

U.S.C.G. Merchant Marine Exam
Third Assistant Engineer
Q535 General Subjects
(Sample Examination)

Choose the best answer to the following Multiple Choice Questions:

1. How may a suspected tube leak on a shell-and-tube jacket water cooler most easily be located?
- (A) Isolate, drain, and dry both the salt water and jacket water sides of the heat exchanger. Remove the waterbox inspection plates. Visually inspect the tube sheets for signs of seepage at each of the tube ends.
 - (B) Isolate, drain, and dry the salt water side of the heat exchanger. Pressurize the sea water side with compressed air. Visually inspect the jacket water expansion tank for bubbles.
 - (C) Isolate, drain, and dry the jacket water side of the heat exchanger. Remove the shell inspection plates. Visually inspect the tubes along the tube lengths for seepage.
 - (D) Isolate, drain, and dry the salt water side of the heat exchanger. Remove the waterbox inspection plates. Visually inspect the tube sheets for signs of seepage at each of the tube ends.

If choice D is selected set score to 1.

2. A spur gear pump should be operated with the discharge valves _____.
- (A) slightly opened
 - (B) fully opened
 - (C) throttled
 - (D) halfway opened

If choice B is selected set score to 1.

3. For a typical transverse-framed deep-draft commercial vessel, what is the normal arrangement for the support of decks?
- (A) Deck beams are transversely arranged and deck girders are longitudinally arranged and both are continuous with the exception of hatches and other openings.
 - (B) Deck beams are transversely arranged and deck girders are longitudinally arranged and the deck beams are continuous with the exception of hatches and other openings. The deck girders are intercostal.
 - (C) Deck beams are transversely arranged and deck girders are longitudinally arranged and the deck girders are continuous with the exception of hatches and other openings. The deck beams are intercostal.
 - (D) Deck beams are longitudinally arranged and deck girders are transversely arranged and both are continuous with the exception of hatches and other openings.

If choice A is selected set score to 1.

4. A device used to hold open the refrigeration compressor suction valve during starting to reduce the compression load is called what?
- (A) relief valve
 - (B) suction line bypass
 - (C) discharge line bypass
 - (D) cylinder unloader

If choice D is selected set score to 1.

5. The low-pressure cut-out switch settings vary with the refrigerant used and the temperature application. If the low-pressure cut-out switch for a particular application is set with a cut-in pressure of 5 psig, what would be the cut-out pressure if the differential is 7.5 psig?
- (A) 5" Hg vac.
 - (B) 0 psig
 - (C) 2.5 psig
 - (D) 12.5 psig

If choice A is selected set score to 1.

6. As it applies to a transverse-framed ship with double bottom construction, what does the term "floor" represent?
- (A) Floors are the actual inner-bottom tank tops.
 - (B) Floors are vertical longitudinal members supporting the inner-bottoms.
 - (C) Floors are vertical transverse members supporting the inner-bottoms.
 - (D) Floors are the actual outer-bottom shell plating.

If choice C is selected set score to 1.

7. Which of the following conditions will occur if the power element of the thermostatic expansion valve shown in the illustration loses its charge? Illustration RA-0007
- (A) The valve will fail closed, providing no cooling capacity.
 - (B) The valve will begin to close, but the external equalizing line will assist in keeping the valve unseated.
 - (C) The valve will fail open and the cooling capacity will be increased.
 - (D) The valve will fail open as designed to provide continuous cooling.

If choice A is selected set score to 1.

8. If a reciprocating air compressor has cylinder suction or discharge valves that fail to properly seat, what statement is true concerning the result?
- (A) The compressor would have shorter running periods at higher displacement capacity between operating cycles.
 - (B) The compressor would have longer running periods at lower displacement capacity between operating cycles.
 - (C) The compressor would have shorter running periods at lower displacement capacity between operating cycles.
 - (D) The compressor would have longer running periods at higher displacement capacity between operating cycles.

If choice B is selected set score to 1.

9. For an analog electronic transmission system for instrumentation and control purposes, what is a common industry standard for electronic signal current range?

- (A) 0 to 10 mA
- (B) 4 to 20 mA
- (C) 1 to 10 A
- (D) 4 to 20 A

If choice B is selected set score to 1.

10. In the presence of an open flame or hot surfaces, chlorinated fluorocarbon refrigerants decompose and form what chemical substance?

- (A) carbon monoxide
- (B) water vapor
- (C) phosgene gas
- (D) petroleum crystals

If choice C is selected set score to 1.

11. Both the direction of flow and fluid flow rate of a variable displacement radial piston pump are determined by the relative positions of the _____.

- (A) floating ring and cylinder body
- (B) pump shaft and horizontal ports
- (C) floating ring and pump shaft
- (D) pump shaft and central valve

If choice A is selected set score to 1.

12. If the speed of a drill is too great, the drill will _____.

- (A) rapidly dull
- (B) not cut
- (C) cut slower
- (D) cut faster

If choice A is selected set score to 1.

13. Which statement is true concerning a liquid desiccant cargo-hold dehumidification system?

- (A) Water from the humid air inlet from the cargo-hold is evaporated and driven out of the liquid desiccant by means of a cooling coil located in the humidification chamber.
- (B) Water vapor from the humid air inlet from the cargo-hold is condensed and absorbed into the liquid desiccant by means of a cooling coil located in the humidification chamber.
- (C) Water vapor from the humid air inlet from the cargo-hold is condensed and absorbed into the liquid desiccant by means of a heating coil located in the humidification chamber.
- (D) Water from the humid air inlet from the cargo-hold is evaporated and driven out of the liquid desiccant by means of a heating coil located in the humidification chamber.

If choice B is selected set score to 1.

14. When accomplishing welding repairs using the electric arc welding process, what statement is true concerning the characteristics of a good quality weld when welding a single-V butt joint?

- (A) There should be overlap, but there should be no undercut at the toe of the weld.
- (B) There should be no overlap, but there should be undercut at the toe of the weld.
- (C) There should be both overlap and undercut at the toe of the weld.
- (D) There should be no overlap and no undercut at the toe of the weld.

If choice D is selected set score to 1.

15. A reciprocating refrigeration compressor may be tested for leaking discharge valves by stopping the compressor, turning the discharge service valve all the way in, and then turning the compressor over by hand. If the discharge valves are leaking, the high-side pressure gauge will show pressures which react in which way?

- (A) decreasing with each stroke
- (B) decreasing to a vacuum
- (C) rising and falling with each stroke
- (D) increasing with each stroke

If choice C is selected set score to 1.

16. Referring to the illustrated motorship fresh water cooling system drawing, what statement is true concerning the evaporator? Illustration MO-0212

- (A) The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in parallel with the jacket water cooler.
- (B) The evaporator uses heat recovered from the jacket water cooler sea water as a heat source to generate fresh water and is piped in series with and prior to the jacket water cooler.
- (C) The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in series with and after the jacket water cooler.
- (D) The evaporator uses heat recovered from the main engine cooling water as a heat source to generate fresh water and is piped in series with and prior to the jacket water cooler.

If choice D is selected set score to 1.

17. If the evaporator coil horizontal return line of a refrigeration system is less than 7/8" (2.21 cm) in diameter (considered small), which figure in the illustration represents the proper orientation and placement of the thermostatic expansion valve sensing bulb? Illustration RA-0049

- (A) A
- (B) B
- (C) C
- (D) D

If choice C is selected set score to 1.

18. Aftercoolers are used with air compressors to _____.

- (A) decrease the density of compressed air
- (B) dampen pressure pulses in the discharge air
- (C) reduce the temperature of compressed air
- (D) ensure complete expansion of the compressed air

If choice C is selected set score to 1.

19. Which of the listed components of a hydraulic system would enable the pump to be temporarily shut down, and yet still provide an instantaneous source of hydraulic force?

- (A) Sump actuator
- (B) Accumulator
- (C) Pressure compensator valve
- (D) Modulator

If choice B is selected set score to 1.

20. Which of the following desalination plants will always require a sterilizer when providing water to a potable water system?

- (A) Submerged tube type unit
- (B) Titanium plate type unit
- (C) Reverse osmosis type unit
- (D) Multi-stage flash type unit

If choice C is selected set score to 1.

21. What is meant by the term toughness as it applies to a material?

- (A) The ability to resist continuous compression.
- (B) The ability to resist repeated application and release of force.
- (C) The ability to resist penetration.
- (D) The ability to resist continuous tension.

If choice B is selected set score to 1.

22. What would happen if valve "25" shown in the illustration, vibrated open with the unit in operation?
Illustration MO-0111

- (A) The unit would continue to operate with no adverse effects.
- (B) Jacket water would be automatically bypassed around the distiller.
- (C) The absolute pressure of the unit would increase, causing a decrease in distillate output.
- (D) The unit would automatically shut down due to the closing of the low-pressure contacts.

If choice C is selected set score to 1.

23. In the illustrated single zone HVAC system, what prevents the simultaneous flow of steam through the preheat coil and flow of chilled water through the cooling coil? Illustration RA-0009

- (A) The supply air duct thermostat controlling the steam flow is set equal to the design off-coil temperature associated with the cooling coil.
- (B) The supply air duct thermostat controlling the steam flow is set several degrees higher than the design off-coil temperature associated with the cooling coil.
- (C) The supply air duct thermostat controlling the steam flow is set several degrees lower than the design off-coil temperature associated with the cooling coil.
- (D) Simultaneous steam flow through the preheater and chilled water flow through the cooling coil is permitted for the purposes of space humidity control.

If choice C is selected set score to 1.

24. If the drive belts on an air compressor were squealing during start-up, you should do which of the following?

- (A) Check the air filter.
- (B) Check for a receiver outlet valve which may be partially closed.
- (C) Check for a defective high-pressure cut-out switch.
- (D) Check the operation of the unloaders.

If choice D is selected set score to 1.

25. In a flash evaporator, scale as a result of higher than normal temperatures is most likely to occur in the _____.

- (A) second stage feed heater
- (B) salt water feed heater
- (C) second stage vapor separator
- (D) distillate cooler

If choice B is selected set score to 1.

26. A high-pressure centrifugal chiller currently charged with R-134a is being evaluated for the need for leak testing. Using the leak test procedures decision tree illustrated and the R-134a pressure-temperature chart illustrated, with the machine idle and the pressures equalized at 10 psig with an ambient temperature of 60°F, what statement is true? Illustration RA-0011 and Illustration RA-0047

- (A) The machine has a suspected leak; therefore, the refrigerant pressure should be raised to 35 psig by adding refrigerant prior to checking for leaks.
- (B) The machine definitely does not have a leak; therefore no attempt at leak detection is necessary.
- (C) The machine may or may not have a leak; therefore the machine should be checked for leaks without any adjustments in pressure.
- (D) The machine has a suspected leak; therefore, nitrogen should be added to bring the pressure to 70 psig prior to checking for leaks.

If choice A is selected set score to 1.

27. As shown in figure "B" of the illustrated self-contained recovery unit connection diagrams, what is the recovery method supported by the connection scheme? Illustration RA-0033

- (A) liquid recovery/push-pull
- (B) vapor recovery/push-pull
- (C) direct vapor recovery
- (D) direct liquid recovery

If choice C is selected set score to 1.

28. When repacking a stuffing box fitted with a lantern ring, which of the following precautions should be observed?

- (A) Block off the sealing water connection.
- (B) For good lubrication, apply a fine grade lapping compound between the shaft and packing.
- (C) Be certain that all packing is fitted loosely to the shaft.
- (D) Replace all of the packing rings.

If choice D is selected set score to 1.

29. If the demister used in the device shown in the illustration is improperly installed, which of the following will occur? Illustration MO-0110

- (A) Interstage leakage will cause a decrease in output.
- (B) The vacuum of the device will increase.
- (C) The temperature of the device will decrease.
- (D) There will be an increase of chlorides measured at the distillate pump salinity cell.

If choice D is selected set score to 1.

30. Which term represents how rapidly a speed control governor will complete a corrective action as the result of a load change?

- (A) Power
- (B) Deadband
- (C) Sensitivity
- (D) Promptness

If choice D is selected set score to 1.

31. The rudder torque capacity of the four ram steering gear illustrated, is rated at 44,210,000 inch-pounds with one power unit in operation. If the four ram system was able to be operated as a two ram system with both power units on line, what would be the available torque? Illustration GS-0067

- (A) 11,052,500 inch-pounds
- (B) 22,105,000 inch-pounds
- (C) 44,210,000 inch-pounds
- (D) 88,420,000 inch-pounds

If choice B is selected set score to 1.

32. In a refrigeration system, from what location would air and non-condensable gases be removed by the use of a purge unit?

- (A) expansion valve equalizer connection
- (B) the top of the condenser purge connection
- (C) compressor oil fill connection
- (D) the bottom of the receiver drain connection

If choice B is selected set score to 1.

33. Referring to the illustration, note that the solenoid in line "C" is closed. The check valve in line "E" is open. The separator service pump is running. The check valve in line "G" is closed. Valve "B" is closed. Valve "D" is open. What is the operational status of the oily-water separator unit? Illustration GS-0175

- (A) The oily-water separator is in the bilge water separation processing mode with water discharging overboard with an oil content greater than 15 ppm.
- (B) The oily-water separator is in the bilge water separation processing mode with water discharging overboard with an oil content less than 15 ppm.
- (C) The oily-water separator is in the bilge water separation processing mode with water discharging back to the bilge water holding tank with an oil content greater than 15 ppm.
- (D) The oily-water separator is in the bilge water separation processing mode with water discharging back to the bilge water holding tank with an oil content less than 15 ppm.

If choice C is selected set score to 1.

34. Capacity control of a centrifugal refrigeration compressor can be accomplished by what means?

- (A) varying the position discharge bypass valve
- (B) varying the speed of the compressor
- (C) varying the position of the prerotation inlet vanes
- (D) all of the above

If choice D is selected set score to 1.

