U.S.C.G. Merchant Marine Exam

QMED

Q803 Refrigerating Engineer

(Sample Examination)

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

1. To prevent blowback when attempting to light off an idle boiler, what statement is true?

   A. The boiler fuel oil supply header temperature must be maintained above the flash point of the fuel, the furnace floor should be free of oil, and there should be sufficient combustible gases in the furnace.
   B. The boiler fuel oil supply header temperature must be maintained below the pour point of the fuel, the furnace floor should be free of oil, and the furnace should be purged.
   C. The boiler fuel oil supply header temperature must be maintained at the temperature necessary to obtain proper atomization of the fuel, the furnace floor should be free of oil, and there should be sufficient combustible gases in the furnace.
   D. The boiler fuel oil supply header temperature must be maintained at the temperature necessary to obtain proper atomization of the fuel, the furnace floor should be free of oil, and the furnace should be purged.

   Correct answer: D

2. Of the various possible methods shown in the illustration, which is the correct method of attaching a TXV feeler bulb to a small, large line with a horizontal run? Illustration RA-0050

   A. A
   B. B
   C. C
   D. D

   Correct answer: C

3. In a refrigeration system, what component is installed directly downstream of the thermal expansion valve?

   A. evaporator coil
   B. compressor
   C. receiver
   D. box solenoid valve

   Correct answer: A

4. When you have completed bunkering operations, the hoses should be _____.

   A. steam cleaned and flushed with hot water
   B. blown down with inert gas
   C. drained into drip pans or tanks
   D. stowed with their ends open for venting

   Correct answer: C

5. Which pipe listed has the largest outside diameter?

   A. A 3/4" pipe with a standard wall thickness
   B. A 3/4" pipe with an extra strong wall thickness
   C. A 3/4" pipe with a double extra strong wall thickness
   D. All have the same outside diameter

   Correct answer: D

6. An oxygen indicator will detect _____.

   A. an oxygen deficiency in a space
   B. concentrations of explosive gas
   C. the presence of harmful amounts of carbon monoxide
   D. all of the above

   Correct answer: A

7. In a two-stage centrifugal air conditioning system such as the one illustrated, the liquid refrigerant passes from the condenser directly to what component? Illustration RA-0064

   A. evaporator
   B. expansion valve
   C. chiller
   D. economizer

   Correct answer: D

8. Which of the lettered components shown in the illustration indicates the high-pressure cut-out? Illustration RA-0012

   A. W
   B. X
   C. Y
   D. Z

   Correct answer: B

9. Under what circumstances could equipment be operated when tagged with DANGER tags?

   A. Whenever there is a break in the actual maintenance activity
   B. Whenever you feel that it is safe to do so
   C. Whenever permission is granted by your supervisor
   D. Under NO circumstances should the equipment be operated when tagged

   Correct answer: D

10. In a refrigeration system, the bulb for the thermal expansion valve is always located where?

    A. at the evaporator coil inlet
    B. in the middle of the evaporator coils
    C. at the beginning of the bottom row of the evaporator coils
    D. at the evaporator coil outlet

    Correct answer: D

11. Suppose a remote valve operator is fitted with a gearbox. What is the purpose of the gearbox?

    A. The gearbox may be used to change the orientation of the handwheel to the valve stem, or it may be used to reduce the turning effort, but NEVER both.
    B. The gearbox is strictly used to change the orientation of the handwheel to the valve stem. The gearbox is never used to reduce the turning effort.
    C. The gearbox is strictly used to reduce the turning effort. The gearbox is never used to change the orientation of the handwheel to the valve stem.
    D. The gearbox may be used to change the orientation of the handwheel to the valve stem, or it may be used to reduce the turning effort, OR both.

    Correct answer: D

12. Rather than design an infinite variety of thermostatic expansion valve sizes to accommodate different capacities for heat removal, some manufacturers use a few standard valve body sizes in conjunction with what other feature?

    A. an externally adjustable superheat to accommodate different heat removal capacities
    B. internal equalizers to accommodate different heat removal capacities
    C. a flexible diaphragm to accommodate different heat removal capacities
    D. internal needle valve orifices of various sizes to accommodate different heat removal capacities

    Correct answer: D

13. A refrigeration unit will tend to short cycle when operating under what conditions?

    A. under heavy loads
    B. during starting conditions
    C. lack of refrigerant
    D. during hot gas defrost

    Correct answer: C

14. Before charging a refrigeration unit, unless quick disconnect fittings are used, the refrigerant charging hoses should be prepared in what way?

    A. they should be cleaned with carbon tetrachloride
    B. they should be flushed with clean refrigerant oil
    C. they should be purged with refrigerant
    D. they should be warmed in an oven

    Correct answer: C

15. When testing the low pressure cut out switch, assuming the compressor is running, what should be done to initiate the test?

    A. stop the compressor
    B. close the compressor suction valve
    C. stop the circulating pump
    D. secure the condenser

    Correct answer: B

16. If a fire broke out in an automation console, you would first secure the power and then proceed to use which of the listed hand portable fire extinguishers?

    A. Dry chemical
    B. CO2
    C. Soda acid
    D. Foam

    Correct answer: B

17. Moisture is removed from recovered refrigerant using a recycling machine by what means?

    A. purging non-condensables off the top of the recovery cylinder
    B. condensing the moisture in the condenser
    C. circulating the refrigerant through a dehydrator
    D. opening a drain petcock on the oil separator

    Correct answer: C

18. 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. Bring the part of the system to be opened to 0 psig.
    B. Bring the part of the system to be opened to a pressure corresponding to the ambient temperature.
    C. Set the high-pressure cut-out on manual to prevent automatic starting.
    D. Use the hot gas defrost line to remove any frost on the evaporator coils.

    Correct answer: A

19. While adrift in an inflatable life raft in hot, tropical weather _____.

    A. the canopy should be deflated so that it will not block cooling breezes
    B. the pressure valve may be periodically opened to prevent excessive air pressure
    C. deflating the floor panels may help to cool personnel
    D. the entrance curtains should never be opened

    Correct answer: C

20. What statement below summarizes an engine lubricating oil's viscosity given as 20W-50?

    A. It is formulated for hot summer days when the cooling water temp is 50°F higher than the oil temperature.
    B. The "W" designates what the additives are that are added to this oil.
    C. It is formulated for a metric weight of 20 milligrams at 50°F.
    D. It is formulated for both a low temperature and a high temperature based on viscosities determined at 100°C.

