U.S.C.G. Merchant Marine Exam

UFIV – Assistant Engineer

Q693 General Subjects

(Sample Examination)

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

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

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

   Correct Answer: D

2. In order to distribute the side pressures over a wide area of the cylinder walls and liners, which of the listed types of pistons are used in modern low-pressure air compressors?

   A. Trunk
   B. Valve-in-head
   C. Barrel
   D. Differential

   Correct Answer: A

3. In a closed-loop process control system, what term is used to describe the action of measuring the difference between the actual result and the desired result and using that difference to drive the actual result toward the desired result?

   A. Instability
   B. Deadband
   C. Gain
   D. Feedback

   Correct Answer: D

4. Which of the following liquid level sensors would be most suitable for measuring the liquid level in a pressure vessel, such as a water-tube boiler steam drum?

   A. Static pressure sensor
   B. Displacement float level sensor
   C. Differential pressure sensor
   D. Capacitance probe

   Correct Answer: C

5. With respect to shaft bearing load absorption capability in terms of direction, what is meant by an axial load?

   A. An axial load is a load applied tangent to the circumference of the shaft.
   B. An axial load is a load applied perpendicular and parallel to the axis of the shaft.
   C. An axial load is a load applied perpendicular to the axis of the shaft.
   D. An axial load is a load applied parallel to the axis of the shaft.

   Correct Answer: D

6. According to the illustration, which of the following conditions would most likely cause pump "A" to short cycle? Illustration GS-0173

   A. The hydro-pneumatic expansion tank is operating with an insufficient air charge.
   B. The hydro-pneumatic tank is operating with a low water level.
   C. A low water level exists in the potable water storage tank.
   D. Pump "A" wearing rings have excessive clearance.

   Correct Answer: A

7. Concerning governor speed droop, what statement is true?

   A. If speed droop is permanent, the prime mover's final speed is different for each amount of loading.
   B. If speed droop is temporary, there will be no transient speed changes associated with load changes.

   C. If speed droop is permanent, the prime mover's final speed is constant regardless of the load.
   D. If speed droop is temporary, the prime mover's final speed is different for each amount of loading.

   Correct Answer: A

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

   A. In single-pass and two-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 two-pass and four-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: C

9. Energy losses occurring in a hydraulic system are ultimately absorbed by the _____.

   A. hydraulic piping flexibility
   B. reservoir expansion chamber
   C. fluid as friction
   D. atmosphere as heat

   Correct Answer: D

10. With an increase in temperature, the volume of hydraulic fluid _____.

    A. increases
    B. remains the same
    C. remains constant if pressure decreases
    D. contracts

    Correct Answer: A

11. A precharged bladder-type accumulator used in a hydraulic system, can be potentially dangerous if _____.

    A. the inert gas is exposed to hydraulic oil
    B. compressed air is used rather than an inert gas
    C. the bladder contacts the top of the poppet
    D. it is precharged with dry nitrogen

    Correct Answer: B

12. With respect to lubricating oils, what statement is true concerning viscosity and viscosity index?

    A. Viscosity is a measure of an oil's ability to resist oxidation and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.
    B. Viscosity is a measure of an oil's lubricity and viscosity index is a measure of an oil's ability to resist change in lubricity as the pressure changes.
    C. Viscosity is a measure of an oil's resistance to emulsification and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.
    D. Viscosity is a measure of an oil's internal resistance to flow and viscosity index is a measure of an oil's ability to resist change in viscosity as the temperature changes.

    Correct Answer: D

13. What type of fuel oil as part of an oily-water mixture is most likely to have a density approaching that of water?

    A. Light distillate oil
    B. Heavy residual fuel oil
    C. Marine diesel oil
    D. Distillate/residual fuel oil blends

    Correct Answer: B

14. The shaft sleeve for the pump shown in the illustration is identified by which item number? Illustration GS-0143

    A. 9
    B. 2
    C. 3
    D. 7

    Correct Answer: D

15. When an electricity generating plant features shaft-driven generators, what type of propulsor would be the most practicable for main propulsion?