35. Which of the listed reciprocating pump parts control the position of the pilot slide valve?

- (A) Stay rods
- (B) Moving tappets
- (C) Movement of the main piston through the steam cylinder
- (D) Adjusting of the tappet collars

If choice C is selected set score to 1.

36. For a parallel axis single reduction gear, what statement is true?

- (A) The drive pinion is the smaller of the two gears and rotates at a relatively high-speed. The driven gear is the larger of the two gears and rotates at a relatively low-speed.
- (B) The drive pinion is the smaller of the two gears and rotates at a relatively low-speed. The driven gear is the larger of the two gears and rotates at a relatively high-speed.
- (C) The drive pinion is the larger of the two gears and rotates at a relatively high-speed. The driven gear is the smaller of the two gears and rotates at a relatively low-speed.
- (D) The drive pinion is the larger of the two gears and rotates at a relatively low-speed. The driven gear is the smaller of the two gears and rotates at a relatively high-speed.

If choice A is selected set score to 1.

37. When checking the oil level on a reciprocating air compressor fitted with a dipstick, under what conditions should the oil level be checked?

- (A) With the compressor in the off mode incapable of starting.
- (B) With the compressor running at speed and loaded.
- (C) With the compressor in the auto mode and currently not running.
- (D) With the compressor running at speed and unloaded.

If choice A is selected set score to 1.

38. What type of primary element for a pressure transmitter would be most suitable for measuring oil-fired boiler furnace and forced-draft pressures?

- (A) Strain gage pressure sensor
- (B) Diaphragm pressure sensor
- (C) Bourdon tube pressure sensor
- (D) Bellows pressure sensor

If choice B is selected set score to 1.

39. To add refrigerant to the high side of an air conditioning system, you should close the king valve and introduce the refrigerant through what valve in what state?

- (A) condenser purge valve as a vapor
- (B) discharge service valve as a vapor
- (C) suction service valve as a liquid
- (D) charging valve as a liquid

If choice D is selected set score to 1.

40. How would the pressure setting of the illustrated self-contained, internal-pilot, piston-operated steam pressure-reducer be raised to a higher setpoint? Illustration GS-0044

- (A) The adjusting spring would need to have its compression load increased by rotating the adjusting screw counter-clockwise further out of the adjusting spring chamber.
- (B) The adjusting spring would need to have its compression load increased by rotating the adjusting screw clockwise further into the adjusting spring chamber.
- (C) The adjusting spring would need to have its compression load reduced by rotating the adjusting screw clockwise further into the adjusting spring chamber.
- (D) The adjusting spring would need to have its compression load reduced by rotating the adjusting screw counter-clockwise further out of the adjusting spring chamber.

If choice B is selected set score to 1.

41. For a given shell diameter and tube sizes for a shell-and-tube heat exchanger, which tube pitch pattern would be the most compact design allowing for the most tubes?

- (A) Triangular tube pitch
- (B) Rotated square tube pitch
- (C) Square tube pitch
- (D) Rotated triangular tube pitch

If choice A is selected set score to 1.

42. The device shown in the illustration is being used to control the output of an axial piston pump. "E" is the exhaust to pump casing. "D" is the supply from the replenishing pump. What will happen when part "A" is moved to the left? Illustration GS-0039

- (A) "B" will move to the left, and "C" will move to the right, but lagging behind "B"
- (B) "B" will move to the right, and "C" will move to the left, but will lag behind the movement of "A"
- (C) "B" will move to the left, as will "C"
- (D) "B" will move to the right, as will "C"

If choice B is selected set score to 1.

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

If choice D is selected set score to 1.

44. Which of the following propulsor types represents the proper terminology for a Z-drive?

- (A) Azipod propulsor
- (B) Cycloidal propeller
- (C) Azimuthing propulsor
- (D) Jet drive

If choice C is selected set score to 1.

45. Charging liquid HCFC-123 into a system under a deep vacuum could cause what to happen unless necessary precautions are taken?

- (A) the purge unit to operate
- (B) rupture disk to rupture
- (C) air and moisture to enter the receiver
- (D) water in chiller evaporator to freeze

If choice D is selected set score to 1.

46. If a reverse-osmosis freshwater generator has fouled membrane modules, what statement is true?

- (A) The freshwater production rate would be lower than normal, and the feed pressure would be lower than normal.
- (B) The freshwater production rate would be higher than normal, and the feed pressure would be higher than normal.
- (C) The freshwater production rate would be higher than normal, and the feed pressure would be lower than normal.
- (D) The freshwater production rate would be lower than normal, and the feed pressure would be higher than normal.

If choice D is selected set score to 1.

47. You press start button on the hydraulic power unit shown in the illustration, and the motor does not start. The first thing you should check is the _____. Illustration GS-0161

- (A) controller contactor operating coil
- (B) suction strainer condition
- (C) controller circuit breaker
- (D) pump discharge relief valve setting is too low

If choice C is selected set score to 1.

48. The illustration shown represents a blueprint of a metal _____. Illustration GS-0028

- (A) rod with a conventional break
- (B) tube with a broken out section
- (C) pipe with a missing center section
- (D) bar with a sawn out section

If choice A is selected set score to 1.

49. When normal operating pressure is applied to the hydraulic oil in a high-pressure system, the oil _____.

- (A) volume will increase
- (B) viscosity will decrease
- (C) floc point will increase
- (D) viscosity will increase

If choice D is selected set score to 1.

50. Concerning air conditioning system steam heating coils, what statement is true?

- (A) Steam heating coils are usually the header type and vertically installed.
- (B) Steam heating coils are usually the serpentine type and vertically installed.
- (C) Steam heating coils are usually the header type and horizontally installed.
- (D) Steam heating coils are usually the serpentine type and horizontally installed.

If choice A is selected set score to 1.

51. A roller bearing has an interference fit with the shaft upon which it is being installed. What thermal method of mounting the bearing would be most appropriate?

- (A) Cooling the shaft with liquid refrigerant.
- (B) Heating the bearing in an oil-bath bearing heater.
- (C) Heating the bearing with an oxyacetylene torch.
- (D) Cooling the bearing with dry ice.

If choice B is selected set score to 1.

52. Under the federal regulations of 33 CFR Subchapter O (Pollution), if a vessel equipped with a Type III Marine Sanitation Device enters a body of water where the discharge of untreated sewage is prohibited, which of the following methods of securing the device to prevent the discharge of sewage is UNACCEPTABLE?

- (A) Closing and tagging each valve leading to an overboard discharge.
- (B) Using a non-releasable wire-tire to hold each valve leading to an overboard discharge in the closed position.
- (C) Closing each valve leading to an overboard discharge and removing the handle.
- (D) Padlocking each valve leading to an overboard discharge in the closed position.

If choice A is selected set score to 1.

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 increases the viscosity of the oil and increases the specific gravity differential between the oil and water.
- (B) Heating the oily-water mixture decreases the viscosity of the oil and decreases 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 decreases the viscosity of the oil and increases the specific gravity differential between the oil and water.

If choice D is selected set score to 1.

54. Standard filter/driers used in many commercial type refrigeration units may contain what type of substance?

- (A) alcohol based liquid drying agents
- (B) activated alumina or silica gel desiccant beads
- (C) activated charcoal
- (D) any of the above may be used

If choice B is selected set score to 1.

55. Assuming that a standard micrometer (without a Vernier scale) has the ability to read to the nearest one thousandths of an inch, such a micrometer with a vernier scale would make it possible to read to the nearest _____.

- (A) five thousandths of an inch
- (B) ten thousandths of an inch
- (C) twenty-five thousandths of an inch
- (D) one fortieth of an inch

If choice B is selected set score to 1.

56. Which of the following bilge pumping applications would most likely use a non-automated centrifugal pump under manual supervision?

- (A) Engine room bilges
- (B) Dry cargo-hold bilges
- (C) Shaft alley bilges
- (D) Machinery space bilges

If choice B is selected set score to 1.

57. Concerning a conventional mooring winch, what statement is true?

- (A) A high capacity brake is required to hold a load approaching the breaking strength of the mooring line, but it is required to slip at a lower tension to avoid mooring line breakage.
- (B) A high capacity brake is required to hold a load equal to the breaking strength of the mooring line. For reasons of safety, no slippage of the brake is permitted.
- (C) A high capacity brake is required to hold a load exceeding the breaking strength of the mooring line. For reasons of safety, no slippage of the brake is permitted.
- (D) A low capacity brake is required to hold a load far below the breaking strength of the mooring line, but it is required to slip at a lower tension to avoid mooring line breakage.

If choice A is selected set score to 1.

58. On a bearing using an oiling ring as a means of static oil feed, how often should the bottom of the bearing sump be drained of impurities?

- (A) Every round
- (B) Daily
- (C) Bimonthly
- (D) Annually

If choice C is selected set score to 1.

59. What advantage does a 4-pipe hydronic heating/cooling system have over a 2-pipe hydronic heating/cooling system? Illustration GS-0192

- (A) A 4-pipe hydronic heating/cooling system requires one-half the amount of piping as compared to a 2-pipe hydronic heating/cooling system serving the same number of zones.
- (B) A 4-pipe hydronic heating/cooling system can serve twice as many zones as a 2-pipe hydronic heating/cooling system.
- (C) A 4-pipe hydronic heating/cooling system requires double the amount of piping as compared to a 2-pipe hydronic heating/cooling system serving the same number of zones.
- (D) A 4-pipe hydronic heating/cooling system allows simultaneous heating and cooling of different zones, whereas a 2-pipe hydronic heating/cooling system does not.

If choice D is selected set score to 1.

60. 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

If choice C is selected set score to 1.

61. If an air compressor is fitted with a hand-off-auto (H-O-A) control station, what statement concerning operation is true?

- (A) In the hand mode, the compressor will cycle on and off.
- (B) In the off mode, the compressor will cycle on and off.
- (C) In the hand mode, the compressor will run continuously with unloading.
- (D) In the auto mode, the compressor will run continuously with unloading.

If choice C is selected set score to 1.

62. Referring to the illustrated bellows-type thermostatic steam trap, what statement is true concerning its operation? Illustration GS-0005

- (A) When the bellows comes into contact with relatively cool condensate, the liquid within the bellows vaporizes resulting in bellows expansion and valve closing.
- (B) When the bellows comes into contact with relatively hot steam, the liquid within the bellows vaporizes resulting in bellows contraction and valve opening.
- (C) When the bellows comes into contact with relatively hot steam, the vapor within the bellows condenses resulting in bellows contraction and valve opening.
- (D) When the bellows comes into contact with relatively cool condensate, the vapor within the bellows condenses resulting in bellows contraction and valve opening.

If choice D is selected set score to 1.

63. How would you prevent the rudder from moving while a repair is made on the steering system using the illustrated actuator? Illustration GS-0116

- (A) screw in the locking pin, item "J"
- (B) tighten the locking screws in item "S"
- (C) tighten the locking pins, item "H" at each position of item "I" to keep the rudder from swinging
- (D) secure the valves in the supply and return lines

If choice D is selected set score to 1.

64. Suppose the illustrated pneumatically operated, diaphragm actuated control valve is used to control the fuel oil outlet temperature of a steam-heated heavy fuel oil heater by controlling the steam flow. What would be the result if the control diaphragm became ruptured? Illustration GS-0051

- (A) It is not possible to predict how the valve would respond to a ruptured diaphragm.
- (B) The valve would fail in the fully closed position, most likely resulting in a low fuel oil temperature alarm condition.
- (C) The valve would fail in the fully open position, most likely resulting in a high fuel oil temperature alarm condition.
- (D) The valve would fail in the exact position just before the control diaphragm ruptured. The fuel temperature will fluctuate with changes in fuel demand.

If choice C is selected set score to 1.

65. The action necessary to use the steering gear room trick wheel when transferring the steering control from the wheelhouse to local control is to _____.

- (A) Align the trick wheel to the rudder angle position before engaging
- (B) Set the six-way control valve in the trick wheel position
- (C) Open the power transfer switch before engaging the trick wheel
- (D) Always place the rudder in the amidships position to engage the trick wheel

If choice A is selected set score to 1.

66. Which of the listed temperature sensors is made of heat-treated metallic oxides and generally has a negative coefficient of resistance?

- (A) Thermocouple
- (B) Resistance temperature detector
- (C) Bimetallic device
- (D) Thermistor

If choice D is selected set score to 1.

67. Which of the following listed bulkhead types has the most rigorous standard for testing purposes?

- (A) Non-watertight bulkheads
- (B) Watertight bulkheads
- (C) Wash bulkheads
- (D) Oiltight bulkheads

If choice D is selected set score to 1.

68. As shown in figure "B" of the illustrated block diagram of a central operating system configured for supervisory control, which statement is true concerning the block "COMPUTER" with respect to closed-loop control processes? Illustration EL-0094

- (A) The computer provides the set point input data to the analog controllers, but the analog controllers actually control the closed-loop processes.
- (B) The computer has no role in the various closed-loop control processes regardless of the control mode.
- (C) The computer normally has no role in the various closed-loop control processes. It is only used for backup control purposes.
- (D) The computer provides the set point input data to the process control loop, as well as the measured variable data. The analog controllers are only used for manual backup control.

If choice A is selected set score to 1.

69. When taking a shell-and-tube heat exchanger with a removable tube bundle such as a bayonet-tube heavy fuel oil service heater out of service, to prevent water hammer what statement represents the correct operating procedure?

- (A) Open wide the condensate drains first. Gradually close down and secure the steam, then close the condensate drains when no longer issuing dry steam. Finally, secure the heavy fuel oil.
- (B) Secure the heavy fuel oil first, then crack open the condensate drains. Gradually close down and secure the steam, then close the condensate drains when no longer draining condensate.
- (C) Crack open the condensate drains first. Gradually close down and secure the steam, then close the condensate drains when no longer draining condensate. Finally, secure the heavy fuel oil.
- (D) Secure the heavy fuel oil first, then crack open the condensate drains. Gradually close down and secure the steam, then close the condensate drains when no longer issuing dry steam.

