

U.S.C.G. Merchant Marine Exam

QMED

Q803 Refrigerating Engineer

(Sample Examination)

Choose the best answer to the following Multiple-Choice Questions.

1. Which of the listed devices would be installed in the air compressor discharge line between the compressor and receiver of a control air system?
- A. P-I converter
 - B. Moisture separator
 - C. Lubricator
 - D. Vacuum breaker

Correct answer: B

2. At a minimum threshold, how many milliamps of current through the body produces a condition where most people would suffer ventricular fibrillation and could only be resuscitated with a ventricular defibrillator?
- A. 3 to 7 mA
 - B. 10 to 16 mA
 - C. 30 mA
 - D. 75 mA for 5 sec.

Correct answer: D

3. If the compressor is heard to knock while pumping down the low side for repairs, but otherwise the compressor sounds normal, this is a possible indication of what condition?
- A. worn piston rings
 - B. faulty bearings
 - C. air being introduced to the system
 - D. foaming of the crankcase oil

Correct answer: D

4. When purging a refrigeration gauge manifold using system pressure as the source of refrigerant for purging, which of the fittings listed is normally tightened LAST?
- A. the low-pressure hose fitting at the gage manifold low-pressure connection
 - B. the high-pressure hose fitting at the discharge service valve service port
 - C. the high-pressure hose fitting at the gage manifold high-pressure connection
 - D. the low-pressure hose fitting at the suction service valve service port

Correct answer: D

5. The gas that exists in the stratosphere forming a protective shield that helps to protect the environment from the harmful effects of ultraviolet radiation is called what?
- A. nitrogen
 - B. oxygen
 - C. ozone
 - D. radon

Correct answer: C

6. When the relief valve opens on a refrigeration compressor discharge line, it discharges high-pressure refrigerant vapor to what location?
- A. refrigerant inlet of the condenser
 - B. inlet side of the evaporator
 - C. suction side of the compressor
 - D. liquid strainer

Correct answer: C

7. With respect to machine shop "taps and dies", a bottoming tap is correctly used for _____.
- A. reversing the threads in a hole
 - B. chasing the threads on a circular rod
 - C. the second cut when threading a blind hole
 - D. starting the threads on a circular rod

Correct answer: C

8. Zinc plates commonly found in refrigeration systems and used as sacrificial anodes are located where?
- A. saltwater side of the condenser
 - B. refrigerant side of the condenser
 - C. cooling water suction strainer
 - D. evaporator coils

Correct answer: A

9. To obtain a 1/2 inch per foot taper on an 18-inch workpiece, the tailstock of the lathe must be set over _____.
- A. 3/8 inch
 - B. 1/2 inch
 - C. 3/4 inch
 - D. 7/8 inch

Correct answer: A

10. In a refrigeration system, what component is installed directly downstream of the thermal expansion valve?
- A. box solenoid valve
 - B. compressor
 - C. evaporator coil
 - D. receiver

Correct answer: C

11. Sea water or low temperature central fresh water is typically provided to a ship's stores refrigeration plant for what purpose?
- A. prevent motor overheating
 - B. prevent refrigerant superheating
 - C. cool the expansion valve
 - D. condense the refrigerant gas

Correct answer: D

12. When installing DANGER tags when performing a tag-out and lock-out procedure in preparation for accomplishing maintenance, what is the color of these tags?

- A. Green
- B. Yellow
- C. Orange
- D. Red

Correct answer: D

13. What is the drive arrangement of refrigeration compressor shown in figure "B" of the illustration? Illustration RA-0041

- A. open
- B. serviceable, bolted, accessible semi-hermetic
- C. external drive
- D. welded, fully hermetic

Correct answer: D

14. When repairing a refrigeration system, a swaging tool set would be used to carry out which of the following operations?

- A. Swaging tools are used during the breaking-in of refrigeration compressors and drive motors.
- B. Swaging tools are no longer used with repairing refrigeration systems due to progressive changes in the tool industry.
- C. Swaging tools can be used to expand an end of one tube to fit onto a tube of the same original outside diameter.
- D. Swaging tools are used to remove any sweated edges formed on the tubing while soldering.

Correct answer: C

15. According to 33 CFR, which type of Marine Sanitation Device (MSD) is used solely for the storage of sewage and flushwater at ambient air pressure and temperature?

- A. Type I
- B. Type II
- C. Type III
- D. Type IV

Correct answer: C

16. A typical common digital multimeter (DMM) can be used to measure what values?

- A. voltage, current, and reactance
- B. current, frequency, and resistance
- C. current, frequency, and reactance
- D. voltage, current, and resistance

Correct answer: D

17. To find the relative humidity of an accommodation space, you would use a _____.

- A. Entropy Chart
- B. Enthalpy Chart
- C. Mollier Chart
- D. Psychrometric Chart

Correct answer: D

18. What term represents the difference between synchronous speed and actual speed of a running AC induction motor?

- A. variation
- B. differential
- C. slip
- D. deviation

Correct answer: C

19. Refrigeration systems using forced air circulation evaporators have a tendency to cause rapid dehydration of produce in chill boxes. Which of the following will minimize this dehydration?

- A. the air is circulated rapidly over a small evaporator with a minimum temperature differential
- B. the air is circulated slowly over a large evaporator with a minimum temperature differential
- C. the air is circulated slowly over a large evaporator with a maximum temperature differential
- D. the air is circulated rapidly over a small evaporator with a maximum temperature differential

Correct answer: B

20. What could be the cause of water hammer in a steam heating system?

- A. filling the auxiliary boiler with cold water
- B. steam admitted to a cold pipe
- C. filling the auxiliary boiler with hot water
- D. draining a sootblower line before cracking the steam supply valve

Correct answer: B

21. An increase in which of the listed conditions will increase the speed of a synchronous electric motor?

- A. Voltage
- B. Inductance
- C. Frequency
- D. Armature current

Correct answer: C

22. What statement best represents the characteristics of an innage tape and bob for the purposes of taking a vented tank sounding?

