Government of South Australia

SA Water

Engineering Services

Technical Guideline

TG 104

Design of Pipe End Dissipators

Revision: 1.0

Date: 15 December 2015

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Significant/Major Changes Incorporated in This Edition

The following changes have been made to the 01 July 2002 version of this document:

- Format changed (including associated re-arrangement of clauses).
- Minor changes to Dissipator Chamber drawing.
- Definitions relocated to clause 1.4.

Document Controls

Revision History

Revision	Date	Author	Comments
1.0	15 December 2015	B Harris	

Template: Technical Standard Version 4.00, 02/11/2015

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No Tables Included.

1 Introduction

SA Water is responsible for operation and maintenance of an extensive amount of engineering infrastructure.

This guideline has been developed to assist in the design, maintenance, construction, and management of this infrastructure.

1.1 Purpose

The purpose of this guideline is to provide information and guidance on the principles and practices that must be applied to the use and application of SA Water standards and design of SA Water assets to ensure that assets are fit for purpose and will meet SA Water's objectives.

1.2 Glossary

The following glossary items are used in this document:

Term	Description
EPD	End Pipe Dissipator
SA Water	South Australian Water Corporation
TG	SA Water Technical Guideline
TS	SA Water Technical Standard

1.3 References

1.3.1 Australian and International

The following table identifies Australian and International standards and other similar documents referenced in this document:

Number	Title

1.3.2 SA Water Documents

The following table identifies the SA Water standards and other similar documents referenced in this document:

Number	Title

1.4 Definitions

The following definitions are applicable to this document:

Term	Description
SA Water's Representative	The SA Water representative with delegated authority under a Contract or engagement, including (as applicable): • Superintendent's Representative (e.g. AS 4300 & AS 2124 etc.) • SA Water Project Manager • SA Water nominated contact person
Responsible Discipline Lead	The engineering discipline expert responsible for TG 104 defined on page 3 (via SA Water's Representative)
Dissipator Chamber	The Dissipator Chamber is the main component of an EPD. The chamber is usually made of a precast concrete pipe of appropriate diameter and is sized to reduce the flow velocity to a certain level so that it will not cause erosion.
Inlet Pipe	Inlet Pipe in an EPD refers to the pipe that connects the outlet of a hydraulic structure to the inlet of the dissipator chamber.

2 Scope

This document provides general guidance for the design of one type of low energy dissipators known as End Pipe Dissipators, which are used at the outlets of some hydraulic structures to prevent downstream erosion and scouring.

EPD's are suitable for dissipating the energy of water from reservoir and tank overflow pipes, scour outlets, storm drain outlets, etc.

3 Design Parameters

Some of the design parameters which are critical to the design of the EPD are given below.

3.1 General Technical Requirement

In general, the design of an EPD is deemed acceptable if, in the event of high flow, the EPD can control the flow so that there is no erosion downstream.

3.2 Location and Scour Protection

It is recommended that the EPD be installed in an area of flat ground or creek bed, and surrounded by compacted riprap with a minimum thickness of 300 mm and a width of not less than 1000 mm, to minimise the risk of local scouring. Water should spread around the dissipator and flow away as shallow sheet flow.

The riprap stone/rock size should range between 50 to 150 mm; with the smaller stones/rocks just filling the voids between the larger rocks but not keeping them apart (refer to Figure 1).

Where a dissipator discharges to a drainage line or watercourse, it is preferable to be located on the watercourse bed rather than the side slopes, to avoid flow down a steep bank. Consideration should also be given to the erosion resistance (steepness, vegetation cover, etc.) of the ground or bed further down the slope or watercourse. If discharging to a dam, an EPD should be set on ground close to top water level.

In some situations, it may be required that the scour protection be extended. Allowance for larger sized riprap or a concrete apron around the dissipator chamber may be necessary in other situations.

3.3 Inlet Pipe

Minimum cover to the inlet pipe should be 750 mm, and additionally as necessary to achieve grade down to the chamber and/or ensure that the pipe enters near the bottom of the chamber.

The clearance between the inlet pipe entering the dissipator chamber and the bottom of the chamber is recommended to be minimum 150 mm (300 mm for stormwater). Figure 1 illustrates the recommended design parameters for the inlet pipe.

3.4 Dissipator Chamber

The dissipator chamber is the main component of the EPD. The cross sectional area of the chamber should be selected to give a mean upward flow velocity in the chamber not greater than 0.3 m/s, and ideally 0.1 m/s or less. A low upward velocity in the chamber also means a shallow depth of flow over the rim at the top of the chamber. The height of the chamber (top to bottom) should be a minimum of 1.5 times the diameter (or mean width if the chamber is rectangular).

A precast concrete pipe of appropriate diameter and length-to-diameter ratio (as specified above) may be used as the dissipator chamber for the EPD. A square or rectangular, pre-cast or cast-in-situ box may also be used.