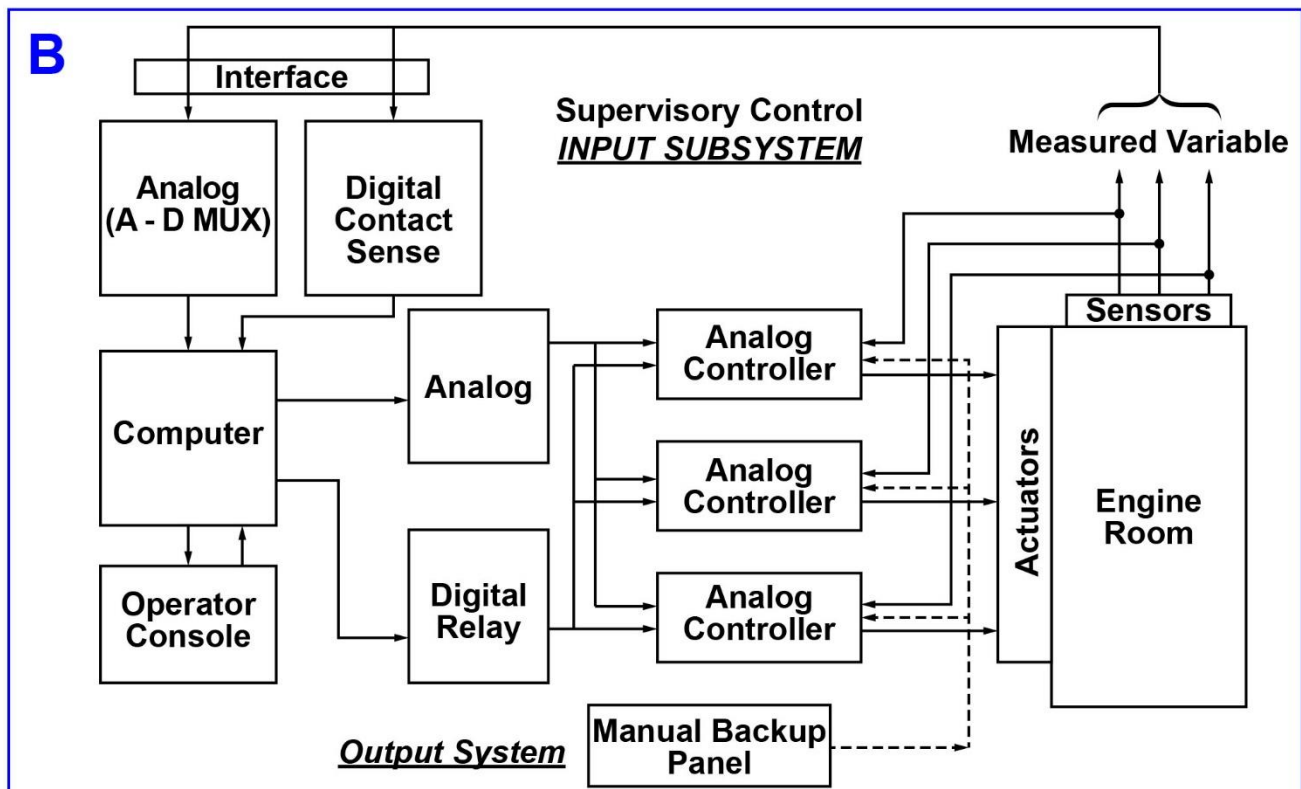
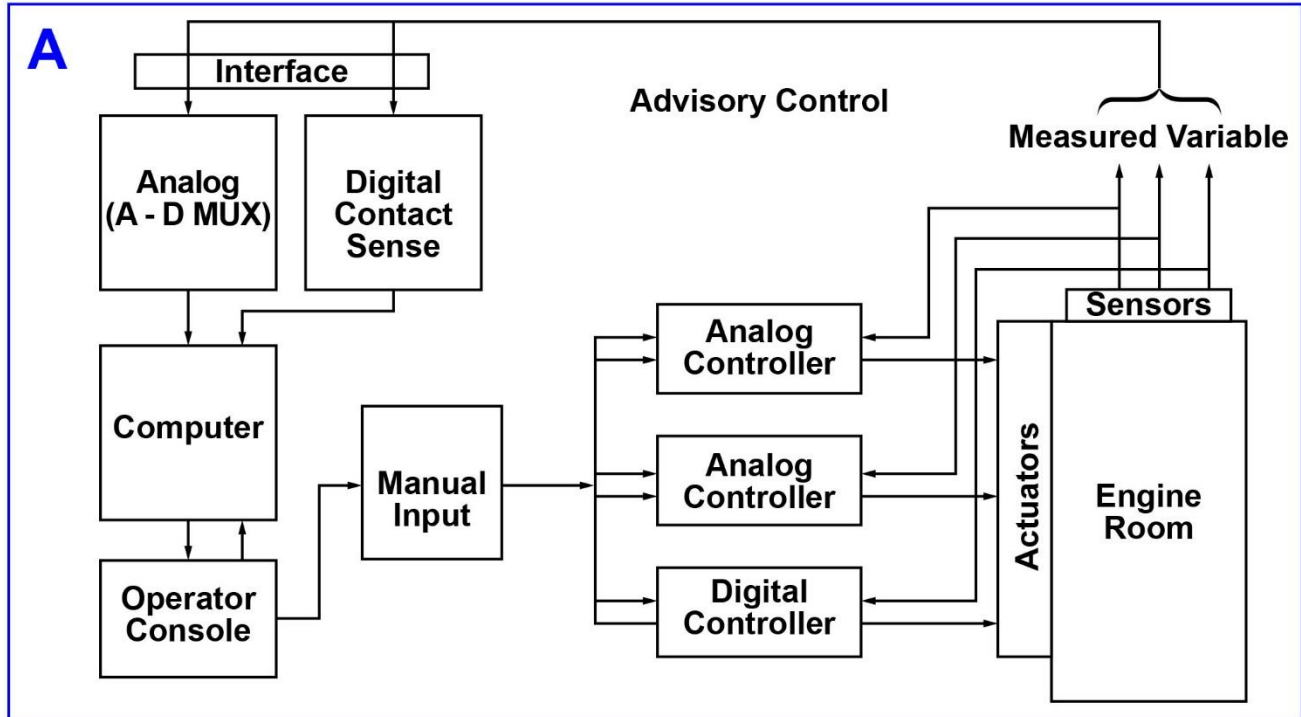
If choice C is selected set score to 1.

70. A vessel is in compliance with federal regulations regarding the discharge of sewage by _____.

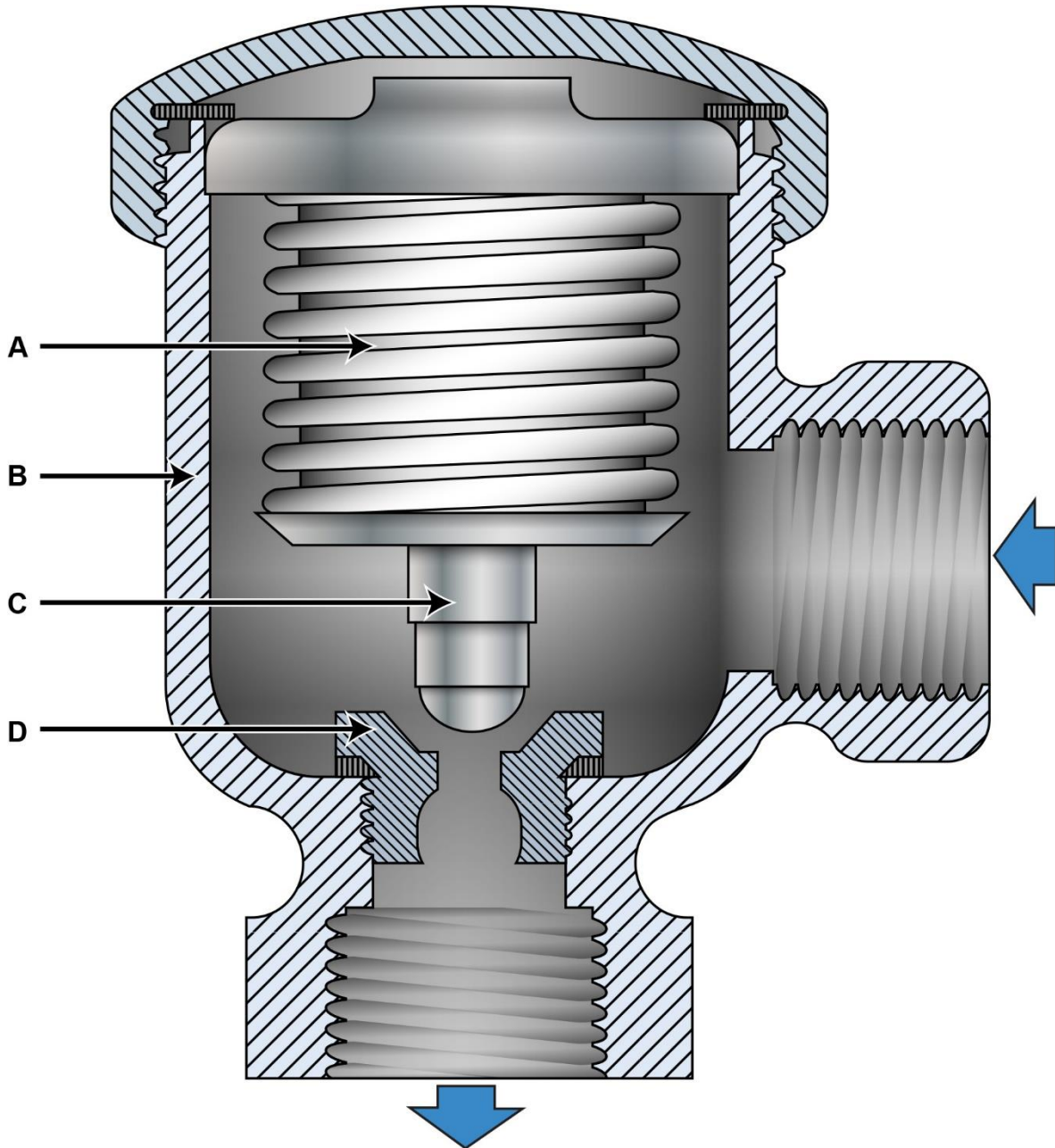
- (A) treating sewage in an approved system
- (B) pumping the sewage ashore to an approved container
- (C) holding all sewage onboard
- (D) all of the above

If choice D is selected set score to 1.