    Correct answer: D

21. As a firefighting medium, CO2 can be dangerous under certain conditions as it can cause _____.

    A. undulation
    B. hallucinations
    C. carbon monoxide poisoning
    D. freeze burns and blistering

    Correct answer: D

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

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

    Correct answer: B

23. What statement best represents the characteristics of innage and ullage tank soundings?

    A. Innage is the distance between the oil/water interface and top of the tank, and ullage is the distance between the oil/water interface and the bottom of the tank.
    B. Innage is the distance between the surface of the liquid and the bottom of the tank, and ullage is the distance between the surface of the liquid and the top of the tank.
    C. Innage is the distance between the surface of the liquid and the top of the tank, and ullage is the distance between the surface of the liquid and the bottom of the tank.
    D. Innage is the distance between the oil/water interface and bottom of the tank, and ullage is the distance between the oil/water interface and the top of the tank.

    Correct answer: B

24. The primary function of an automatic sprinkler system is to _____.

    A. instantaneously extinguish the fire which triggered it
    B. limit the spread of the fire and control the amount of heat produced
    C. protect high value electronic equipment in adjacent areas which have had sprinkler heads installed
    D. alert the crew to the fire

    Correct answer: B

25. Which of the following statements is true concerning the gauge labeled "A" of the illustrated gauge manifold set? Illustration RA-0001

    A. The gauge labeled "A" is a compound gauge and is usually color-coded red.
    B. The gauge labeled "A" is a standard pressure gauge and is usually color-coded blue.
    C. The gauge labeled "A" is a standard pressure gauge and is usually color-coded red.
    D. The gauge labeled "A" is a compound gauge and is usually color-coded blue.

    Correct answer: D

26. What is meant by the phrase "solid flooding"?

    A. A compartment completely filled from deck to overhead, with every cubic foot of the compartment occupied by some solid material.
    B. A compartment nearly filled from deck to overhead, with nearly every cubic foot of the compartment occupied by flooding water, the remainder by the trapped air on the bottom.
    C. A compartment completely filled from deck to overhead, with every cubic foot of the compartment occupied by flooding water.
    D. A compartment nearly filled from deck to overhead, with nearly every cubic foot of the compartment occupied by flooding water, the remainder by the trapped air on top.

    Correct answer: C

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

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

    Correct answer: A

28. The carbon seal ring of a refrigeration compressor crankshaft mechanical seal is held in position against the stationary ring face by using what device?

    A. woodruff key
    B. spring
    C. thrust washer
    D. snap ring

    Correct answer: B

29. 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

30. 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

31. There are three pieces of information that should be included in delivering a message via a sound-powered telephone. Which of the following represents the proper sequence of information delivery?

    A. First: give the name of the calling station. Second: give the name of the station being called. Third: state the message.
    B. First: state the message. Second: give the name of the calling station. Third: give the name of the station being called.
    C. First: state the message. Second: give the name of the station being called. Third: give the name of the calling station.
    D. First: give the name of the station being called. Second: give the name of the calling station. Third: state the message.

    Correct answer: D

32. Which of the following methods will reduce the possibility of producing an electrical spark?

    A. Using a cargo hose with a built-in electrical bonding wire
    B. Placing an insulating flange or a section of non-conducting hose in the hose setup
    C. Connecting a bonding wire between the shoreside piping and the vessel
    D. All of the above

    Correct answer: D

33. If the refrigeration compressor crankcase is sweating or frosting and is operating with an unusual noise, what is most likely the cause?

    A. liquid refrigerant returning to the compressor
    B. the compressor short-cycling on the high-pressure cut-out
    C. the compressor running continuously
    D. a shortage of refrigerant

    Correct answer: A

34. 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

35. A tourniquet should be used to control bleeding only _____.

    A. to prevent bleeding from minor wounds
    B. when all other means have failed
    C. with puncture wounds
    D. when the victim is unconscious

    Correct answer: B

36. How does a refrigeration solenoid valve differ from a modulating valve?

    A. Solenoid valves are only used in low voltage refrigeration control systems, while modulation valves are used in high voltage applications.
    B. Both valves operate in exactly the same manner, only the manufacturer's terminology is the differentiating factor.
    C. A solenoid valve can only be installed in liquid lines.
    D. A liquid line solenoid valve is either completely opened or closed, whereas a modulation valve is infinitely positioned according to the strength of the applied electrical signal.

    Correct answer: D

37. The device shown in the illustration is a/an _____. Illustration GS-0116

    A. vane type steering gear
    B. mechanical shaft seal
    C. oil scraper ring stuffing box for a crosshead engine
    D. diesel engine motor mount

    Correct answer: A

38. With regard to the number of passes through the tubes of shell-and-tube heat exchangers, what statement is true?

    A. In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.
    B. In two-pass and four-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.
    C. In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at the same end.
    D. In single-pass and two-pass heat exchangers, the inlet and outlet tube-side fluid connections are at opposite ends.

    Correct answer: A

39. 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. Moisture separator
    B. Vacuum breaker
    C. P-I converter
    D. Lubricator

    Correct answer: A

40. Which of the following shoring materials is used to tightly make up the difference in length of a shore cut slightly shorter than the measured distance for required length and must be frequently checked for tightness?

    A. Shole
    B. Strongback
    C. Wedge
    D. Beam

    Correct answer: C

41. If you see an individual fall overboard, you should _____.

    A. throw a life ring overboard
    B. pass the word to the bridge
    C. hail "Man Overboard"
    D. all of the above

    Correct answer: D

42. Refrigerant entering the compressor of a refrigeration system should be in which of the following conditions?

    A. Low-pressure vapor
    B. Low-pressure liquid
    C. High-pressure liquid
    D. High-pressure vapor

    Correct answer: A

43. 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. Red
    D. Orange

    Correct answer: C

44. If you find a refrigerant leak while using a halide torch, what will happen to the flame as the exploring tube approaches the leak?

