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EPA 608

Universal Practice Test

Test 4

100 Questions • 25 per section

Universal: Core, Type I, Type II and Type III • Original practice questions

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How to Use This Material

This test has 100 questions in the four sections of the Universal exam: Core, Type I, Type II and Type III, 25 questions each. Answer each question on your own first, choosing the single BEST answer. Each section is scored separately, and you need 18 of 25 (70%) to pass a section. Your certifying organization sets the time limit on exam day, so practice at a steady pace: about 30 minutes per section, or 2 hours for all 100 questions. Then check your work against the separate answer key, fill in the score sheet at the end of the key, and read every explanation, including for the questions you got right, because the reasoning is what transfers to new questions on exam day.

EPA 608 Universal Practice Test 4

100 questions • 4 sections of 25 • Answer key and explanations in the separate Answer Key file
Choose the single BEST answer for each question. Passing is 18 of 25 (70%) in each section. Suggested practice pace: about 30 minutes per section.

Section 1: Core Questions 1-25

1. What is temperature glide?

- **A.** The change in boiling point when a system is moved to a higher altitude
- **B.** The range of temperatures over which a zeotrope boils or condenses at constant pressure
- **C.** The drop in liquid temperature below saturation in the condenser
- **D.** The rise in suction temperature after all liquid has boiled off

2. A technician recovers refrigerant to dispose of a 20 lb R-410A packaged unit. What recordkeeping applies?

- **A.** Disposal records for appliances over 5 and under 50 lb, kept 3 years
- **B.** None; HFC appliances need no disposal records
- **C.** Leak-rate records kept by the owner for 3 years
- **D.** Disposal records, but only if the unit holds an ozone-depleting refrigerant

3. Breathing high concentrations of refrigerant vapor can cause which effect on the body?

- **A.** Heart irregularities, unconsciousness and death
- **B.** Frostbite of the airways and lungs only
- **C.** Allergic skin reactions with no other effects
- **D.** Delayed kidney damage only

4. A technician's older gauge set and hoses are rated for R-22 pressures only. He is sent to an R-32 heat pump. What is the concern?

- **A.** R-32 runs about 1.7 times R-22 pressure, so the set may not be rated for it
- **B.** R-32 attacks the hose material used for R-22, so the hoses will leak
- **C.** R-32 requires microns instead of psig on every gauge
- **D.** R-32 runs at lower pressure than R-22, so the gauges will read inaccurately

5. On an inches-of-mercury vacuum scale, about what reading represents a perfect vacuum?

- **A.** 14.7 in. Hg
- **B.** 29.92 in. Hg
- **C.** 0 in. Hg
- **D.** 760 in. Hg

6. A technician wants to top off an R-410A compressor with mineral oil left over from R-22 jobs. What is the correct response?

- **A.** Mineral oil is fine if it is mixed with PAG first
- **B.** Mineral oil is fine because R-410A is an HFC blend
- **C.** Mineral oil is fine if a new filter-drier is installed
- **D.** Use the oil the compressor manufacturer specifies, which is POE

7. Four low-pressure chiller refrigerants are R-11, R-123, R-1233zd(E) and R-514A. Which one is a CFC?

- **A.** R-1233zd(E)
- **B.** R-11
- **C.** R-514A
- **D.** R-123

8. An A2L refrigerant leaks into a room. What two conditions must occur together for it to ignite?

- **A.** Concentration above its OEL and a room air temperature above 104°F
- **B.** A pressure above 0 psig and an electrical spark
- **C.** Concentration at or above its LFL and a competent ignition source
- **D.** A burning velocity above 10 cm/s and an open flame

9. A junkyard is about to crush cars with intact AC systems. Which rule governs the refrigerant in those cars?

- **A.** No federal rule, because junked cars are not considered appliances
- **B.** Section 609 only, because cars are not stationary appliances
- **C.** Section 608 leak repair, because cars are MVACs
- **D.** Section 608 safe disposal, though MVAC service is Section 609

10. Why can a recovery machine with a hermetic compressor overheat when it pulls a deep vacuum?

- **A.** It relies on refrigerant flow through it for cooling
- **B.** Its high-pressure cutout is bypassed in a deep vacuum
- **C.** Its oil boils away under deep vacuum and starves the bearings
- **D.** Its filter-drier releases heat as it dries

11. Which of these refrigerants has the lowest GWP?

- **A.** R-407C
- **B.** R-22
- **C.** R-123
- **D.** R-134a

12. During a standing vacuum (decay) test, the micron gauge stays near 400 microns for 15 minutes after the pump is isolated. What does this show?