EL-0094



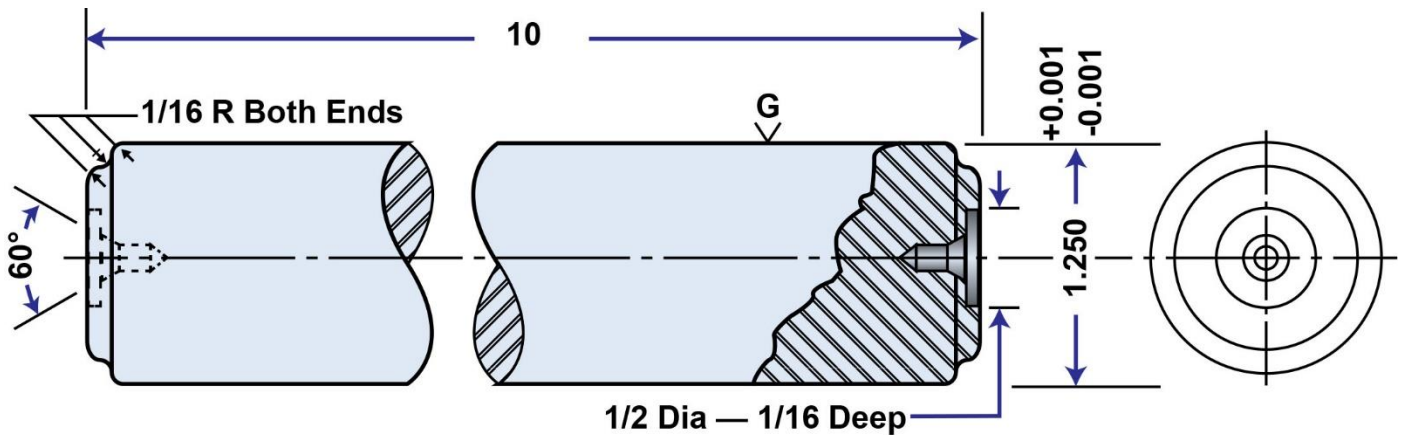
GS-0005



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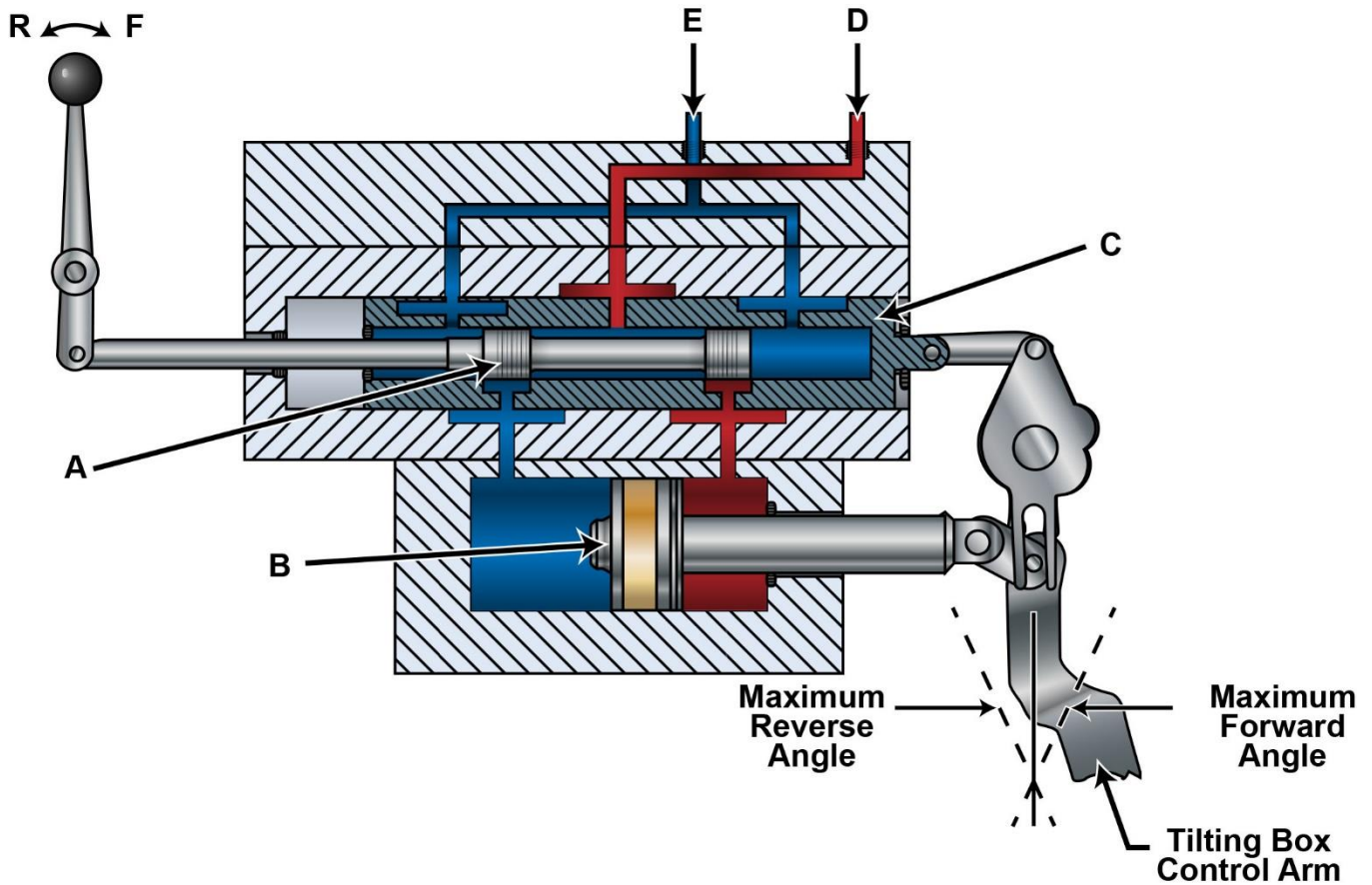
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GS-0028



Allow 0.012 to 0.015 for Grinding

GS-0039

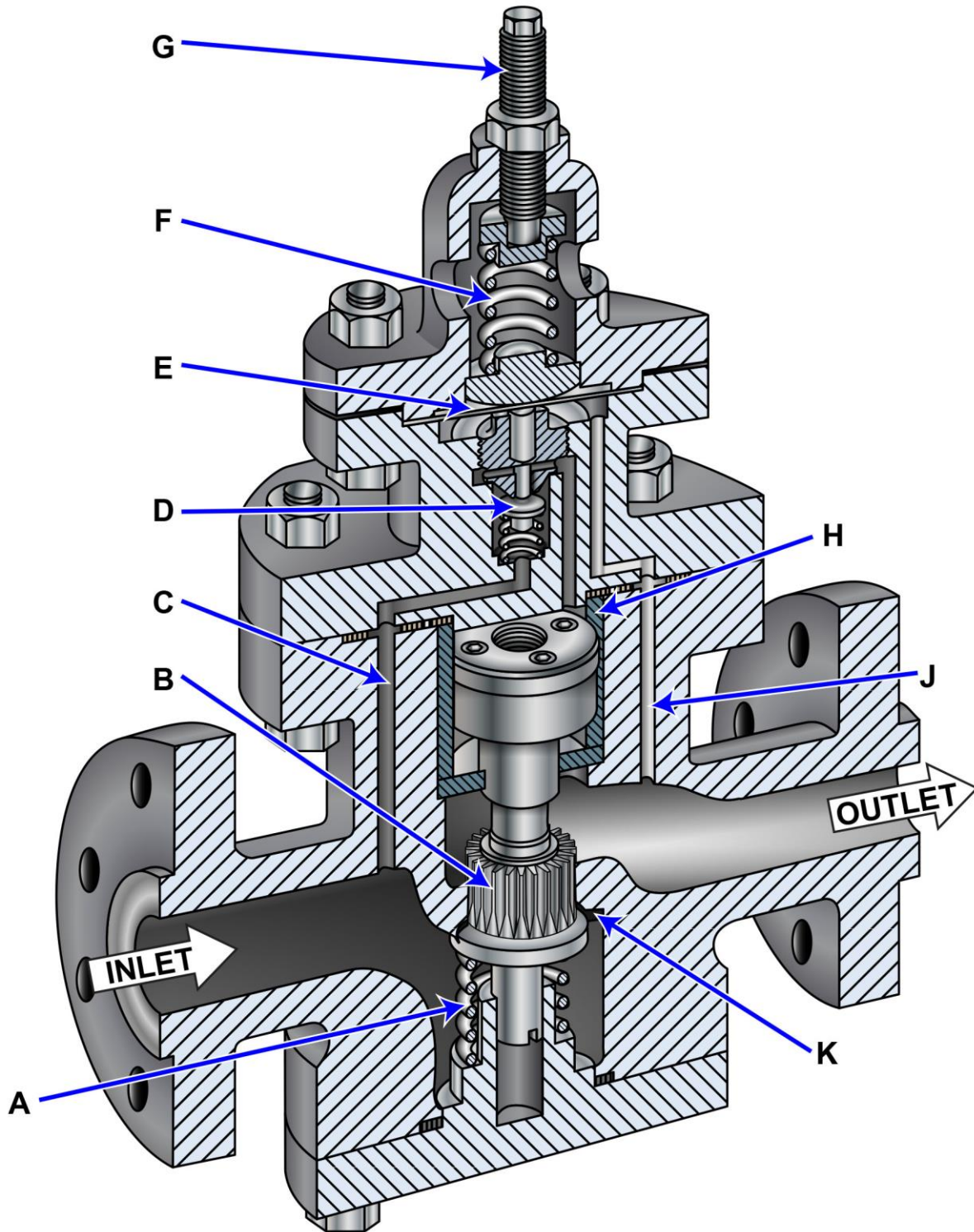


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GS-0044

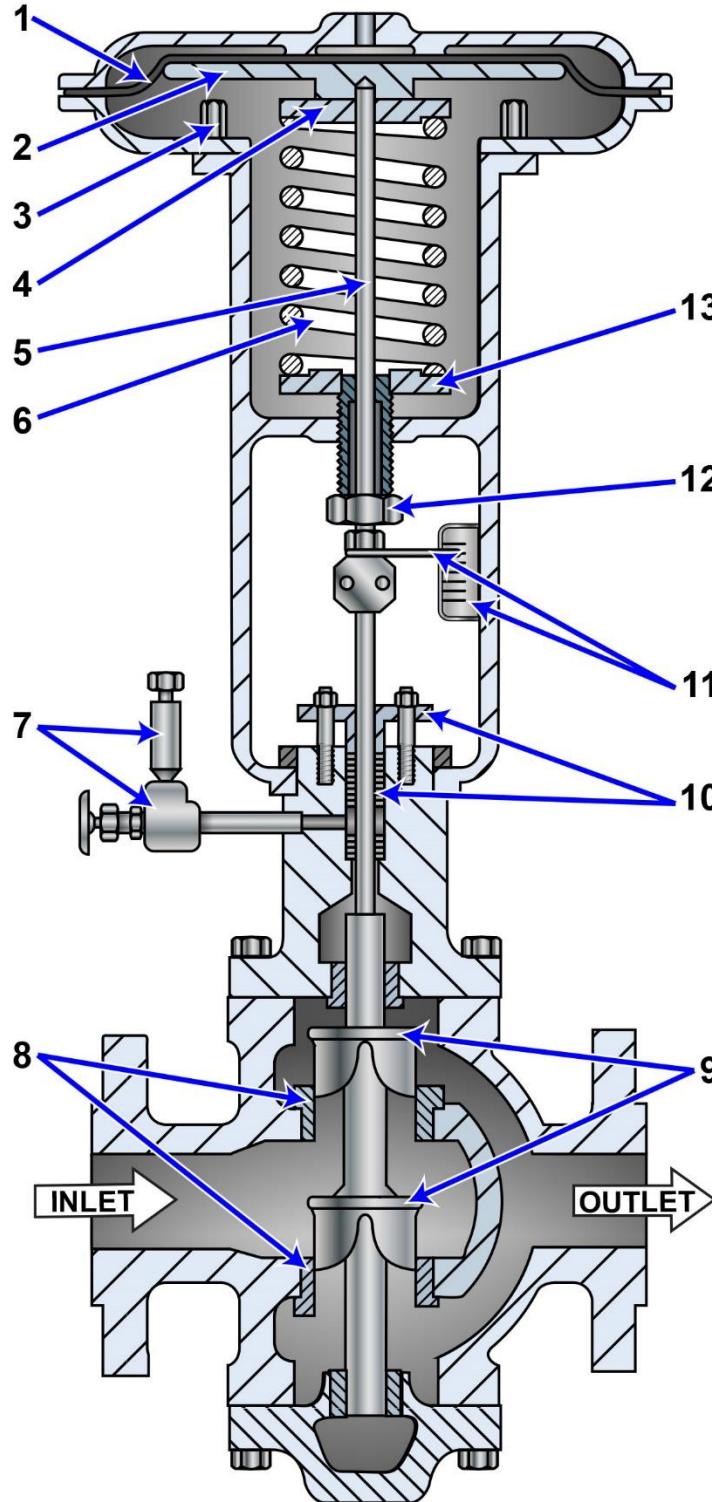


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GS-0051



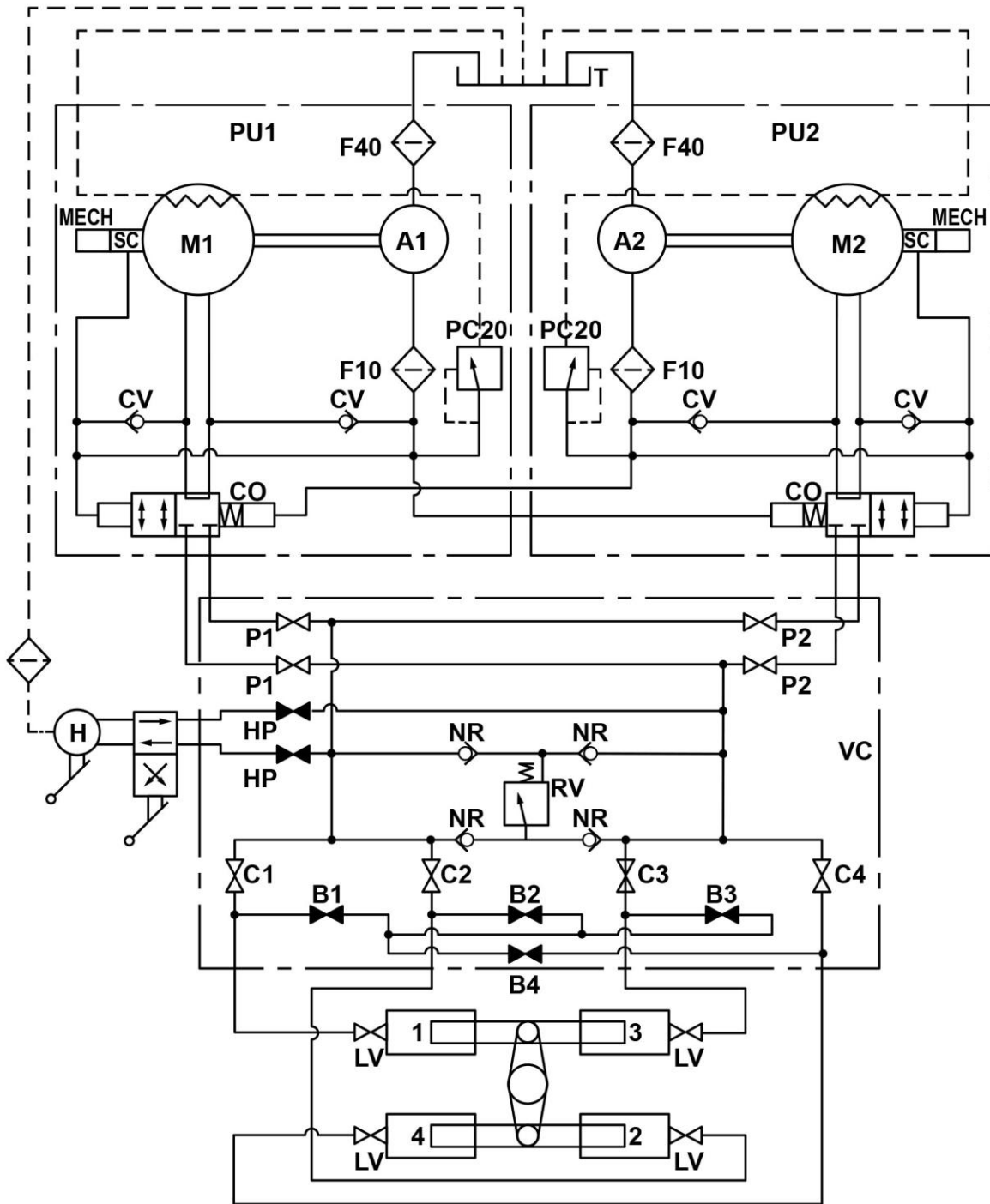
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GS-0067

