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Engineering Standard - NSW

Category
Electrical

Title
Cable Pits

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Document Control

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		Refer to Reference Number	T Moore	M Owens	Refer to minutes of meeting 24/01/05

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About This Standard

This document sets out the requirements to be considered when designing and constructing cable pits. In particular the occupational health and safety aspects (safe working in confined spaces aspects and the general construction requirements to provide a safe work environment). Features to assist in the installation and maintenance of cables and their accessories are included.

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Document History

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List of Amendments –

ISSUE	DATE	CLAUSE	DESCRIPTION
1.1	05/01/2005		Reformatting to ARTC Standard
1.2	11/03/2005	Disclaimer	Minor editorial change

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1 Scope and Application

This document sets out the requirements to be considered when designing and constructing cable pits. In particular the occupational health and safety aspects (safe working in confined spaces aspects and the general construction requirements to provide a safe work environment). Features to assist in the installation and maintenance of cables and their accessories are included.

The requirements of this document apply to new and major rehabilitation works.

2 References

C(b)2		ESAA Guide to the Installation of Cables Underground.
AS/NZS 2865	2001	Safe working in a confined space.
AS 3996	1992	Metal Access Covers, Road Grates and Frames.
SAA HB29	2000	Communications Cabling Manual, Module 2: Communications Cabling Handbook.
EP 12 30 00 01 SP		Electrical Electrolysis From Stray DC Current. (RailCorp publication)
PCP 03		Cable Route Selection Guide.
PDS 13		Above Ground Cable Installation Systems - Selection Guide.

3 Introduction

Cable pits are usually associated with duct or ground line troughing systems and are usually located at changes in the cable route direction and at the location of cable joints.

The maximum distance between pits is governed by the gradient of the route, changes in route direction, maximum allowable cable pulling tension and the drum length of cable.

4 Design requirements

Cable pits shall be designed and constructed taking the following criteria into consideration.

- the gradient of the duct line
- changes in route direction
- maximum allowable pulling tension of the cable
- drum length of cable
- racking and jointing of cables in pit
- protection of all cables within the pit against a major explosion or fire

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Hazards involved in working in a confined space should be minimised at the design stage and during the initial installation of equipment.

Cable pit covers and access covers shall be flush with the surrounding finished surface on platforms, access roads or other areas subject to pedestrian or road traffic. At other locations the top of the cable pit shall be 300 mm above the surrounding ground level to prevent the ingress of water and silt.

Access covers shall be in accordance with Section 15 of this document.

The internal surfaces of cable pits shall be smooth, chemically inert and as far as possible impervious to water.

The design shall take account of the following:

- The purpose for which the pit is intended, eg. jointing pit or cable installation pit.
- The General Design Considerations for confined spaces as specified in AS/NZS 2865.
- Requirements of the Occupational Health and Safety Act by ensuring that hazards are identified during the design stage of the pit before the pit is provided for use as a place of work. The design must eliminate any foreseeable hazards arising from the design that has potential to harm the health or safety of any person accessing, using or egressing from the pit, the physical work environment including the potential for people slipping, tripping or falling and objects or structures falling on people.
- The reduction in current rating of individual cables as the number of cables in the bank is increased.
- The size of the pit with consideration for present and future requirements for:
  - the number of cables;
  - change in direction of cable routes;
  - the minimum allowable cable bending radii;
  - jointing requirements;
  - provisions for racking and jointing.
- Protection of all cables within the pit against a major explosion or fire.

5 Cable entries and ducts

Cable entries or ducts entering the pit shall be in the form of a bellmouth, smooth and free of sharp edges to prevent damage to the cable during installation and subsequent operation of the cable.

Cable entries into circular pits shall be positioned to be tangential to the pit as shown in Appendix A.

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Cable entries into rectangular pits shall be positioned to the side of the pit as shown in Appendix A.

Where ducts or ground line troughing enters a cable pit, the ducts or ground line troughing shall be encased in concrete for a distance of 300 mm from the pit to hold the ducts or ground line troughing securely in position.

Spare cable entries or ducts shall be provided for future use and shall be sealed to prevent the ingress of soil and water into the pit. The minimum number of spare entries or ducts shall be in accordance with Table 1. Cable entries or ducts carrying cables shall be sealed to prevent the ingress of soil and water into the pit.

Ducts											
For use	1	2	3	4	5	6	7	8	9	10	> 10
Spare	1	1	1	2	2	2	3	3	3	3	4

Table 1 - Spare entry or duct requirements.

6 Space for persons working

The pit shall be of sufficient size to provide a safe work and rescue environment under the Occupational Health and Safety Act for the activities to be performed in the pit

7 Provision of support for cables and joints

Cable cleats or suitable racking shall support cables and joints within the pit to ensure that no damage is caused to the cable or joint by normal operation or future maintenance and installation activities.

The principles contained in document PDS 13 “Above Ground Cable Installation Systems - Selection Guide” shall generally be applicable to the support of cables within cable pits.