- **A.** The system is tight and dry
- **B.** The gauge is reading the pump
- **C.** Moisture is still boiling off
- **D.** The system has a small leak

13. On a hot summer afternoon a city issues a ground-level ozone (smog) alert. What formed that ozone?

- **A.** Nitrogen oxides and VOCs reacting in sunlight
- **B.** Stratospheric ozone sinking to street level
- **C.** Leaked HFC refrigerant breaking down in strong sunlight
- **D.** CFC refrigerant leaking from local equipment

14. A technician's arithmetic gives a superheat of −8°F on a running system. What most likely happened?

- **A.** The terms were subtracted in reverse order
- **B.** The refrigerant is a zeotrope with an 8°F glide
- **C.** The suction line is 8°F colder than the condenser
- **D.** The evaporator outlet holds 8°F of subcooled liquid

15. Which one of these releases is legal under Section 608?

- **A.** R-32 from a window AC
- **B.** R-600a from a household freezer
- **C.** R-1234yf from a chiller
- **D.** R-290 from a split-system AC

16. Both CFCs and HCFCs contain chlorine. Why do HCFCs have much lower ODP values?

- **A.** They release bromine instead of chlorine
- **B.** Their chlorine does not react with ozone
- **C.** Their extra fluorine neutralizes most of the chlorine
- **D.** Less of their chlorine reaches the stratosphere

17. On a running system, where can a gauge pressure be converted to a valid saturation temperature?

- **A.** In the discharge line, where the vapor is hottest
- **B.** In the evaporator or condenser, where liquid and vapor coexist
- **C.** In the suction line, where the vapor is superheated
- **D.** In the liquid line, where the liquid is subcooled below saturation

18. A farm tractor's cab AC is an open-drive system holding 3 lb of R-134a. Which certification lets a technician service it?

- **A.** Type III only
- **B.** Type II or Section 609
- **C.** Type I only
- **D.** No certification is needed

19. What is the net result of the chlorine catalytic cycle once both steps are added together?

- **A.** Cl + O3 becomes ClO + O2
- **B.** O + O3 becomes 2 O2
- **C.** ClO + O2 becomes Cl + O3
- **D.** 2 O2 becomes O + O3

20. Which buyer may purchase restricted refrigerant without holding technician certification?

- **A.** A property manager
- **B.** A scrap metal recycler
- **C.** An HVAC sales representative
- **D.** An appliance manufacturer

21. A technician wants to start liquid recovery on a split system with a receiver. Where in the cycle does liquid refrigerant collect?

- **A.** Receiver, condenser outlet and liquid line
- **B.** Discharge line leaving the compressor
- **C.** Compressor inlet and suction line
- **D.** Discharge line and condenser inlet header

22. Which part of Section 608 is the basis for the safe-disposal rules?

- **A.** 608(b)
- **B.** 609
- **C.** 608(c)
- **D.** 608(a)

23. A recovery cylinder's capacity for the refrigerant being recovered is 50 lb by weight, and its tare weight is 30 lb. Using the industry 80% fill limit, what is the most the scale should read?

- **A.** 64 lb
- **B.** 70 lb
- **C.** 40 lb
- **D.** 80 lb

24. What is the leak rate threshold for commercial refrigeration appliances under §82.157?

- **A.** 20%
- **B.** 35%
- **C.** 30%
- **D.** 10%

25. The rule allowing recovered refrigerant to go back into another appliance of the same owner does not apply to which appliances?

