higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

5 December 2023

This marking guideline consists of 6 pages.

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QUESTION 1

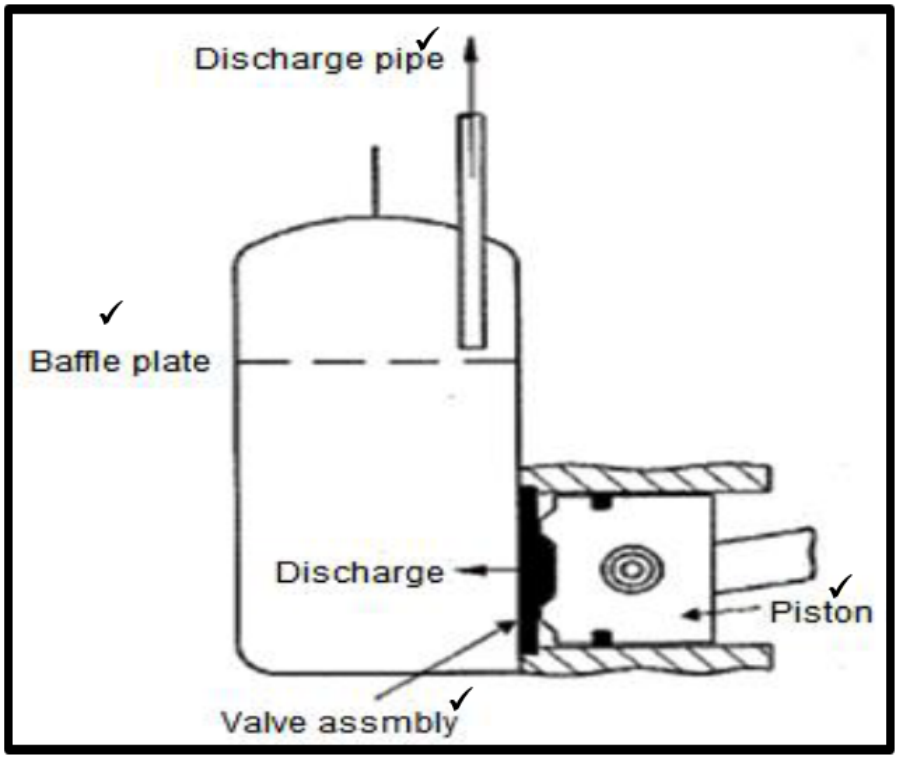
1.1 1.1.1 Low-pressure switch
1.1.2 Critical temperature of a substance
1.1.3 Saturated vapour
1.1.4 Swaging tool
1.1.5 Multi meter
1.1.6 Thermostat

(6 × 1) (6)

1.2
- The reciprocating compressor
- The rotary compressor
- The centrifugal compressor

(Any 2 × 1) (2)

1.3



(4)

1.4 Used to break up pulses and to reduce the noise level inside the reciprocating compressor.✓✓ (2)

1.5 A fixed amount of gas is positively contained during its passage through the machine.✓✓ (2)

1.6 1.6.1 To circulate the oil under pressure in the crankcase✓✓

1.6.2 To observe the conditions of the refrigerant and oil level in refrigeration systems✓✓

(2 × 2) (4)

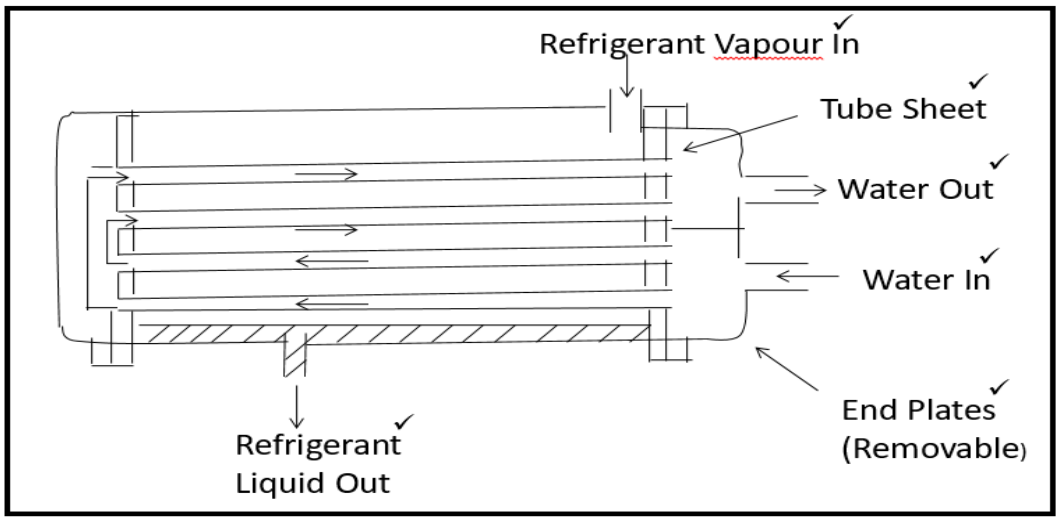
[20]

