higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

SPECIALISED ELECTRICAL INSTALLATION CODES (Second Paper)

4 APRIL 2018

This marking guideline consists of 7 pages

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QUESTION 1

1.1 The upper limit of the ratio between fuel and free oxygen which, if exceeded, will make the mixture suffer from a lack of oxygen that will result in no fire or an explosion.

1.2 The lower limit of the ratio between fuel and free oxygen which, if exceeded, will make the mixture suffer from a lack of fuel that will result in no fire or an explosion.

1.3 Temperature at which a liquid will ignite without any source of flame, arc or spark.

1.4 The temperature at which vapour or damp is released from the liquid which could result in an air-fuel ratio that could cause an explosion.

1.5 The weight ratio of any flammable substance when compared to free air, where air is always one.

(5 × 3) **[15]**

QUESTION 2

2.1 2.1.1 It remains valid until some part of the installation covered by the certificate is changed, or in the case of a change of ownership, if the certificate is more than 2 years old. (3)

2.1.2
- MSDS of the substance 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 (the minutes of the hazardous area committee meeting) (4)

2.1.3 False (1)

2.1.4 Any person suitably qualified or a person deemed competent enough by the owner or user of the installation. (2)
[10]

QUESTION 3

3.1 3.1.1 Set of documents showing the compliance of electrical equipment and installations (2)

3.1.2 Individual or organisation who can demonstrate appropriate technical knowledge and relevant skills to make the necessary assessment of the safety aspects under consideration (2)

3.1.3 Arrangement within an item of intrinsically safe apparatus or associated apparatus which permits the transfer of signals or power between two circuits without any direct electrical connection between the two (3)

3.2 The installation must be under the supervision of a competent body:

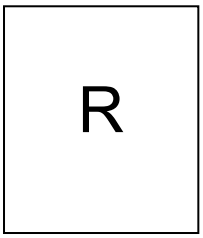
- Measures must be taken to ensure that an explosive atmosphere does not occur.
- Measures must be taken to ensure that this equipment is disconnected on occurrence of an explosive atmosphere, in which case ignition after disconnection is prevented, for example by heated parts.
- Measures must be taken to ensure that persons and the environment are not endangered by fire or explosions.
- Measures must be stated in writing by a competent body familiar with the relevant requirements, and any other relevant standards and codes of practice concerning the use of electrical equipment and systems for use in hazardous areas,
- There must be access to all information necessary to carry out the assessment. (Any 4 × 2) (8)

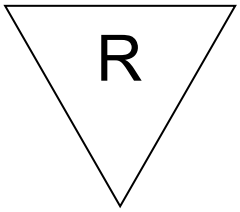
[15]

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QUESTION 4:

4.1 4.1.1 This mark is used when apparatus is in full compliance with Part 3 of 10086, and the certificate.✓





4.1.2 This mark is used when apparatus is in full compliance with Part 3 of 10086, but is **NOT** in compliance with certificate.✓

(2)

4.2 True (1)

4.3
- The relevant symbol (as in 4.1)
- The standard number
- The name of the repairer or registered trade mark
- The repairer's reference number regarding the repairs
- The date of repair or overhaul (5)

4.4 Only Department of Labour certified repairers (1)
[9]

QUESTION 5

5.1 A 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.

A 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. (5)

5.2 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)

5.3
- 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)

5.4 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 earthling and bonding is required. An earth boss needs to be welded onto the tank which is then bonded through to the earth electrode. The earth electrode should have provision to connect. (3)
[16]

QUESTION 6

6.1 False. As long as the person is competent he may carry out the inspections. (2)

6.2 One will have to inquire at the manufacturer or the supplier of the product. If still not available, one can have the product tested at a laboratory or, if all else fails, employ IIC T6 equipment. (1)

6.3 Visual inspection or closed inspection (2)

6.4 Exi Exd Exe Exs Exm Exp (5)

6.5 Have the areas sanded using a fine grid sandpaper, then clean properly and apply a thin layer of petroleum jelly. (4)

6.6 He/she has to make sure that the area is gas-free before commencing with the tests. (2)

6.7 Not more than 24 months apart (1)

6.8 This is an electrolytic method of preventing corrosion on ferrous metal objects that stand on the ground or are buried underground, such as fuel storage tanks and buried pipelines. (5)

6.9 The motors run at variable speeds; this means that the fans used for cooling are not effective at lower speeds. Either an additional fan has to be fitted or, alternatively, the motor needs to be selected so that it overcompensates for the variable speed (stronger motor). (2)

6.10 The design of the circuit will depend on the type of gas present (gas grouping).

In the UK, two grades of intrinsic safety are recognized based on the safety factor of the equipment involved:

Exia: the highest category based on a safety factor of 1.5 with two faults on the circuit.

Exib: based on a safety factor of 1.5 with one fault on the circuit. (4)

6.11 He/she should take steps to safely isolate and disconnect the supply to the electrical equipment that poses a risk as far as an explosion is concerned. (2)

[30]

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QUESTION 7

7.1 Protection by pressurisation is a type of protection that relies upon the interior of the enclosure being subjected to a continuous overpressure from a supply of protective gas while the electrical equipment within the enclosure is energised. (2)

7.2 In the case of static pressurisation, doors and covers shall only be opened by the use of a tool, and shall carry the following warning:

REMOVE TO A NON-HAZARDOUS AREA BEFORE OPENING

Where doors and covers are provided to permit inspection in service, they shall carry the following or equivalent warning:

DO NOT OPEN WHILE ENERGISED

except where provision is made for adjustment during operation, in which case the warning shall indicate:

SEE INSTRUCTIONS BEFORE OPENING (3)
[5]

TOTAL: 100

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