- **A.** Small appliances
- **B.** Industrial process refrigeration
- **C.** Low-pressure centrifugal chillers
- **D.** MVAC and MVAC-like appliances

Section 2: Type I: Small Appliances Questions 26-50

26. In what condition should a recovery bag be before it is connected?

- **A.** Holding the same refrigerant
- **B.** Filled with air at 0 psig
- **C.** Partly filled with nitrogen
- **D.** Empty and evacuated

27. Why is a ductless mini-split holding 2 lb of refrigerant not a small appliance?

- **A.** It uses a high-pressure refrigerant such as R-410A
- **B.** Its line set is connected in the field, so it is not factory sealed
- **C.** It has a hermetic compressor instead of an open one
- **D.** Its charge is too large to meet the small-appliance definition's limit

28. Why must compressor oil be able to mix with the refrigerant?

- **A.** So the PT chart reading stays accurate in the condenser
- **B.** So the oil can absorb moisture out of the refrigerant
- **C.** So oil carried into the system returns to the compressor
- **D.** So the refrigerant's boiling point drops in the evaporator

29. Which charge limit do EPA's use conditions set for R-441A in portable room air conditioners?

- **A.** 150 g
- **B.** 300 g
- **C.** 330 g
- **D.** 1,000 g

30. A self-contained ultra-low freezer in a hospital lab was factory sealed with 1.5 lb of refrigerant. How is it classified?

- **A.** As very high-pressure equipment under Type II
- **B.** As a small appliance (medical research refrigeration)
- **C.** As exempt equipment because it serves a hospital
- **D.** As Type II equipment because it is not a household unit

31. A dead-compressor refrigerator is being recovered with system-dependent equipment. Where is the low-side access fitting usually installed?

- **A.** On the condenser fan bracket
- **B.** On the capillary tube near the evaporator
- **C.** On the process stub at the compressor
- **D.** On the discharge line inside the compressor

32. Which statement about the 5 lb and 15 lb figures is correct?

- **A.** Both figures limit where system-dependent equipment may be used
- **B.** 5 lb defines a small appliance; 15 lb limits system-dependent equipment
- **C.** Both figures define which appliances need Type I certification
- **D.** 5 lb limits system-dependent equipment; 15 lb defines a small appliance

33. The low side of a running R-134a drinking water cooler reads 35 psig. What is the evaporator saturation temperature?

- **A.** About 0°F
- **B.** About 20°F
- **C.** About 40°F
- **D.** About 70°F

34. A technician will open a household refrigerator charged with R-600a. What should be done before starting?

- **A.** Ventilate the area and remove ignition sources
- **B.** Chill the compressor so the oil releases the R-600a
- **C.** Close the room so vapor cannot spread to other areas
- **D.** Run the compressor to pump the R-600a into the condenser

35. Which order is correct when using a piercing valve for recovery?

- **A.** Check pressure, clamp, recover, pierce, leak-test
- **B.** Pierce, leak-test, clamp, recover, check pressure
- **C.** Clamp, pierce and back out the stem, leak-test, check pressure, recover
- **D.** Clamp, recover, leak-test, pierce, back out the stem

36. A running R-600a freezer has an evaporator near 0°F, and the low-side gauge reads about 6 in. Hg vacuum. What does this reading indicate?

- **A.** Normal operation; R-600a saturates in a vacuum near 0°F
- **B.** Air has entered the low side through a leak in the evaporator
- **C.** The charge has leaked out, since any vacuum means it is empty
- **D.** The compressor valves have failed and cannot build pressure

37. Type I certification covers which equipment?

- **A.** Low-pressure appliances
- **B.** Motor vehicle air conditioners
- **C.** Small appliances
- **D.** High-pressure split systems

38. A technician holding only Type I certification is asked to recover refrigerant from a 10 lb R-410A split system. May the technician do the job?

