higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

INSTALLATION RULES
(First Paper)

26 MARCH 2018

This marking guideline consists of 7 pages.

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QUESTION 1: OHS ACT OF 1993: ELECTRICAL MACHINERY REGULATIONS

1.1 1.1.1 An electrified barrier against the trespassing of persons or animals which consists of one or more bare conductors

1.1.2 Electrical machinery arranged so as to deliver a periodic non-lethal amount of electrical energy to an electric fence connected to it

1.1.3 Conductors between the supplier's mains and the consumer's electrical installation

1.1.4 A substation that a person cannot enter

1.1.5 An electrical system in which all the conductors and devices are electrically connected to a common source of electrical energy

(5 × 1) (5)

1.2
- It is fitted with a substantial handle which is made of non-hygroscopic, non-conducting material.
- All live metal parts which may become live owing to a faulty circuit are completely protected against accidental contact.
- The lamp is protected by means of a substantial guard firmly fixed to the insulated handle.
- The cable lead-in is such that the insulation can withstand rough use. (4)

[9]

QUESTION 2: SANS 10198-2 OF 2004: SELECTION OF CABLE TYPE AND METHOD OF INSTALLATION

2.1
- Support for the tray shall be freestanding or fixed to walls.✓Alternatively roof trusses or joints shall be used as supports.✓
- Do not fix such supports or the trays to structural steel work by means of drilling as this may weaken the structure.✓
- Ensure that the cable trays or ladder racks are adequately supported. A typical spacing for supports is 2 m.✓
- Fix multicore cables neatly to the tray by means of clips or straps.✓
- Fix single-core cables in the foil cleats ✓ and strap them at intermediate positions to contain short-circuit forces.✓ (7)

2.2
- Mining industry
- Paper industry
- Steel industry (3)

[10]

QUESTION 3: SANS 10292 – 2001: EARTHING OF A LOW-VOLTAGE DISTRIBUTION SYSTEM

3.1 3.1.1 Neutral and protective functions are combined in a single conductor between the source and the point of supply and separated in the consumer's electrical installation.

3.1.2 Separate neutral and protective conductors throughout the system earthing.

3.1.3 All exposed conductive parts of a consumer's installation are connected to a consumer's earth electrode that is electrically independent of the source earth.

3.1.4 The source of energy is connected either to earth through a deliberately introduced high earthing impedance or it is isolated from earth.

3.1.5 Neutral and protective functions are combined in a single conductor throughout the system earthing.

(5 × 1) (5)

3.2
- Bare copper
- Galvanised iron
- Stainless steel (3)

3.3 3.3.1 False
3.3.2 False

(2 × 1) (2)
[10]

QUESTION 4: SANS 10142-1 of 2008: FUNDAMENTAL REQUIREMENTS

4.1
- Earthing and bonding
- Electrical separation of the circuit
- Use of isolating transformers with an output of 50 V or less
- Use of electrical equipment that is double-insulated. (4)

4.2 4.2.1 impair the functioning or safety of other equipment. (1)

4.2.2 replacement, operation, testing, inspection and repairs. (1)

4.2.3 without the need to entry into any adjoining premises. (1)

4.2.4 not likely to accumulate on live or other parts and cause flash over. (1)

4.2.5 by a cupboard or other covering, the notice for live electrical apparatus referred in Annexure Q✓ shall be in a conspicuous place indicating the position of the distribution board✓. (2)
[10]

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QUESTION 5: SANS 10142-1 OF 2008: FUNDAMENTAL REQUIREMENTS

5.1
- Power factor
- Inrush current
- Asymmetrical load
- Harmonics (4)

5.2
- Double insulation
- Reinforced insulation for the highest voltage present
- Basic insulation and protective screening according to the highest voltage present. (3)

5.3 For :
- Maintenance
- Testing
- Fault detection
- Repairs (4)

[11]

QUESTION 6: SANS 10142-1 0F 2008: SPECIAL INSTALLATIONS OR LOCATIONS: BATHROOMS, SHOWERS, SPAS

6.1
- Zone 0 - It is the interior of the bathtub or shower basin.✓✓
- Zone 1 - It is the vertical plane circumscribing the outer edge or 0,2 m from the inner edge of the bathtub (where the ledge is too wide), shower basin,✓or for a shower without a basin, by the vertical plane 0,6 m from the shower rose.✓
- Zone 2 - It is the volume external to zone 1 and the parallel vertical plane 0,6 m external to zone 1,✓the floor and the horizontal plane 2,25 m above the floor.✓
- Zone 3 – It is the vertical plane external to zone 2 and the parallel vertical plane 2,4 m external to zone 2, ✓and the floor and the horizontal plane 2,25 m above the floor. ✓ (8)

6.2
- Barriers or enclosures that offer at least a degree of protection of IP2X
- Insulation capable of withstanding a test voltage of 50 V for 1 min (2)

[10]

QUESTION 7: SANS 10142-1 OF 2008: SPECIAL INSTALLATIONS OR LOCATIONS: CONSTRUCTION AND DEMOLITION SITE INSTALLATIONS

7.1 7.1.1 Shall have a degree of protection of at least IP32

7.1.2 Shall be arranged that no strain be placed on termination of conductors.

7.1.3 To avoid damage, cables should not be run across side roads or

walk ways.