- A. The bob has a pointed end and floats on the surface of the liquid when lowered by the tape.
- B. The bob has a cupped end and sinks in the liquid when lowered by the tape.
- C. The bob has a cupped end and floats on the surface of the liquid when lowered by the tape.
- D. The bob has a pointed end and sinks in the liquid when lowered by the tape.

Correct answer: D

23. The tool used to prepare copper tubing for the installation of fittings is called a _____.

- A. stretcher
- B. flaring tool
- C. swaging tool
- D. spreader

Correct answer: B

24. Remote valve operators are frequently fitted with a handwheel for local operation if the motor fails. If this is so, what is the procedure for local manual control?

- A. Just rotate the handwheel in the appropriate direction for valve operation.
- B. First move the lever to disengage the motor clutch, then rotate the handwheel.
- C. Motor-operated valves are generally not fitted with local handwheels.
- D. First move the lever to engage the motor clutch, then rotate the handwheel.

Correct answer: B

25. When one belt of a multiple V-belt drive requires replacing, what will be required?

- A. ensure the proper belt dressing is applied
- B. ensure the seasoned belts are reinstalled in their proper sequence
- C. replace the entire belt set
- D. season the new belt prior to installation

Correct answer: C

26. In a compression type automatic grease cup, the lubricant is forced into the bearing by _____.

- A. a pressure gun
- B. spring force
- C. gravity flow
- D. a Zerk fitting

Correct answer: B

27. Bottom blow valves are installed on auxiliary water-tube boilers to _____.

- A. completely drain the boiler in an emergency
- B. prevent sludge from forming in the steam drum
- C. remove floating impurities from the boiler water surface
- D. remove settled solids from the water drum

Correct answer: D

28. What is one benefit of maintenance of proper air circulation in an air-conditioned cargo space?

- A. increased moisture content
- B. reduced slime and mold
- C. more temperature differential
- D. increased density of the air

Correct answer: B

- 29.** Which of the precautions listed should be taken before opening any part of a refrigeration system for the purpose of accomplishing non-major repairs?
- A. Set the high-pressure cut-out on manual to prevent automatic starting.
 - B. Bring the part of the system to be opened to 0 psig.
 - C. Use the hot gas defrost line to remove any frost on the evaporator coils.
 - D. Bring the part of the system to be opened to a pressure corresponding to the ambient temperature.

Correct answer: B

- 30.** If the valve labeled "D" in the illustration is a suction service valve, what will the port labeled "7" be connected to? Illustration RA-0008
- A. to the line connected to the evaporator inlet
 - B. to the inlet of the compressor
 - C. to the outlet of the compressor
 - D. to the line connected to the evaporator outlet

Correct answer: D

- 31.** If a magnetic controller relay fails to drop out when the coil voltage is removed from the relay, what is the probable cause?
- A. excessive spring tension
 - B. welded contacts
 - C. overvoltage
 - D. excessive current

Correct answer: B

- 32.** Inhalation of high concentrations of chlorofluorocarbon refrigerants (CFCs) may have which of the following effects?
- A. cardiac arrhythmias
 - B. drowsiness
 - C. loss of concentration
 - D. all of the above

Correct answer: D

- 33.** In DC motor construction, where are the commutating windings wound?
- A. opposite main poles
 - B. interpoles
 - C. adjacent main poles
 - D. the rotor core

Correct answer: B

- 34.** The crosshatch design on the end of piece "3" in the illustration shown indicates that _____. Illustration GS-0020
- A. piece 3 is made of stainless steel
 - B. the piece is made of mild carbon steel
 - C. piece 3 is knurled in that area
 - D. the piece is screwed into piece 2

Correct answer: C

- 35.** Why can CFC or HCFC refrigerants leaking into a confined space or in limited surroundings cause suffocation?
- A. Refrigerants contain an acidic substance.
 - B. Refrigerants lighter than air will rise.
 - C. Refrigerants are heavier than air and displace oxygen.
 - D. Refrigerants obnoxious odor prevents breathing.

Correct answer: C

- 36.** Copper coil tubing is best cut with a _____.
- A. hand hacksaw
 - B. tubing cutter
 - C. flare cutter
 - D. pipe cutter

Correct answer: B

- 37.** Concerning frost appearing on one set of evaporator coils of a multi-box, direct expansion type refrigeration system, what is true?
- A. the frost will increase the value of superheat to the fluid leaving the coils
 - B. the frost can be quickly removed by simply shutting off fluid flow to the coils
 - C. the frost can be removed by passing hot vapors through the coils
 - D. the frost will assist in increasing the refrigeration effect

Correct answer: C

- 38.** What statement below summarizes an engine lubricating oil's viscosity given as 20W-50?
- A. It is formulated for a metric weight of 20 milligrams at 50°F.
 - B. It is formulated for both a low temperature and a high temperature based on viscosities determined at 100°C.
 - C. It is formulated for hot summer days when the cooling water temp is 50°F higher than the oil temperature.
 - D. The "W" designates what the additives are that are added to this oil.

Correct answer: B

- 39.** If the combination moisture indicator and sight glass indicates an accumulation of moisture within the system, which of the listed procedures would be the most practical to follow?
- A. Purge the entire system to the atmosphere, replace the drier cartridge, and recharge the system with refrigerant.
 - B. Secure the system, disassemble and de-ice the thermostatic expansion valve.
 - C. Close the king valve, pump down the system, isolate the drier, remove the desiccant core and replace with new drier cartridge.
 - D. Using a vacuum pump, draw the entire system down to 1,270 microns for a period of three hours.

Correct answer: C

- 40.** A reheater in an air conditioning system performs what function?
- A. controls the inlet air volume
 - B. restores the conditioned air temperature to a comfortable level
 - C. maintains the relative humidity at 15%
 - D. controls the inlet air temperature

Correct answer: B

- 41.** To prevent overheating and scoring of the shaft after repacking the stuffing box, which of the following procedures should be carried out?
- A. Tightening the gland in all the way and then backing it off slightly.
 - B. Tighten the packing in small increments while the pump is operating.
 - C. Lubricate the lantern ring with cylinder oil before installing new turns of packing.
 - D. Operating the pump slowly and applying oil freely to the shaft until the packing is properly seated.