- **A.** Yes; Type I covers up to 50 lb
- **B.** Yes; the charge is under 15 lb
- **C.** No; it requires Universal only
- **D.** No; a split system requires Type II

39. Who may recover the refrigerant from a small appliance before it reaches the final processor?

- **A.** Only an EPA-certified reclaimer, at its reclamation facility
- **B.** Anyone in the chain, using certified equipment
- **C.** Only the appliance manufacturer, using its own recovery equipment
- **D.** Only the final processor, using equipment on its own site

40. A factory-sealed reach-in freezer holds 7 lb of R-404A. A technician recovers with a machine made in 2018. What recovery level applies?

- **A.** 90% of the charge, because the compressor runs
- **B.** 4 in. Hg vacuum under the small-appliance rule for factory units
- **C.** 0 in. Hg vacuum under Table 1 (high-pressure, under 200 lb)
- **D.** 80% of the charge with any certified equipment

41. A Type I technician is called to recover refrigerant from a 3 lb R-32 ductless mini-split. Which statement is correct?

- **A.** Type I suffices; recover 90% or 4 in. Hg
- **B.** Type I suffices; recover 80% of the charge
- **C.** Type II is required, and the level is 10 in. Hg
- **D.** Type II is required, and the level is 0 in. Hg

42. A scrap yard receives an R-290 vending machine. Under Section 608, which statement is correct?

- **A.** A signed statement with the recoverer's name, address and date is required
- **B.** The yard must keep a 3-year record of the propane that was released
- **C.** The disposal rule does not apply, because R-290 is exempt in this end-use
- **D.** The yard must recover 80% using system-dependent recovery equipment

43. An R-600a refrigerator's compressor will not start, and the electrical parts look damaged. The owner suggests a hard-start kit to run the compressor during recovery. What should the technician do?

- **A.** Use the hard-start kit so that the higher 90% recovery level can be reached
- **B.** Run the compressor briefly, for under one minute, to push out vapor
- **C.** Run the compressor only after the room has been ventilated
- **D.** Leave it off and use the both-sides method for a non-running compressor

44. Which of these appliances must have its leak rate calculated each time refrigerant is added?

- **A.** A 4 lb R-22 window air conditioner
- **B.** A 5 lb R-12 chest freezer
- **C.** An 80 lb R-404A supermarket walk-in system
- **D.** An 80 lb R-22 supermarket walk-in system

45. Before recovering from an appliance with an unfamiliar refrigerant, where should a technician look for its hazards, exposure limits and required PPE?

- **A.** The recovery machine's certification label
- **B.** The cylinder's DOT specification stamp
- **C.** The refrigerant's safety data sheet (SDS)
- **D.** The appliance's wiring diagram

46. A refrigerator holds 10 oz and its compressor runs. The recovery device was made in 1992. What is the least amount that satisfies the rule by percentage?

- **A.** 9 oz
- **B.** 7 oz
- **C.** 9.5 oz
- **D.** 8 oz

47. A technician connects a vacuum pump directly to a refrigerator still holding R-134a, with no recovery container. What is the result?

- **A.** The refrigerant is held in the pump's housing
- **B.** The refrigerant is vented through the pump exhaust
- **C.** The refrigerant is captured in the pump's oil
- **D.** The refrigerant is recycled for the same owner

48. Solderless piercing valves are made for use on which tubing materials?

- **A.** Aluminum or steel
- **B.** Steel or stainless steel
- **C.** Copper or aluminum
- **D.** Copper or plastic

49. Right after a piercing valve is installed on a dehumidifier, the hose gauge shows 0 psig. What does this tell the technician?

- **A.** The gauge needs to be recalibrated and zeroed before recovery starts
- **B.** The appliance is ready to open without recovery
- **C.** The charge has leaked out or the pin did not pierce the tube
- **D.** The appliance holds R-600a and is operating normally

50. A refrigerator's compressor runs. The technician installs a high-side piercing valve and connects an evacuated recovery bag. What moves the refrigerant into the bag?