7.1.4 Armoured cables or cables must be protected against mechanical damage

7.1.5 Are permitted where they cannot be subjected to mechanical damage and are out of arm's reach

7.1.6 Not permitted

(6 × 1) (6)

7.2 The size of the site✓ and the demand for power ✓ (2)

7.3 7.3.1 Sub distribution board or loads
7.3.2 500 mA

(2 × 1) (2)
[10]

QUESTION 8: SANS 10142-1 0F 2008: SPECIAL INSTALLATIONS OR LOCATIONS – MEDICAL LOCATIONS

8.1 Distribution board in the building that fulfils all the functions of the main distribution board for the supply area assigned to it✓and where the voltage drop is measured for operating the safety services✓ (2)

8.2 Location intended for the purpose of diagnosis, treatment, monitoring and care of patients (1)

8.3 Medical location where no applied part is intended to be used (1)

8.4 Medical locations where applied parts are intended to be used externally✓ or to any part of the body, but not the heart✓ (2)

8.5 Medical location where applied parts are intended to be used in application as in an intra-cardiac procedure in an operation✓ and in vital treatment where discontinuity of the supply causes danger to life✓ (2)

8.6 Living being undergoing medical or dental investigation or treatment (1)

8.7 Voltage which during an insulation fault, appears between simultaneously accessible parts (1)
[10]

QUESTION 9: SANS 10142-1 OF 2008: ANNEXURE M - ELECTRICITY SUPPLY SYSTEMS

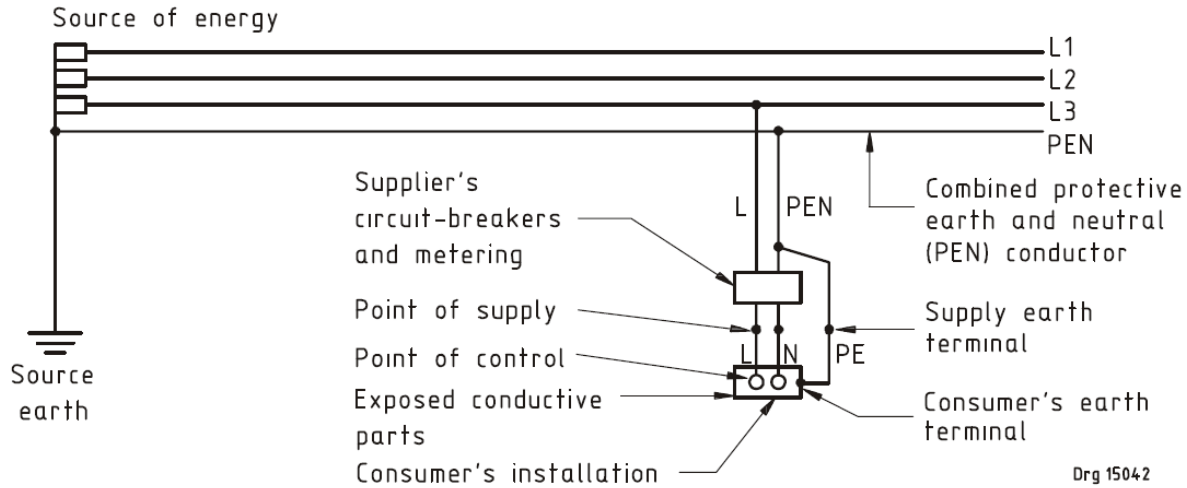


Figure M.2.1 —TN-C-S system earthing

Neutral and protective functions combined in a single conductor between the source of energy and the point of supply and separated in the consumer's installation **[10]**

QUESTION 10: SANS 10142-1 OF 2008: ANNEXURE P AND Q

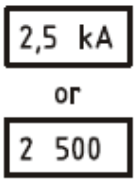
10.1 10.1.1
- Electrical tester for single phase
- Installation electrician
- Master installation electrician (3)

10.1.2
- Installation electrician
- Master installation electrician (2)

10.1.3 Master installation electrician (1)

10.2

Table Q.1 — IEC symbols for switchgear

1	2
Symbol	Description
	General symbol for switch ✓
	Disconnector (off-load isolator) provisionally used for other switchgear which has isolation properties ✓
	Switch-disconnector (on-load isolator) ✓
	Circuit-breaker ✓
	Circuit-breaker, suitable for isolation ✓
	Short-circuit rating (kA or A respectively) ✓
	Live electrical apparatus ✓
	Transformers ✓

(8 × ½) (4)
[10]

TOTAL: 100

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