higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T1630**(E)**(M26)T

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES

(First Paper)

(8080654)

26 March 2018 (X-Paper)
09:00–12:00

This question paper consists of 8 pages and 1 addendum.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
SPECIALISED ELECTRICAL INSTALLATION CODES
(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. Write neatly and legibly.

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QUESTION 1: SANS 10108: 2005

THE CLASSIFICATION OF HAZARDOUS LOCATIONS AND THE SELECTION OF APPARATUS FOR USE IN SUCH LOCATIONS

You are requested as a master installation electrician, to issue a Certificate of Compliance, for an electrical installation in an aircraft hangar. The hanger has a service pit which is equipped with service amenities such as compressed air, power-supply sockets mounted in the ground and socket outlets for inspection lights and for use for other power tools. The hangar is used to service aircraft and includes wing-service platforms (wing docks) with electrical equipment mounted on the platforms.

No additional forced ventilation is provided.

Use the above scenario and answer the following questions:

1.1 Describe what the expected zoning would be as stipulated in the *Area Classification* by direct example, SANS 10108. (5)

1.2 Give the minimum specifications for explosion-protected equipment suitable for use in the areas you have zoned in QUESTION 1.1.

There is a jet fuel MSDS on the ADDENDUM (attached). (5)

1.3 After inspection and testing with the results obtained, all being within the stipulated values, you have to attach the additional documentation to the Certificate of Compliance that you have to issue for the respective areas.

State these additional documentation. (5)

1.4 Name the zones which are suitable for the use of *Ex ia* and *Ex ib* (intrinsically safe electrical apparatus). Copy and complete the following table in your ANSWER BOOK.

Ex ia	***Ex ib***
Zones which are suitable for use	**Zones which are suitable for use**

(5)

1.5 In addition to the existing requirements for the marking of explosion-protected equipment to European standards (Cenelec), you are requested by your supervisor to use the ATEX marking system.

Briefly explain the purpose of the ATEX marking system used on large numbers of explosion-protected electrical equipment. (5)

1.6 Name FIVE authorised testing bodies or certification bodies for electrical explosion-protected equipment recognised in this Standard. (You may use abbreviations.) (5)

[30]

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QUESTION 2: OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993)

2.1 The following is an extract from the Electrical Installation Regulations, found in the Occupational Health and Safety Act (Act 85 of 1993):

'Every user or lessor of an electrical installation, as the case may be, shall on request produce the certificate of compliance for that installation to an inspector or the supplier. (3) Subregulation 1 shall not apply to electrical installations existing prior to the coming into force of this regulation: (23 October 1992) provided that if any additions or alterations are effected to such an installation … the user or lessor of the electrical installation, as the case may be, shall obtain a certificate of compliance for the whole installation …'

Explain the meaning of the above paragraph. (3)

2.2 State TWO regulations in the act mentioned in QUESTION 2.1 that specifically deal with the electrical industry. (2)

2.3 You are required to supervise the work, use and inspections of the electrical installations on a construction site. The construction regulations in the act mentioned in QUESTION 2.1 contain certain requirements which specifically deal with electrical installations and more specifically on a construction site.

State FIVE requirements that you would put in place to ensure safety with regard to temporary installations on the construction site. (5)
[10]

QUESTION 3: SANS 10142: PART 1: 2012

THE WIRING OF PREMISES (LOW-VOLTAGE INSTALLATIONS)

3.1 SCOPE

3.1.1 Describe the extent of voltages covered by this Standard. (2)

3.1.2 Only state whether the following statement is TRUE or FALSE:

This standard forms the basis of the installation methods and techniques authorised in all electrical installations, even those in hazardous locations. (1)

3.1.3 As a competent person, you are sent into a hazardous location to determine the hazardous electrical conditions which people, animals and property should be protected against.

State FOUR potential hazardous electrical conditions, according to this standard, that you may have discovered. (4)

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3.2 MEDICAL LOCATIONS

3.2.1 Define the term *medical location.* (3)

3.2.2 Name and explain the THREE groups into which you would subdivide a medical location. (5)

3.3 ELECTRICITY SUPPLY SYSTEMS

Explain the significance of the letter 'T' used in the first position of the earth protection identification system used in this Standard (e.g. TNS; TNC-S; TT; IT). (2)
[17]

QUESTION 4: APPROVED RECOMMENDED PRACTICE: 2007

REGULATORY REQUIREMENTS FOR EXPLOSION-PROTECTED EQUIPMENT

4.1 Define the following terms used in this document:

4.1.1 IA certificate (2)

4.1.2 Approved test laboratory (3)

4.2 IA CERTIFICATE

4.2.1 What does the abbreviation IA stand for? (1)

4.2.2 Who may issue an IA certificate? (1)

4.2.3 What is the main aim of an IA certificate? (3)

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4.3 ATEX MARKINGS

Choose from the following list the best description of each marking, symbol or letter of ATE certified equipment given below. Write only the answer next to the question number (4.3.1–4.3.5) in the ANSWER BOOK.

gas group; equipment category (M1, M2, 1, 2 or 3); suitability category for atmospheric conditions; G = gas; D = dust; SANAS explosion-protected symbol; CE mark; EU explosive-atmosphere certification mark

4.3.1 

4.3.2 

4.3.3 II

4.3.4 1

4.3.5 G

(5 × 1) (5)

4.4 Name THREE markings/items of compulsory information that you should affix to explosion-protected equipment, because it is required to ensure safety. (3)

[18]

QUESTION 5: SANS 60079–0: 2012

EXPLOSIVE ATMOSPHERES PART 0: GENERAL REQUIREMENTS

5.1 Define the scope of this Standard. (3)

5.2 State the maximum surface temperatures allowed in an authorised design of Group-1 explosion-protected equipment. (2)

[5]

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QUESTION 6: SANS 60079–10–1: 2010

EXPLOSIVE ATMOSPHERES PART 10: CLASSIFICATION OF AREAS (EXPLOSIVE GAS ATMOSPHERES)

A flammable liquid storage tank is situated outdoors, with a fixed roof and no internal floating roof as shown in FIGURE 1.