Correct answer: B

- 42.** When replacing a thermostatic expansion valve power element, what is true concerning the thermal bulb?
- A. apply a light film of oil to increase heat transfer
 - B. carefully coat the device with silicone sealant to reduce the effects of convective cooling
 - C. with steel wool or an abrasive cloth remove oxidation on the bulb and suction line
 - D. apply a heavy coating of grease to function as a heat sink

Correct answer: C

- 43.** When opening or closing compressor service and line isolation valves on a typical refrigeration system that is fitted with packed valves, what must you do?
- A. you should never loosen or tighten the packing gland
 - B. you should turn valves slowly to avoid thermal stresses due to low temperatures
 - C. you must first remove the stem seal cap
 - D. you should replace the gasket each time the valve position is changed

Correct answer: C

- 44.** Which recovery procedure should be used to minimize the loss of oil from the system during the recovery of refrigerant from small appliances such as a water cooler?
- A. vapor-liquid recovery
 - B. vapor recovery
 - C. liquid recovery
 - D. initial recovery

Correct answer: B

- 45.** As shown in the illustrated DC machine which is configured as a generator, what is the purpose of the interpoles? Illustration EL-0052
- A. counteract armature reaction to maintain the brushes in the neutral plane to minimize brush sparking
 - B. statically balance the stator for uniform weight distribution
 - C. provide residual magnetism to facilitate an output by means of self-excitation
 - D. strengthen the main field above and beyond the capability of the main field poles

Correct answer: A

- 46.** By what criteria are hard hats (protective helmets) rated?
- A. They are rated by type as it applies to direction of impact protection only, such as impacts from the top or impacts from the top and side.
 - B. They are rated by whether or not the headband is adjustable and by the length of the bill on the shell.
 - C. They are rated by type as it applies to direction of impact protection, and they are rated by class of service as it applies to protection from exposure to electrical voltage.
 - D. They are rated by class of service as it applies to protection from exposure to electrical voltage only, such as no voltage, limited voltage, and high voltage protection.

Correct answer: C

- 47.** Which of the following precautions should be taken when troubleshooting various power circuits using a digital multimeter?
- A. Always remember that the unit is polarity sensitive and if used on DC circuits reversing the leads may result in high temperatures within the tester.
 - B. Never connect the device to circuits where potentials greater than 120 volts may be present, as the internal electronics can only withstand small currents.
 - C. Never use this type of meter on circuits greater than 60 Hz as the meter may not register voltages over 60 Hz.
 - D. When in the manual ranging mode, always preset the meter to the next higher range than the amount of voltage expected in the circuit.

Correct answer: D

- 48.** When removing the primary refrigerant from a system using water as a secondary refrigerant, it is important to follow which procedure(s) to safeguard the equipment?
- A. Ensure that the water is drained or continually circulating to avoid freeze-up.
 - B. Ensure that the water doesn't become contaminated with oil in the direct contact heat exchanger.
 - C. Leave some refrigerant in the system to prevent the water from contaminating the refrigerant if there is a leak.
 - D. Ensure that the water and refrigerant separator is functioning properly.

Correct answer: A

- 49.** In general, the thermal bulb for a thermal expansion valve used in a reciprocating air conditioning system is usually charged with what substance?
- A. mercuric sulfate
 - B. distilled water
 - C. the same refrigerant as the system
 - D. bees wax

Correct answer: C

- 50.** On vessels exceeding 1600 GRT, who is responsible for the practical upkeep of machinery and the manning of the engine room?
- A. Officer in charge of the engineering watch
 - B. First assistant engineer
 - C. Chief mate
 - D. Chief engineer

Correct answer: B

- 51.** The motor fails to start on an attempted startup. With the start button depressed, a voltmeter reading between 1 and 5, as illustrated in figure "A", indicates line voltage available to the control circuit, what should be your next step in the troubleshooting process? Illustration EL-0007
- A. test the contactor coil "M" for continuity and replace if necessary
 - B. ensure that the disconnect switch (DS) is closed
 - C. test the stop button for continuity and replace if necessary
 - D. attempt to reset the overload relay and determine the cause of the overload if applicable

Correct answer: D

- 52.** Low compressor head pressure in a refrigeration system can be caused by which of the following?
- A. excessive condenser cooling water flow
 - B. air in the refrigeration system
 - C. insufficient condenser cooling water flow
 - D. excessive refrigerant in the system

Correct answer: A

- 53.** The blade for a power hacksaw should be installed with the teeth _____.
- A. pointing toward the motor end of the machine
 - B. pointing toward the motor if using a 4 or 6 tooth blade and away from the motor if using a 10 or 14 tooth blade
 - C. pointing away from the motor end of the machine
 - D. pointing either toward or away from the motor end of the machine

Correct answer: A

- 54.** A refrigeration compressor used in a multi-box refrigeration system, is designed with six of its eight cylinders able to be controlled for variable load conditions. If all of the reefer boxes are currently feeding, what percentage of the total number of compressor cylinders will be loaded after start up?
- A. 100%
 - B. 50%
 - C. 25%
 - D. 0%

Correct answer: A

- 55.** At a minimum threshold, how many milliamps of current through the body produces a condition where most people would experience respiratory paralysis and be unable to breathe while still in contact with the energized conductor?
- A. 3 to 7 mA
 - B. 10 to 16 mA
 - C. 30 mA
 - D. 75 mA for 5 sec.