    A. Fixed-pitch propeller
    B. Controllable-pitch propeller
    C. Tandem propeller
    D. Detachable-blade (built-up) propeller

    Correct Answer: B

16. Referring to the illustrated motorship freshwater cooling system drawing, which set of cooling water pumps would MOST likely require a priming maintenance system or the use of deep-well pumps? Illustration MO-0212

    A. The main engine jacket cooling freshwater pumps
    B. The main engine injector cooling freshwater pumps
    C. The main engine piston cooling freshwater pumps
    D. The ship's service diesel-generator freshwater cooling pumps

    Correct Answer: C

17. The gas that exists in the stratosphere forming a protective shield that helps to protect the environment from the harmful effects of ultraviolet radiation is called what?

    A. nitrogen
    B. ozone
    C. oxygen
    D. radon

    Correct Answer: B

18. What is the physical state and pressure condition of refrigerant as it enters the condenser of a typical refrigeration system?

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

    Correct Answer: D

19. The safety heads of most large reciprocating compressors used in refrigeration systems are held in place by what means?

    A. heavy coil springs
    B. tack welding on the sides
    C. discharge pressure in the relief valve return line
    D. large Teflon gaskets

    Correct Answer: A

20. During operating periods of a multi-box refrigeration system using a capacity-controlled compressor, when all of the evaporators of a four-box plant are actively being fed with liquid refrigerant, the control oil pressure acting on the hydraulic relay piston shown in the illustration will be at what value? Illustration RA-0013

    A. the lowest
    B. at its mid-range
    C. the highest
    D. of no consequence as the lube oil is not used in the operation of the unloader

    Correct Answer: C

21. Refrigerant flow through a thermostatic expansion valve is greatest under what conditions?

    A. when the low side and high side pressures are equal
    B. when the evaporator has just begun feeding at relatively high box temperature
    C. when the low side pressure and the bulb pressure are equal
    D. just before the evaporator stops feeding at relatively low box temperature

    Correct Answer: B

22. 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. direct liquid recovery
    C. vapor recovery/push-pull
    D. direct vapor recovery

    Correct Answer: D

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

    Correct Answer: C

24. The output volume of a positive fixed displacement pump can be changed only by _____.

    A. moving the shaft trunnion block
    B. changing the angle of the tilting plate
    C. changing the speed of the pump
    D. moving the slide block and rotor

    Correct Answer: C

25. Spring reinforced oil seals are generally installed with the tail or lip of the seal facing _____. Illustration GS-0152

    A. toward the bearing preload washer
    B. away from the oil pressure being sealed
    C. away from the bearing housing recess
    D. toward the oil pressure being sealed

    Correct Answer: D

26. Which of the listed temperature measuring devices installed on a large turbo-electric alternating current propulsion generator would be the most reliable for monitoring generator temperatures to avoid premature winding insulation failure?

    A. Temperature sensors measuring the temperature of the cooling air associated with the generator air cooler

    B. Current transformers are the most reliable means of monitoring generator temperatures
    C. Temperature sensors inserted in the stator slots for measuring stator winding temperature
    D. Temperature sensors measuring the temperature of the cooling water associated with the generator air cooler

    Correct Answer: C

27. An electric propulsion drive system in which the propulsion generator supplies power to both the propulsion motor and ship service loads is referred to as what type of system?

    A. a dedicated system
    B. an integrated system
    C. a composite system
    D. a multi-purpose system

    Correct Answer: B

28. In accordance with 33 CFR Subchapter O (Pollution), which type of Marine Sanitation Device (MSD) is used solely for the storage of sewage and flush water at ambient air pressure and temperature?

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

    Correct Answer: C

29. In an electro-hydraulic steering system, damage due to rudder shock is prevented by _____.

    A. buffer springs
    B. relief valves
    C. oil flowing through the pumps
    D. dashpots

    Correct Answer: B

30. 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 pins, item "H" at each position of item "I" to keep the rudder from swinging
    C. tighten the locking screws in item "S"
    D. secure the valves in the supply and return lines

    Correct Answer: D

31. In a series circuit, what is the applied voltage (or sum of the applied voltages) equal to?

    A. the sum of the individual currents multiplied by the number of resistors
    B. the sum of the individual voltage drops
    C. the total current divided by the total resistance
    D. the total resistance divided by the total current

    Correct Answer: B

32. If the cutting edges of a drill are ground at different angles, the _____.

    A. drill will not cut
    B. hole will be oversized
    C. drill will seize immediately
    D. hole will be undersized

    Correct Answer: B

33. What is the primary function of the devices shown in the illustration? Illustration GS-0156

    A. The transit washers transmit the rotary motion of the cap screw to the actuating assembly.
    B. The grounding straps help prevent electrolysis by improving the conductivity between the components.
    C. These abrasion resistors prevent damage to the surface around the bolt holes when tightening the bolts.