- **A.** A vacuum pump drawing from the low side
- **B.** The bag's own built-in pump
- **C.** The appliance compressor, pushing from the high side
- **D.** Heat applied to the recovery bag

Section 3: Type II: High- and Medium-Pressure Appliances Questions 51-75

51. The 170 psia boundary between medium and high pressure is about what reading on a gauge at sea level?

- **A.** 185 psig
- **B.** 170 psig
- **C.** 140 psig
- **D.** 155 psig

52. An R-22 system shows head pressure well above the PT value for its condensing temperature, and air is suspected. What is the correct fix?

- **A.** Vent vapor from the top of the condenser briefly
- **B.** Run the condenser fan at a higher speed permanently
- **C.** Add refrigerant to dilute the air in the condenser
- **D.** Recover the charge, evacuate, and recharge by weight

53. An R-32 heat pump in cooling mode is condensing at 100°F. About what pressure should the high-side gauge show?

- **A.** About 326 psig
- **B.** About 429 psig
- **C.** About 196 psig
- **D.** About 206 psig

54. An R-410A system reaches 450 microns and holds steady with the pump isolated. What is the next step?

- **A.** Pressure-test with nitrogen to 150 psig
- **B.** Break the vacuum by charging refrigerant
- **C.** Start the compressor to test it under vacuum
- **D.** Break the vacuum with dry compressed air

55. A facility uses the rolling-average method. Its 250 lb R-22 comfort-cooling chiller received 10 lb, 8 lb and 12 lb in the past 365 days, with no follow-up verification test in that time. What is the result?

- **A.** 12%; no repair, since 20% applies
- **B.** 12%; repair is required
- **C.** 4.8%; no repair, since only the last 12 lb counts
- **D.** 12%; no repair, since 15% applies

56. An R-407A system with a 210 lb charge needs a new condenser. The recovery machine was made in 1999. What level is required?

- **A.** 4 in. Hg vacuum
- **B.** 15 in. Hg vacuum
- **C.** 0 in. Hg
- **D.** 10 in. Hg vacuum

57. A technician plans to replace a leaking Schrader core on a 20 lb R-410A unit by opening it at 50 psig, since the job is non-major. What is wrong with this plan?

- **A.** Only the 5 psig oil-change limit must be met
- **B.** Nothing; non-major repairs have no required pressure level at all
- **C.** The unit must first be pulled to 10 in. Hg
- **D.** The unit must first be recovered to no higher than 0 psig

58. A running R-410A air conditioner shows about 78 psig on the low side instead of the usual 118 psig. What evaporator temperature does this indicate, and what might cause it?

- **A.** About 40°F; normal for an air conditioner
- **B.** About 20°F; possibly low charge or low airflow
- **C.** About 0°F; an overcharge of refrigerant
- **D.** About 20°F; a normal reading on a mild day

59. An 85 lb R-22 packaged rooftop unit cools a hotel lobby. Which leak-rate threshold applies?

- **A.** 30%
- **B.** 20%
- **C.** 15%
- **D.** 10%

60. A regulator is installed on a full nitrogen cylinder. What should the technician do before opening the cylinder valve?

- **A.** Crack the cylinder valve fast to seat it
- **B.** Remove the relief valve from the outlet line
- **C.** Back the regulator adjusting screw all the way out
- **D.** Turn the regulator adjusting screw fully in

61. Which of these appliances would NOT be Type II work?

- **A.** A rooftop unit using R-407C
- **B.** A chiller using R-134a
- **C.** A freezer system using R-508B
- **D.** A chiller using R-245fa

62. A technician front-seats the discharge service valve on a reciprocating compressor and then starts the compressor. What is the danger?

- **A.** Nothing, if the crankcase heater is energized
- **B.** Discharge pressure can build until a part ruptures
- **C.** Liquid will flood back into the suction line
- **D.** Oil will be pumped out into the evaporator

63. A newly installed split system is pressurized with dry nitrogen only. Which tool can find the general area of a leak?