Correct answer: C

- 56.** To minimize magnetic field interaction between electrical conductors in physical proximity, what is the best practice?
- A. at right angles and as close as possible to each other
 - B. parallel to and as far as practicable from each other
 - C. at right angles and as far as practicable from each other
 - D. parallel and as close as possible to each other

Correct answer: C

- 57.** If a delicate component must be soldered into a circuit, how can the component be protected from the heat of the soldering process?
- A. pre-oxidizing the leads to be soldered
 - B. using a thermal shunt heat sink
 - C. coating the leads to be soldered with a light oil film
 - D. operating the soldering gun not more than 60 seconds at a time

Correct answer: B

- 58.** What is true concerning frost build-up on the evaporator coils of a multi-box direct expansion refrigeration system?
- A. the frost will increase the refrigeration effect
 - B. the frost can be removed by passing hot gas through the coils or energizing defrost heaters with the evaporator fan shut down
 - C. the frost can be quickly removed by simply shutting down the compressor
 - D. the frost can be removed by passing hot gas through the coils or energizing defrost heaters with the evaporator fan still running

Correct answer: B

- 59.** Concerning the proper installation of the sensing bulb of a thermal expansion valve that is attached to the evaporator tail coil on a horizontal run, what statement is true?
- A. the bulb should be attached so that the pinched off tubing should be oriented down and the capillary tube running to the valve diaphragm should be oriented up
 - B. the bulb should be attached with no regard to the orientation of the pinched off tubing or the capillary tube running to the valve diaphragm
 - C. the bulb should be attached so that the pinched off tubing should be oriented up and the capillary tube running to the valve diaphragm should be oriented down
 - D. the bulb should be attached so that the pinched off tubing should be oriented to one side and the capillary tube running to the valve diaphragm should be oriented to the opposite side

Correct answer: A

- 60.** What material is most commonly used as a sacrificial anode for the purposes of minimizing the galvanic corrosion of steel and cast iron?
- A. Platinum
 - B. Brass
 - C. Zinc
 - D. Bronze

Correct answer: C

- 61.** The portion of a hydraulic hose that determines its overall strength, is the _____.
- A. braided inner layer(s)
 - B. outer cover
 - C. inner tube
 - D. outer armor

Correct answer: A

- 62.** Which of the hand valve configurations for the gauge manifold set is the correct set up for monitoring both the low and high system pressures? Illustration RA-0003
- A. A
 - B. B
 - C. C
 - D. D

Correct answer: D

- 63.** With a service gauge manifold set connected to a refrigerant compressor as shown in the illustration, which arrangement of the gauge manifold set valves and compressor service valves would allow for simultaneous reading of the compressor suction and discharge pressures? Illustration RA-0003
- A. Valves "2" and "5" both closed, along with valves "1" and "6" both cracked open off their backseats.
 - B. Valves "2" and "5" both closed, along with valves "1" and "6" both back-seated.
 - C. Valves "2" and "5" both open, along with valves "1" and "6" both open in the mid-position.
 - D. Valves "2" and "5" both open, along with valves "1" and "6" both front-seated.

Correct answer: A

- 64.** An inadequate reciprocating bilge pump discharge is most often caused by_____.
- A. clogged suction strainers
 - B. defective intake valves
 - C. clogged drain valves
 - D. scarred cylinder walls

Correct answer: A

- 65.** If there is a "large" release of R-134a refrigerant gas in a confined area, which of the following statements would be true?
- A. safety goggles and lined butyl gloves would be required before entering the space
 - B. dust or particle masks would be required before entering the space
 - C. a self-contained breathing apparatus (SCBA) would be required before entering the space
 - D. an explosive atmosphere would be created

Correct answer: C

- 66.** If both the shell-and-tube lube oil cooler and shell-and-tube jacket water cooler of a diesel engine are sea water-cooled, what statement is true?
- A. Sea water flows through the shells of both the lube oil and jacket water coolers.
 - B. Sea water flows through the tubes of both the lube oil and jacket water coolers.
 - C. Sea water flows through the tubes of the jacket water cooler and through the shell of the lube oil cooler.
 - D. Sea water flows through the tubes of the lube oil cooler and through the shell of the jacket water cooler.

Correct answer: B

- 67.** On a ship with a continuously manned engine room, with a three-person watch rotation, what is the watch and rest period rotation?
- A. 4 hours on watch followed by 8 hours rest
 - B. 6 hours on watch followed by 6 hours rest
 - C. 8 hours on watch followed by 4 hours rest
 - D. 8 hours on watch followed by 8 hours rest

Correct answer: A

68. What differentiates "system-dependent" and "self-contained" recovery devices in refrigeration systems?

- A. the system compressor must be working to use system-dependent devices, the system compressor may or may not be operational when self-contained devices are used
- B. self-contained recovery devices usually contain a compressor, system-dependent recovery devices do not
- C. self-contained recovery devices can only be used on large CFC and HCFC units
- D. there is no difference between the devices

Correct answer: B

69. During tests to discover why a refrigeration compressor is running continuously, it is determined that the refrigerated space temperature is slightly above normal without ever reaching the desired minimum temperature. Suction and discharge pressures are normal for the corresponding box temperature. In this situation, what should you suspect?

- A. high cooling water temperature
- B. air in the system
- C. leaking door gaskets
- D. a shortage of refrigerant