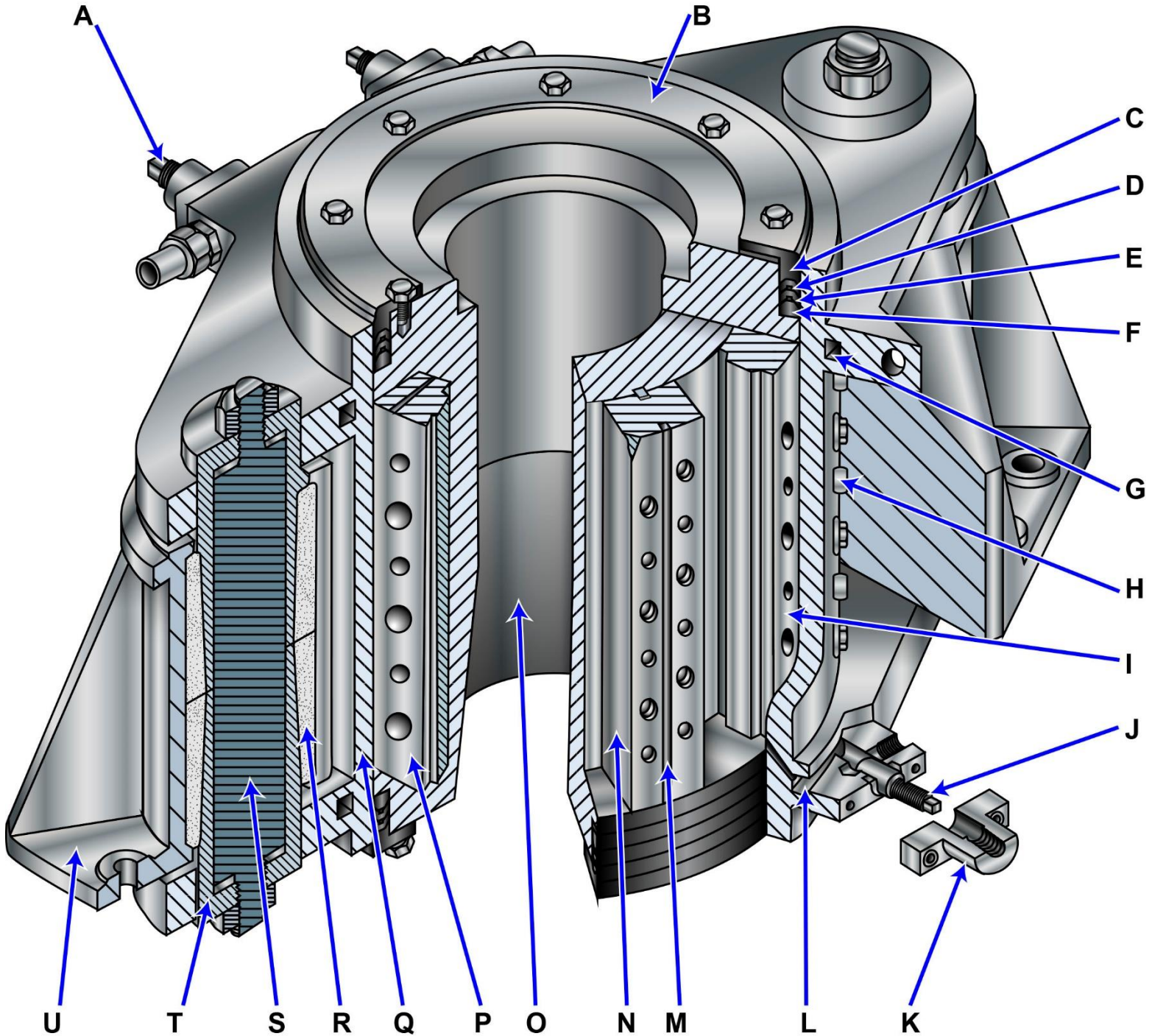


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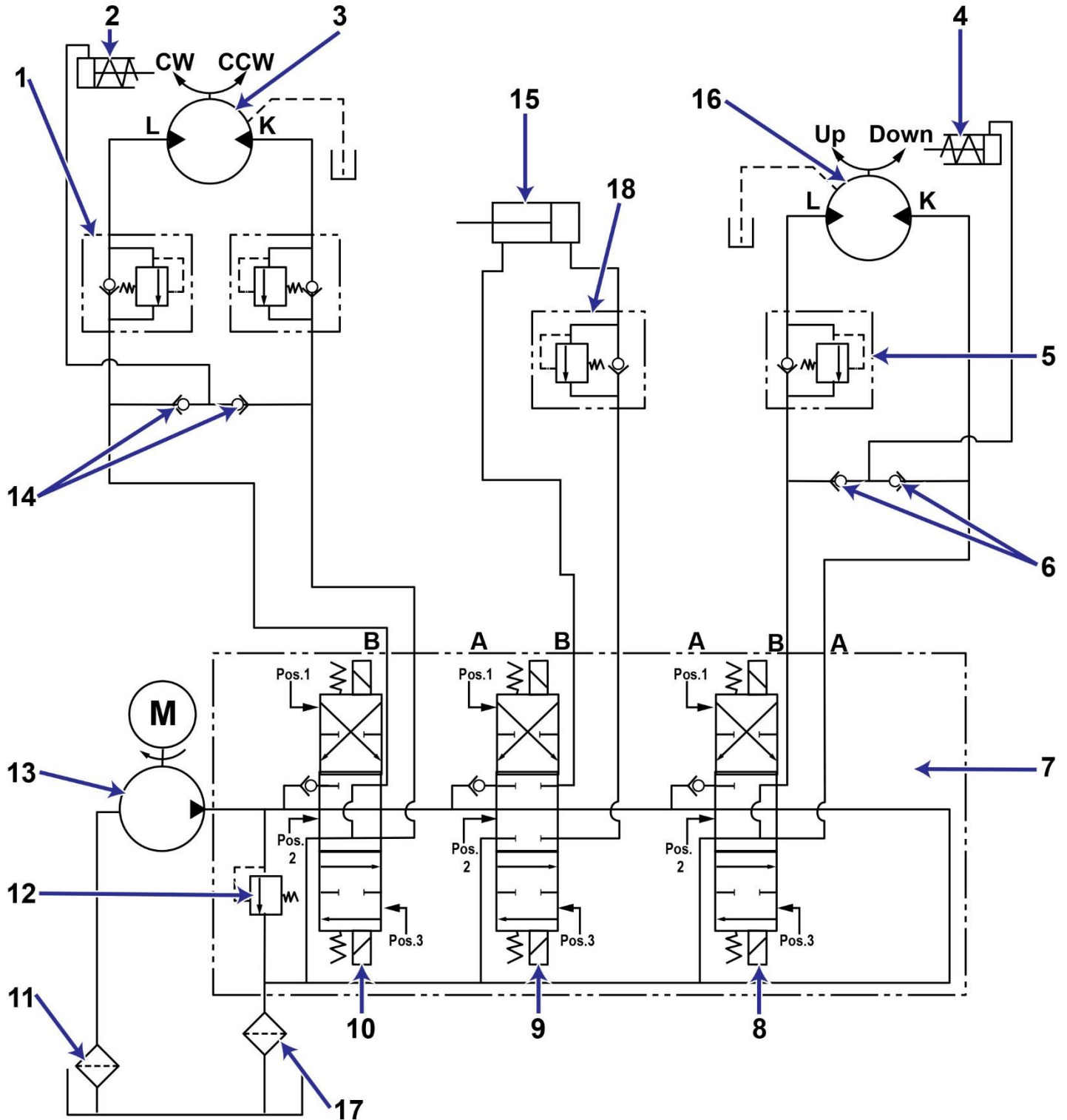


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GS-0161

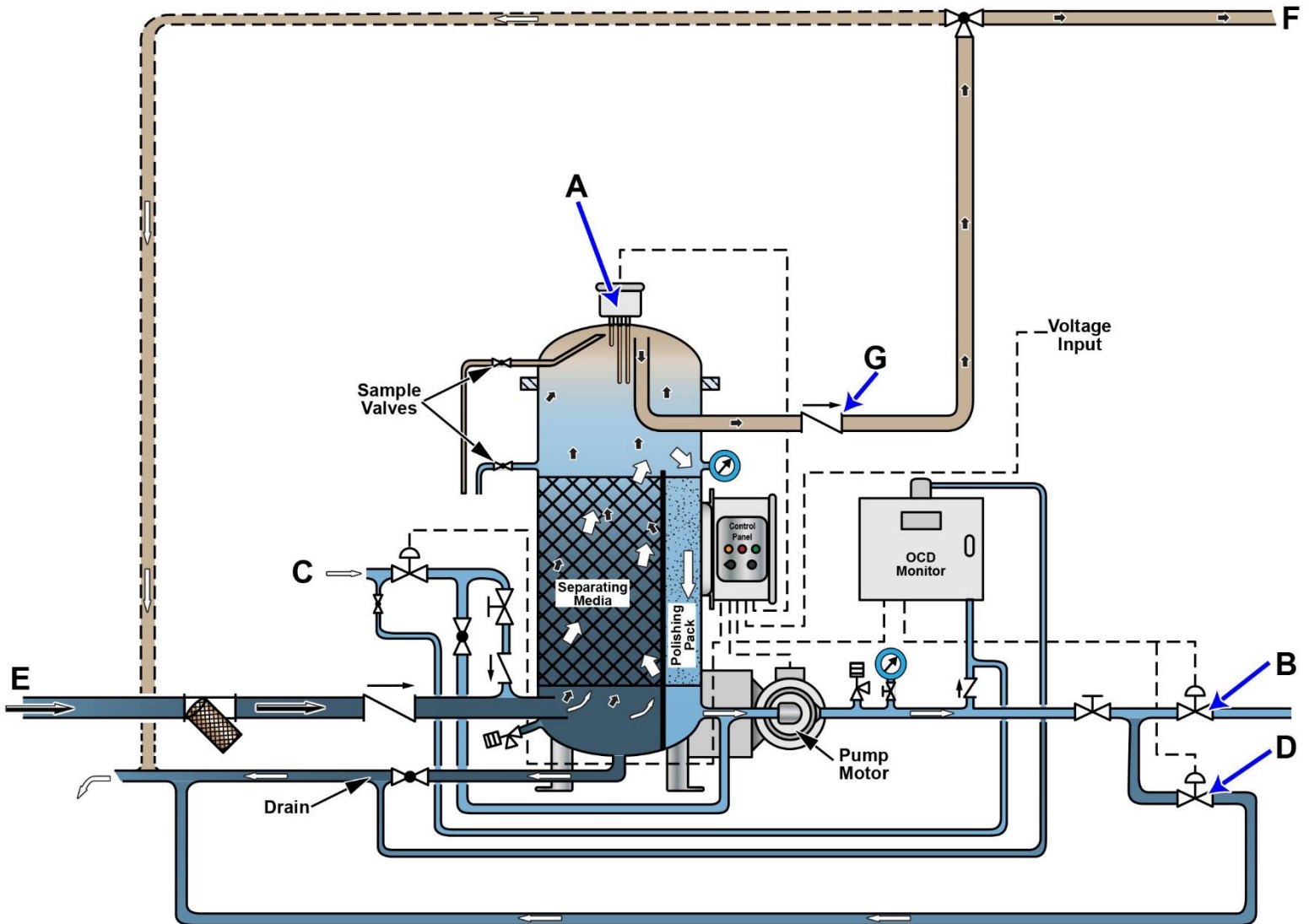


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GS-0175



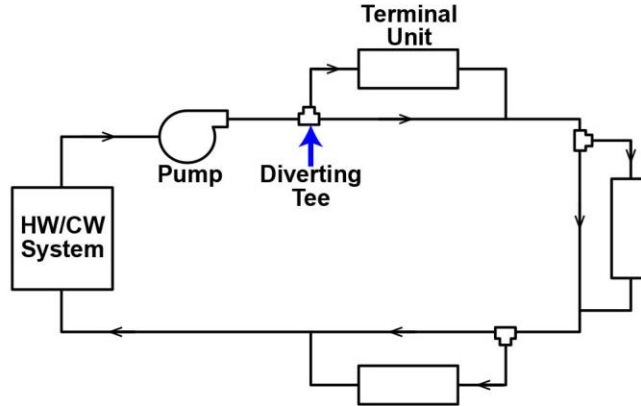
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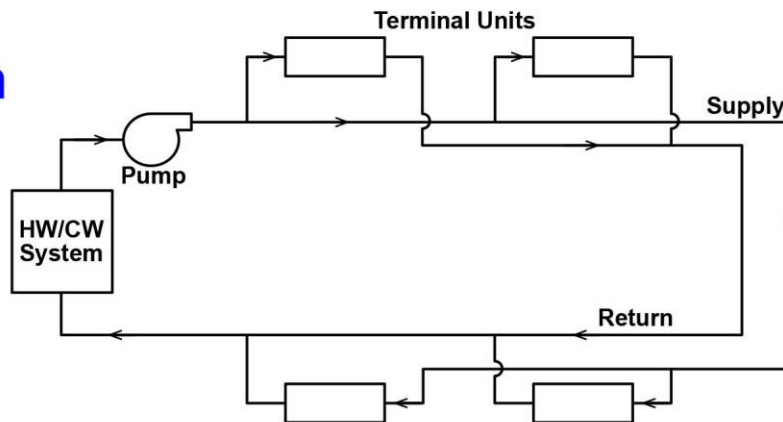
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GS-0192