    A. it will change from blue to orange
    B. it will change from green to blue
    C. it will change from blue to green
    D. it will stay blue

    Correct answer: C

45. A file coated with oil and stowed away will _____.

    A. cause the file to overheat
    B. cause the file to slide across the work and prevent fast, clean cutting
    C. cause dust and metal particles to collect in the teeth
    D. both B and C are correct

    Correct answer: D

46. Moisture entering a typical refrigeration system will most likely produce what effect?

    A. boil in the condenser
    B. be removed by the liquid line strainers
    C. cause sweating and frost on the evaporator coils
    D. freeze in the expansion valve

    Correct answer: D

47. 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. Secure the system, disassemble and de-ice the thermostatic expansion valve.
    B. Purge the entire system to the atmosphere, replace the drier cartridge, and recharge the system with refrigerant.
    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

48. 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 outlet of the compressor
    B. to the line connected to the evaporator inlet
    C. to the inlet of the compressor
    D. to the line connected to the evaporator outlet

    Correct answer: D

49. Which of the following substances is normally classified as a low-pressure refrigerant?

    A. R-12
    B. R-22
    C. R-123
    D. R-134A

    Correct answer: C

50. Which of the following descriptions should be included when identifying the length for pipe nipples?

    A. Close, short, long, and tank
    B. Fully threaded, half threaded, long, and short
    C. Standard, extra-strong, double extra-strong, and schedule 80
    D. Cast, wrought, stainless, and brass

    Correct answer: A

51. For most multi-box refrigeration systems, the refrigerant sight glass would be located where in the system?

    A. before the compressor in the suction line
    B. after the condenser in the drain line to the receiver
    C. after the compressor in the discharge line
    D. after the receiver in the liquid line

    Correct answer: D

52. When securing the operation of an inert gas system, the final step should be _____.

    A. secure the saltwater supply to the scrubber
    B. close the flue gas isolating valve
    C. close the deck isolating valve
    D. secure the inert gas blower

    Correct answer: A

53. What statement is true concerning the effect of elevating the temperature of the oily-water mixture associated with an oily-water separator?

    A. Heating the oily-water mixture decreases the viscosity of the oil and decreases the specific gravity differential between the oil and water.
    B. Heating the oily-water mixture decreases the viscosity of the oil and increases the specific gravity differential between the oil and water.
    C. Heating the oily-water mixture increases the viscosity of the oil and decreases the specific gravity differential between the oil and water.
    D. Heating the oily-water mixture increases the viscosity of the oil and increases the specific gravity differential between the oil and water.

    Correct answer: B

54. Excessively tight drive belts installed between a motor and a refrigeration compressor pulley may cause what condition?

    A. premature wear of the pulley end motor shaft bearing, but normal wear of the pulley end compressor crankshaft main bearing
    B. premature wear of both the pulley end motor shaft bearing and the pulley end compressor crankshaft main bearing due to overloading
    C. premature wear of both motor shaft bearings and both compressor crankshaft main bearings due to belt slippage
    D. normal wear of the pulley end motor shaft bearing, but premature wear of the pulley end compressor crankshaft main bearing

    Correct answer: B

55. Which pair of the illustrated service gauge manifold sets would require switching hoses when transitioning from a dehydration evacuation to refrigerant charging? Illustration RA-0030

    A. A and B
    B. B and D
    C. C and D
    D. D and A

    Correct answer: B

56. R-134a is often the replacement for which older type of refrigerant?

    A. R-12
    B. R-22
    C. R-11
    D. R-123

    Correct answer: A

57. During normal operation, traditionally, how is most of the refrigerant released to the atmosphere from low-pressure systems?

    A. through the compressor shaft seal
    B. through a leaking rupture disk
    C. through the purge unit vent
    D. through water-side system leaks

    Correct answer: C

58. In a refrigeration system that is not protected by a water failure switch, if the cooling water to the condenser fails, what will be the result for protective purposes?

    A. the box temperature solenoid valve will close initiating a pumpdown
    B. the king valve will open
    C. the expansion valve will close due to high superheat
    D. the compressor will shut down by the action of the high-pressure cut-out switch

    Correct answer: D

59. The principle personnel hazard unique to Halon fire extinguishers is _____.

    A. inhaling toxic vapors produced when exposed directly to a flame for extended periods
    B. eye irritation produced immediately after discharge from cylinder
    C. displacement of oxygen
    D. skin irritation

    Correct answer: A

60. What is the physical state and pressure condition of refrigerant as it leaves a receiver in a typical refrigeration system?

    A. high-pressure liquid
    B. low-pressure liquid
    C. high-pressure vapor
    D. low-pressure vapor

    Correct answer: A

61. An air-cooled refrigerated container unit using R-134a as a refrigerant has a box temperature setpoint of -15°F, but it is currently operating with a stable return air temperature of 0°F. The fresh air makeup vent is closed, the unit is operating at 460 VAC/60 Hz, and the unit is in full capacity cool (modulating valve 100% open). Using the illustrated troubleshooting guide, what would be the normal range of expected discharge pressures if the ambient air temperature is 90°F? Illustration RA-0052

    A. 150-190 psig
    B. 160-180 psig
    C. 190-230 psig
    D. 200-220 psig

    Correct answer: A

62. Which of the instruments listed is used to measure the gauge of a piece of sheet metal?

    A. Circular mil
    B. Wire gauge
    C. Gauge calibrator
    D. Inside micrometer

    Correct answer: B

63. During fueling operations oil is detected in the water adjacent to your vessel. If, however, it is determined to be from some source other than your vessel, you should _____.

    A. secure operations until the exact type of oil is determined
    B. make an entry in the Oil Record Book to that effect
    C. notify the Coast Guard
    D. all of the above

    Correct answer: C

64. If the superheat setting of a thermostatic expansion valve is set too low, what would be the result, assuming that the system has a single evaporator?

    A. the suction line will be abnormally cold and liquid may flood back to the compressor
    B. the receiver level will be abnormally high due to a reduced amount of refrigerant returning back to the compressor
    C. the suction line will be abnormally warm due to a reduced amount of refrigerant returning back to the compressor
    D. the box temperature will be pulled way down below the normal temperature range

    Correct answer: A

65. If a condenser coil of an air-cooled container refrigeration system becomes dirty and requires cleaning, what would be an acceptable method of cleaning?