Correct answer: C

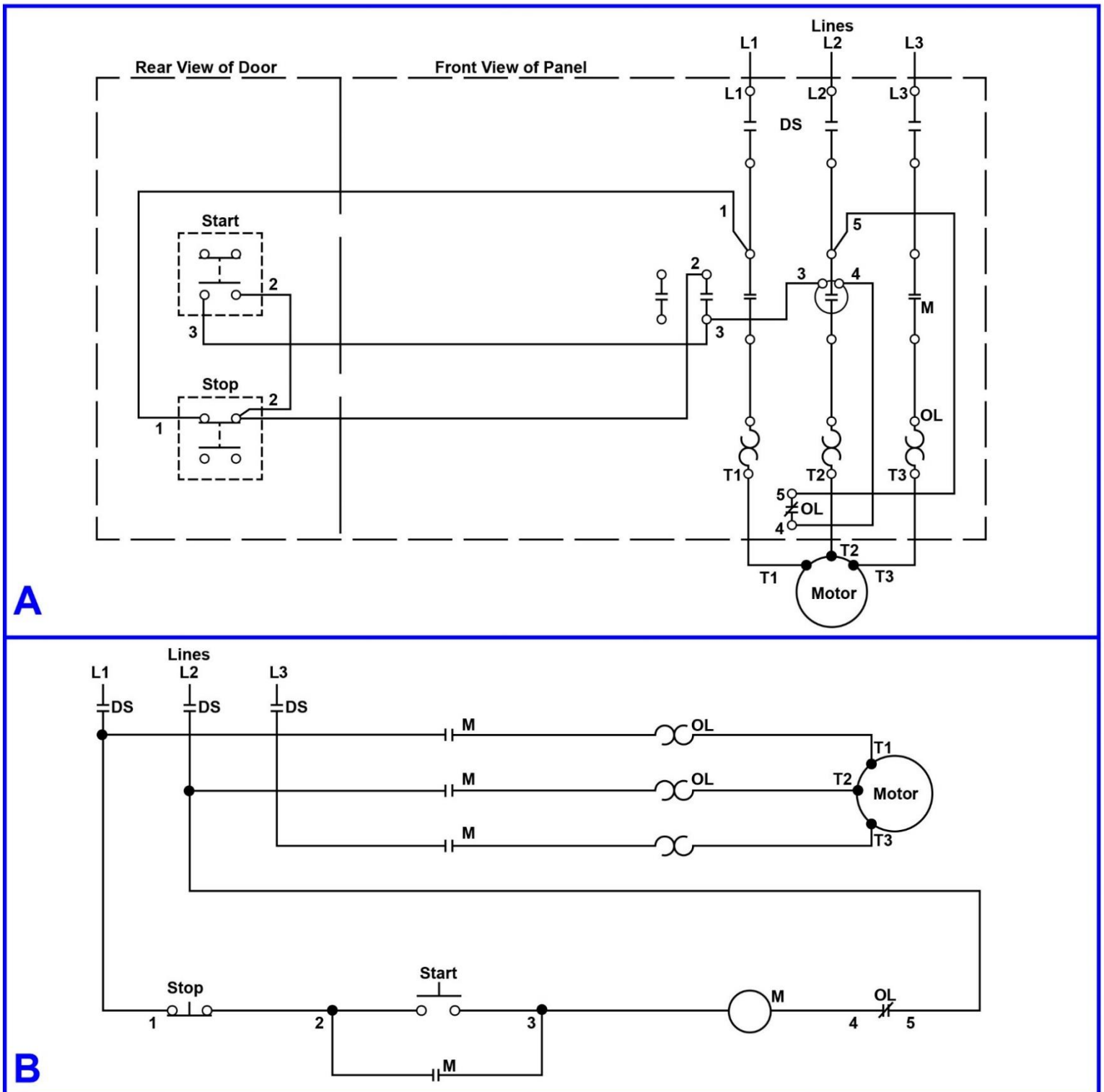
70. Leaking suction valves in a refrigeration compressor are indicated by which of the following?

- A. lower than normal evaporator temperature
- B. higher than normal suction pressure
- C. lower than normal suction pressure
- D. noticeable increase in compressor noise