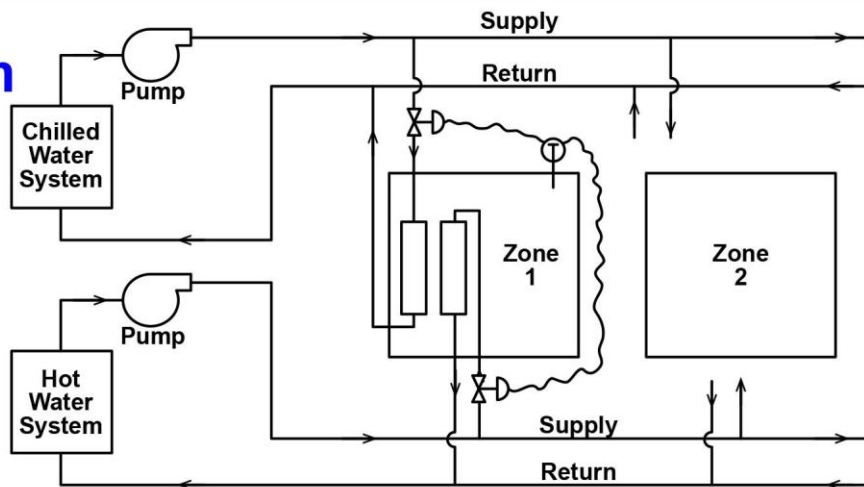
One-Pipe Water System



Two-Pipe Water System



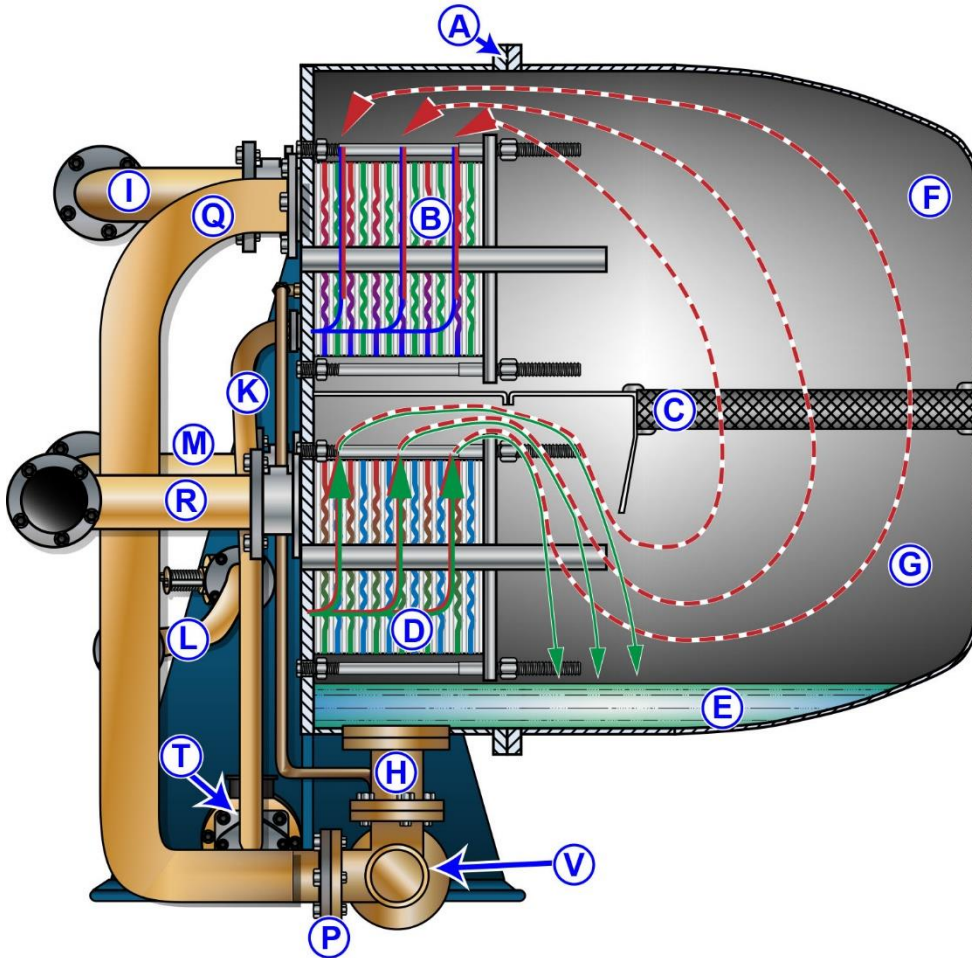
Four-Pipe Water System



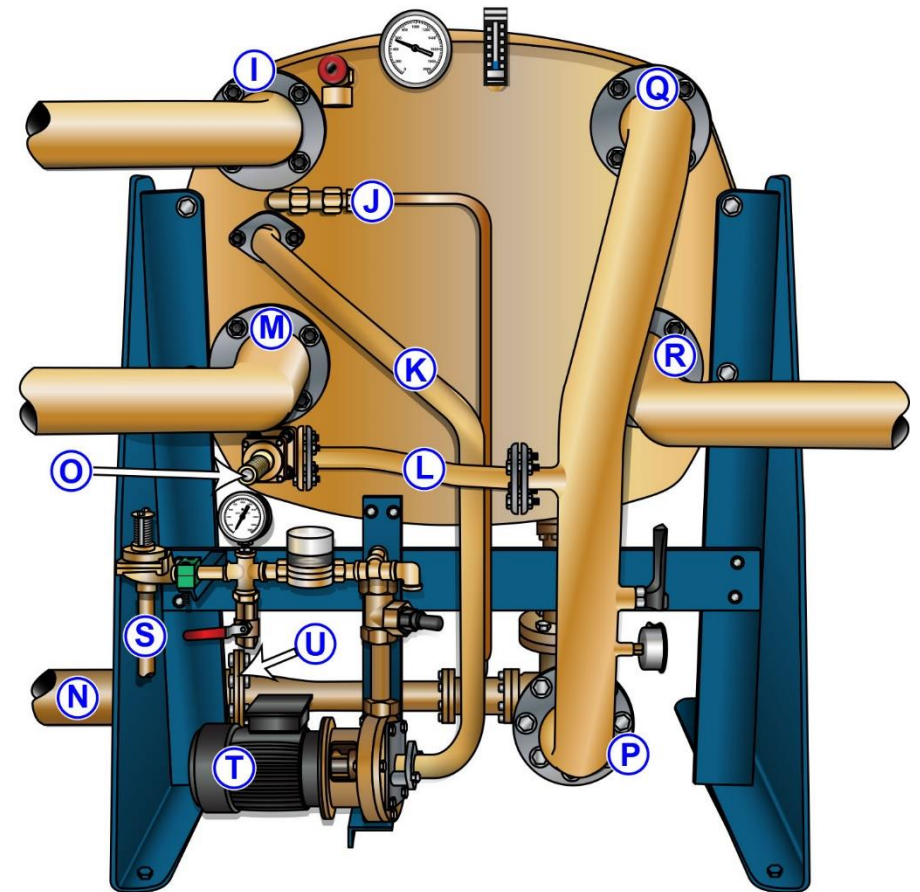
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MO-0110

Side View



Rear View

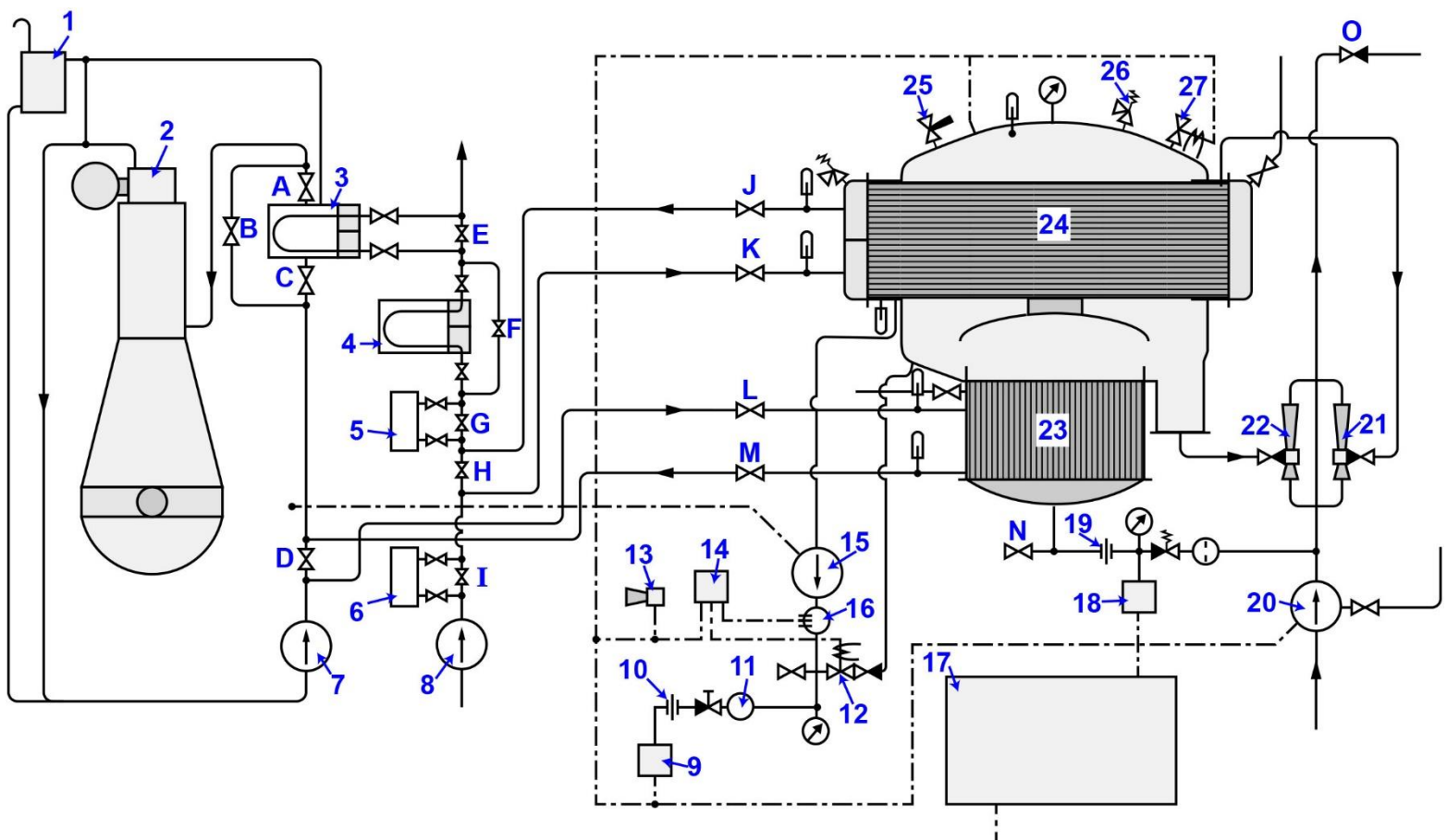


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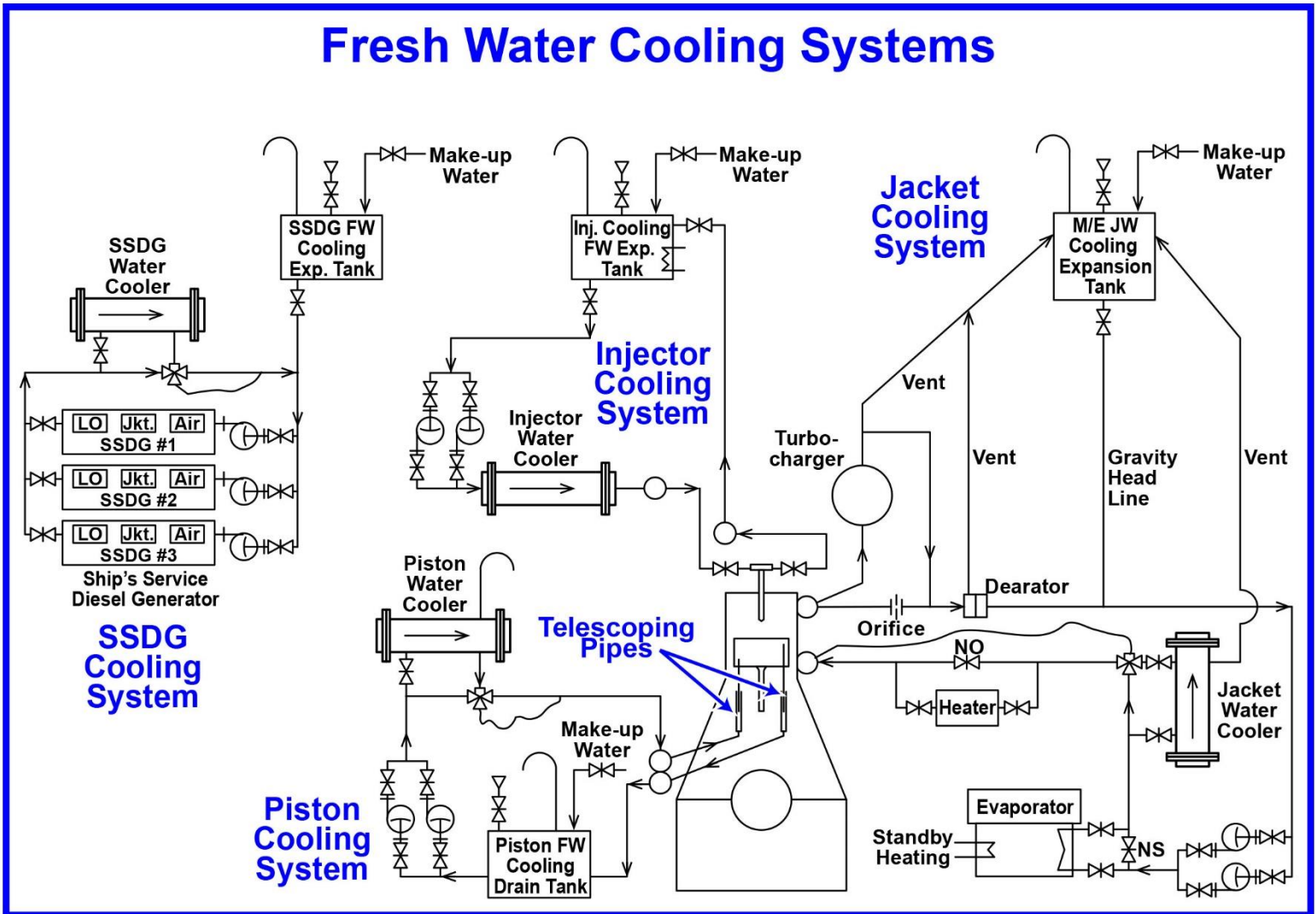
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MO-0111



