higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES
(Second Paper)

3 APRIL 2019

This marking guideline consists of 7 pages.

Copyright reserved

QUESTION 1: OCCUPATIONAL HEALTH AND SAFETY ACT, ACT 85 OF 1993- ELECTRICAL INSTALLATION REGULATIONS

1.1 1.1.1 Earthed means connected to the general mass of earth in such a manner as will always ensure an immediate safe discharge of electrical energy;

1.1.2 Accreditation authority means the South African National Accreditation System (SANAS) established by section 3 of the Accreditation for Conformity

(2 × 1) (2)

1.2

- Every employer or user shall identify all hazardous locations and classify them in accordance with the relevant health and safety standard incorporated into these regulations.

- No person may use electrical machinery in locations where there is danger of fire or explosion owing to the presence, occurrence or development of explosive or flammable articles, or where explosive articles are manufactured, handled or stored, unless such electrical machinery, with regards to its construction relating to the classification of the hazardous locations in which it is to be used, meets the requirements of the safety standard incorporated for this purpose in these Regulations.

- Every employer or user shall be in possession of a certificate in a form acceptable to the chief inspector, which has been issued by an approved inspection authority and in which it is certified that the electrical machinery referred to in sub regulation (2) has been manufactured and tested for the groups of dangerous articles in accordance with the relevant Health and Safety standard of the Act: Provided that in lieu of such certificate an inspector may approve permanent labelling on such machinery, which label shall contain all the relevant information.

- When diverse items of electrical machinery such as motors, cables and control apparatus is used together to form a system, the employer or user shall ensure that the selection, arrangement, installation, protection, maintenance and working of the system results in no less a degree of safety than when the individual items of such machinery are used separately.

- The employer or user shall use electrical machinery to which this regulation applies only under such conditions and in such surroundings as prescribed in the health and safety standard.

Copyright reserved

- No employer or user shall affect repairs or adjustments to or otherwise work on electrical machinery unless such machinery has been rendered dead and effective measures have been taken to ensure that such machinery remains dead.

- Wherever there is a possibility of the formation of static electricity under working conditions, the employer or user shall earth all metallic structures, machine parts, pneumatic conveyor ducts and pipelines conveying flammable articles and the like or take such other measures as may be necessary to prevent the formation of electric sparks.

- The employer or user shall cause all electrical machinery in a hazardous location to be visually inspected and tested at intervals not exceeding two years, or any other interval approved by the chief inspector after a risk assessment has been conducted by a person who is competent to express an opinion on the safety thereof: Provided that installed intrinsically safe equipment may in lieu of a test be verified in terms of the approved design.

- The person carrying out the examination referred to in shall enter, sign and date the results of each examination in a record book which shall be kept by the employer or user for this purpose. (Any 6 × 1 (6)

1.3
- where the operating voltage does not exceed 50 V;
- roofs made of non-conductive material or metal roofs covered by non-conductive material;
- gutters, downpipes and waste pipes made of non-conductive material or gutters and downpipes attached to a metal roof which is covered by non-conductive material;
- roofs, gutters, downpipes and waste pipes on premises which

receive electricity by means of underground service connections:
Provided that the connection is to the conductive structures;

- metal in earth-free situations, other than runs of metal wire way, and the close-fitting metal sheathing and armouring of cables;
- short separate lengths of heavy-gauge metal wire way used for the mechanical protection of cables where such cables are not used in the secondary circuits of discharge luminaire installations; (Any 3 × 1) (3)

[13]

QUESTION 2

2.1 Classification of surface dust areas
2.2 Inspection and maintenance of surface installations.
2.3 SANS 10108 and SANS 60079-14
2.4 SANS 10142-1
2.5 SANS 10086-3, ARP 0108, SANS 10108 and SANS 60079-19
2.6 SANS 10108 and SANS 60079-10-1
2.7 Installations in underground mines
2.8 Ex Equipment certification requirements
2.9 Wiring of premises
2.10 SANS 10086-1, SANS 60079-14, SANS 10142-1 and SANS 60079-14

(10 × 1) **[10]**

QUESTION 3: GENERAL

3.1
3.1.1 False
3.1.2 False
3.1.3 True
3.1.4 True
3.1.5 False
3.1.6 False
3.1.7 False
3.1.8 True
3.1.9 False
3.1.10 True

(10 × 1) (10)

3.2
- MSDS of the substances found in the atmosphere making it a hazardous location
- Equipment conformity certificates from an authorised test laboratory stating the equipment is suitable for use in this type of atmosphere
- Drawing depicting the hazardous locations
- Relevant information pertaining to the classification exercise (hazardous area committee meeting minutes) (Any 2 × 1) (2)

[12]

Copyright reserved

QUESTION 4

4.1 FIGURE 2 (1)

4.2 FIGURE 1 (1)

4.3 Combustible liquid is a liquid is that has a closed-cup flash point at or above 38 °C. For the purpose of this part of SABS 089, combustible liquids are subdivided as follows:
Class II: liquids that have a closed-cup flash point at or above 38 °C and below 60,5 °C.
Class IIIA: liquids that have a closed-cup flash point at or above 60,5 °C and below 93 °C.
Class IIIB: liquids that have a closed-cup flash point at or above 93 °C.