Principal factors which influence the type and extent of zones:

PLANT AND PROCESS VENTILATION	
Type	Natural
Degree	Medium
Availability	Good
Sources of release and grade of release	
Liquid surface	Continuous
Vent opening and other openings in the roof	Primary
Flanges, etc. inside bund	
Overfilling of the tank	Secondary
Product	
Flashpoint	Below process and ambient temperature
Vapour density	Higher than air

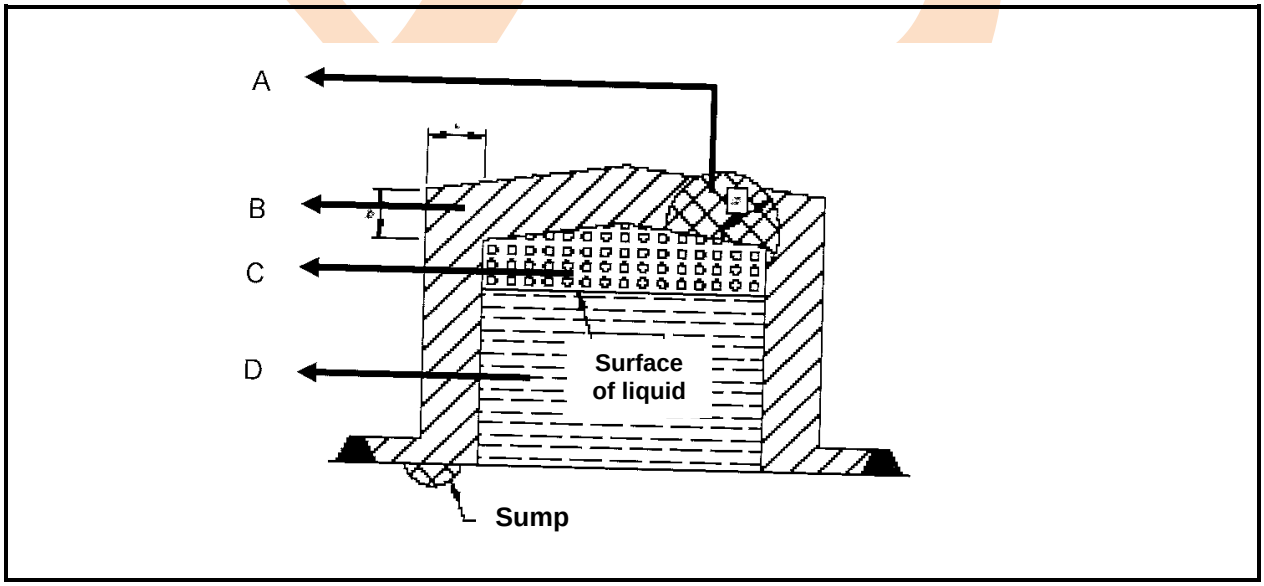

FIGURE 1

6.1 Name and briefly describe FOUR of the six risk profile categories (zones) that can be used to identify hazardous locations. (4 × 1) (4)

6.2 Using the information given in QUESTION 6.1, name the zones labelled A, B, C and D in FIGURE 1. Write only the answer next to the letter (A–D) in the ANSWER BOOK. (4) **[8]**

QUESTION 7: SANS 61241: PART 4: 2001

ELECTRICAL EQUIPMENT FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST PART 4: TYPE OF PROTECTION 'PD'

7.1 Explain the difference between *Ex pG* and *Ex pD.* (2)

7.2 Explain the difference between an enclosure equipped with static pressurisation as opposed to an enclosure fitted with pressurisation that has a continuous flow of protective gas. (2 × 1) (2)
[4]

QUESTION 8: 10123: 2011

THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

8.1 State SIX factors that influence the generation of static electricity in the printing industry. (6)

8.2 Why is static electricity so dangerous in an atmosphere containing flammable substances? (2)
[8]

TOTAL: 100

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ADDENDUM

MATERIAL SAFETY DATA SHEET: JET FUEL

pH:	Data not available
Initial boiling point and boiling range:	150–300 °C/302–572 °F
Freezing point:	< -47 °C/-53 °F
Flash point:	> 38 °C/100 °F
Lower/Upper flammability/explosion limits:	1–6% (V)
Auto-ignition temperature:	> 220 °C/428 °F
Vapour pressure:	< 1 hPa at 20 °C/68 °F
Specific gravity:	Data not available
Density:	775–840 kg/m^3 at 15 °C/59 °F
Water solubility:	Negligible
Solubility in other solvents:	Data not available
N-octanol/water partition coefficient (log pow:	2–6
Kinematic viscosity:	1–2 mm^2/s at 40 °C/104 °F
Vapour density (air = 1):	> 5

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