higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE (VOCATIONAL)

REFRIGERATION PRINCIPLES
NQF LEVEL 2

XX February 2020

This marking guideline consists of 5 pages.

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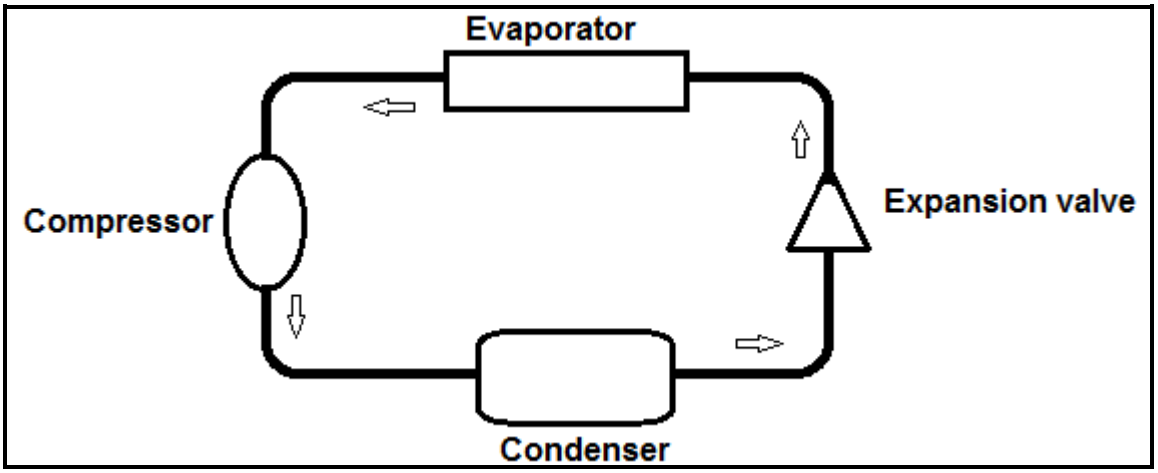
QUESTION 1

1.1



(8)

1.2 1.2.1 Suction line
1.2.2 Discharge line
1.2.3 Liquid line

(3 × 1) (3)

1.3 1.3.1 The crankcase heater is positioned inside the compressor's crankcase down in the oil sump.

1.3.2 Shrewder valves are positioned at the compressor's suction and discharge sides.

(2 × 2) (4)
[15]

QUESTION 2

2.1 Multimeter (1)

2.2 2.2.1

$$R_T = \frac{R_1 \times R_2}{R_1 + R_2} + R_3$$
$$= \frac{10 \times 30}{10 + 30} + 15$$
$$= 22{,}5\ \Omega$$

2.2.2

$$I_T = \frac{V_T}{R_T}$$
$$= \frac{220}{22{,}5}$$
$$= 9{,}78\ A$$

2.2.3

$$P = I^2 \times R$$
$$= (9{,}78)^2 \times 22{,}5$$
$$= 1\ 434{,}75\ W$$

(3 × 3) (9)
[10]

QUESTION 3

3.1
3.1.1 Voltmeter
3.1.2 Ammeter
3.1.3 Ohmmeter
3.1.4 Manifold gauge
3.1.5 Wattmeter

(5 × 1) (5)

3.2
- Screw type
- Punch type (2)

3.3
3.3.1 Wire stripper
3.3.2 Pipe bender
3.3.3 Pipe cutter
3.3.4 Micrometer
3.3.5 G-clamp

(5 × 1) (5)
[12]

QUESTION 4

4.1
- Traditional refrigerants
- Transitional alternative
- Chlorine-free long-term alternatives
- Halogen-free long-term alternatives
- Natural refrigerants (5)

4.2
- Causes eye cataracts that can lead to blindness
- Causes skin cancer
- Suppresses the efficiency of the body's immune system
- Reduces the rate of plant growth/production
- Upsets the balance of ecosystems
- Accelerates degradation of plastic, rubber and other organic materials (6)

4.3
4.3.1 True
4.3.2 True

(2 × 1) (2)
[13]

QUESTION 5

5.1
- Polyvinyl chloride (PVC)
- Polyethylene
- Rigid polypropylene
- Acrylonitrile butadiene styrene (ABS)
- Nylon (5)

5.2
5.2.1 B
5.2.2 A
5.2.3 D
5.2.4 C
(4 × 1) (4)

5.3
- Use nitrogen to pressurise the system.
- Increase the test pressure to the required level.
- Use the leakage-detecting method for nitrogen.
- Rectify the leakage before recharging the system. (4)

5.4 Use pipe insulation (2)

5.5
- Time and money will be wasted.
- The initial cost of the job will be increased. (2)

5.6
- Copper alloy
- Tin lead
- Silver alloy (3)

[20]

QUESTION 6

6.1 Plain washer
6.2 Spring washer
6.3 Tap washer
6.4 Internal washer
6.5 External washer
(5 × 2) **[10]**

QUESTION 7

7.1
- Critical pressure
- Critical temperature
- Specific heat liquid
- Specific heat vapour
- Liquid density (5)

7.2
- Type of refrigerant
- Volume in litres of water
- Tare weight in kilogram (3)

7.3 True (1)

7.4 Mass of refrigerant transferred = Final mass – original mass
= 25 kg – 16 kg
= 9 kg (3)

7.5
- Small leaks are very difficult to detect.
- Testing for small leaks takes a long time.
- Large leaks are difficult to find because bubbles burst before being seen. (3)

7.6
- Refrigerant bottles must be stored in a cool place.
- Empty refrigerant bottles must not be mixed with full bottles.
- Refrigerant bottles must be stored upright.
- Similar refrigerant bottles must be stored together.
- Refrigerant bottles may be not thrown down. (5)

[20]

TOTAL: 100

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