MO-0212

Fresh Water Cooling Systems

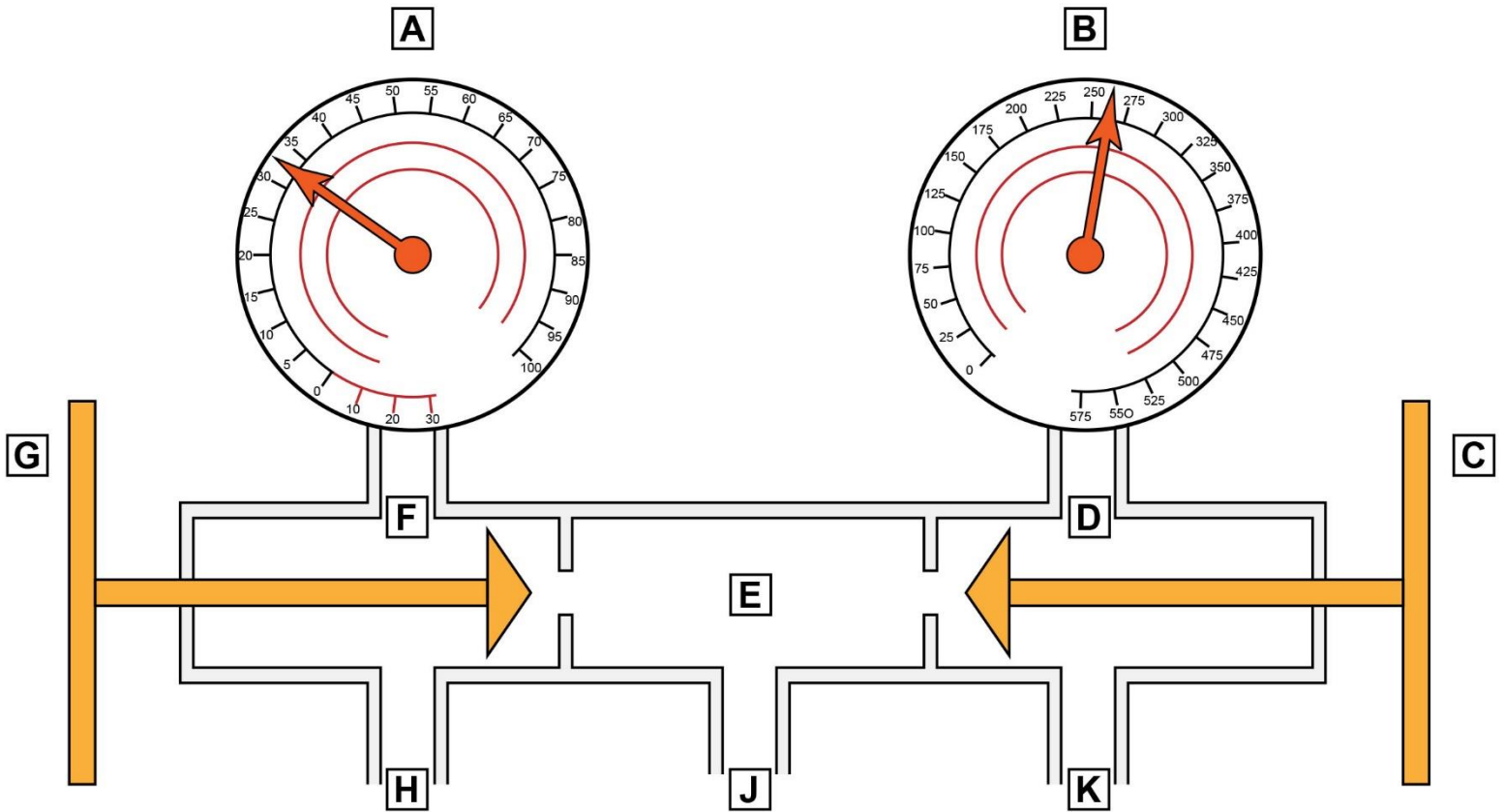


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RA-0001

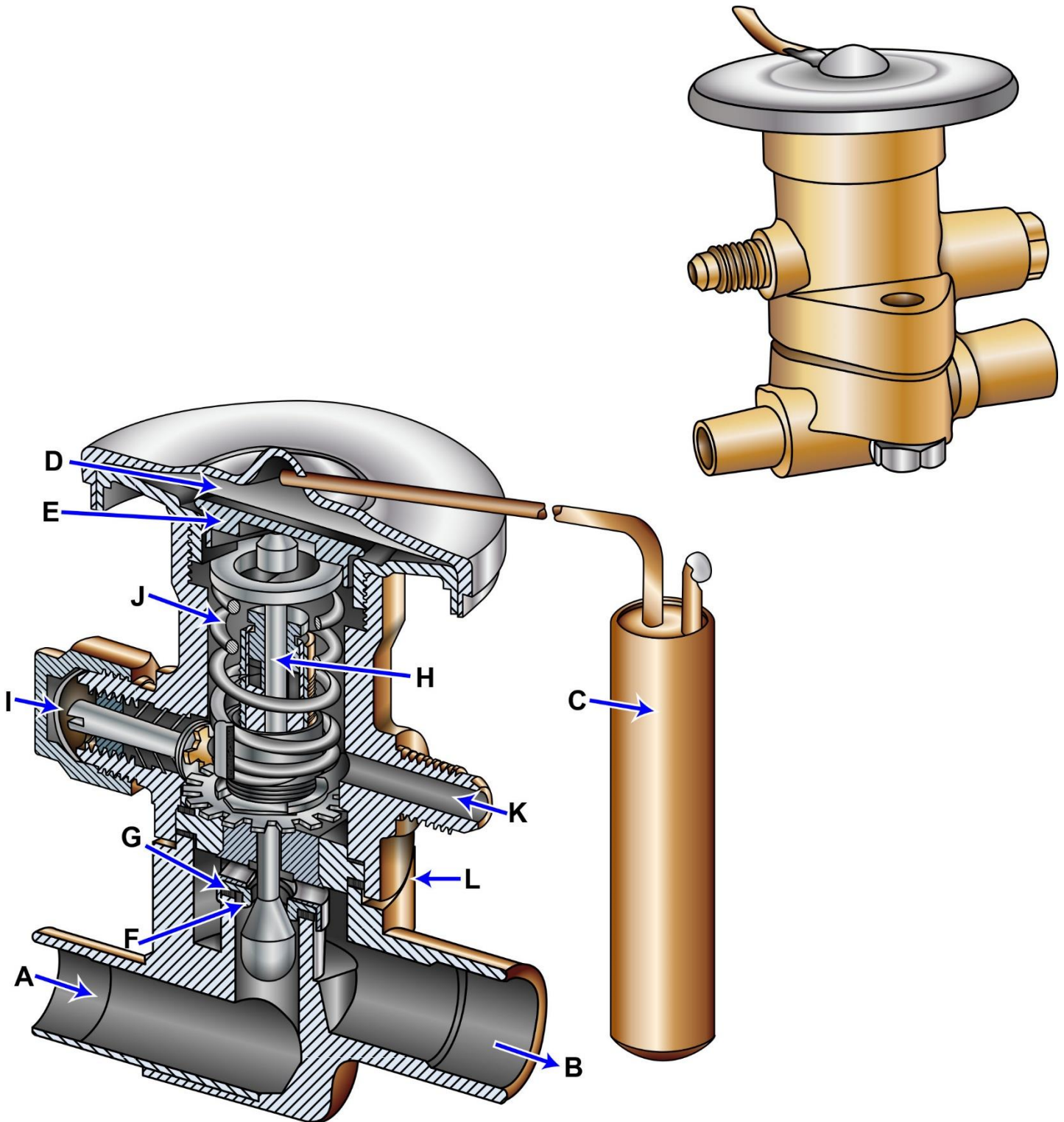


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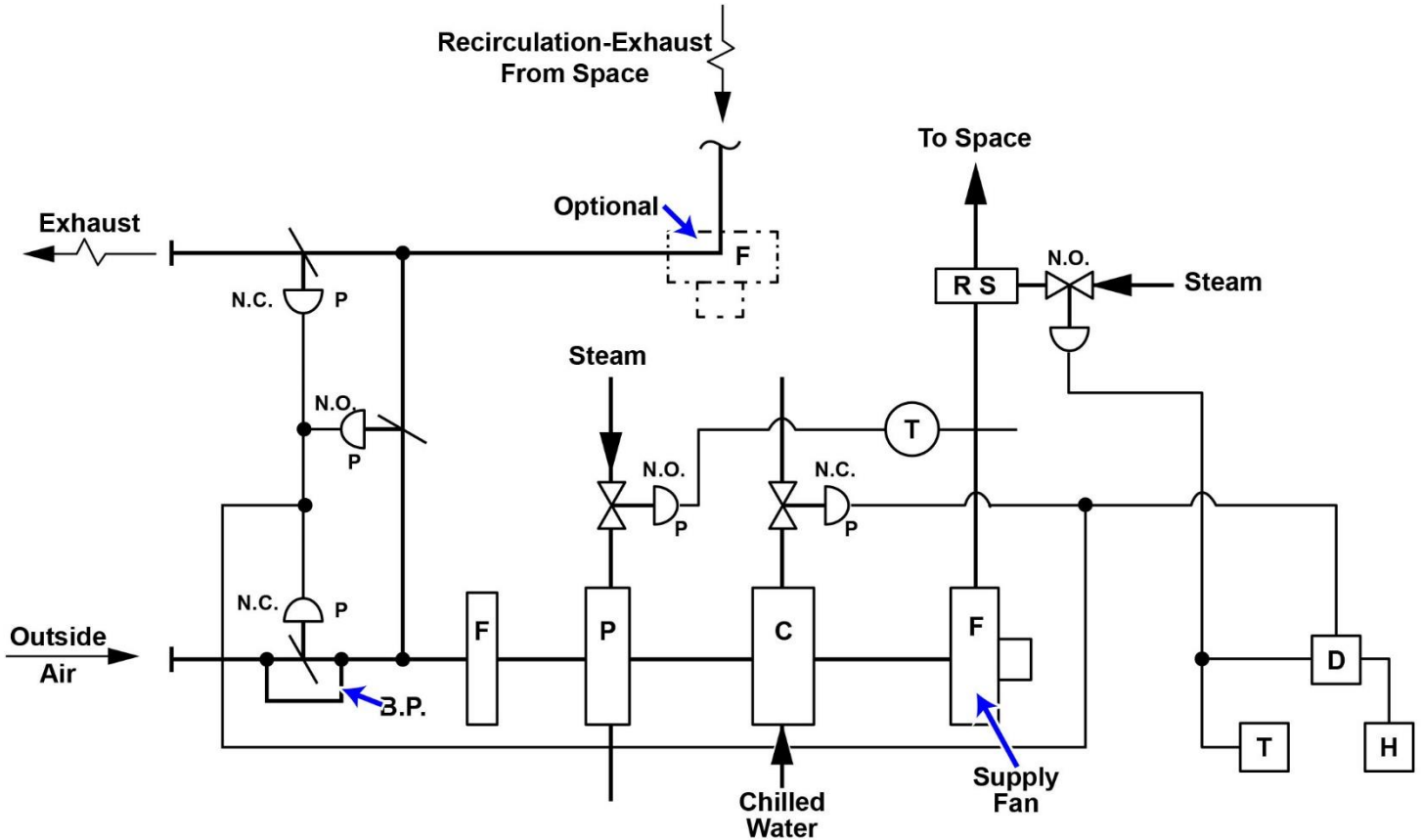
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








RA-0007



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RA-0009



	Humidistat		Room Thermostat
	Fan		Diverting Relay
	Filter		Pneumatic Damper and Motor
	Cooling Coil		Pneumatic Relay
	Preheater (Steam)	N.C.	Normally Closed (Valve or Damper)
	Reheater (Steam)	N.O.	Normally Open (Valve or Damper)
	Duct Thermostat	B.P.	Minimum Outside Air Bypass
		P	Positive Positioning Relay

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RA-0011

R-134a Pressure-Temperature Chart

Temperature °F	Vacuum “Hg
-40	14.6
-35	12.3
-30	9.7
-25	6.7
-20	3.5
-18	2.1
-16	0.6