    D. The locking plates are used to prevent the fastening devices from vibrating loose.

    Correct Answer: D

34. Suppose the pilot pressure is from 3 to 15 psig for the illustrated pneumatically operated, diaphragm actuated control valve. Assuming the control valve is trimmed for a linear response and the travel position indicator is calibrated in percentage, what would be the approximate pilot pressure if the position indicator showed the valve to be 75% open? Illustration GS-0051

    A. 4.5 psig
    B. 6.0 psig
    C. 7.5 psig
    D. 9.0 psig

    Correct Answer: B

35. As shown in the illustration, if figure "21" indicates the "TOP VIEW" of an orthographic projection, and figure "11" indicates the "FRONT VIEW", which figure would best represent the correct "RIGHT SIDE VIEW"? Illustration GS-0165

    A. Figure "2"
    B. Figure "8"
    C. Figure "10"
    D. Figure "15"

    Correct Answer: C

36. The term, whole depth of the gear, shown in the illustration, is equal to _____.
Illustration GS-0111

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

Correct Answer: D

37. 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 reduced 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 counter-clockwise further out of the adjusting spring chamber.
C. The adjusting spring would need to have its compression load increased 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 clockwise further into the adjusting spring chamber.

Correct Answer: C

38. A metal scribe commonly found on a combination square measuring tool should only be used to _____.

A. remove packing
B. clean file teeth
C. punch gasket holes
D. mark on metal

Correct Answer: D

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

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

Correct Answer: A

40. As shown in figure "A" of the illustration, with the switch closed what statement is true if "R1" and "R2" have unequal resistance values? Illustration EL-0019

A. The energy dissipated in "R1" will be the same as the energy dissipated in "R2".
B. The voltage drop across "R1" will not be equal to the voltage drop across "R2".
C. The current flow through "R1" will differ from the current flow through "R2".
D. The current flow through "R1" will equal the current flow through "R2".

Correct Answer: C

41. Periodic testing using a special sensing device may be performed to detect potentially dangerous loose or corroded bus bar and controller connections. What is the name of this testing technology?

    A. electric vibro-analysis
    B. visual pyrotronics
    C. corrosion electrolysis
    D. infra-red thermography

    Correct Answer: D

42. Which of the substances listed can be used to shield sensitive equipment from static magnetic fields?

    A. Glass
    B. Iron
    C. Mica
    D. Bakelite

    Correct Answer: B

43. A silicon-controlled rectifier (SCR) is a solid-state device used for what functional purpose?

    A. attenuating of voltage, current, and/or power
    B. automatic impedance matching function
    C. amplifying voltage, current, and/or power
    D. triggering the operation of a switching function

    Correct Answer: D

44. To keep emergency lead-acid batteries in a full state of charge for emergency use, what is normally done?

    A. Batteries are kept charged by maintaining a continuous trickle charge.
    B. Batteries are kept charged by performing an equalizing charge daily.
    C. Batteries are kept charged by maintaining the maximum charging rate.
    D. Batteries are kept charged by cycling through discharge and charge cycles daily.

    Correct Answer: A

45. What is the most reliable and preferred method for determining the state of charge of a wet cell NiCad battery while it is being charged?

    A. Measuring the battery voltage with a digital voltmeter
    B. Measuring the temperature corrected specific gravity of each cell with a hydrometer and thermometer
    C. Measuring the specific gravity of each cell with a hydrometer
    D. Measuring the battery voltage with a solenoid type voltage tester

    Correct Answer: A

46. Which of the illustrated motors has an open motor enclosure? Illustration EL-0001

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

    Correct Answer: B

47. What is the functional name of an electrical device which prevents simultaneous energization of loads thereby preventing damage or injury?