QUESTION 2

2.1 2.1.1 True
2.1.2 True
2.1.3 True
2.1.4 False
2.1.5 False

(5 × 1) (5)

2.2



(6)

2.3 2.3.1 Reduces the pressure of the liquid and thus cools the liquid.✓✓

2.3.2 Absorbs heat from the ambient medium and thereby allows evaporation of the refrigerant.✓✓

(2 × 2) (4)

2.4
- Thermostatic expansion valve outlet – ideal is liquid and could also be a mixture of liquid and vapour
- Evaporator outlet – Ideal is vapour and could also be a mixture of liquid and vapour (2)

2.5
- Conduction
- Convection
- Radiation (3 × 1) (3)

[20]

QUESTION 3

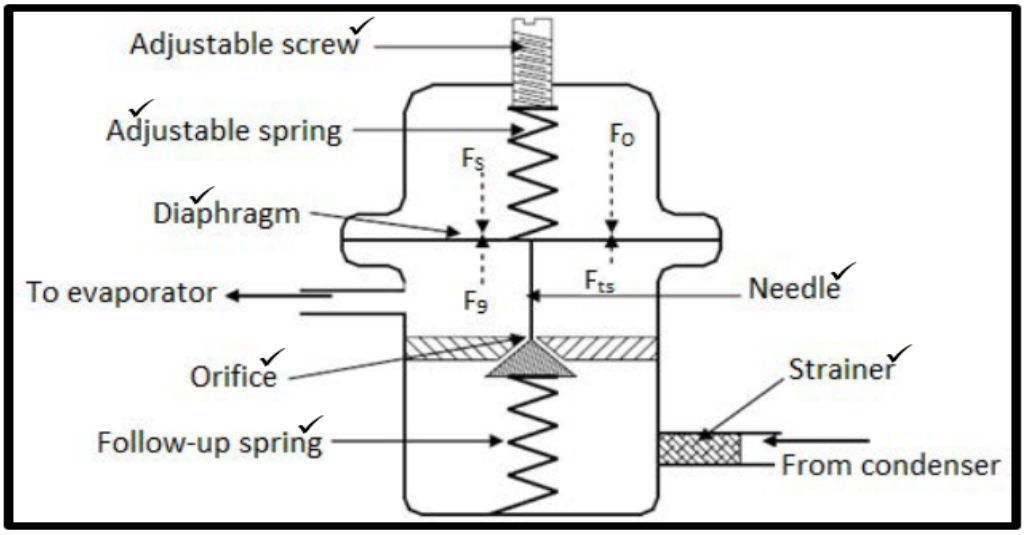
3.1 The oil must:

- have a low pour point.
- have a good emulsion (sludge) resistance.
- have a low carbon reduction valve.
- be free of impurities.
- mix easily with the refrigerant.
- have good lubricating qualities.
- be free of moisture. (Any 5 × 1) (5)

3.2

- R134a
- R404A
- R407C
- R410A
- R507 (Any 2 × 1) (2)

3.3



(7)

3.4

- It stops liquid carry-over to the compressor.✓✓
- It ensures that the entire evaporator is used at full and part loading conditions.✓✓
- It responds quickly to wide and frequent load variations. (Any 2 × 2) (4)

3.5

- The oil becomes homogenized due to water in the coil.
- The oil changes colour or is obviously dirty.
- When the pump has been standing for a long time and has absorbed moisture. (Any 2 × 1) (2)

[20]