The top of the chamber should be set 300 to 600 mm above finished ground surface. The top of the rim of the chamber should be level with maximum vertical misalignment of +/- 5 mm and horizontal to within +/- 5 mm. If the top is a cut end, the cut should be square to the pipe and straight to within +/- 5 mm. The top of the chamber should be fitted with a lockable grid cover for safety (Figure 1). Provide a 50 mm drain hole, 100 mm down from the top, to keep the grid cover dry when there is no flow.

3.5 Footing of the Dissipator Chamber

It is recommended that a minimum 300 mm thick compacted riprap be placed under the chamber as shown in Figure 1. Installation of the riprap will provide a structural footing for the chamber, a scour protection bed, as well as a basin to allow slow drainage by percolation of water inside the chamber during the time between flow events. Therefore, the thickness of the riprap layer and the size and placement of the stones/rocks should satisfy the requirements for the scour protection. In some situations, a concrete footing may be used instead of riprap.

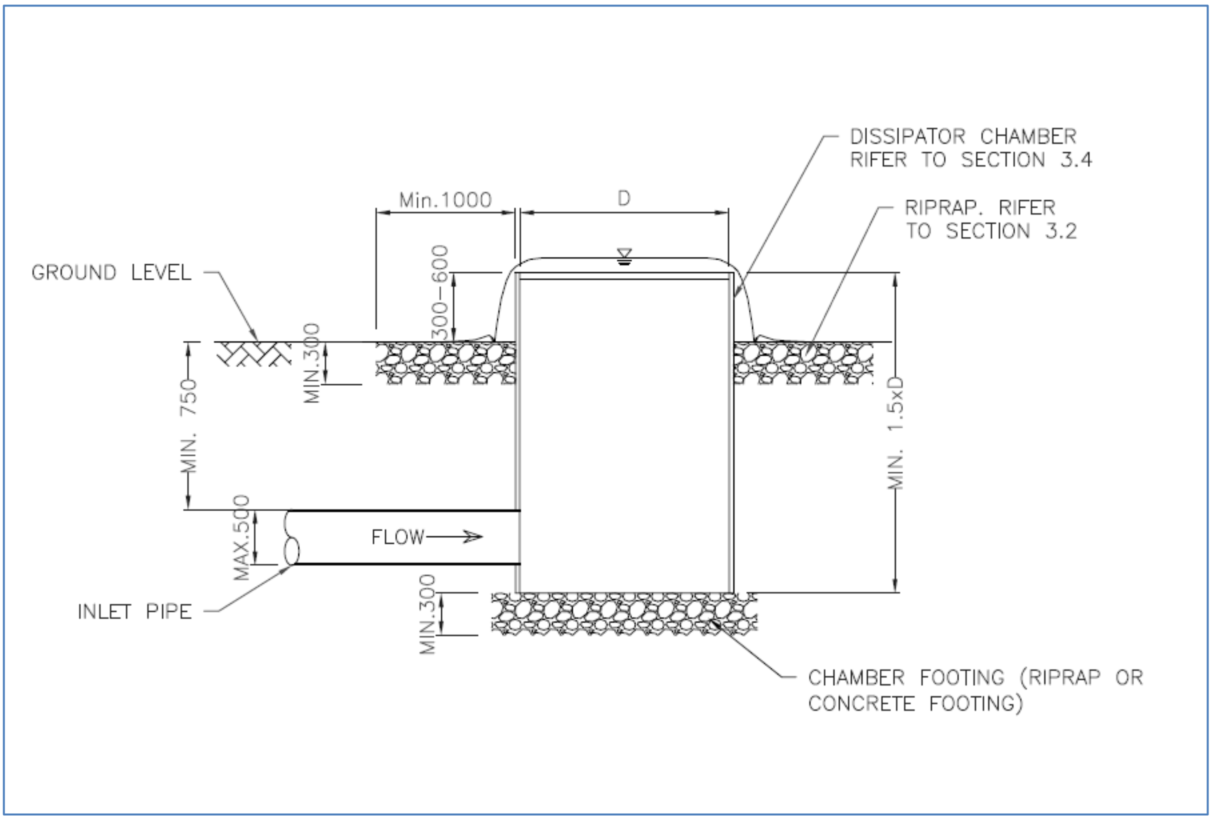

Figure 1 – Typical Dissipator Chamber

Appendix A Examples

This section provides the designer with general views of the two existing EPDs. The design parameters for the dissipator in Figure 2 are also provided.

A1 WWTP Wetlands Dissipator

Figure 2 shows a general view of the EPD installed at the Murray Bridge WWTP Wetlands. It is handling a flow of approximately 30 L/s from a 300 mm diameter rising main.

This dissipator has a good depth to diameter ratio (about 2:1) and a comfortably low mean upward velocity (less than 0.1 m/s), which gives an excellent uniform and shallow depth of flow over the rim. The surrounding riprap copes well with the cascade height of about 1 m.

Figure 2 – Murray Bridge WWTP Wetlands Dissipator

A2 Typical Small Tank Overflow Dissipator

Figure 3 illustrates a general view of a typical overflow and scour dissipator for a small tank (this example in the Wistow area).

Figure 3 - Typical Small Tank Overflow and Scour Dissipator