higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES
(First Paper)

26 JULY 2019

This marking guideline consists of 7 pages.

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QUESTION 1: OCCUPATIONAL HEALTH AND SAFETY ACT (ACT 85 OF 1993)

1.1
- Eliminate or mitigate hazards before resorting to personal protective equipment.
- Provide for the safe use of articles and substances.
- Establish hazards and apply precautionary measures in the use of articles, substances, plant and machinery.
- Provide information, instruction, training and supervision.
- Do not permit employees to work unless precautionary measures are taken.
- Ensure compliance with the Act on the premises.
- Enforce measures in the interest of OHS.
- Provide supervision by trained persons with the necessary authority.
- Inform employees of the scope of their authority. (Any 8 × 1) (8)

1.2
- Ensure articles are safe when properly used and comply with prescribed requirements.
- Persons who erect or install articles for use at work should ensure such is without risk.
- Provide information, procedures for proper use, incident procedures, etc. with regard to substances. (Any 2 × 1) (2)

1.3
- Check that equipment to be worked on is safe and correctly identified.
- Implement and maintain all precautionary conditions.
- The permit must be cancelled if any changes occur which jeopardise the safety of the personnel or plant.
- The permit issuer needs to consider the area classification (zone 0; 1; 2; 20; 21; 22) when writing a permit.
- It is the responsibility of the permit issuer to communicate with all the affected parties, the panel operator, the permit accepter, the safe maker, the task executor and the standby.
- Ensure that only competent persons who also understand the significance of area classifications can perform gas tests.
- Ensure that only persons declared competent, work on Ex equipment in the plant.
- Isolate all electricity and lock out. (Any 5 × 1) (5)

[15]

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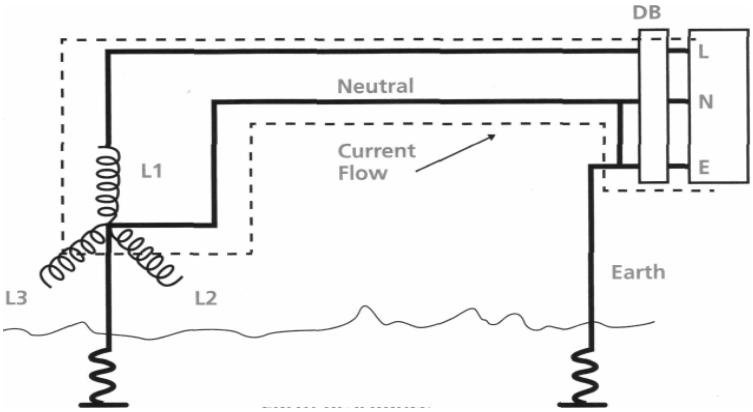
QUESTION 2: GENERAL

2.1	Methane gas	(1)
2.2	Sugar dust and bagasse (fine sugar cane particles)	(2)
2.3	Prevents corrosion caused by stray electrolytic spray currents resulting in pitting (corrosion)	(3)
2.4	Sparking caused by static discharge	(1)
2.5	Sparking caused by static discharge	(1)
2.6	An exothermic reaction is a chemical or physical reaction that releases heat. Energy is released to its surroundings. The energy needed for the reaction to occur is less than the total energy released.	(3)
2.7	Housekeeping (cleaning of dust deposits) and dust extraction systems	(2)
2.8	Water and it generates hydrogen gas	(2)
2.9	Spray booths	(1)
2.10	A mixture of gasses in underground coal mines, the largest portion of which is methane gas	(2)
2.11	Housekeeping (cleaning of dust deposits) and dust extraction	(2)
2.12	Zone 0, zone 1 and zone 2	(3)
2.13	• Crude oil • LPG (liquefied petroleum gas) (Any 1 × 1)	(1)
2.14	Hydrogen gas	(1)
		[25]

QUESTION 3: SANS 10142, PART 1: THE WIRING OF PREMISES (LOW-VOLTAGE INSTALLATIONS)

3.1 ELECTRICITY SUPPLY SYSTEMS (EARTHING)

3.1.1 TN-C-S SYSTEM EARTHING



(4)

3.1.2 T – Terre (French for earth) – It means a direct connection to earth. The exposed conductive parts of the consumer's electrical installation are connected directly to earth, independently of the earthing of any point of the source of energy.
N – Neutral – The exposed conductive parts of the consumer's electrical installation are connected directly to the source earth, which, in the case of an AC system, is usually the neutral point of the transformer.
C – Combined – The neutral and protective functions on the incoming supply and in the consumer's electrical installation are combined in a single conductor.
S – Separate – The neutral and protective functions on the incoming supply and in the consumer's electrical installation are provided by separate conductors. (4)

3.2 MEDICAL LOCATIONS

3.2.1 Part of medical electrical equipment which in normal use, for the equipment to perform its function, necessarily comes into physical contact with the patient, or can be brought into contact with the patient or needs to be touched by the patient (2)

3.2.2 Electricity supply to the environment of patients in an allocated medical location where the supply is isolated from the earth and from the electricity supply to other areas of the medical location (2)

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

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

[15]