Correct answer: B



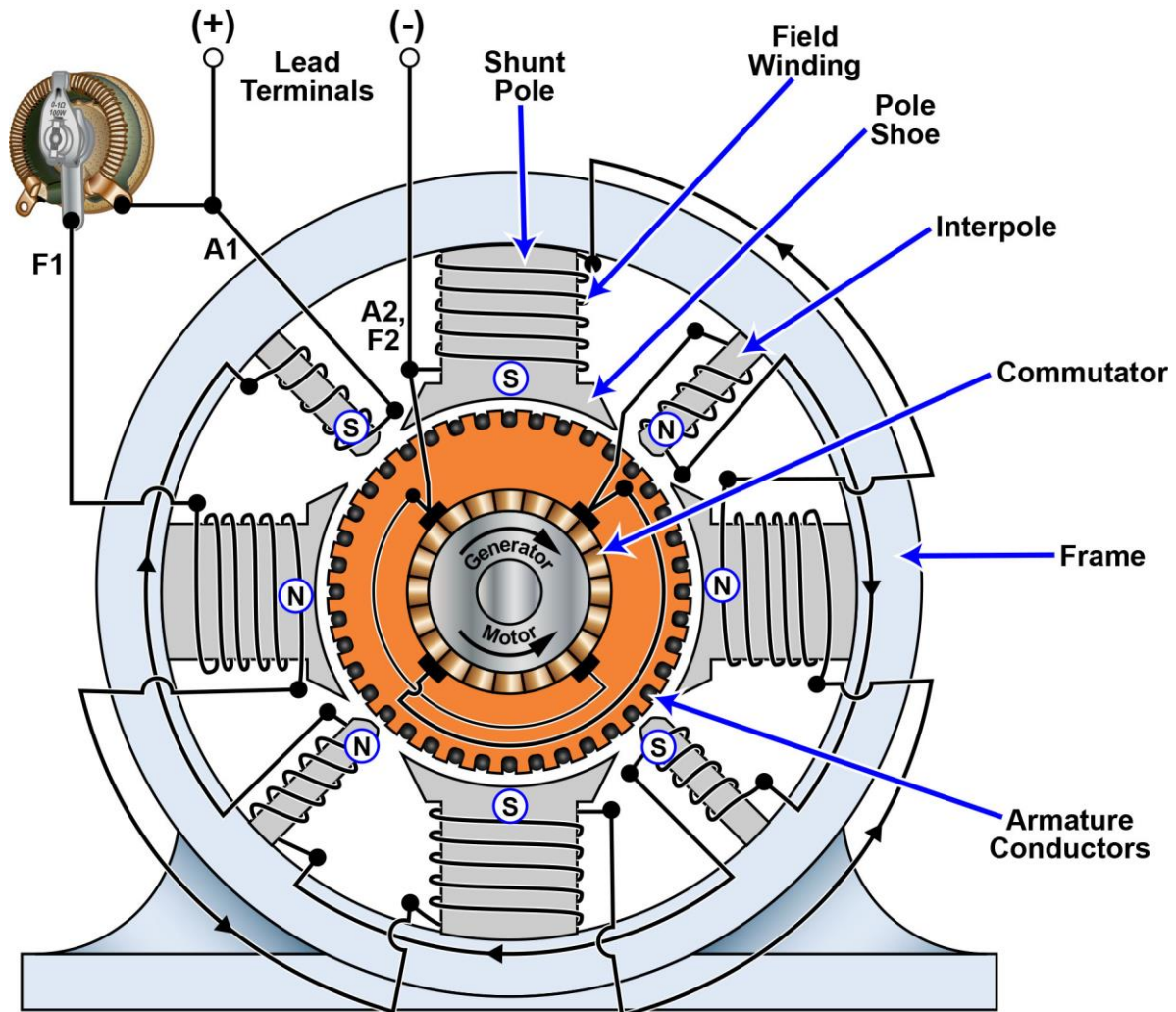
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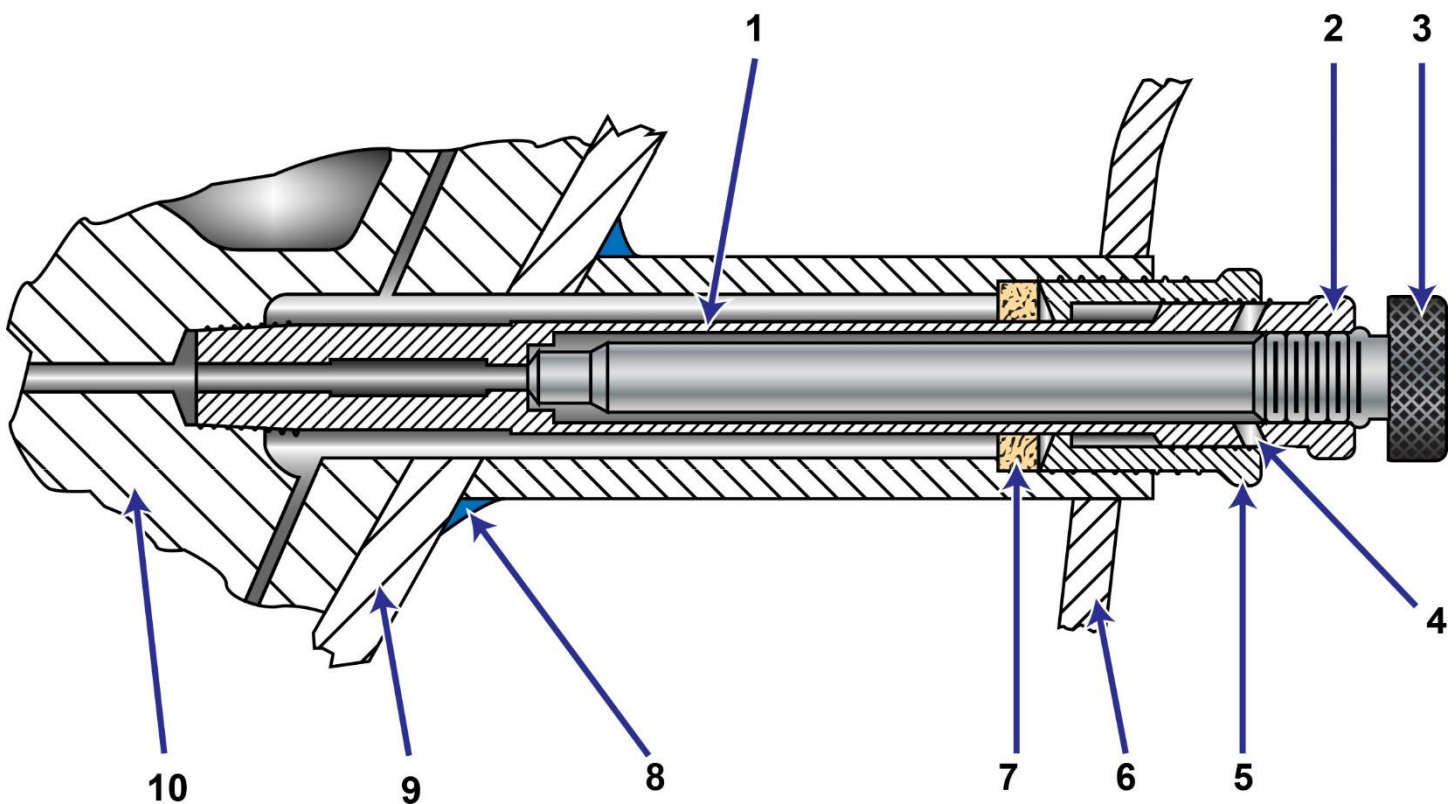
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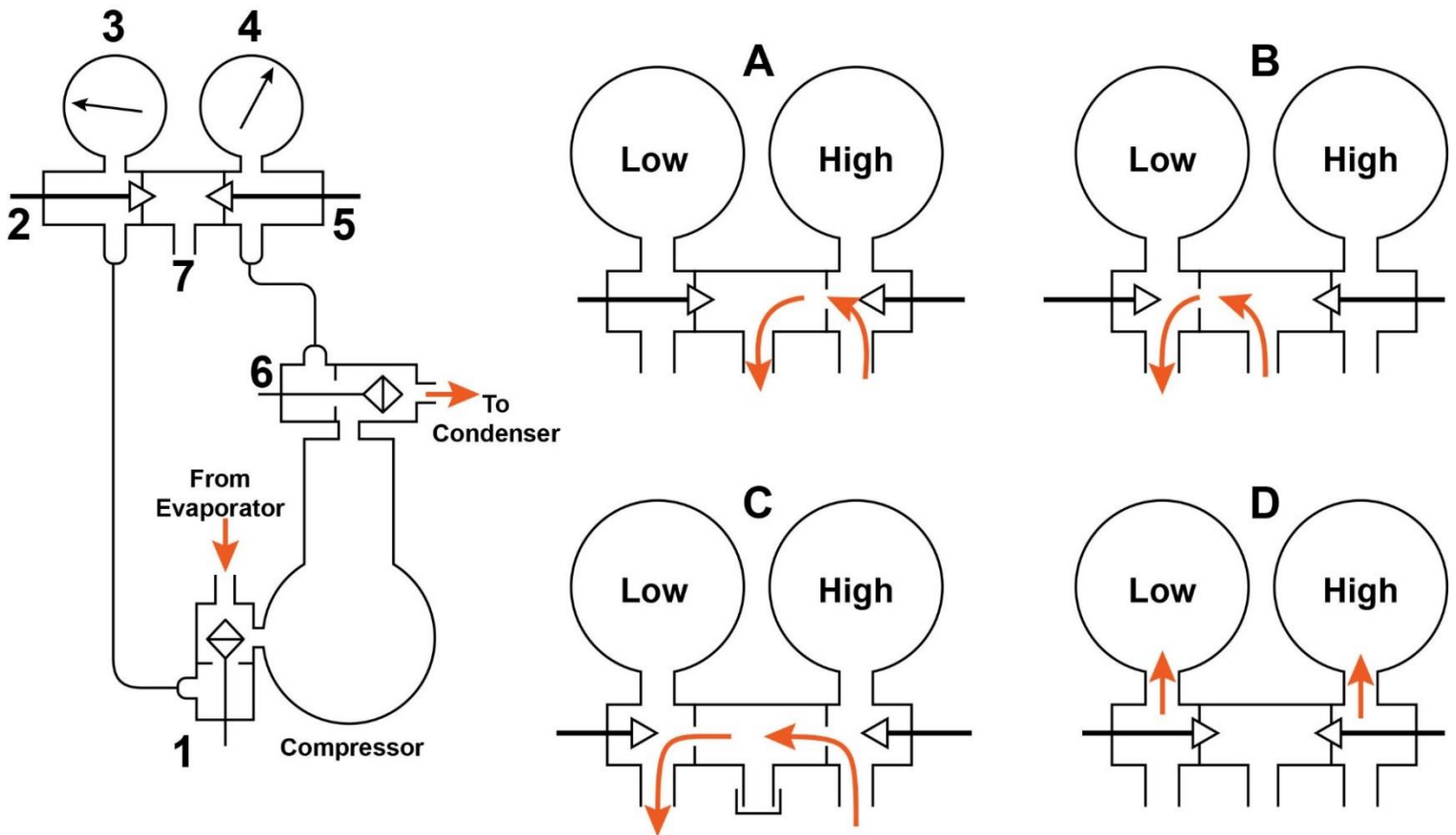
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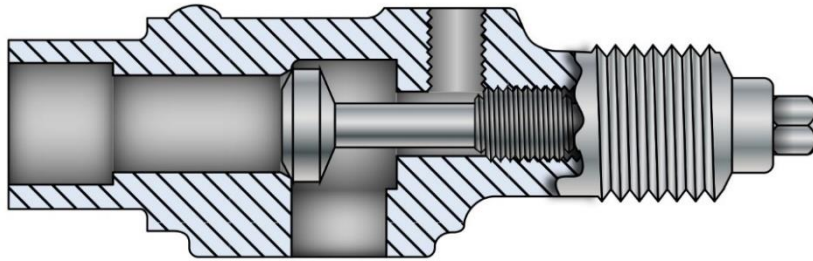