Flammable liquid is a liquid with a flash point below 38 °C, regardless of its temperature, or a liquid with a flash point at or above 38 °C being handled at temperatures at or above its flash point
NOTE: Classes of petroleum are defined in SABS 089-1 as follows and apply to this part of SABS 089: Petroleum products are classified according to their physical properties. Product classifications vary between different codes of practice. The following classification applies to the requirements listed in this part of SABS 089:

Class 0: Liquefied petroleum gases
Class I: liquids, which are subdivided as follows:
Class IA: liquids that have a closed-cup flash point below 23 °C and a boiling point below 35 °C;
Class IB: liquids that have a closed-cup flash point below 23 °C and a boiling point at or above 35 °C; and
Class IC: liquids that have a closed-cup flash point at or above 23 °C and a boiling point below 38 °C. (6)

4.4 Class I: liquids, which are subdivided as follows:
Class IA: liquids that have a closed-cup flash point below 23 °C and a boiling point below 35 °C;
Class IB: liquids that have a closed-cup flash point below 23 °C and a boiling point at or above 35 °C; and
Class IC: liquids that have a closed-cup flash point at or above 23 °C and a boiling point below 38 °C.
Class II: liquids that have a closed-cup flash point at or above 38 °C and below 60,5 °C.
Class IIIA: liquids that have a closed-cup flash point at or above 60,5 °C and below 93 °C.
Class IIIB: liquids that have a closed-cup flash point at or above 93 °C. (5)

Copyright reserved

4.5 Exd; Exi; Exp; Exe; Exm; Exq; Exs; Exo (Any 4 × 1) (4)

4.6 Exd; Exi; Exp; Exe; Exm; Exq; Exs; Exo; Exn (2)

4.7 SANS 1020, 2003 (1)

4.8
- The area needs to be cordoned off to ensure no interference by unauthorised personnel
- The necessary fire extinguishing measures should be put in place in the event of a fire
- The earth clamp provided should ensure that during the off-loading (discharge) process no static build-up can occur. (3)

4.9 Tanks buried in the ground are generally considered sufficiently earthed. In this case where the tanks are covered with an insulated fibreglass layer additional provision for earthing and bonding is required. An earth boss needs to weld on to the tank which is then bonded through to the earth electrode. The earth electrode should have provision to connect. (3)

4.10 A technique for mitigating corrosion attack on a metal by making it the cathode in the electrolytic environment, by using as anode another metal that will preferentially be corroded. Cathodic protection may be provided by a power-impressed system or using sacrificial anodes, depending on the type of equipment to be protected and on soil conditions. (4)

[30]

QUESTION 5

5.1 5.1.1 A mixture with air, under atmospheric conditions, of flammable materials in which, after ignition, combustion spreads throughout the unconsumed mixture. (2)

5.1.2 A conductive part that forms part of the electrical installation and that can easily be touched and under normal conditions, is not a live part, but under fault conditions can become live. (2)

5.1.3 A conductive part that does not form part of the electrical installation. (1)

5.2
- Selection with respect to zones
- Selection with respect to the ignition temperature of the explosive atmosphere
- Selection with respect to the classification of gas or vapour
- External influences
- Ambient temperatures (Any 4 × 1) (4)

Copyright reserved

5.3 5.3.1 TN
5.3.2 TT
5.3.3 IT

(3 × 1) (3)

5.4 5.4.1 All three phases in a three-phase supply shall be isolated.

5.4.2 Both live and neutral in a single-phase supply must be isolated.

(2 × 1) (2)

5.5 5.5.1
- Non-combustible
- Non-toxic
- Free from moisture
- Free from oil
- Free from fibres
- Free from chemicals
- Free from combustibles
- Free from any contaminating material (Any 4 × 1) (4)

5.5.2 A (1)

5.5.3 Isolated from earth or connected at one point to the equipotential bonding system if this exists over the whole area in which the intrinsically safe circuits are installed. (1)

5.5.4 If all intrinsically safe circuits cables or all cables of circuits which are not intrinsically safe are armoured, metal sheathed or screened, then the marking of intrinsically safe circuit cables is not required (1)

5.5.5 The colour for cables and conductors of intrinsically safe circuits shall be light blue (1)

5.5.6 Luminaires with fluorescent lamps and electronic ballasts shall not be used where temperature class T5 or T6 is required, or where the ambient temperature exceeds 60 °C. (1)

5.5.7 Additional holes shall not be made into flame-proof enclosures, unless it is done by a certified repairer. (2)

5.5.8 Unused openings for cable glands or conduit entries in electrical equipment shall be closed with blanking elements suitable for the relevant type of protection. Blanking elements shall comply with the relevant standards and be of a type that can only be removed with the aid of tools. (1)

Copyright reserved

5.5.9 The hazardous area end of each unused core in multicore cables shall either be connected to earth or be adequately insulated by means of terminations suitable for the type of protection. Insulation by tape alone is not permitted This requirement shall not apply to intrinsic-safe circuits. (2)

5.5.10 If multi-stranded and, fine-stranded conductors are employed, the ends shall be protected against separation of the strands, for example by means of cable lugs or core-end sleeves, or by the type of terminal, but not by soldering alone. (2)
[30]

QUESTION 6

6.1 Means of repair involving for example, the removal or addition of material to reclaim component parts which have sustained damage, in order to restore such parts to a serviceable condition in accordance with the relevant standard. (3)

6.2 Shows that the equipment is incomplete. This means that on its own the equipment will not offer the protection stated on its marking plate. For example, a switch that needs to be mounted in an enclosure. (2)
[5]

TOTAL: 100

Copyright reserved