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QUESTION 4: SANS-IEC 61241, PART 4, 2001: ELECTRICAL APPARATUS FOR USE IN THE PRESENCE OF COMBUSTIBLE DUST. PART 4: TYPE OF PROTECTION 'PD'

4.1
- Static overpressure is obtained by creating an overpressure using a static air source which only discharges when the pressure inside the enclosure drops below the desired pressure.
- Continuous flow on the other hand, provides a continuous flow of inert gas or atmosphere to maintain an overpressure inside the enclosure. (2)

4.2 Hybrid means *a combination of*. In this case it could be a combination of dust and gas or dust and liquid. (2)

4.3 Ex Pg: Explosion protection pressurised equipment/enclosures suitable for gas atmospheres
Ex Pd: Explosion protection pressurised equipment/enclosures suitable for dust atmospheres (2)

4.4 Dust deposited in layers could, if located on a hot surface, start smouldering. If enough heat is provided, a fire can start. The increase in air flow (hot air) can give rise to dust being suspended into the air which will result in a secondary dust explosion. (3)

4.5 If the moisture content is too high, it will result in a fermentation process inside the silo. This will cause heat which can ignite the gas causing the silo to start burning. (2)

4.6 DIP (dust ignition proof) (1)
[12]

QUESTION 5: SANS 60079-0:2012 ELECTRICAL APPARATUS FOR EXPLOSIVE GAS ATMOSPHERES PART 0: GENERAL REQUIREMENTS

5.1 This part of SANS 60079 specifies the general requirements for construction, testing and marking of electrical equipment and Ex components intended for use in explosive gas atmospheres. Unless modified by one of the parts in the SANS 60079 series, electrical equipment complying with this standard is intended for use in hazardous areas in which explosive gas atmospheres, caused by mixtures of air and gases, vapours or mists, exist under normal atmospheric conditions of:

- Temperatures – 20 °C to + 60 °C
- Pressure 80 kPa (0,8 bar) to 110 kPa (1,1 bar)
- Air with normal oxygen content of typically 21 % v/v (3)

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5.2 These maximum surface temperatures shall not exceed 150 °C on any surface where coal dust can form a layer, 450 °C where coal dust is not expected to form a layer (for example, due to sealing or ventilation), provided that the actual maximum surface temperature is marked on the equipment. (2)

NOTE: When choosing Group I electrical equipment, the user should consider the influence and the smouldering temperature of coal dusts if they are likely to be deposited in a layer on surfaces with temperatures above 150 °C.

5.3 5.3.1 Blanking elements shall satisfy the requirements of the specific type of protection concerned. The blanking element shall only be removable with the aid of a tool. (2)

5.3.2
- Gaskets shall be attached or secured to one of the mating faces to prevent loss, damage or incorrect assembly. The gasket material shall not itself adhere to the other joint face.
- An adhesive may be used for attaching a gasket to one of the mating faces. (2)

5.3.3
- Disconnectors shall disconnect all poles.
- The switchgear shall be designed so that either the position of the contacts of the disconnector is visible or their open position is reliably indicated.
- Any interlock between the disconnector and the cover or door of the switchgear shall be allowed.
- The cover or door should be opened only when the separation of the disconnector contacts is effective.
- Disconnectors which are not designed to be operated under the intended load, shall either be electrically or mechanically interlocked with a suitable load breaking device.
- Group II apparatus only, should be marked at a place near the actuator of the disconnector. (Any 4 × 1) (4)

5.3.4 The manufacturer shall prepare documents that give a full and correct specification of the explosion safety aspects of the electrical apparatus. (2)

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5.3.5 The marking of Ex components shall include the following:

- The name or the registered trade mark of the manufacturer
- The manufacturer's type identification
- The symbol Ex
- The symbol for each type of protection used
- The symbol of the group of the electrical apparatus of the Ex component
- The name or mark of the issuer of the certificate and the number of the certificate, if the Ex component has one, to indicate it complies with this standard
- The symbol 'U' (7)

[22]

QUESTION 6: SANS 10123:2011 THE CONTROL OF UNDESIRABLE STATIC ELECTRICITY

6.1

- The inherent properties of the dust, i.e. type of material, particle size, contact area and surface resistivity
- The presence and magnitude of any external electrostatic fields
- The overall leakage resistance of the system, i.e. resistance between the surface from which dust disperses and surfaces on which dust settles or with which dust makes contact
- The occurrence and extent of any ionisation of air as the dust separates from a surface
- The smoothness of the surface from which the dust disperses (the smoother the surface, the greater the charge amount of static generated) (5)

6.2 6.2.1 Ensure that nozzles from which dust is ejected are made wholly from conductive materials and are earthed. (2)

6.2.2 Do NOT position any object in a dust stream. Where this cannot be avoided, ensure that the object is of conductive material and is earthed. (1)

6.2.3 Use only earthed conductive sampling devices. (1)

6.2.4 Use conductive bags that are earthed or bonded during filling, emptying and transporting Conductivity can be maintained by rinsing them in an antistatic solution as often as is necessary before re-using the bags. (2)

[11]

TOTAL: 100

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