

## Part 1: Short answer

Answer questions in the spaces provided giving references to Australian Standards as shown.

1. List three ways that wiring systems can be selected and installed so as to minimise the risk of mechanical damage.

1. Mechanical characteristics of the wiring system.
2. Location selected.
3. Provision of additional local or general mechanical.

AS/NZS 3000: 3.3.2.6

2. What is the requirement for the separation of above ground low voltage wiring systems from gas and water services?

Maintain a distance of at least 25mm from these services

AS/NZS 3000: 3.9.8.4 (b)

3. What are the AS/NZS 3000 requirements for wiring installed through the space formed between roofing or wall lining material and its immediate support?

Not permitted

AS/NZS 3000: 3.9.4.3.1

4. Provide one example of situation where wiring may have been installed in a prohibited location under roofing or wall lining material.

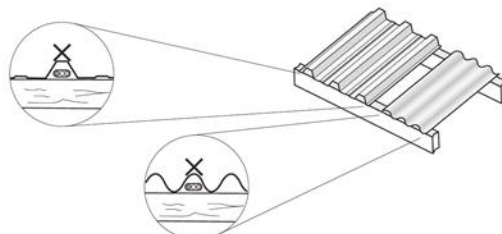


FIGURE 3.6 PROHIBITED WIRING SYSTEM LOCATION—  
ROOF OR WALL-LINING MATERIALS

Between tile batten and roofing tiles

Between corrugated sheeting and wall or roof supporting members.

(Accept similar answers)

AS/NZS 3000: 3.9.4.3.1

5. What are the sealing arrangements where a wiring system has penetrated a fire-rated barrier in a building, such as above a suspended ceiling?

The opening must be close fitting and at least 50mm from other services.

Opening can be no greater than 500mm<sup>2</sup> (e.g. 25mm diameter hole)

Fire rating must be reinstated

(All three responses required to be marked correct)

AS/NZS 3000: 3.9.9.3

6. What is the NCC, who is it written by, what are its goals, and what are the three volumes it contains?

What: National Construction Code

Who: Australian Building Codes Board in conjunction with the building and plumbing authorities in the States and Territories.

Goals: Its goals are nationally consistent health, safety, amenity and sustainability in building construction and plumbing and drainage.

Volumes:

1. Building Code of Australia Class 2 to Class 9 Buildings
2. Building Code of Australia Class 1 and Class 10 Buildings
3. Plumbing Code of Australia.

AS/NZS 3000: 2018 E2.1

7. List two considerations that need to be addressed when installing electrical wiring and accessories in heritage listed buildings.

1. Colour scheme
2. Style of accessories,
3. Protection of finished surfaces (e.g. original brickwork)
4. Limitation on access to cable routes

Any two of the above. There may be other responses in accordance with State Heritage Requirements.

8. Which NSW Government department should you contact for advice before conducting work on a Heritage listed building?

NSW Environment and Heritage

9. List the Australian Standards that need to be referred to when carrying out electrical work in the following Special Situations.

Special Situation	Australian Standard	AS/NZS 3000 Reference
Electro-medical treatment areas	AS/NZS 3003	7.8.2.2
Construction and demolition sites	AS/NZS 3012	7.8.2.1
Relocatable installations and their site supply	AS/NZS 3001	7.8.2.3
Caravan parks	AS/NZS 3001	7.8.2.3
Marinas and pleasure craft at low voltage	AS/NZS 3004	7.8.2.4
Shows and carnivals	AS/NZS 3002	7.8.2.5

10. Extension leads on construction sites must have plug tops and cord extension sockets with clear castings. What is the purpose of this?

To allow for inspection of wiring and terminations.

AS/NZS 3012:

11. What is the minimum rating for socket-outlets that accommodate 3-pin flat pin plugs where they are installed to supply each site in a caravan park?

15A

AS/NZS 3001: 2.2.7.2 (a)

12. What type of switch is required to control light fittings in a caravan?

Double pole switch

AS/NZS 3001: 3.6.2

13. What are two environmental conditions that exist specifically at a boating marina and the adverse effect these conditions might have on electrical equipment?

1. Saltwater – increased risk of corrosion

2. Water variation level (tidal and wave action) – inundation of equipment

(Also accept - water spray, high temperatures, prolonged exposure to UV radiation)

AS/NZS 3004: 1.6.3

14. What is the minimum clearance height for overhead wiring installed as a catenary above areas where concessions are located at a show or carnival?

6.0 metres

AS/NZS 3002: 2.1.3

15. What is the AS/NZS 3000 definition of a "Hazardous Area"?

An area in which an explosive atmosphere is present, or may be expected to be present in quantities such as to require special precautions for the construction, installation and use of equipment.

AS/NZS 3000: 1.4.15

16. Who is responsible for the classification of a Hazardous Area?

The person or parties in control of the installation

AS/NZS 3000: 7.7.2.1

17. Which standard(s) should be referenced when selecting equipment to be installed in a Hazardous Area?

AS/NZS 60079.14

AS/NZS 3000: 7.7.2.4

18. What is the AS/NZS 3000 definition of a damp situation?

A situation in which moisture is either permanently present, or intermittently present to such an extent as would be likely to impair the effectiveness or safety of an electrical installation that complies with AS/NZS 3000 for ordinary situations.

AS/NZS 3000: 1.4.44

19. What is the minimum horizontal distance from the internal rim of a bath without a shower to ensure that equipment is outside of Zone 2?

0.6m

AS/NZS 3000: Fig 6.1

20. What is the minimum horizontal distance from the fixed shower plumbing connection of a shower without a barrier or screen to ensure that equipment is outside of Zone 2?