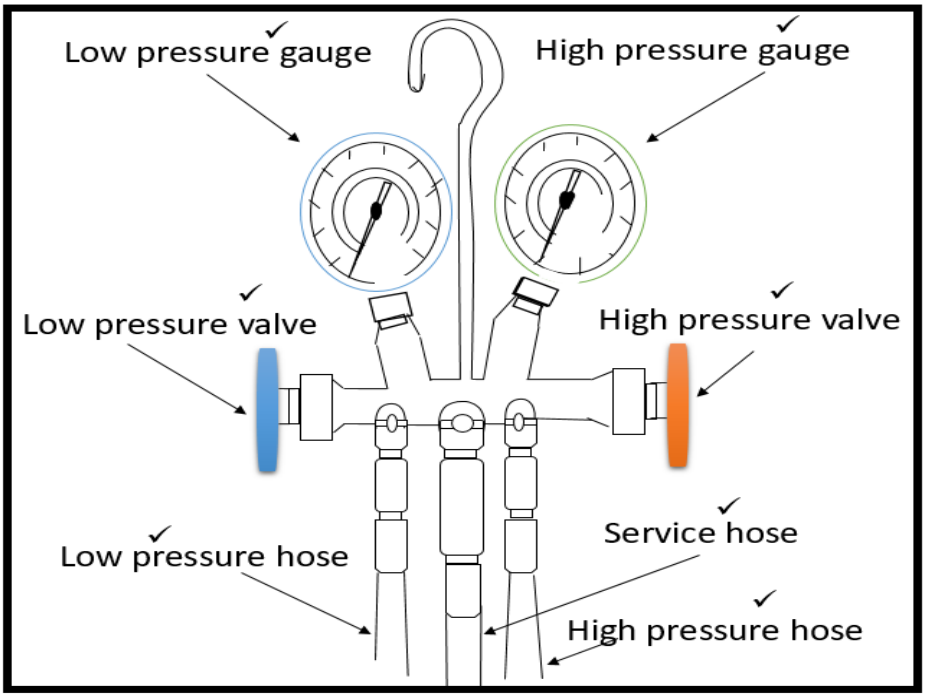
QUESTION 4

4.1
- Soap bubbles
- Oil spot
- Halide torch
- Ultrasonic
- Electronic/digital leak detector (Any 4 × 1) (4)

4.2 4.2.1 Pipe bender✓ – used to bend soft copper and aluminium tubes✓✓ (3)

4.2.2 Pipe cutter✓ – used to cut soft copper and aluminium tubes✓✓ (3)

4.3



(7)

4.4
- Do not exert too much pressure at once.
- Use oil to obtain a better finish.
- Keep the swaging tools clean and well-oiled.
- Do not hammer on it.
- Take care not to damage the threads on the yoke.
- Replace the swaging tools if they are damaged. (Any 3 × 1) (3)

[20]

QUESTION 5

5.1
5.1.1 Light green
5.1.2 Light blue
5.1.3 Orange
5.1.4 Light maroon

(4 × 1) (4)

5.2 5.2.1
- Disconnect switch open
- Overload tripped
- Control stick in the open condition
- Loose wiring (Any 2 × 1) (2)

5.2.2
- Close switch
- Reset or replace overload
- Repair or replace switch
- Check wiring against diagram (Any 2 × 1) (2)

5.3 5.3.1 The accumulator is safety device to prevent liquid refrigerant from flowing into the suction line into the compressor✓ and it is fitted between the evaporator and the compressor. ✓ (2)

5.3.2 The receiver is a storage tank✓ for liquid refrigerant. It is used as a reservoir during maintenance where all the refrigerant in the system is stored. During normal operations, it ensures that there is enough refrigerant in the system✓ and ensures subcooling and that flash gases are eliminated✓ in the system. Where it is fitted, it will be just after the condenser✓. (4)

5.4
- If very little moisture is present, it may run for days before it restricts for the first time.✓✓
- A restriction of this type is usually intermittent, and the system will start to work again once the restriction has mated.✓✓
- The period of the restriction will depend on the amount of moisture that is present.✓✓
- Any moisture that passes through the drier and enters the capillary tube will turn into ice where the capillary tube enters the evaporator and restrict the end of the capillary tube so that no refrigerant can circulate.

(Any 3 × 2) (6)
[20]

TOTAL: 100

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