    A. "Binks" gun with weak acid solvent
    B. high-pressure water wash
    C. copper wire rotary brush
    D. all of the above

    Correct answer: B

66. Which of the following procedures reduces the possibility of an interior ventilation duct fire from rapidly spreading?

    A. Keeping the duct interior clean
    B. Keeping the duct exterior clean
    C. Having a fire hose charged at each duct opening
    D. Having a portable CO_2 ready at each duct opening

    Correct answer: A

67. When a rescuer discovers an electrical burn victim in the vicinity of electrical equipment or wiring, his first step is to _____.

    A. remove the patient from the vicinity of the live electrical equipment or wiring
    B. shutdown electrical power in the area
    C. flush water over any burned area of the patient
    D. apply ointment to the burned areas on the patient

    Correct answer: B

68. Some "hot gas" defrost systems reheat the refrigerant just prior to its returning to the compressor for what purpose?

    A. to improve the efficiency of the expansion valve
    B. to prevent the damaging effects of liquid slugging
    C. to prevent chill shocking the compressor suction valves
    D. to increase the circulation of liquid refrigerant

    Correct answer: B

69. In order for the automatic lifeboat drain to operate properly _____.

    A. the cap should be removed to drain the boat when it is waterborne
    B. the cage must be free of rubbish or the ball may not seat properly
    C. there is an automatic ball check located in a siphon tube
    D. the small lever to release the rubber ball float must be turned counter-clockwise