8 Pulling eyes

Pulling eyes shall be provided as close as possible to the pulling alignment of the cable in all pits constructed for the purpose of pulling in cables. The pulling eyes are required to minimise possible damage to the cable caused by pulling the cable through radii less than the minimum cable bending radius during the installation process. Pulling eyes shall be located as shown in Appendix A and shall:

- be suitably located opposite the cable entries or ducts in the pit wall to assist with the installation of cables;
- have a safe working load not less than three (3) times the maximum allowable pulling tension of the cables to be installed.

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9 Access steps

Access steps shall be provided in the pit wall at a convenient location to provide a safe means of entry and egress to the pit when all cables have been installed.

10 Drainage

Adequate drainage shall be provided unless impractical to discharge water seepage from the pit. The drain shall be vermin proof.

Where it is impractical to provide drainage, the pit shall be provided with a sump suitable for transfer of seepage to a decanting system.

11 Ventilation

The pit shall be designed to:

- avoid the build up of any contaminants or combustible atmospheres;
- facilitate the use of portable ventilating equipment by providing adequate access and ventilating openings in the pit cover.

When the entire top area of the pit is not covered by cable pit access covers, two access openings shall be provided at diagonally opposite ends of the pit as shown in Figure 1 for safe access and ventilating purposes.

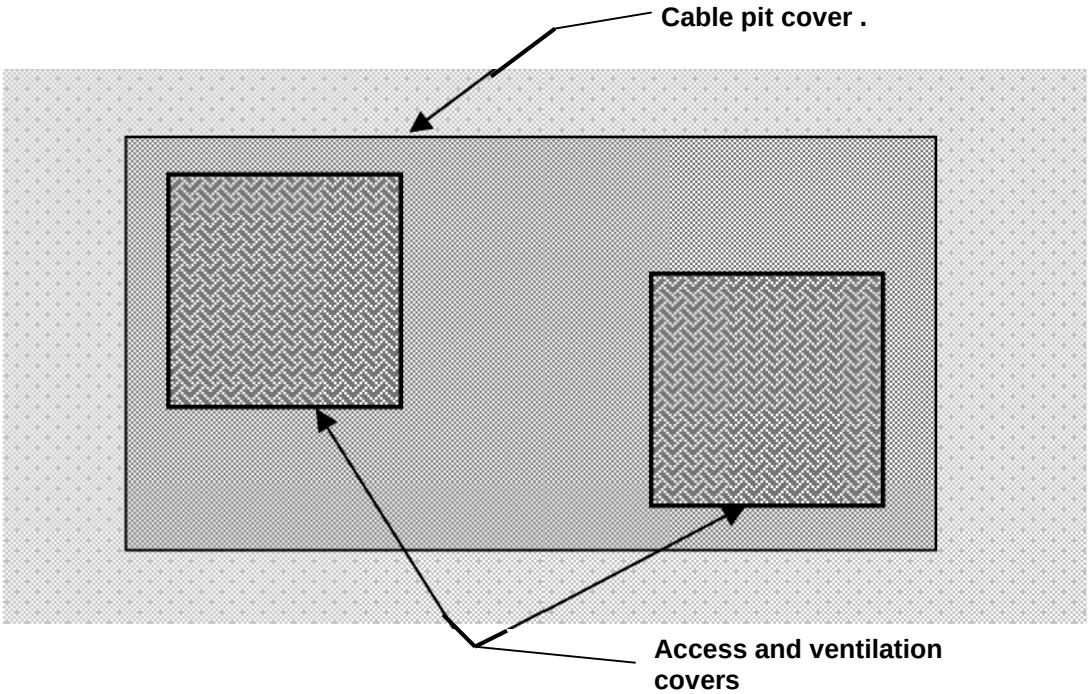

Figure 1 - Cable pit cover provided with access and ventilation openings.

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12 Future maintainability

Joints in cables shall be arranged and supported in the pit in a manner which will provide for easy access to all joints within the pit for future maintenance purposes.

13 Identification of cables

All cables entering and exiting a pit shall be positively identified by corrosion resistant tags with the cable's owner, voltage and designated feeder number clearly shown by engraving or embossing. The tags shall be securely attached to the relevant cable with a corrosion resistant securing system.

All high voltage cables within shared pits shall be suitably identified as high voltage cable in a permanent manner, i.e. by binding the cable with a suitable plastic warning tape.

14 Other services in high voltage cable pits

Communication cables shall not occupy pits with high voltage cables unless the minimum separation specified in SAA HB29 - 2000 Communications Cabling Manual, Module 2: Communications Cabling Handbook is maintained by fixed cable trough, ladders, tray or conduit within the pit.

The installation of low voltage and signalling cables with high voltage cables should be avoided. However when it is necessary to locate all services in the same pit, the high voltage cable(s) shall be grouped and identified as specified in Section 12. Signalling or low voltage cables shall be physically separated by a continuous rigid barrier.

Compressed air lines in cable pits shall comply with the requirements of ARTC Standards on Earthing, Bonding and Electrolysis.

High voltage cable joints shall not be located in cable pits with communication, signalling or low voltage cables.

In high voltage cable pits other utility services shall be segregated as required in document PCP 03 "Cable Route Selection Guide".