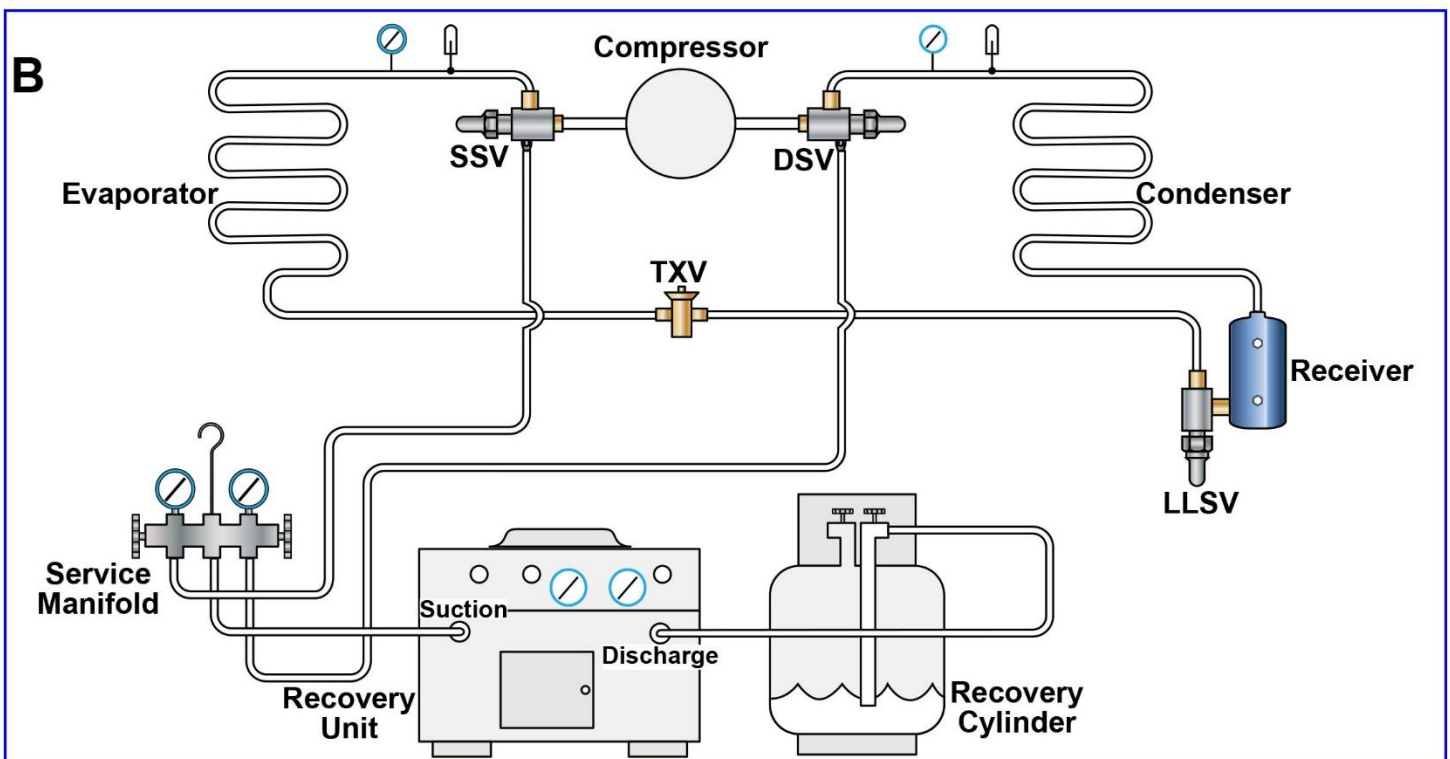
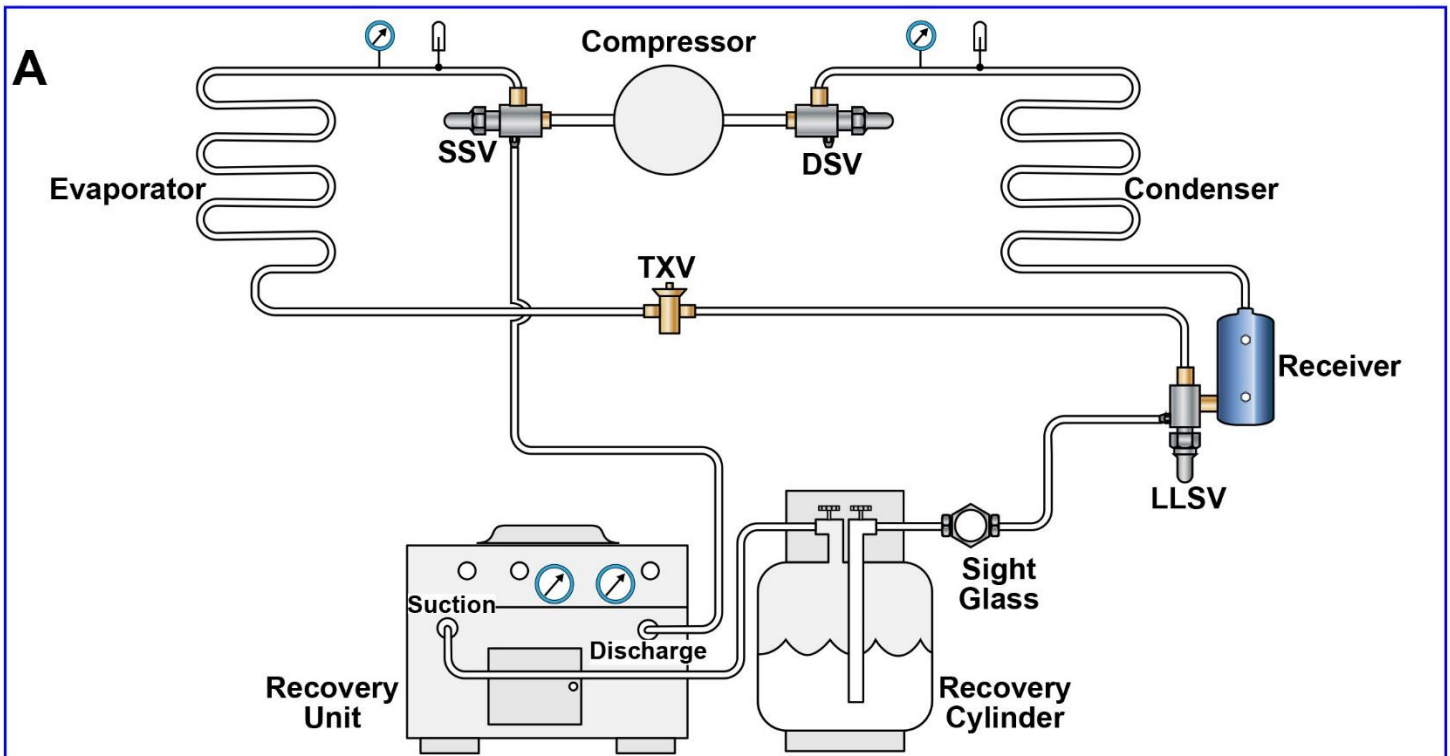
Temperature °F	Pressure psig
-14	0.4
-12	1.2
-10	2.0
-8	2.9
-6	3.7
-4	4.6
-2	5.6
0	6.5
2	7.6
4	8.6
6	9.7
8	10.8
10	12.0
12	13.2
14	14.5
16	15.8
18	17.1
20	18.5
22	19.9
24	21.4
26	22.9

Temperature °F	Pressure psig
28	24.5
30	26.1
32	27.8
34	29.6
36	31.3
38	33.2
40	35.1
45	40.1
50	45.5
55	51.2
60	57.4
65	64.1
70	71.1
75	78.7
80	86.7
85	95.3
90	104.3
95	114.0
100	124.2
105	135.0
110	146.4
115	158.4
120	171.2
125	184.6
130	198.7
135	213.6
140	229.2
145	245.6
150	262.9
155	281.1

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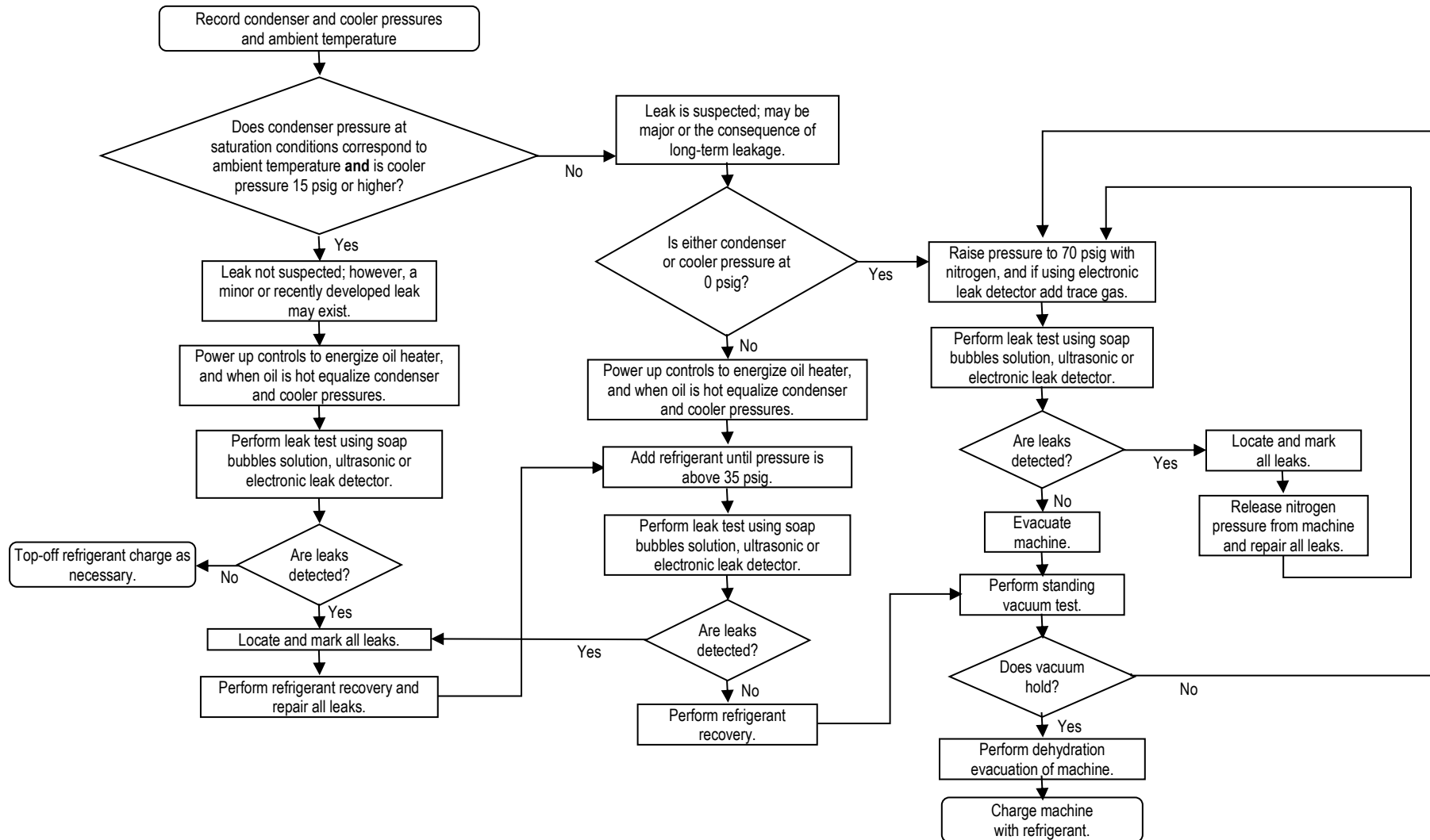
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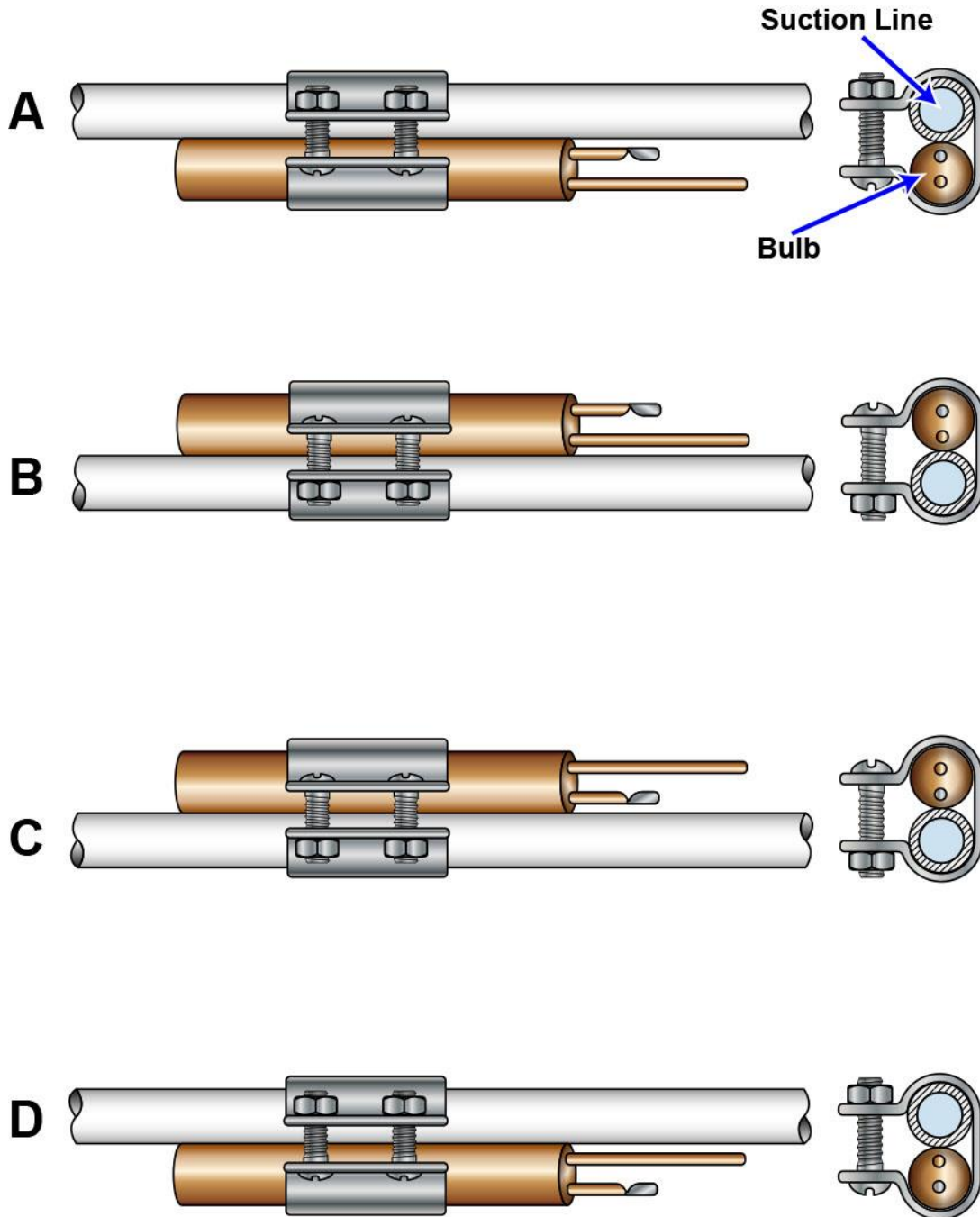
Leak Test Procedure for Idle Centrifugal Chiller Charged with R-134a Refrigerant



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 Start-Up, Operation, and Maintenance Instructions
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RA-0049

TXV Feeler Bulb on Small Suction Line (less than 3/4")



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