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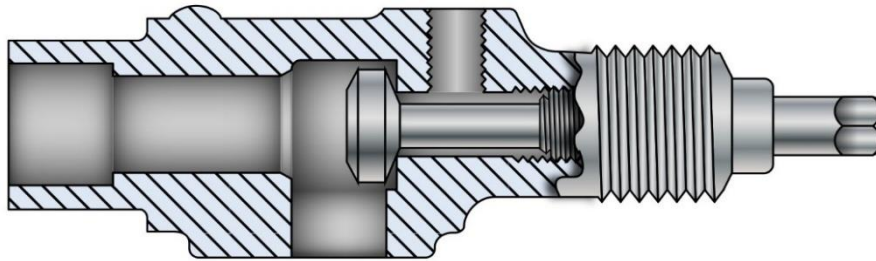
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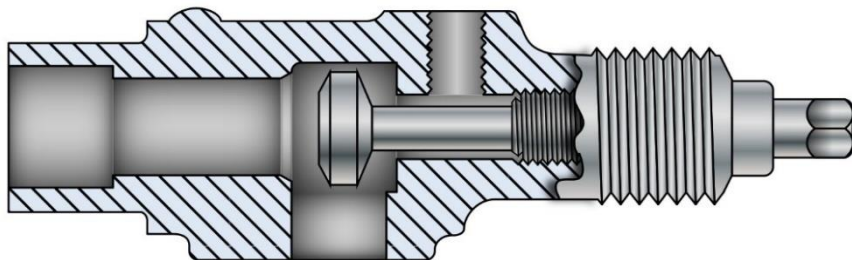
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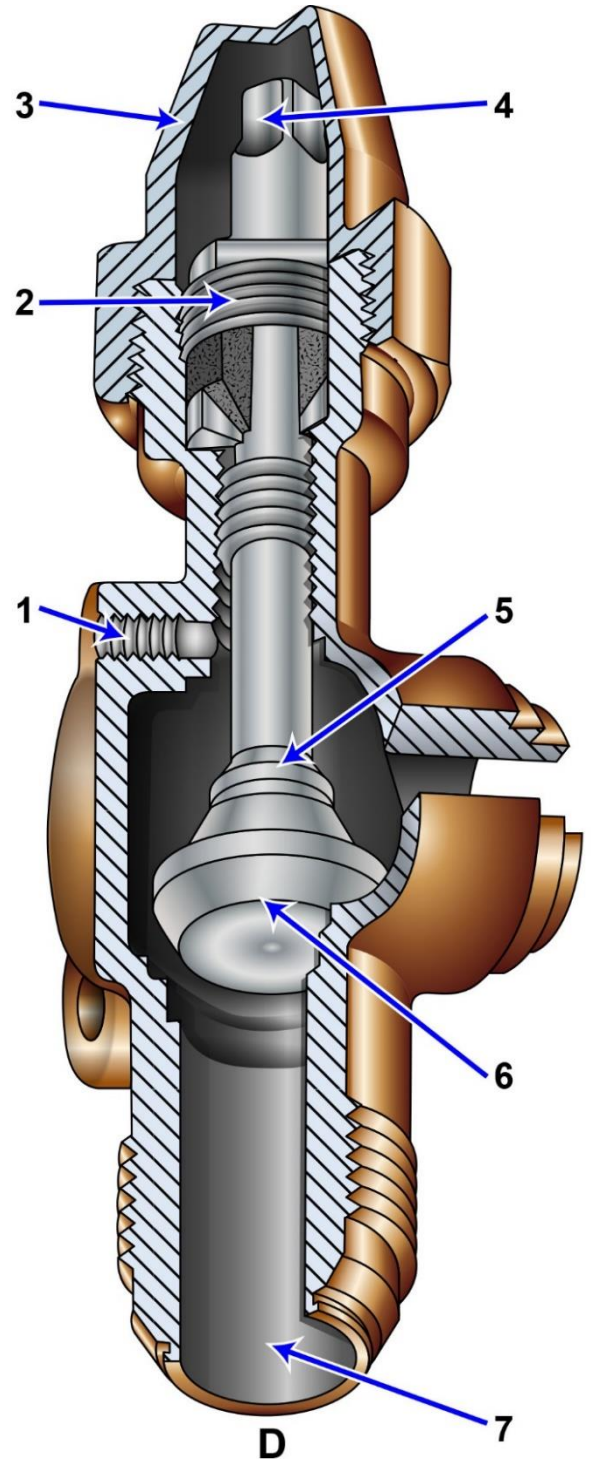
A