- **A.** An electronic refrigerant detector
- **B.** An ultrasonic leak detector
- **C.** An electronic refrigerant identifier
- **D.** Fluorescent dye and a UV light

64. What is §82.158 Table 2, which still lists 'HCFC-22' rows, used for?

- **A.** Setting technician recovery levels
- **B.** Certifying recovery machines
- **C.** Setting cylinder fill limits
- **D.** Setting leak-rate thresholds

65. In which parts of a Type II system does liquid refrigerant usually collect, making them good liquid recovery points?

- **A.** Evaporator inlet, suction filter and crankcase
- **B.** Suction line, accumulator inlet and evaporator outlet
- **C.** Receiver, condenser outlet and liquid line
- **D.** Discharge line, compressor head and oil separator

66. In a lab, a refrigerant held at 104°F shows a liquid saturation pressure of 345 psig at sea level. Which class fits it?

- **A.** High-pressure
- **B.** Very high-pressure
- **C.** Medium-pressure
- **D.** Low-pressure

67. Why must compressed air never be used to pressurize a refrigeration system for a leak test?

- **A.** Air may not be vented to the atmosphere after the test
- **B.** Air is heavier than refrigerant and hides leaks from detectors
- **C.** Air reacts with copper tubing to form ozone-depleting gas
- **D.** Air mixed with oil or refrigerant under pressure can explode

68. After charging a new R-32 split system by weight, what labeling does UL 60335-2-40 call for?

- **A.** Mark the unit with the charge weight and the date
- **B.** Attach a DOT Division 2.1 label to the indoor unit
- **C.** Send the charge weight to EPA within 30 days
- **D.** Mark the cylinder with the technician's card number

69. A micron gauge near the pump reads 300 microns while the pump runs. After the system is isolated and the pump is off, a gauge at the system reads 900 microns and holds. What is the system's actual vacuum?

- **A.** 1,200 microns, the sum of the two gauge readings
- **B.** 900 microns, read at the system with the pump isolated
- **C.** 300 microns, the reading taken while the pump was running
- **D.** 600 microns, the average of the two gauge readings

70. How must pressure relief valves on a Type II system be installed?

- **A.** Always in series for added backup
- **B.** Never in series with one another
- **C.** Only on the low side of the system
- **D.** Downstream of a closed shutoff valve

71. An R-410A system is off and has stood at 70°F long enough to equalize. About what pressure should the gauges read?

- **A.** About 201 psig
- **B.** About 318 psig
- **C.** About 118 psig
- **D.** About 121 psig

72. A recovery machine's label lists certification to AHRI 740-2016 only, with no flammable-refrigerant listing. May it be used on R-454B?

- **A.** Yes, as long as it was made after January 1, 2017
- **B.** Yes, as long as all of its hoses have low-loss fittings
- **C.** Not unless its listing covers flammable refrigerants
- **D.** Yes; AHRI 740 covers every refrigerant on the market

73. Which condition extends the normal 30-day leak-repair period to 120 days?

- **A.** The owner has chosen the rolling-average method
- **B.** The appliance is a comfort-cooling chiller of 500 lb or more
- **C.** The needed replacement parts are on back order
- **D.** The repair requires an industrial process shutdown

74. Why can't the pressure gauge on a refrigerant cylinder show how much refrigerant has been charged?

- **A.** Cylinder pressure depends on temperature, not contents
- **B.** Cylinder pressure rises as refrigerant is removed
- **C.** Cylinder gauges read in psia instead of psig
- **D.** Cylinder gauges are accurate only above 200 psig

75. Where should a technician look for the specific health and fire hazards of a refrigerant before working with it?

- **A.** The color of the cylinder
- **B.** The DOT shipping label alone
- **C.** The safety data sheet (SDS)
- **D.** The equipment warranty card

Section 4: Type III: Low-Pressure Appliances Questions 76-100

76. Why must the refrigerant side of a low-pressure chiller be raised above atmospheric pressure before an electronic leak search?