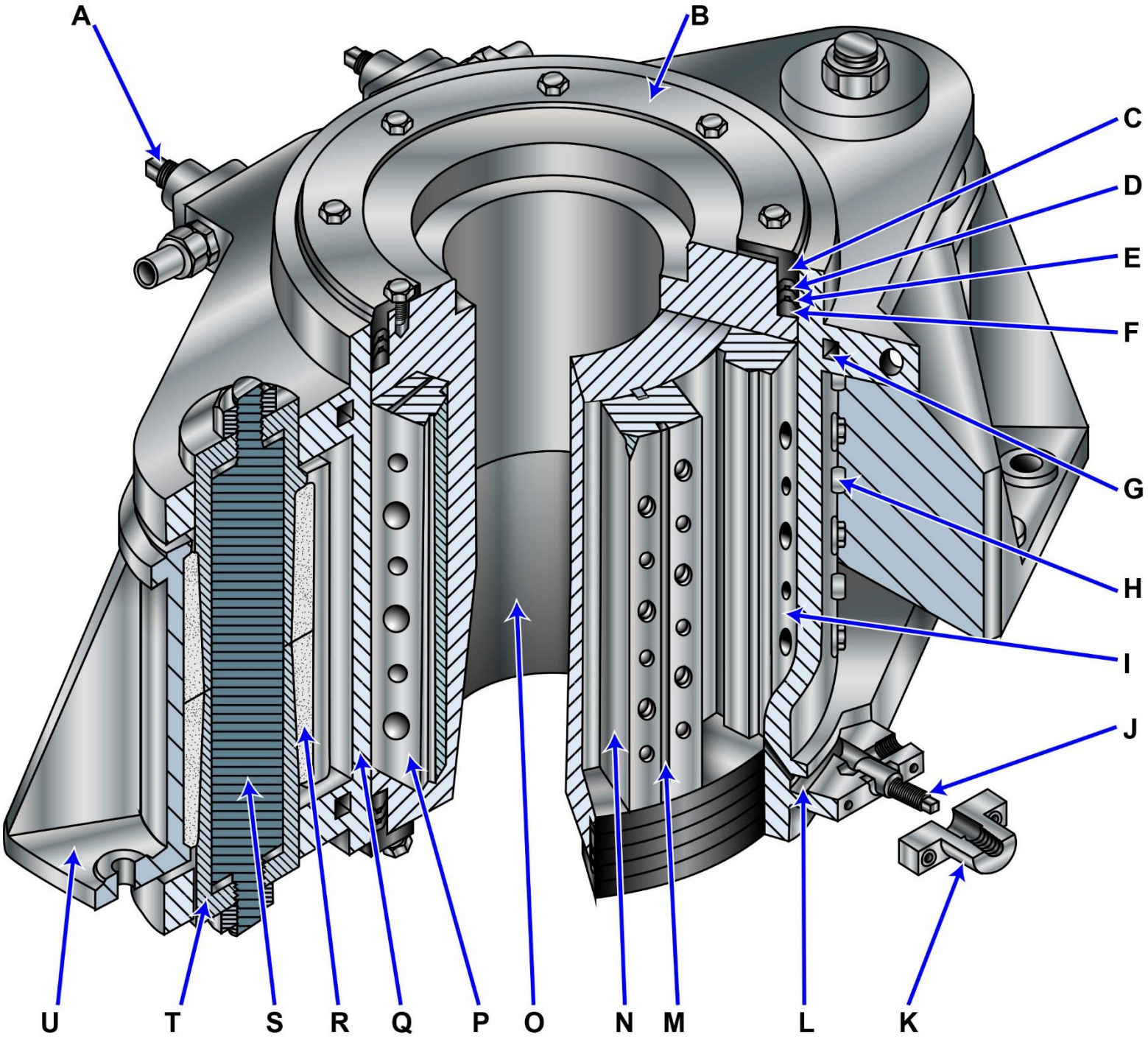
    Correct answer: B

70. In an air conditioning system, moisture is removed from the air by what means?

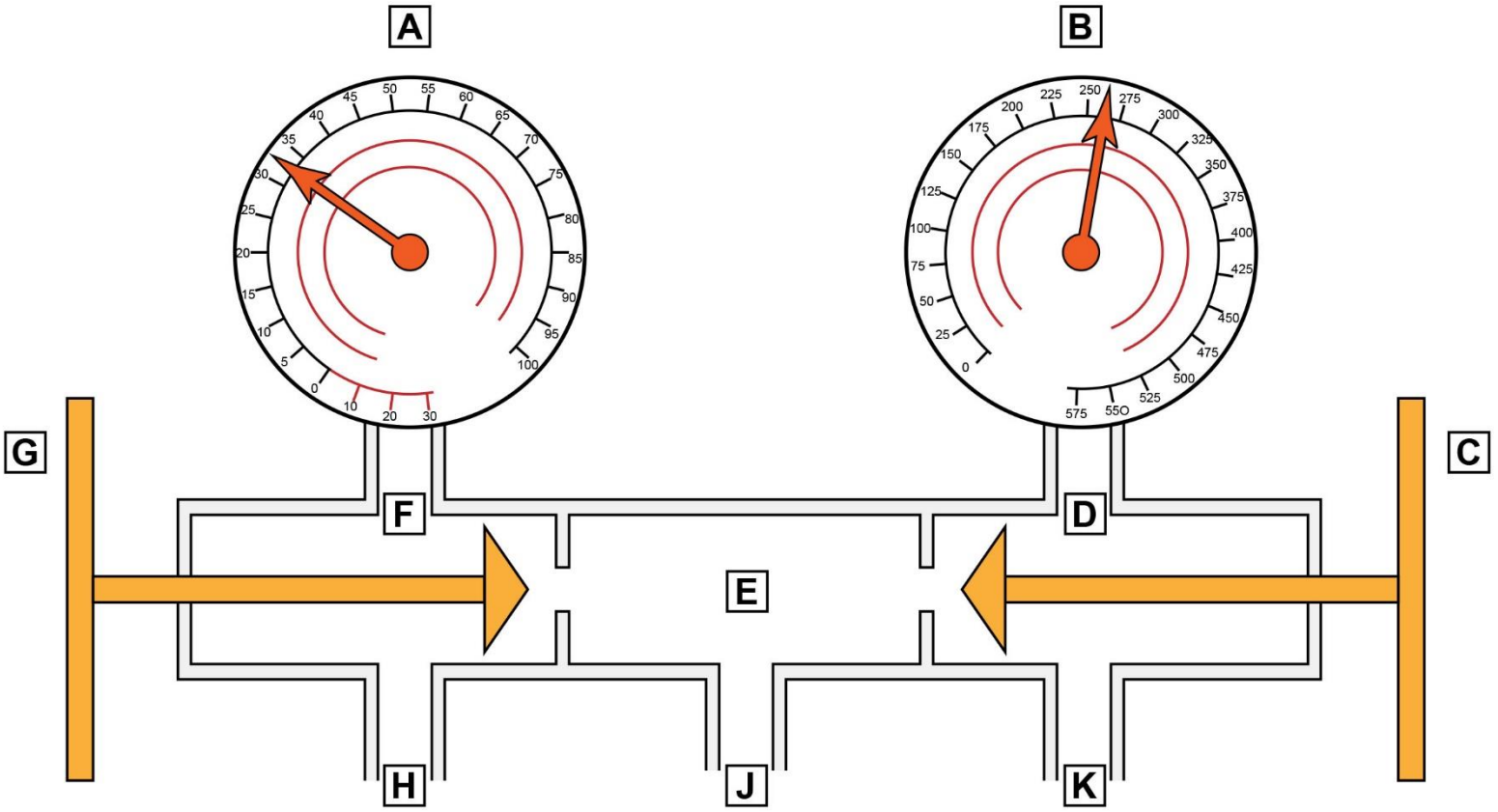
    A. dehumidification by cooling coils
    B. mechanical filtration by duct filters
    C. gravity separation by ducted moisture traps
    D. chemical absorption by moisture separators