1.8m

AS/NZS 3000: Fig 6.3

21. What do the initials "IP" stand for with regard to the installation of electrical equipment in damp situations?

Ingress Protection

AS/NZS 3000: 1.4.70 (or Appendix G)

22. What is the minimum IP Rating for a switch installed within Zone 2 of a non-communal bathroom?

IPX4

AS/NZS 3000: 6.2.4.1 and 6.2.4.3

23. What is the minimum horizontal distance for the installation of a socket-outlet from the internal rim of a 12 litre hand basin with a fixed water outlet to avoid the damp situation associated with the basin?

0.15m (150mm)

AS/NZS 3000: Fig 6.13

24. What is the voltage range of extra-low voltage?

Not exceeding 50V a.c. or 120V ripple free d.c.

AS/NZS 3000: 1.4.28 (a)

25. What is the difference between a separated extra-low voltage (SELV) system and a protected extra-low voltage (PELV) system?

PELV is electrically separated from earth. SELV is not.

AS/NZS 3000: 1.4.105 and 1.4.96 (or Section 7.5)

26. Two circuits need to be run to a swimming pool zone, with the following specifications:

- Circuit 1 is wired in 450/750V 2C+E TPS to supply a 230V pool filter pump.
- Circuit 2 is fed from an SELV isolating transformer with a 12V secondary and is wired in 2-core ordinary duty 250/440V flexible cord to supply a 12V underwater light.

Can the two circuits be run in the same underground conduit?

Yes

AS/NZS 3000: 3.9.8.3

27. List two types of cable permissible for use as aerial conductors.

1. Hard drawn bare conductors
2. Polymeric insulated cables
3. Neutral-screened cables
4. Parallel-webbed, twisted or bundled insulated cables

(Any two)

AS/NZS 3000: 3.12.1

28. What is the minimum clearance for an XLPE insulated (unsheathed) aerial bundled cable when used as an aerial consumer main installed over a driveway?

4.6m

AS/NZS 3000: Table 3.8

29. Where the point of attachment for an aerial consumer main is to be installed adjacent to a window, what is the minimum horizontal clearance that must be maintained from the window?

1.25m

NSW Service Rules: Fig 3.6

30. List two mandatory tests that need to be conducted on an aerial consumer main prior to energising.

1. Insulation Resistance
2. Polarity

AS/NZS 3000: 8.3.6.1 and 8.3.7.1

31. Describe the three classifications of underground wiring system.

1. Category A – wiring systems suitable for underground use without further protection
2. Category B – wiring systems suitable for underground use with further protection
3. Category C – wiring systems laid in a channel chased in rock and covered with concrete

Insulation Resistance and Polarity

AS/NZS 3000: 3.11.2

32. Give an example of a typical 'Category A' underground wiring system.

TPS or TPI cables installed in heavy duty underground conduit (typically orange)

AS/NZS 3000: 3.11.3.1

33. Who should be contacted prior to digging a trench for the installation of an underground cable and what is the phone number?

Dial Before You Dig - Phone number 1100 (or use phone app)

NSW Service Rules: 2.4.2

34. What is the minimum depth of cover for cables installed underground as a Category A system beneath a slab greater than 75mm thick within the confines of a building?

Directly below the slab

AS/NZS 3000: Table 3.6

35. What is the minimum depth of cover for underground cables installed under a grassed area of a backyard?

500mm

AS/NZS 3000: Table 3.6

36. List **two advantages** of an underground wiring system over an aerial wiring system.

1. Underground cables are not as unsightly.
2. Protection from the elements (e.g. falling trees).

37. What is the main advantage of a 'Category A' system over a 'Category B' system if required to install a single 2.5mm<sup>2</sup> underground cable across the backyard of a domestic premises?

Less cost

38. The electricity distributor's aerial supply cable terminates at a pole on a customer's domestic premises. From there the supply is to be via an underground consumer main that will NOT be protected at the pole. What is the minimum size and type of cable required for a single phase 100A supply to the premises?

16mm<sup>2</sup> XLPE cable

NSW Service Rules: 2.3.2 and 2.6.1

39. What does the term 'rough-in' mean with regard to electrical installation work?

Installation of cables prior to the fixing of wall cladding.

40. What are the requirements for the fixing of wiring systems installed above a suspended ceiling?

Wiring systems may be tied to the hangers unless it is not permitted by the suspended ceiling manufacturer. Additional protection is required against mechanical damage where cables are in contact with conductive ceiling support runners. Cables must be supported to prevent undue sagging.

AS/NZS 3000: 3.9.3.2

41. Where TPS cables are to be joined in an accessible ceiling space, how must the exposed cable cores be protected?

Uninsulated or single insulated conductors must be enclosed (e.g. in a junction box).

AS/NZS 3000: 3.10.1.1 or 3.10.1.2

42. Explain the purpose of a 'draw-wire' when installing cables in conduit.

A draw wire is installed in a conduit run during assembly, or pushed through once assembly is complete. The draw wire is then used to pull the cables to be installed through the length of the conduit run.

43. Is it permissible to clamp a soft soldered electrical connection under a screw or between metal surfaces?

No

AS/NZS 3000: 3.7.2.7



44. Explain why the earth continuity of a cabling system needs to be tested.

To ensure the effective operation of circuit protective devices if an earth fault occur

AS/NZS 3000: 8.3.5.1

AS/NZS 3000: 3.9.4.3.1

45. What protection is required against fire initiated or propagated by elements of the electrical installation?

Electrical equipment shall be selected, installed and protected such that the equipment will not:

1. Obstruct escape routes
2. Contribute to or propagate a fire
3. Attain a temperature high enough to ignite adjacent materials
4. Adversely affect means of egress from a structure.

AS/NZS 3000: 2018 1