- **A.** The detector cannot operate in a cold machine room
- **B.** The purge unit must be off during the test
- **C.** Table 1 requires the shell to be at 0 psig before any leak test
- **D.** A leak test needs positive pressure to push refrigerant out

77. Why does Table 1 require a low-pressure chiller to be taken all the way to 25 mm Hg absolute?

- **A.** Low-pressure refrigerants are all in the higher-toxicity class
- **B.** The rupture disc fails unless the shell is held in a deep vacuum
- **C.** Refrigerant left at higher pressure cannot later be reclaimed
- **D.** A chiller holds a large mass of refrigerant as vapor at 0 psig

78. An idle R-123 chiller with liquid in the shell sits in a 70°F machine room. What should the shell gauge read?

- **A.** About 6.1 psig
- **B.** About 18.1 in. Hg vacuum
- **C.** About 6.5 in. Hg vacuum
- **D.** About 0 psig

79. An owner is retiring an R-123 chiller and sending it for scrap. Which recovery level applies before disposal?

- **A.** 25 mm Hg absolute, the same as for a major repair
- **B.** No level is required, if the scrap yard signs a statement
- **C.** 10 in. Hg vacuum, since it is being scrapped
- **D.** 0 psig, since the chiller will not be reused

80. A new chiller uses R-514A, an HFO-based refrigerant. Do the A2L and A3 flammable-refrigerant handling rules apply to it?

- **A.** No; it is B1 and does not propagate flame
- **B.** No; it is A1, the same as R-1233zd(E)
- **C.** Yes; it is B2L, the same as ammonia
- **D.** Yes; all HFO-based refrigerants are classed A2L

81. The purge on a running R-11 chiller is removing air. Where did the air most likely get in?

- **A.** At a leak on the low side, which runs in a vacuum
- **B.** Through the cooling tower water in the tubes
- **C.** At a leak on the condenser, above atmosphere
- **D.** Through the purge unit's own vent line

82. While R-123 is being recovered, the city water to the recovery unit's condenser is shut off by mistake. As the condenser warms toward 120°F, what happens?

- **A.** Pressure reaches only about 6 psig, safely below the cut-out
- **B.** Pressure stays below 5 psig because R-123 is a low-pressure refrigerant
- **C.** The recovery vessel is pulled into a deeper vacuum as it warms
- **D.** Pressure nears 15 psig, so the 10 psig cut-out should trip

83. About what absolute pressure in psia is 25 mm Hg absolute?

- **A.** About 14.2 psia
- **B.** About 2.5 psia
- **C.** About 0.5 psia
- **D.** About 25 psia

84. Which setup for a non-major repair on an R-11 chiller, not followed by evacuation to the atmosphere, is compliant?

- **A.** Shell warmed to 0 psig with hot water, part isolated
- **B.** Shell raised to 0 psig with dry compressed air
- **C.** Shell raised to 0 psig with nitrogen, part isolated
- **D.** Shell warmed to 3 psig with blankets, part isolated

85. Why do non-condensables in a running chiller collect at the top of the condenser?

- **A.** They enter the shell through the condenser water tubes
- **B.** They are heavier than the liquid refrigerant in the shell
- **C.** They cannot condense and gather at the highest point
- **D.** They are drawn there by oil returning from the compressor

86. What made R-123 a practical substitute for R-11 in centrifugal chillers?

- **A.** It is an HFC, so it is exempt from the venting prohibition
- **B.** It works at similar low pressures with far lower ODP
- **C.** It has zero ODP and a lower toxicity rating
- **D.** It runs at higher pressure, so air cannot leak in

87. At what saturation temperature does R-123 read 0 psig?

- **A.** 82.1°F
- **B.** 70.0°F
- **C.** 100.0°F
- **D.** 74.8°F

88. An R-11 chiller needs an oil change. The shell already reads 2 psig after a warm afternoon, and the oil is at 75°F. What remains to be done before draining?