B



C

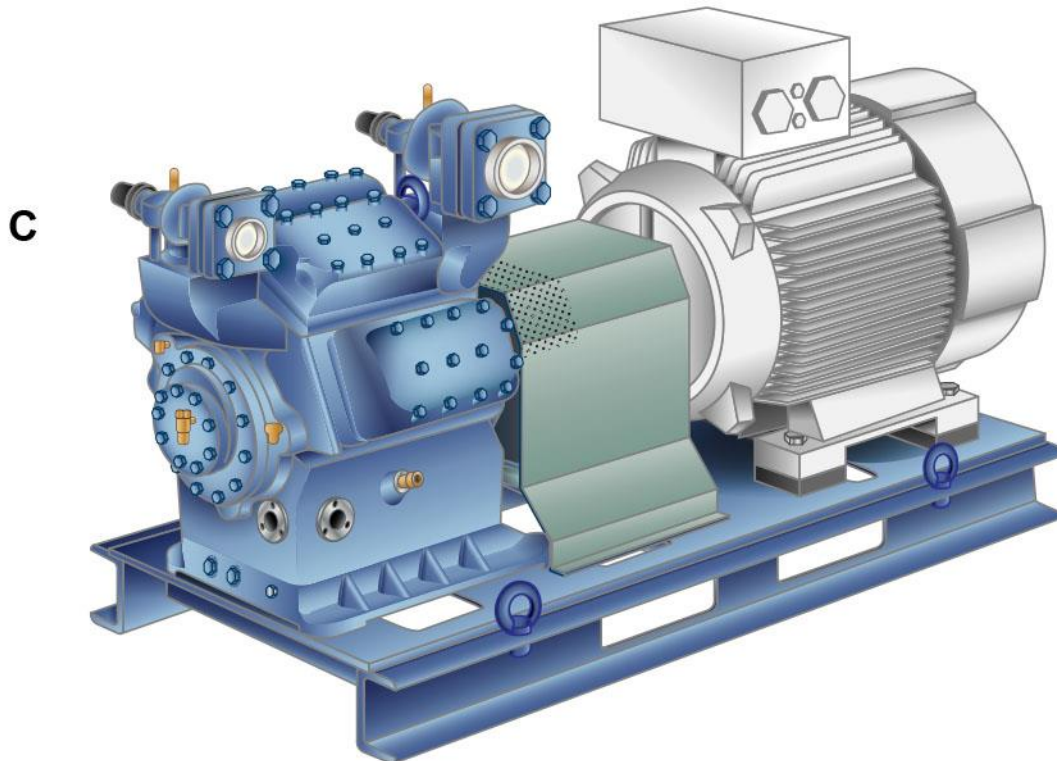
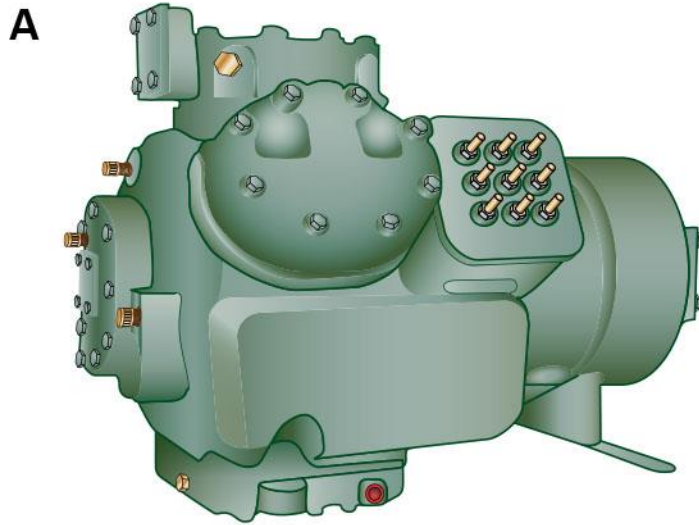


D

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