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Substation Design Instruction

Plumbing and drainage

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Substation Design Instruction

ASSET STANDARDS AND DESIGN

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SDI 532 PLUMBING AND DRAINAGE

CONTENTS

1.0	PURPOSE.....	3
2.0	SCOPE	3
3.0	REFERENCES.....	3
4.0	DEFINITIONS AND ABBREVIATIONS.....	3
5.0	ACTIONS.....	4
5.1	General	4
5.2	Water Services	4
5.3	Water Tank	4
5.4	Electrical isolation and earthing.....	5
5.5	Water taps	5
5.6	Emergency deluge showers.....	5
5.7	Painting	5
5.8	Drainage system	6
5.8.1	<i>General.....</i>	<i>6</i>
5.8.2	<i>Stormwater pollution prevention.....</i>	<i>6</i>
6.0	AUTHORITIES AND RESPONSIBILITIES.....	6
7.0	DOCUMENT CONTROL	7

1.0 PURPOSE

To set out in detail the minimum installation and technical requirements for plumbing and drainage in transmission and zone substations.

2.0 SCOPE

This instruction shall be read in conjunction with SDI 505.

It contains the minimum installation and technical requirements for plumbing and drainage in transmission and zone substations.

3.0 REFERENCES

Internal

- Company Policy 4.0 - Environment
- Company Policy 9.2.5 - Network Asset Design
- Company Policy 9.9.1 - Network Asset Maintenance
- Company Procedure GSY 1066 - Worksite Hazard and Risk Assessment
- Endeavour Energy Electrical Safety Rules
- Network Management Plan 2013 Review
- Earthing Design Instruction EDI 516 - Major substation earthing design, construct and commissioning
- Substation Design Instruction SDI 505 - Minimum design and construction requirements for transmission and zone substations
- Substation Design Instruction SDI 509 - Fire hydrants
- Substation Design Instruction SDI 522 - Emergency deluge showers
- Substation Design Instruction SDI 527 - Clearances
- Substation Design Instruction SDI 540 - Transformer oil containment

External

- ENA National Electricity Network Safety Code (Doc.01-2008)
- Work Health and Safety Act 2011 (NSW)
- AS 1319:1994 - Safety signs for the occupational environment
- AS 1345:1995 - Identification of the Contents of Pipes, Conduits and Ducts
- AS 2032:2006 - Installation of PVC Pipe Systems
- AS 2033:2008 - Installation of Polyethylene Pipe Systems
- AS 3735:2001 - Concrete structures for retaining liquids
- AS 4809:2003 - Copper pipes and fittings - Installation and Commissioning
- AS/NZS 1477:2006 - PVC Pipes and Fittings for Pressure Applications
- AS/NZS 3000:2007 - Electrical Installations
- AS/NZS 3500.1:2003 Plumbing and Drainage - Water Services
- Australian Technical Specification ATS 5200.026:2004 - Technical Specification for plumbing and drainage products - Cold water storage tanks
- National Construction Code 2015 - Volume 3 Plumbing Code of Australia

4.0 DEFINITIONS AND ABBREVIATIONS

Nil

5.0 ACTIONS

5.1 General

All work shall be carried out in accordance with the Plumbing Code of Australia 2015 and AS/NZS 3500.1:2003, AS 2032:2006 and AS 2033:2008 as appropriate.

Any additional Sydney Water requirements, such as back-flow prevention devices, shall be installed where required.

Back-flow prevention devices and water meters installed outside of the security fence shall be adequately protected from vandalism and theft; while still allowing access for maintenance and meter readings.

All pipe work and fittings associated with the plumbing system within a substation or switching station shall be copper pipe or non-metallic (plastic) pressure pipe. Pipe-work within a building shall be copper and wherever possible, be installed within the basement, upon the slab soffit of the basement or around the perimeter of the floor slab above. Short lengths of branch risers shall be taken to individual fittings. Under no circumstances is a pressurised water pipe to be installed upon a ceiling or within a roof-space that is above equipment such as switchgear and control equipment.

Pipe-work shall not be cast into or buried under reinforced concrete slabs. When there is no other option to embedding the pipework in concrete walls or floors, they shall be located in a chase wall or ducts with removable covers.

The copper pipe and fittings shall be installed and commissioned in accordance with AS 4809:2006.

Non-metallic pressure pipes shall be manufactured in accordance with AS/NZS 1477:2006 or equivalent.

All underground pipe work shall be buried to a minimum depth of 300mm.

All ferrous metals shall be zinc coated or hot dip galvanised.

5.2 Water Services

A 32mm (minimum) water service shall be installed between the water authority service main and the substation shut-off valve or water meter. A larger water service may be required to maintain the required flow rates.

5.3 Water Tank

Storage tanks to collect available roof water for general use shall be used only when a street supply main is not available. Reference shall be made to SDI 509 for details of where additional water tanks for fire-fighting purposes may be required.

A minimum tank size of 2,000 litres is generally required for hand washing; however, a larger tank of a minimum size of 5,000 litres may be required where water is also required for toilet flushing.