- **A.** Cool the oil to below 40°F
- **B.** Pull the shell to 25 mm Hg absolute
- **C.** Raise the shell to 5 psig with nitrogen
- **D.** Heat the oil to about 130°F

89. Why do air and other non-condensables collect at the top of a chiller's condenser?

- **A.** They are heavier than refrigerant vapor and sink there
- **B.** The compressor discharge separates them by centrifugal force
- **C.** They cannot condense and are pushed to the highest point
- **D.** The purge unit pumps them there from the evaporator

90. Why is the water drained from a chiller's water box before a detector probe is inserted through the drain valve?

- **A.** So the purge unit can pull air from the box
- **B.** So the tubes can be pressurized to 15 psig
- **C.** So refrigerant leaking from a tube can collect in the empty box
- **D.** So the detector probe is not damaged by the water pressure in the box

91. A standard purge unit on an R-11 chiller vents some refrigerant to the atmosphere along with the air. How does that refrigerant figure in the leak rate?

- **A.** It is excluded as normal purge operation
- **B.** It is excluded if the purge is listed
- **C.** It is excluded as a de minimis release
- **D.** It counts as a loss in the leak rate

92. A micron gauge on an isolated R-123 chiller reads 25,000 microns right after recovery and 60,000 microns ten minutes later. What does this mean?

- **A.** Pressure rose to 60 mm Hg absolute, so refrigerant remains; resume recovery
- **B.** The rise is normal gauge drift, so no further action is needed
- **C.** The reading is still below 25 mm Hg absolute, so the chiller may now be opened
- **D.** The vacuum got deeper over ten minutes, so recovery is complete

93. An R-123 chiller has been shut down for a week of hot weather, and the machine room is near 95°F. What happens at a leak on the evaporator shell now?

- **A.** Nothing passes, since the shell sits at exactly 0 psig
- **B.** Air enters, since the evaporator is always in a vacuum
- **C.** Refrigerant escapes, since the shell is above 0 psig
- **D.** Moisture enters, since warm air is drawn into the shell

94. After a tube bundle repair, which sequence correctly prepares and recharges an R-11 chiller?

- **A.** Evacuate, charge vapor to above 32°F saturation, then weigh in liquid
- **B.** Charge liquid, then let the purge unit remove the air afterward
- **C.** Evacuate, charge liquid until above 32°F saturation, then add vapor last
- **D.** Charge vapor to 0 psig, then add liquid until the purge stops

95. A standing-vacuum test on an R-11 chiller shows a slow pressure rise. Does that alone meet the definition of a leak inspection?

- **A.** No; only an electronic detector may be used on an R-11 chiller
- **B.** Yes; any test that shows a pressure change counts as a leak inspection
- **C.** No; it shows a loss but must be paired with a method that locates it
- **D.** Yes; if a certified technician runs the test and records the reading

96. Two recovery cylinders of R-123 sit in the same 70°F room. One is nearly full and one is nearly empty, but both still hold some liquid. How do their pressures compare?

- **A.** Both read about 6.5 in. Hg vacuum
- **B.** The empty one reads higher pressure
- **C.** Both read about 0 psig
- **D.** The full one reads higher pressure

97. When charging an evacuated R-123 chiller, which order is correct?

- **A.** Vapor first, then liquid
- **B.** Liquid only, from start to end
- **C.** Liquid first, then vapor
- **D.** Vapor only, from start to end

98. What happens if a low-pressure chiller's evaporator rupture disc bursts during an overpressurized leak test?

- **A.** The shell pressure drops into a vacuum
- **B.** The purge unit shuts the chiller down
- **C.** The refrigerant charge is released
- **D.** The nitrogen regulator closes automatically

99. A low-pressure appliance uses a refrigerant that boils at 92°F at atmospheric pressure. How may its pressure be raised for a non-major repair?

- **A.** Nitrogen only, since heat cannot exceed 85°F
- **B.** Heat first as far as possible, then nitrogen to atmospheric
- **C.** Heat only, since nitrogen is never allowed
- **D.** Nitrogen first, then heat to finish

100. Why is a low-pressure chiller limited to 10 psig during a leak test?

- **A.** Higher pressure can cause the 15 psig rupture disc to fail
- **B.** Higher pressure would condense the test nitrogen inside the shell
- **C.** Higher pressure violates the 0 psig limit in Table 1
- **D.** Higher pressure would push oil into the purge unit