    Correct answer: A

GS-0116



RA-0001



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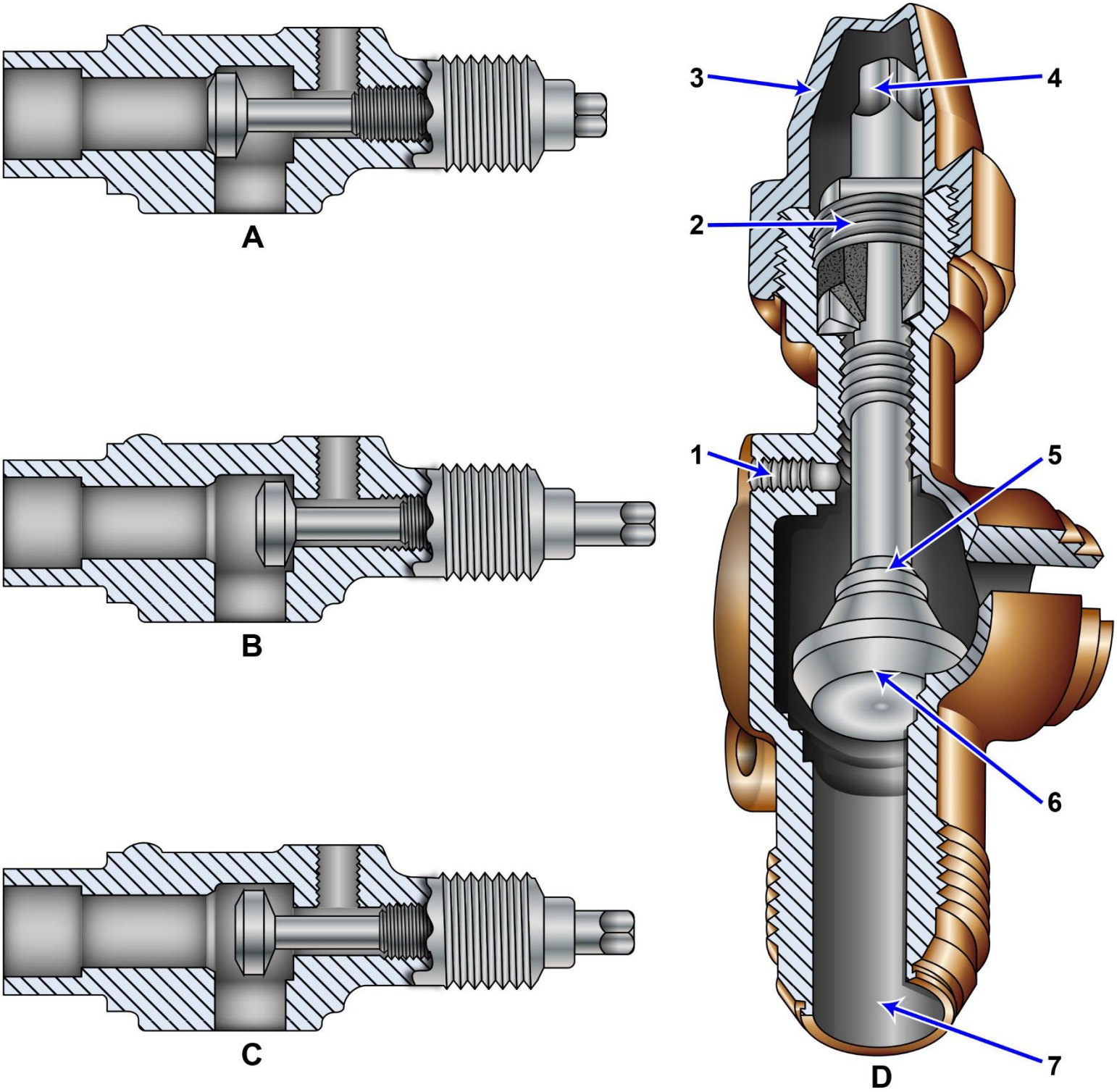
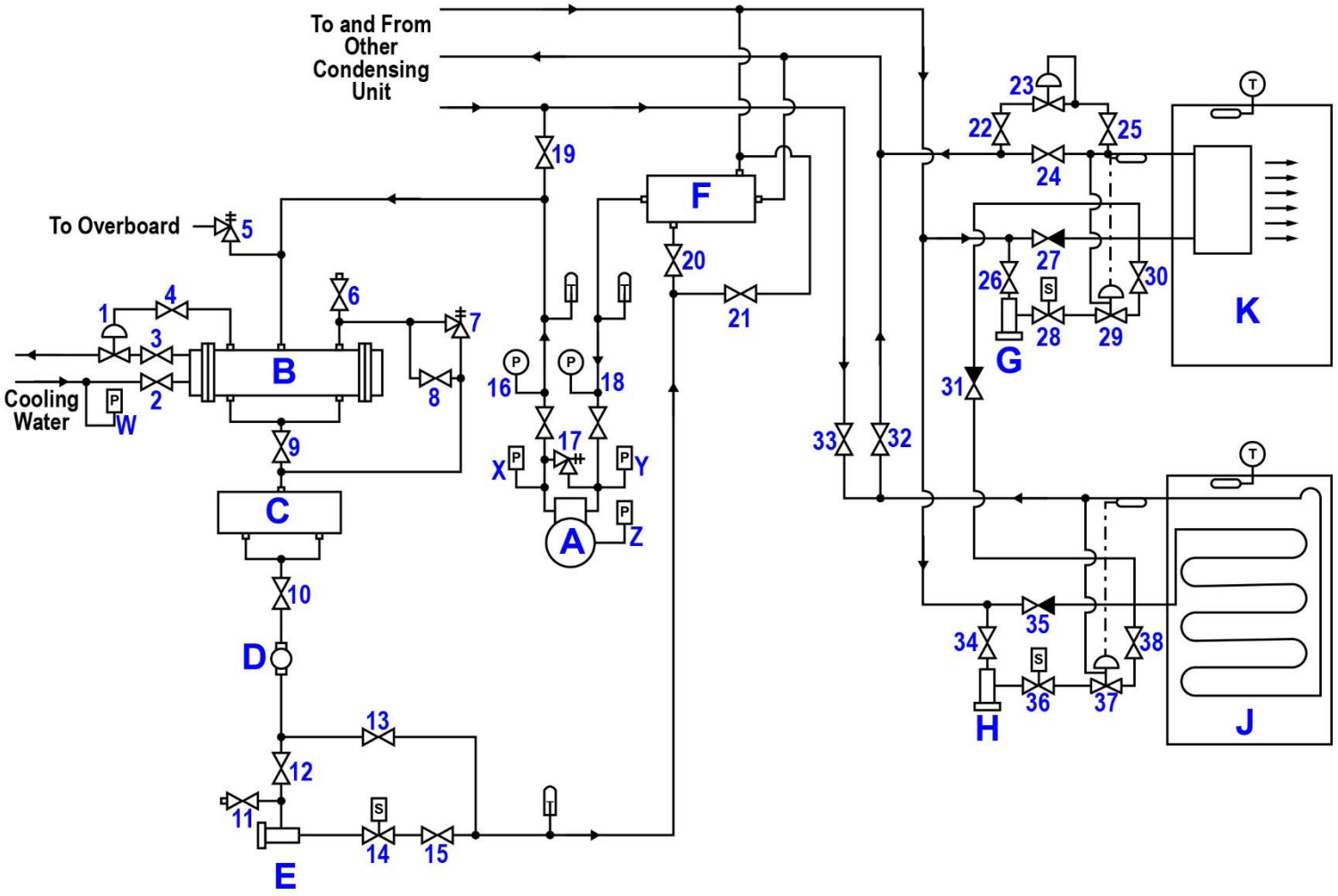
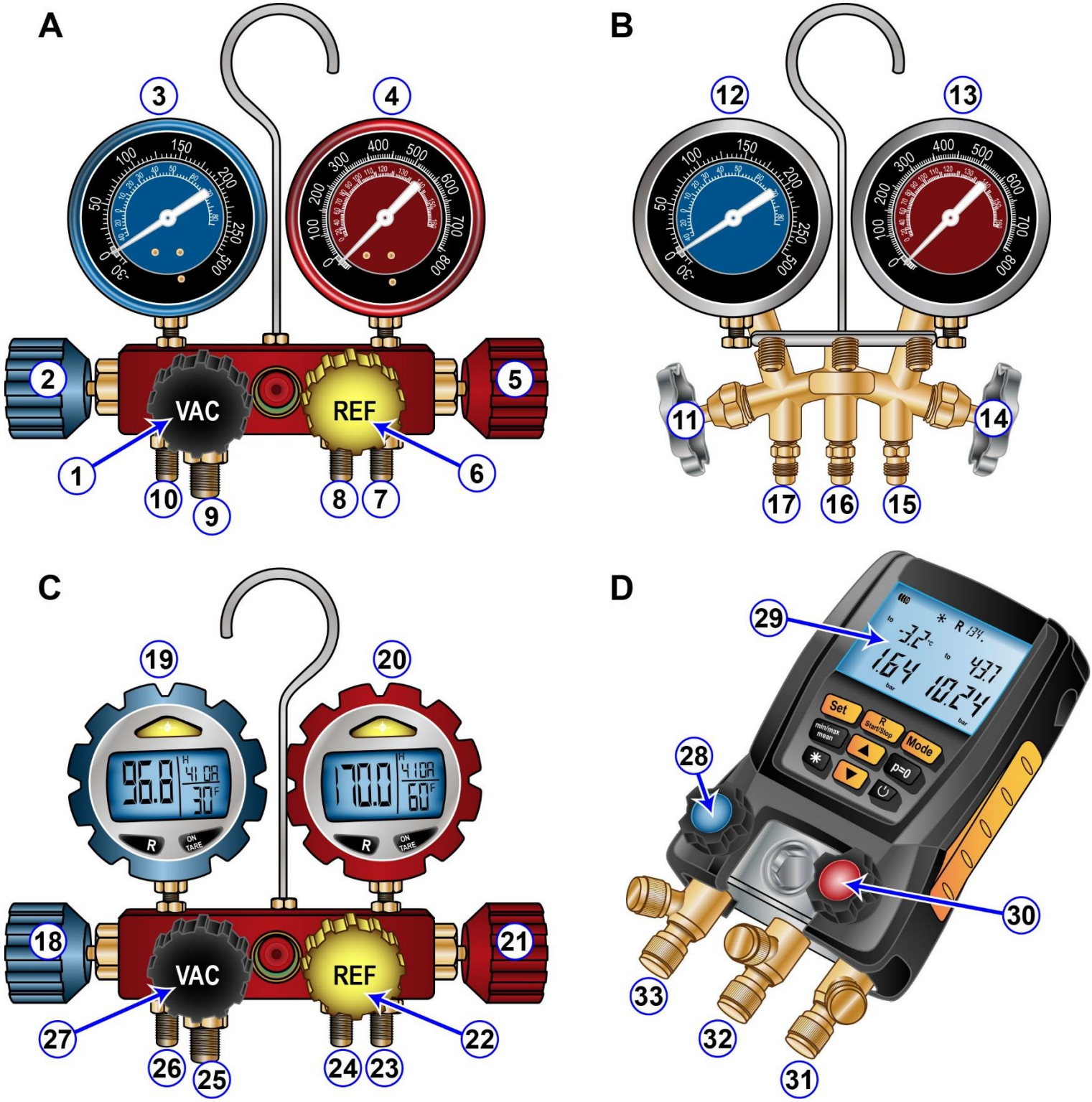


