higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

INSTALLATION RULES
(Second Paper)

30 JULY 2018

This marking guideline consists of 5 pages.

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QUESTION 1

1.1 1.1.1 In the circuit may be reduced.

1.1.2 Current carrying capacity may be tied into a circuit.

1.1.3 TWO or more branches each having conductors of reduced current carrying capacity.

(3 × 1) (3)

1.2 1.2.1 Characteristics in respect of conductor material, nominal cross sectional are, length and, where applicable, insulation and cable construction. (2)

1.2.2 Route and have the same insulation method. (1)

1.3
- Be at least equal to the fun load rated current of the motor.
- Be taken into consideration. (2)

1.4 Be at least equal to the sum of the full load rated current of the motors,✓ but a lower current-carrying capacity may be used if there is cyclic loading.✓ (2)

[10]

QUESTION 2

2.1 2.1.1 F1 – Factor for depth of burial

2.1.2 F2 – Factor for soil tempered

2.1.3 F3 – Factor for thermal resistivity

2.1.4 F4 – Factor for grouping of directly burial cables

(5)

2.2 For 25 mm²
I = Is × F1 x F2 × F3 × F4✓
= 119 × 0,88 × 0,61 × 0,81 × 0,95✓
= 49,155 A✓

For 35 mm²
= 143 × 0,88 × 0,61 × 0,81 × 0,95✓
= 59,069 A✓ (5)

[10]

QUESTION 3

3.1
- Hard-drawn copper.
- Stranded aluminium.
- Composite construction (e.g. steel cord aluminium) (3)

3.2
- On the surface
- Under plaster
- Under s raised floor
- In hallows
- In roof spaces
- Directly in the ground
- Outdoor/exposed to water
- Under screed (Any 7 × 1) (7)

[10]

QUESTION 4

- Be mounted in the distribution board✓ or adjacent to the distribution board in the same room.✓
- In the case of the main or first distribution board of an installation,✓ be labelled as main switch.✓
- In the case of a sub-distribution board,✓ be labelled as sub-main switch or .main switch. If the board is labelled sub-board,✓
- In the case where an alternative supply is installed✓ (emergency supply, uninterruptible power systems (UPS), etc.), be labelled as required in 7.12.2.1✓
- Have a danger notice on or near it.✓ The danger notice shall give instructions that the switch-disconnector be switched off in the event of inadvertent contact or leakage.✓

[10]

QUESTION 5

5.1 Is should:
- be non-flammable
- be located as near to the appliance as is practicable
- be permanently installed
- not be opened without the use of a tool
- be readily accessible (5)

5.2
- Allow enough slack immediately behind the base of the appliance for easy handling.
- In the case pre-wired appliance, be made using a connector. (2)

5.3
- Within 1,5 m from appliance
- In the distribution board (if the switch disconnector is capable of being locked in the open position). (3)

[10]

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QUESTION 6

6.1 True
6.2 False
6.3 True
6.4 True
6.5 False
6.6 True
6.7 False
6.8 False
6.9 False
6.10 True

(10 × 1) **[10]**

QUESTION 7

7.1 With supply on at main distribution board,✓ test between live neutral and earth.✓ (2)

7.2 3 KA✓ it cannot be less than the tested value.✓ (2)

7.3 100 A (1)

7.4
- Graphs
- Tables
- Computer programmes
- Suppliers of equipment
- Calculate (5)

[10]

QUESTION 8

8.1
- Earth fault loop impedance
- Elevated voltage on main supply
- Voltage, main distribution board – No load
- Voltage, main distribution board – On load
- Voltage at available load
- Operation of earth leakage unit
- Earth leakage test button (7)

8.2
- Medical location
- Hazardous locations (2)

8.3 0,2 Ω (1)

[10]

QUESTION 9

9.1 The consumer's earth terminal, shall preferably be 0,5 m or less✓ in order to keep the overall inductive voltage drop due to surge current as low as possible.✓ (2)

9.2 9.2.1 From the SPDs bonding bridge to the consumer's earth terminal (E)✓ shall be equal to that of the phase conductor✓ up to the maximum size specified by the manufacturer but not less than 6 mm²✓ (3)

9.2.2 From the SPDs bonding bridge to the neutral conductor✓and from the SPD between the neutral conductor and the consumer's earth terminal (E✓), shall be equal to that of the phase conductor✓up to the maximum size specified by the manufacturer but not less than 6 mm².✓ (4)

9.3 Caused nuisance tripping in some instances. (1)
[10]

QUESTION 10

- Determine the effectiveness of mechanical actuating elements, interlocks, locks, etc.
- Inspect the conductors and cables for proper laying and the devices for proper mounting.
- Inspect the ASSEMBLY for compliance with the prescribed creepage distances given in QUESTION 4.2.5.
- Inspect the ASSEMBLY for compliance with the prescribed clearance distances in accordance with QUESTION 4.2.7.
- Inspect the ASSEMBLY for compliance with the prescribed degrees of protection given in QUESTION 4.7.3.
- Check, by random testing, the connections, especially the screwed connections, for adequate contact.
- Verify that the information and markings are complete, and that the ASSEMBLY corresponds with the marking.
- Check the ASSEMBLY for conformance with the circuit, wiring diagrams and technical data provided by the manufacturer.
- Depending on the complexity of the ASSEMBLY, it might be necessary to inspect the wiring and to carry out an electrical functional test.
- The test procedure and the number of tests depend on whether or not the ASSEMBLY includes complicated interlocks or sequence control facilities.
- Inspect the nameplate of the ASSEMBLY for use above 125 A for compliance with QUESTION 4.1.
- Inspect the nameplate of the ASSEMBLY for use above 125 A for compliance with QUESTION 4.1.

. (Any 10 × 1) **[10]**

TOTAL: 100

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