higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T880(**E**)(M26)T

NATIONAL CERTIFICATE

INSTALLATION RULES
(First Paper)

(11040412)

26 March 2018 (X-Paper)
09:00–12:00

This question paper consists of 6 pages and 1 addendum.

Copyright reserved

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
INSTALLATION RULES
(First Paper)
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.

2. Read ALL the questions carefully.

3. Number the answers according to the numbering system used in this question paper.

4. Even though NOT explicitly stated in a question, ALL answers must comply with the relevant codes and/or requirements of the SANS publications (latest edition) and the Occupational Health and Safety Act regulations.

5. The answers need NOT be word-perfect in all aspects according to the publications, but the candidates must fully understand the context of the relevant questions.

6. The necessary tables are supplied.

7. The candidates must pass PAPER 1 and PAPER 2 with 50% each. Both examination papers may be written during the same examination period. However, candidates need not pass both examinations during the same trimester, but the second examination must be passed within 12 months of the first otherwise both examinations must be re-written. If a candidate obtains 75 out of 100 marks in ANY ONE of the examinations, he/she will be permanently exempted from re-writing that examination. An appropriate statement will be issued. For accreditation purposes ALL candidates must meet the requirements prescribed by the Department of Labour.

8. NO condonations will be considered.

9. Answers must be rounded off to 2 decimal places.

10. Start each question on a NEW page.

11. Write neatly and legibly.

Copyright reserved

QUESTION 1: OHS ACT OF 1993: ELECTRICAL MACHINERY REGULATIONS

1.1 Define the following terms:

1.1.1 Electric fence

1.1.2 Fence energiser

1.1.3 Service connection

1.1.4 Miniature substation

1.1.5 System

(5 × 1) (5)

1.2 State FOUR conditions in which the use of a portable electric light, with operating voltage exceeding 50 V, is allowed. (4)

[9]

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

2.1 Explain how cables shall be installed on a tray in an indoor installation. (7)

2.2 Name THREE industries where a 500 V/525 V system can be found. (3)

[10]

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

3.1 Briefly explain the following earthing arrangements:

3.1.1 TN-CS system earthing

3.1.2 TNS system earthing

3.1.3 TT system earthing

3.1.4 IT system earthing

3.1.5 TN-C system earthing

(5 × 1) (5)

3.2 Name THREE types of material that can be used for earth electrodes. (3)

Copyright reserved

3.3 State whether the following statements are TRUE or FALSE by writing only 'true' or 'false' next to the QUESTION NUMBER (3.3.1–3.3.2) in the ANSWER BOOK.

3.3.1 Bare aluminium is suitable as an earth electrode.

3.3.2 Galvanised iron can be buried near bare copper.

(2 × 1) (2)
[10]

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

4.1 State FOUR protective measures that can be applied for protection against harmful earth-fault currents. (4)

4.2 Complete the following sentences by writing only the missing information next to the QUESTION NUMBER (4.2.1–4.2.5) in the ANSWER BOOK.

Electrical equipment shall be so positioned that …

4.2.1 it does not … (1)

4.2.2 It is readily accessible for installation … (1)

4.2.3 All parts of the installation shall be accessible … (1)

4.2.4 Dust or moisture is … (1)

4.2.5 Where the distribution board is concealed … (2)
[10]

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

5.1 HARMFUL EFFECTS

State FOUR factors that can lead to harmful effects on electrical equipment or on the power supply. (4)

5.2 SELV/PELV CIRCUITS

ELV circuits should be separated from low-voltage circuits.

Name THREE methods that will provide this protective separation. (3)

5.3 DISCONNECTING DEVICES

Name FOUR reasons why an electrical installation should have disconnecting devices. (4)
[11]

Copyright reserved

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

6.1 Bathrooms are divided into four zones, zone 0, 1, 2 and 3.

Briefly explain the limitations of each zone. (8)

6.2 State TWO means of protection that can be provided where extra low voltage (SELV) is used for safety. (2)

[10]

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

7.1 INSTALLATIONS: State the requirements regarding installations for the following:

7.1.1 Assemblies, fixed equipment and other equipment installed

7.1.2 Arrangement of wiring

7.1.3 Running of cables

7.1.4 In areas where there is a risk of mechanical damage

7.1.5 Use of unarmoured single-core cables

7.1.6 Use of uninsulated live conductors

(6 × 1) (6)

7.2 What will determine the number of subdistribution boards and circuits required on a construction site? (2)

7.3 Complete the following sentences by writing only the missing words next to the question number (7.3.1–7.3.2) in the ANSWER BOOK.

Automatic supply disconnection of cables, which are intended to supply 7.3.1 …, shall be provided at the origin by additional earth-leakage protection devices with a rated earth-leakage tripping current (rated residual current) not exceeding 7.3.2 … (2)

[10]

Copyright reserved

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

Explain the following terms:

8.1 Main distribution board (2)

8.2 Medical location (1)

8.3 Group 0 location (1)

8.4 Group 1 location (2)

8.5 Group 2 location (2)

8.6 Patient (1)

8.7 Touch voltage UL (1)

[10]

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

Draw a fully labelled diagram of a TN-C-S system earthing. **[10]**

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

10.1 ISSUING TEST REPORTS AND CERTIFICATES OF COMPLIANCE

Name the persons that are authorised to do test reports and certificates of compliance for the following:

10.1.1 Single-phase installation only (3)

10.1.2 Single-phase, three-phase and DC voltage installations (2)

10.1.3 Specialised installation (1)

10.2 IEC SYMBOLS ASSOCIATED WITH SWITCHGEAR

Complete the missing information on TABLE Q.1 (attached). Write your EXAMINATION NUMBER in the spaces provided and hand in the ADDENDUM with your ANSWER BOOK. (4)

[10]

TOTAL: 100

Copyright reserved

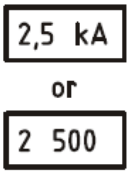
EXAMINATION NUMBER:

Annex Q
(informative)

IEC symbols associated with switchgear

The following symbols are associated with switchgear. The marking of switchgear with these symbols is voluntary, except if prescribed in the product or in any mandatory specification.

Table Q.1 — IEC symbols for switchgear

1	2
Symbol	Description
	
	
	
	
	
	
	
	

Drg.14808z

Amdt 5

Copyright reserved