    A. modulating device
    B. mechanical limit device
    C. monitoring device
    D. electrical interlock device

    Correct Answer: D

48. The arc resulting from the tripping of a circuit breaker is prevented from damaging the contacts. How is this done?

    A. instantaneous magnetic trip for overload currents
    B. designing the contacts to open slowly
    C. extinguishing the arc by means of an arc chute
    D. an inverse timed thermal trip for short circuit currents

    Correct Answer: C

49. A grinding wheel is trued with a _____.

    A. lathe tool
    B. dressing tool
    C. round file
    D. garnet stone

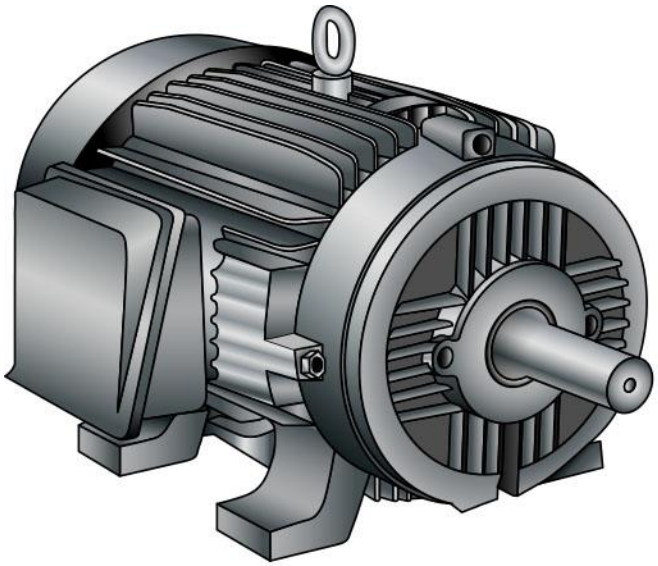
    Correct Answer: B

50. 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

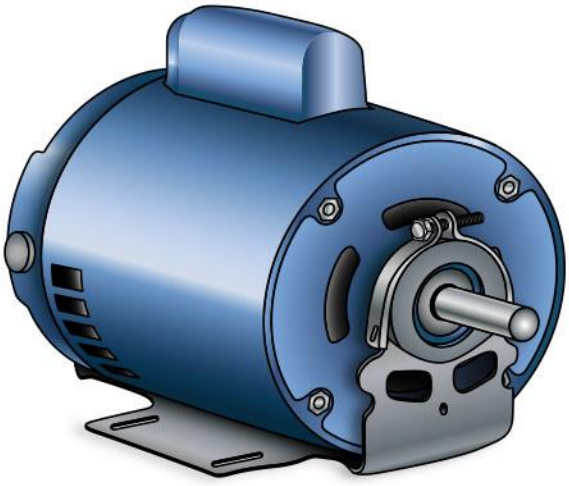
    Correct Answer: D

EL-0001



A

B



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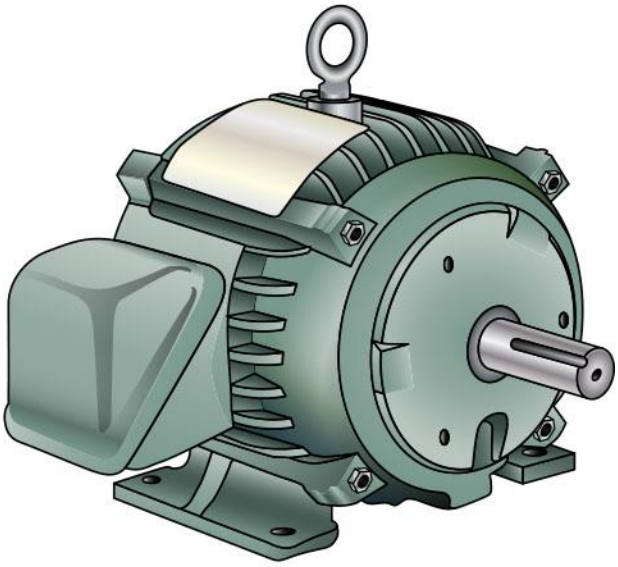

