higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

INSTALLATION RULES
(First Paper)

28 MARCH 2019

This marking guideline consists of 6 pages.

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QUESTION 1: SANS 10142-1 OF 2017: SCOPE

1.1
- Extra-low voltage lighting installations
- Street lighting (2)

1.2
- Electric traction equipment
- Automotive electrical equipment excluding the caravan part of a roving vehicle
- Electrical installations on board ships
- Electrical installations in aircraft
- Electrical installations for underground and opencast mining operations
- Telecommunication, television and radio circuits (excluding the power supply to such equipment)
- Lightning protection of buildings and structures
- Extra-low voltage control circuits between different parts of machinery or system components, forming a unit that are separately installed and derived from an independent source or an isolating transformer (8)

[10]

QUESTION 2: SANS 10142-1 OF 2017: DEFINITIONS

2.1 True
2.2 True
2.3 False
2.4 True
2.5 False
2.6 False
2.7 False
2.8 True
2.9 False
2.10 True

(10 × 1) **[10]**

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QUESTION 3: SANS 10142-1 OF 2017: FUNDAMENTAL REQUIREMENTS

3.1 Unless otherwise permitted by an applicable standard,✓ electrical equipment shall be so designed, positioned and protected✓ that accessible parts under normal operating conditions do not reach a temperature that exceeds any of the following:✓

a) 70 °C in the case of metallic parts✓
b) 90 °C in the case of non-metallic parts✓ (5)

3.2 When all conductors of an AC installation are carrying their maximum estimated load,✓ the difference in voltage (the voltage drop) between the point of supply and any point of outlet or terminal of a fixed appliance shall not exceed 5% of the standard voltage✓ or of the declared phase-to-neutral voltage.✓
In the case where reticulation is part of the electrical installation after the point of supply,✓ the 5% voltage drop shall be calculated to include the reticulation part of the installation.✓ (5)
[10]

QUESTION 4: SANS 10142-1 OF 2017: BATHROOMS, SHOWERS, SPAS

4.1
- In zone 0, only protection by Extra-low voltage at nominal voltage not exceeding 12 V is permitted, the safety source being installed outside zone 0.
- Protection by means of obstacles and by placing equipment out of arm's reach are not permitted.
- Protection by non-conducting locations and earth free equipotential bonding are not permitted. (3 × 2) (6)

4.2 None (1)

4.3
- The heating elements must be covered by a metallic sheath (screened), or
- A metallic grid is installed above the heating elements, and
- The sheath or grid is connected to the equipotential bonding. (3)

[10]

QUESTION 5: SANS 10142-1 OF 2017: ALTERNATIVE SUPPLIES

5.1
- Low-voltage generating sets
- Photovoltaic (PV) installations
- Gas generators
- Diesel generators
- Wind turbines
- Hydropower plants (Any 4 × ½) (2)

5.2
- The capacity and operating characteristics of the alternative supply shall be such
- that danger or damage to equipment does not arise after the connection or disconnection of any intended load
- as a result of the deviation of the voltage or frequency from the standard range.
- Means shall be provided to automatically disconnect parts of the installation if the capacity of the alternative supply is exceeded. (4)

5.3
- The neutral of each unit shall be earthed at the unit✓ and these points shall be bonded to the consumer's earth terminal.✓
- The supply from each unit which supplies the installation or part of the installation shall be switched by means of a switch that breaks all live conductors operating substantially together✓
- to disconnect the earthed neutral point from the installation neutral when the alternative supply is not connected.✓ (4)

[10]

QUESTION 6: SANS 10142-1 OF 2017: MEDICAL LOCATIONS

6.1
- Sterilisation equipment
- Necessary building services, including air conditioning, heating, ventilation
- Cooling equipment
- Cooking equipment
- Storage battery chargers (5)

6.2
6.2.1 Line conductors
6.2.2 Safety power
6.2.3 Operation theaters
6.2.4 3 hours
6.2.5 0,5 sec

(5 × 1) (5)

[10]

QUESTION 7 SANS10142-1: ANNEX F: DETERMINING CONDUIT SIZE

7.1 7.1.1 5 × 2 × 17 = 170
5 × 14 = 85
Total = 255✓
Use a 40 mm² conduit.✓

7.1.2 4 × 2 × 14 = 112
4 × 14 = 56
Total = 168✓
Use a 32 mm² conduit✓

(2 × 2) (4)

7.2 7.2.1 2 × 2 × 17 = 68
2 × 14 = 28
Total = 96✓
% space left = (144-96)/144 × 100% = 33%✓
There will be two separate conduits with two circuits each and one circuit in its own conduit.✓ (3)

7.2.2 2 × 2 × 14 = 56
2 × 14 = 28
Total = 84✓
% space = (144 – 84)/144 × 100% = 41%✓
Use 2 circuits per conduit✓ (3)
[10]

QUESTION 8: OCCUPATIONAL HEALTH AND SAFETY ACT, 85 OF 1993

8.1 8.1.1 After having ascertained himself by means of an inspection and test ✓ that an electrical installation complies with the provisions of regulation 4(1)✓ or
in the case of a reasonably safe electrical installation that existed prior to the coming into force of these regulations,✓
he/she may issue a certificate of compliance in the form of ADDENDUM 1✓
providing that where any addition or alteration has been affected to an electrical installation for which a certificate of compliance was previously issued✓
the accredited person may issue a certificate of compliance for such addition or alteration only.✓ (6)

8.1.2 The accredited person shall refuse to issue such certificate,✓ provided that if such fault or defect in the opinion of the accredited person constitutes an immediate danger to persons in the case where electricity is already supplied,✓
he/she shall forthwith take steps to disconnect the supply to the circuit✓ in which the fault or defect was detected.✓ (4)
[10]

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QUESTION 9: SANS 10292 OF 2001: EARTHING OF LOW-VOLTAGE DISTRIBUTION SYSTEMS

9.1
- Underground installations
- Overhead lines
- Bare (open) overhead LV wires (3)

9.2
- Trench earth
- Earth rods
- Foundation earth (3)

9.3
- TN-C-S with TN-S
- TNS with TN-C-S
- TT with TN-S
- TT with TN-C-S (4)

[10]

QUESTION 10: SANS 10198-2 OF 2004: POWER CABLES UP TO 33 KV: SELECTION OF CABLE TYPE AND METHODS OF INSTALLATION

10.1
- Carry a specified current
- Withstand the rated voltage (2)

10.2
- Increasing the separation between the cables
- Reducing or eliminating any parallelism (2)

10.3
- Snaking the cable
- Installing it in cleats or on suitable hinges and allowing it to sag.
- Avoiding a partly restrained, partly unrestrained system. (3)

10.4 It helps to avoid damage to the cable. (1)

10.5 10.5.1 expand and contract

10.5.2 separate the cores

(2 × 1) (2)

[10]

TOTAL: 100

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