RA-0012

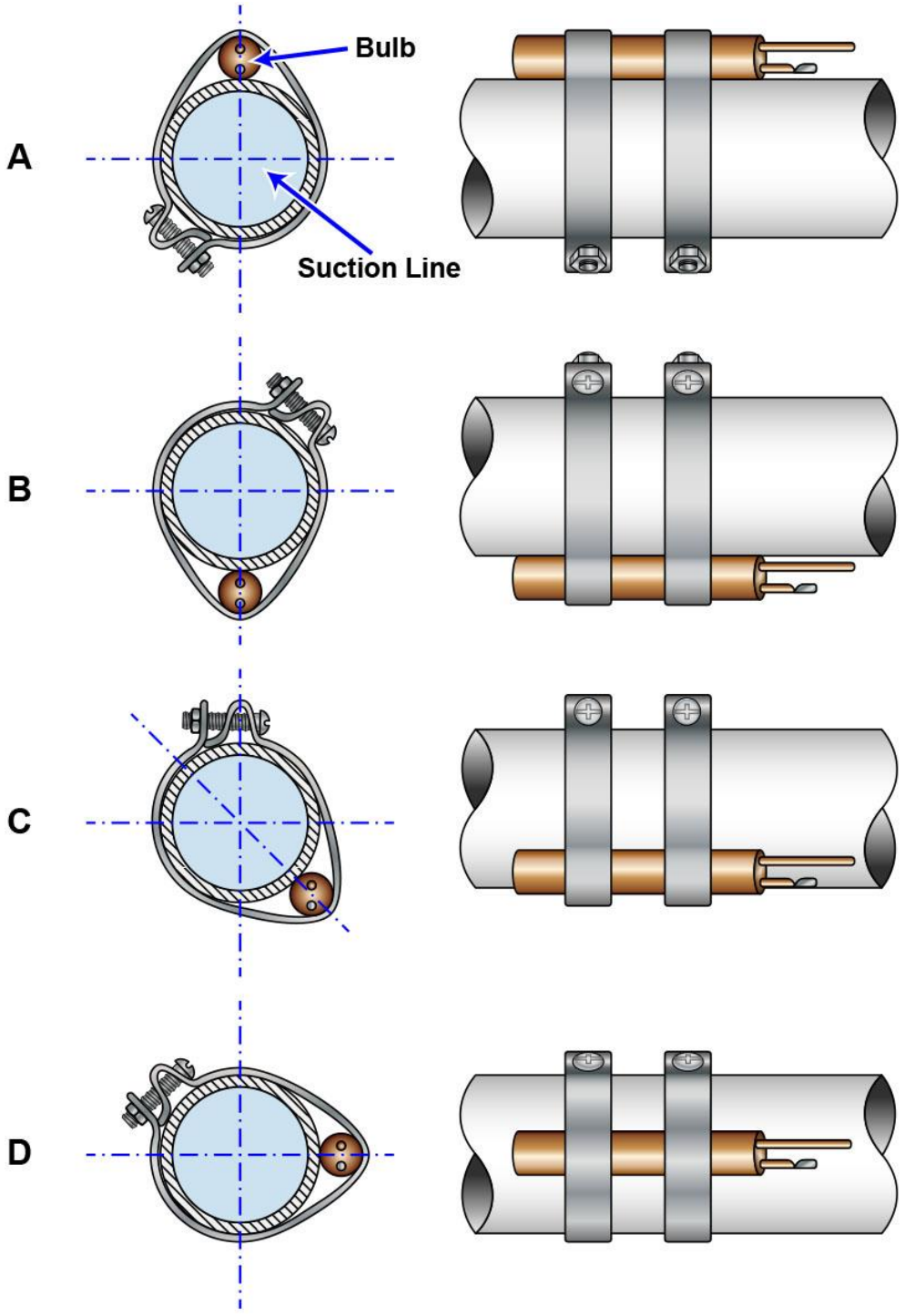


RA-0030



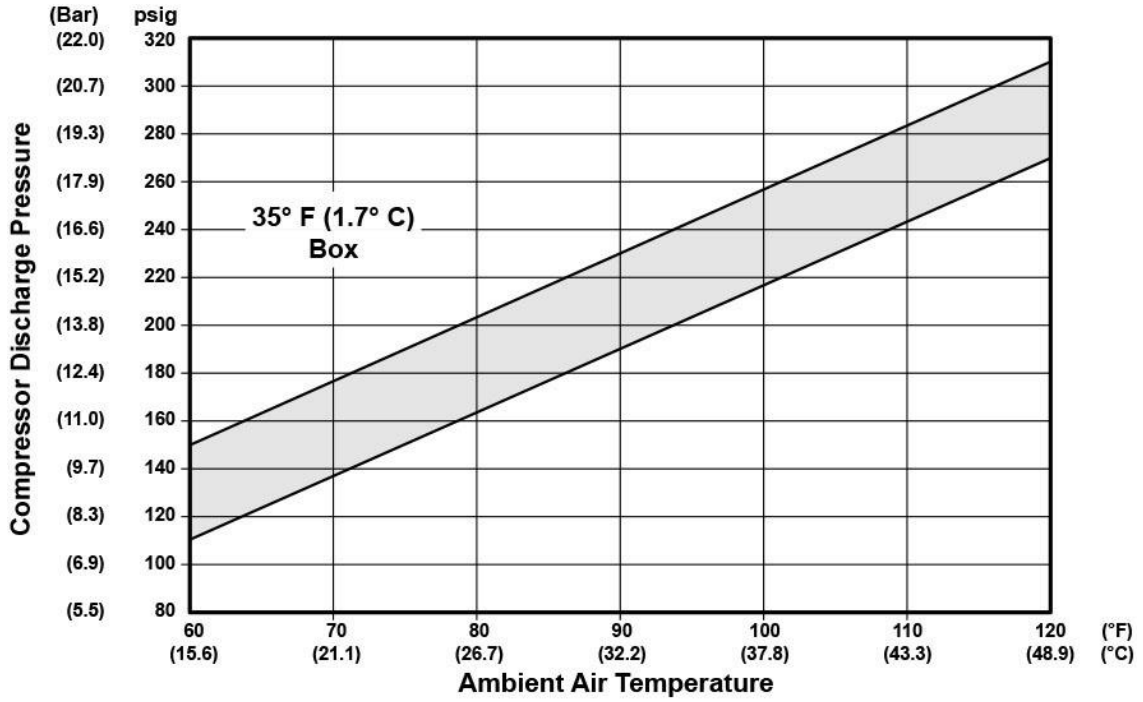
RA-0050

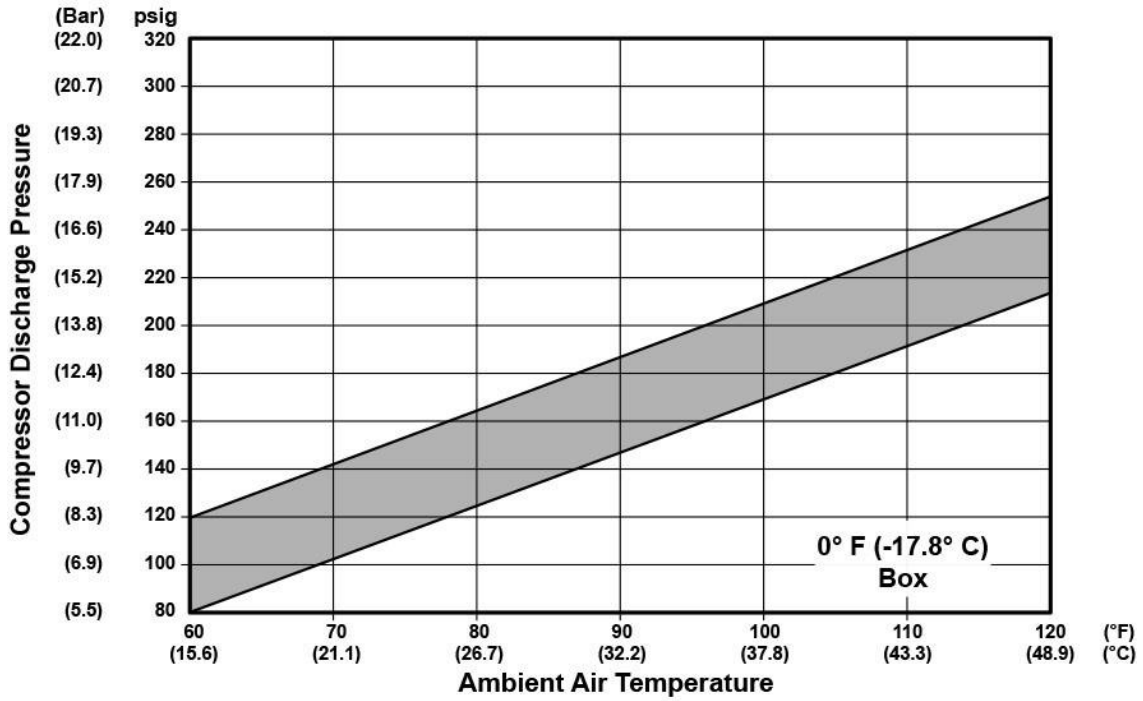
TXV Feeler Bulb on Small Suction Line (7/8" and larger)



RA-0052

Note: Curves to be used as a troubleshooting guide only for model series 69NT40 with fresh air makeup vent closed with unit powered on 460 VAC/60Hz and the suction modulating valve 100% open.





RA-0064