Concrete is the preferred type for tanks of 5,000 litres or greater, however other types in accordance with ATS 5200.026:2004 can be considered where smaller tanks are required.

Concrete tanks shall be heavy-duty/industrial manufactured to AS 3735:2001, and the manufacturer's certification shall be provided on delivery.

Appropriate screens shall be installed to prevent the entry of items such as leaf debris and vermin. Insect screens are not required, as they may clog up with small debris and not allow water to freely enter the tank.

All tanks shall be suitable for filling by a tanker and they shall be provided with an external water level indicator to allow the water level to be easily inspected from the ground during routine substation inspections.

Gravity fed systems are preferred, however, as this is not always feasible, the installation of automatic pumps may be required.

Clean tank water can be used for hand washing, however, water outlets shall have appropriate signage (in accordance with AS 1319:1994 - Table B3 Hazards) and suitable pipe identification (in accordance with AS 1345:1995) so that the water is not used for drinking or food washing.

Refer to Figure-1 for a typical warning and prohibition sign for undrinkable water.

Tanks shall generally be painted or manufactured in a neutral colour to blend in with the environment in rural areas.

Tanks shall generally be supported on a suitable stabilised base or concrete plinth at ground level and shall be located on the site to satisfy the minimum clearances indicated in SDI 527, both for the installation of the tank and the ongoing maintenance (including filling by a tanker).

Figure 1 - Typical warning sign



5.4 Electrical isolation and earthing

Electrical isolation shall be provided between the water authority mains and the substation plumbing system. Isolation shall be required when metallic pipes are being used within the substation boundary. Electrical isolation and earthing associated with the plumbing system shall be in accordance with EDI 516.

5.5 Water taps

Water taps shall not be installed within oil containment bunds or on bund walls however they shall be installed in close proximity to the bunds in accordance with SDI 540; as well as around the building for the purpose of washing down pavement areas, and for the occasional watering of landscaped areas.

Taps within a security fence shall be fitted with a normal tee head, whereas taps outside shall be fitted with a vandal resistant head.

5.6 Emergency deluge showers

Deluge showers shall be installed within the substation boundary to provide users with emergency fire extinguishing, or to wash off any hazardous chemical spills. Refer also to SDI 522.

5.7 Painting

For ease of identification, all exposed pipe work carrying water shall be painted green as set out in Tables 1 and 2 of AS 1345:1995.

5.8 Drainage system

5.8.1 General

The switchyard shall have a sub-surface drainage system installed to remove excess water from the site, and the site shall be contoured in such a manner as to remove hollows that may retain water and cause pooling.

Drainage from the substation to the local council's system shall be in accordance with the local council and water authority's requirements.

Items such as stormwater drains, pipes and collection pits are not to be located within or adjacent to oil containment bunds as insulation oil can pollute the stormwater system in the event of a catastrophic failure of a transformer. Refer also to SDI 540.

Rainwater collection pits within access driveways shall be located in the centre of the pavement to better avoid the superimposed load of the outrigger feet of a crane hoisting transformer components.

5.8.2 Stormwater pollution prevention

A pollution prevention device that efficiently removes oil, sediment and other contaminants from stormwater and stores them for safe and easy removal shall be installed at new substations. This is required so that discharges from the substation site, especially in the event of an accidental release of oil or other pollutants, will comply with the environmental regulations.

All water from the site shall pass through this system.

The system shall provide careful control of flow rates and operational velocities to prevent the re-suspension and loss of fine suspended solids material, and emulsification of collected hydrocarbons during infrequent high flow rates.

Stormwater pollution prevention devices shall be protected from vandalism and mechanical damage as required; and they shall be located within the security fence wherever possible.

The Network Substations Manager, Asset Standards and Design shall approve all stormwater pollution prevention devices for use in transmission and zone substations

6.0 AUTHORITIES AND RESPONSIBILITIES

General Manager, Asset Management has the authority and responsibility for approving this instruction.

Manager Asset Standards and Design has the authority and responsibility for making recommendations to the **General Manager, Asset Management** in respect to this instruction.

Network Substations Manager, Asset Standards and Design is responsible for keeping the content of this instruction up to date.

All **Endeavour Energy employees and contractors** shall be responsible for:

- Meeting the requirements of this instruction and SDI 505.
- Working in accordance with local and statutory requirements.
- Maintaining public safety;
- Working in accordance with Endeavour Energy's Electrical Safety Rules and systems when conducting works associated with this instruction.

All **Project Managers and Design Engineers** shall be responsible for:

- Meeting the requirements of this instruction within their area of responsibility.
- Overseeing that Endeavour Energy workers and/or contractors engaged to perform the work have appropriate qualifications and experience.

- Overseeing that data is entered into Ellipse in accordance with SMI 119 and associated drawings are entered in the company document management system.

7.0 DOCUMENT CONTROL

Documentation Content Coordinator : Network Substation Manager, Asset Standards and Design

Documentation Distribution Coordinator : Branch Process Coordinator