at a maximum interval of 80m. ***Spacing***

3. Outlets shall be made rodent proof using galvanised wire netting. ***Rodent Proof***

4. The outlet shall be located so that erosion of the adjacent areas does not occur or shall be protected by the placement of selected stone or similar approved treatment. ***Erosion Control***

5. Outlet pipes from curtain drains shall be unslotted. At no point shall an outlet pipe be higher than the pipe at the end of the curtain drain. ***Outlet Pipe***

6. All concrete used in the construction of outlet structures shall conform to the requirements of the Specification for MINOR CONCRETE WORKS. ***Concrete Specification***

MATERIALS

C230.10 CORRUGATED PLASTIC PIPE

1. Corrugated plastic pipe shall be Class 1000 complying with AS2439.1 of 100mm diameter unless otherwise indicated on the Drawings. All pipe shall be slotted unless otherwise indicated on the Drawings. ***Specification***

2. Joints, couplings, elbows, tees and caps shall also comply with AS2439.1 and only the manufacturer's recommended fittings shall be used. ***Fittings***

3. The Contractor shall obtain from the Manufacturer a Test Certificate demonstrating compliance with AS2439.1. ***Compliance***

C230.12 FILTER MATERIAL

(a) General

1. The filter material shall consist of clean, hard, tough, durable particles and comply ***Grading***

with the following requirements:

TEST METHOD	PROPERTY	REQUIREMENT
AS 1141.11	Material passing AS sieve	Per cent by mass
	6.7mm	100
	4.75mm	85 to 100
	2.36mm	0 to 40
	1.18mm	0 to 5
	425um	0 to 2

Table C230.1 - Filter Material

C230.13 GEOTEXTILE

(a) General

1. The geotextile, other than seamless tubular filter fabric, shall consist of a needle punched felt which shall be manufactured from synthetic materials other than polyamide. It shall be bio-stable and resistant to attack by alkalis, acids, dry heat, steam, moisture, brine, mineral oil, petrol, diesel and detergents. ***Properties***

2. The geotextile shall be resistant to ultra-violet light. No geotextile shall be left exposed to sunlight during storage and construction for a period longer than a total of twenty-one days. If exposure in excess of twenty-one days does occur, the geotextile shall be tested and if its characteristics have deteriorated to or below 90 per cent of the characteristics claimed by the manufacturer or the characteristics determined on unexposed geotextile, whichever is the better, it shall be removed and replaced with a geotextile complying with this Specification. ***Ultra Violet Light Resistant***

3. The geotextile shall be capable of retaining particles of particle size greater than 100 microns. ***Particle Retention***

4. The minimum mass of geotextiles for different types of subsurface drainage shall be as follows: ***Mass***

TYPE OF SUBSURFACE DRAINAGE	MINIMUM MASS OF GEOTEXTILE (Grams per square metre)
Trench Drains and Drainage Mats	250
Curtain Drains	500

Table C230.6 - Geotextile Mass

5. In addition to the above requirements, geotextiles for curtain drains shall consist of either polyester, polypropylene or polyethylene. When subjected to a pressure of 200 kPa applied at right angles to the plane of the fabric and to a constant ***Water Transmission Rate***

head of water no greater than 50 mm applied to the top edge of the fabric, geotextiles for curtain drains shall have a rate of water transmission not less than 20 litres per hour per metre width of fabric through a 300 mm length of the fabric.

(b) Seamless Tubular Filter Fabric ***Specification***

1. Seamless knitted tubular filter fabric shall be used to enclose all slotted pipes and shall be manufactured from either polypropylene or polyester. The fabric shall be free of imperfections in weave or yarn and have abrasion resistant and weave stability qualities such that it shall not form holes, ladder, deweave, tear or unravel more than 5mm from a cut end.

RECORDING OF DRAINAGE

C230.14 RECORDING OF SUBSURFACE DRAINAGE INFORMATION

1. The Contractor shall keep a detailed record of all subsurface drainage pipes and the completed subsurface drainage systems shall be shown on the work-as-executed plans. ***Work As Executed Plans***

2. The Work As Executed plans shall include: ***Detail***

   a. Type of Drain,

   b. Pipe Size,

   c. Depth below FSL, and

   d. Locations of Outlets.

LIMITS AND TOLERANCES

C230.17 SUMMARY OF LIMITS AND TOLERANCES

1. The limits and tolerances applicable to the various clauses in this Specification are summarised in Table C230.7 below.

Item	Activity	Tolerances	Spec Clause
1.	**Outlets**		
	Spacing	Max 80m	C230.09
2.	**Filter Material**	Table C230.1	C230.12
3.	**Geotextile**		
	(a) Exposure to sunlight	<21 days If >21 days deterioration not to exceed 10% of claimed characteristics	C230.13
	(b) Curtain Drains Water Transmission	>20 litres/hr/m	C230.13

Table C230.7 - Table of Limits and Tolerances

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