higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

REFRIGERATION TRADE THEORY N2

6 APRIL 2018

This marking guideline consists of 6 pages.

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QUESTION 1

1.1
- Rotating vane compressors
- Rotating eccentric compressors
- Screw compressors (3)

1.2
- Usually made of cast iron.
- The cast iron must be dense enough to prevent the seepage of refrigerant through it.
- A small amount of nickel is usually added to produce the required density.
- The smaller compressors usually have fins cast integrated with the cylinders to provide better cooling. (Any 3 × 1) (3)

1.3 1.3.1 To observe the conditions of the refrigerant oil and oil level

1.3.2 To circulate the oil under pressure in the crankcase

1.3.3 Serves as a pressure plate to support and hold the valves and valve plate in position

1.3.4 A leak-proof container which houses the complete mechanism of a compressor

(4 × 2) (8)

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

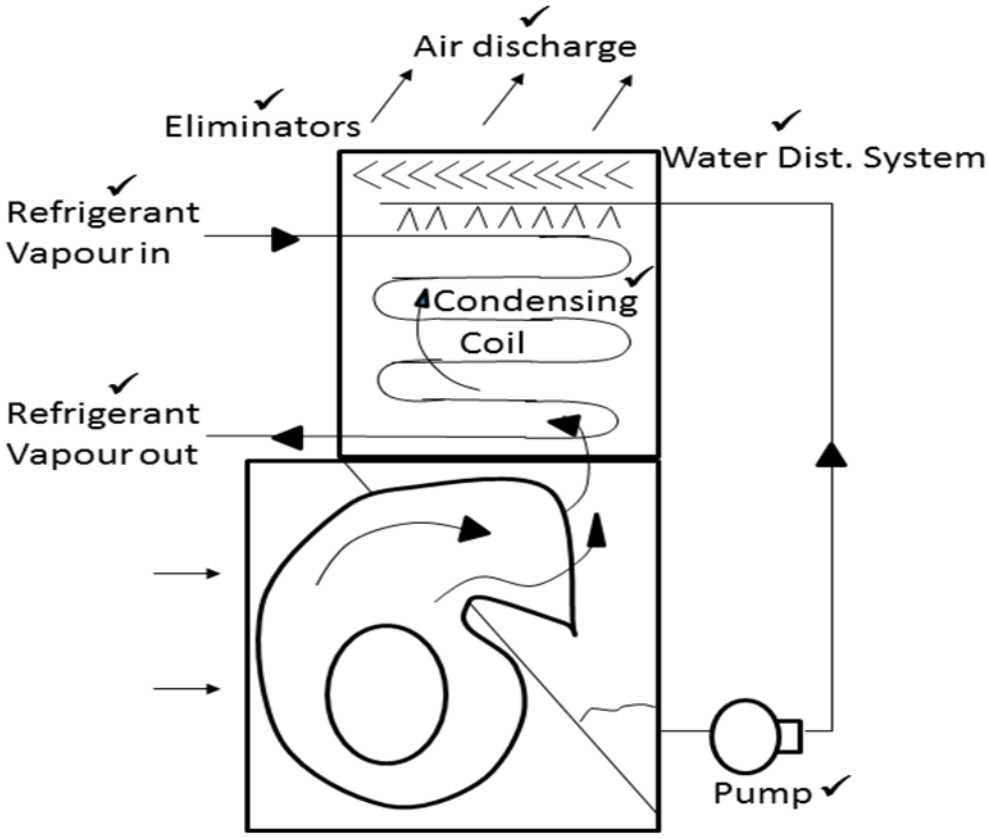
1.5
- Leakage or broken valve reeds
- Worn or broken piston rings, if fitted
- Wear on the cylinder walls and pistons, causing gas pressure to leak into the sump
- A too thick cylinder head gasket giving excessive clearance between the piston and valve plate (4)

[20]

QUESTION 2

2.1
- Direct expansion evaporators
- Flood evaporators
- Liquid over-feed evaporators. (3)

2.2



(7)

2.3
- The refrigerant vapour is circulated through a coil where it is condensed.✓
- Water is pumped from the sump of the evaporative condenser✓ and is distributed over the exterior of the condensing coil.✓
- A fan forces air through the falling water and over the coil sun face.✓ (4)

2.4
- Effect of air velocity and distribution
- Counter-flow arrangement
- Parallel flow arrangement
- Evaporator circulating (Any 3 × 1) (3)

2.5
- Provide practical line sizes without excessive drops.
- Protect compressors.
- Ensure proper feed to evaporators.
- Ensure system efficiency, as well as maintenance and operating simplicity.
- Needed fabrication shall be accomplished with good engineering practice.

(Any 3 × 1) (3)

[20]

QUESTION 3

3.1 3.1.1 To transfer heat from the liquid refrigerant to the suction vapour.

3.1.2 To prevent the accumulation of liquid refrigerant in the compressor crankcase during shutdown.

3.1.3 To remove and trap all dirt in the system. It must be filled in the liquid line.

3.1.4 To remove moisture in the system. It must be installed in the discharge line.

3.1.5 To reduce any vibration that might travel from the compressor into the lines. It must be installed in the suction lines, the hot gas lines or the liquid line.

(5 × 2) (10)

3.2 3.2.1 High-pressure gauge
3.2.2 High-pressure valve stem
3.2.3 Service hose
3.2.4 High-pressure side hose
3.2.5 Low-pressure side hose
3.2.6 Low-pressure valve stem
3.2.7 Low-pressure gauge

(7 × 1) (7)

3.3 The term *control mode* is used to indicate the way in which the controller acts on the signal it receives.✓✓ (2)

- On-off control✓
- Floating control
- Proportional control (Any ONE mode) (1)

[20]

QUESTION 4

4.1 4.1.1 A plant cycle when its capacity exceeds the requirements at an instant in time.

4.1.2 The difference between the highest and the lowest value of the controlled variables.

4.1.3 The difference between the set point and the value of the controlled variable at any instant.

(3 × 2) (6)

4.2
- Propeller fans
- Axial flow fans
- Centrifugal fans
- Mixed-flow fans
- Cross-flow fans (Any 4 × 1) (4)

4.3 Centrifugal fan✓
- It has less noise✓
- Efficient operation at high pressure ✓ (Any other valid reason) (3)

4.4 4.4.1 To detect leaks

4.4.2 To measure atmospheric pressure

4.4.3 Loosening and securing pipes

4.4.4 To measure pressure

(4 × 1 (4)

4.5
- Well-type cases – open or covered
- Multi-shelf type
- Reach-in refrigerated
- Island-type cases (Any 3 × 1) (3)

[20]

QUESTION 5

5.1
A Install service manifold.
B Connect centre hose to vacuum manifold assembly.
C Open the valves to the pump and indicator.
D Open both valves on the service manifold and mid-seat both equipment service valves.
E Start vacuum pump and evaluate system until a vacuum of at least 500 microns is achieved.
F Close pump valve and isolate the system.
G Close valve to vacuum pump and indicator.
H Disconnect pump and indicator.

(8 × 1) (8)

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

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

(2 × 2) (4)

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5.3
- 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 again start to work 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 × 1) (3)

5.4
- R22
- R134a
- R404a
- R410a
- R502
- R600a
- R1

(Any relevant 5 × 1) (5)
[20]

TOTAL: 100

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