15 Cable pit access covers

Cable pit access covers may, in some instances, also be the cable pit covers. However on large cable pits it will be necessary to install cable pit access covers within the cable pit cover as the cable pit cover will be too large and heavy to move without cranes or other lifting equipment.

Cable pit access covers shall:

- comply with AS 3996;
- be removable without the need for lifting appliances such as cranes etc;
- be of sufficient mechanical strength for the environment in which they are installed and loading conditions to which they may be subjected;

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- be designed to resist the ingress of water;
- be vermin proof;
- require the use of specialised tools, keys or locking systems to gain access to the cable pit.

16 Signage

Suitable signs shall be installed in a prominent position where applicable, to caution maintainers who are about to enter the cable pit of:

- confined space;
- the presence of gas cables in the pit.

The signs shall be prominently visible prior to entering the cable pit.

17 Location of cable pits

Cable pits shall not be located within three metres from the nearest rail of any track.

Cable pits shall be sighted as not to interfere with surface drainage. If this is not possible alternative drainage arrangements must be made.

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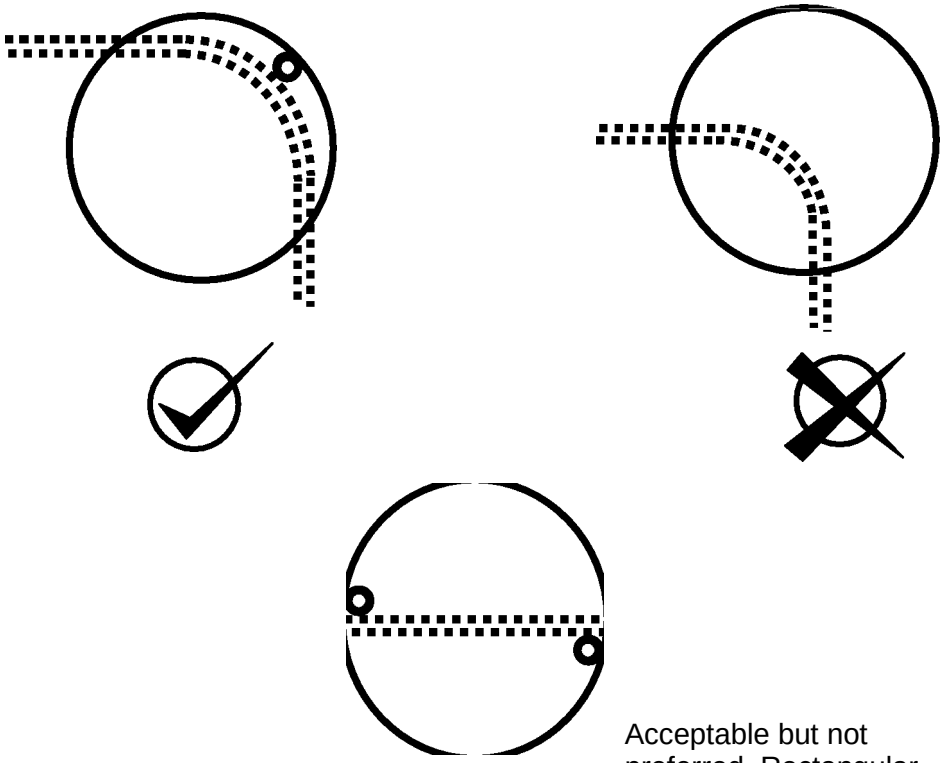
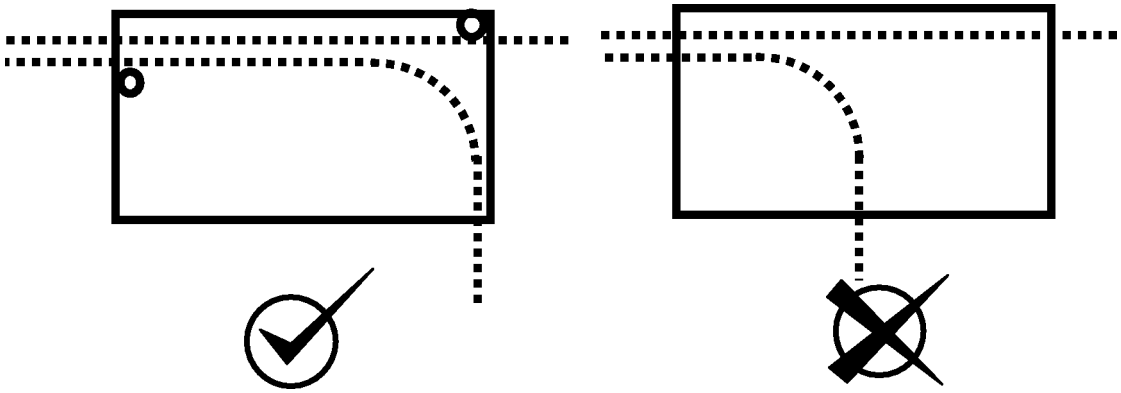
Appendix A Circular Pits



Acceptable but not preferred. Rectangular pit is the preferred arrangement

Pulling eyes shall be installed opposite the cable entry and exit positions as indicated on the diagram by the symbol “ ”

Rectangular Pits



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