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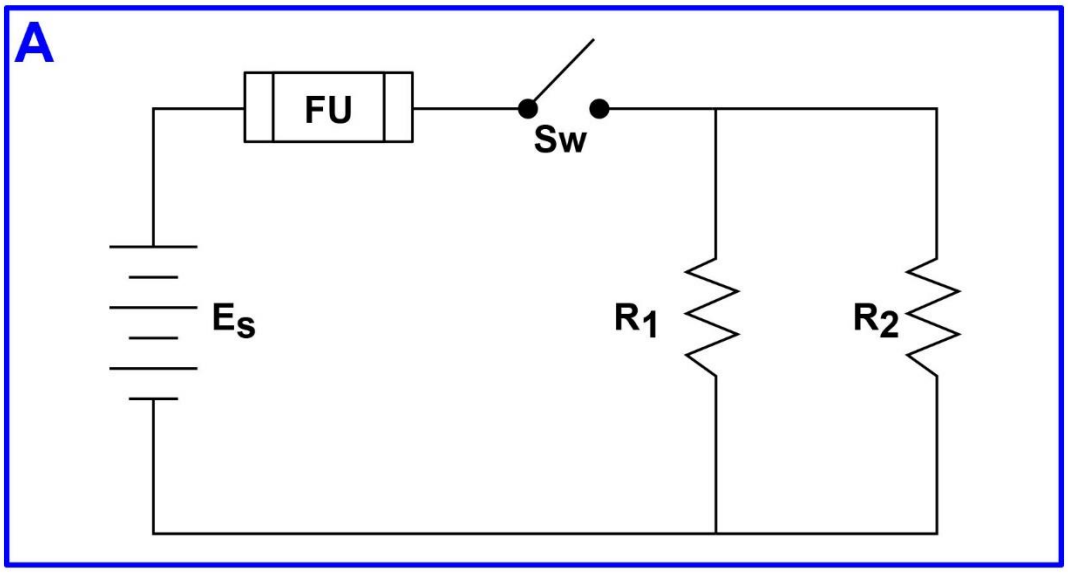

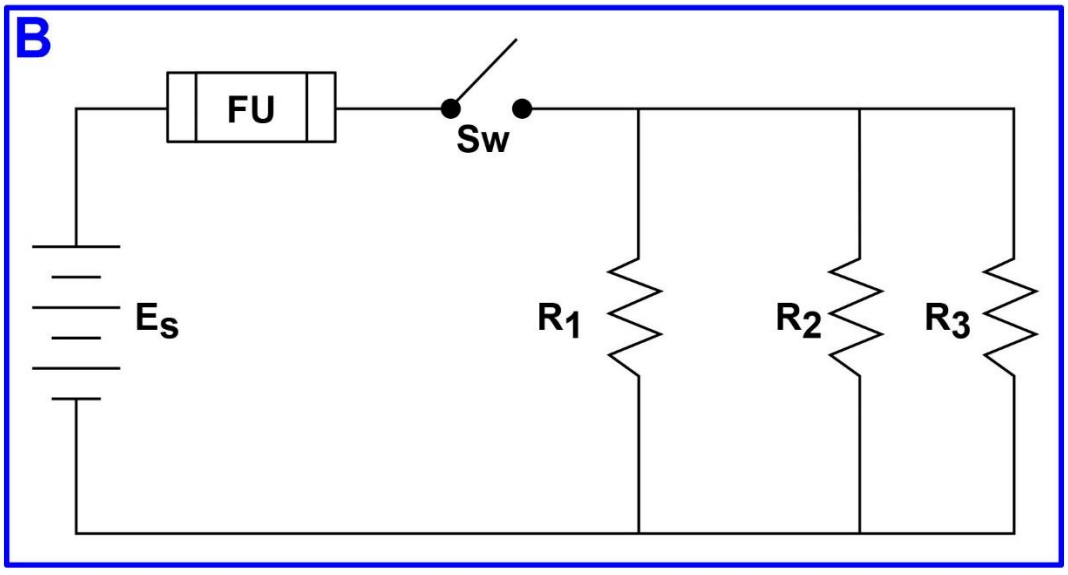

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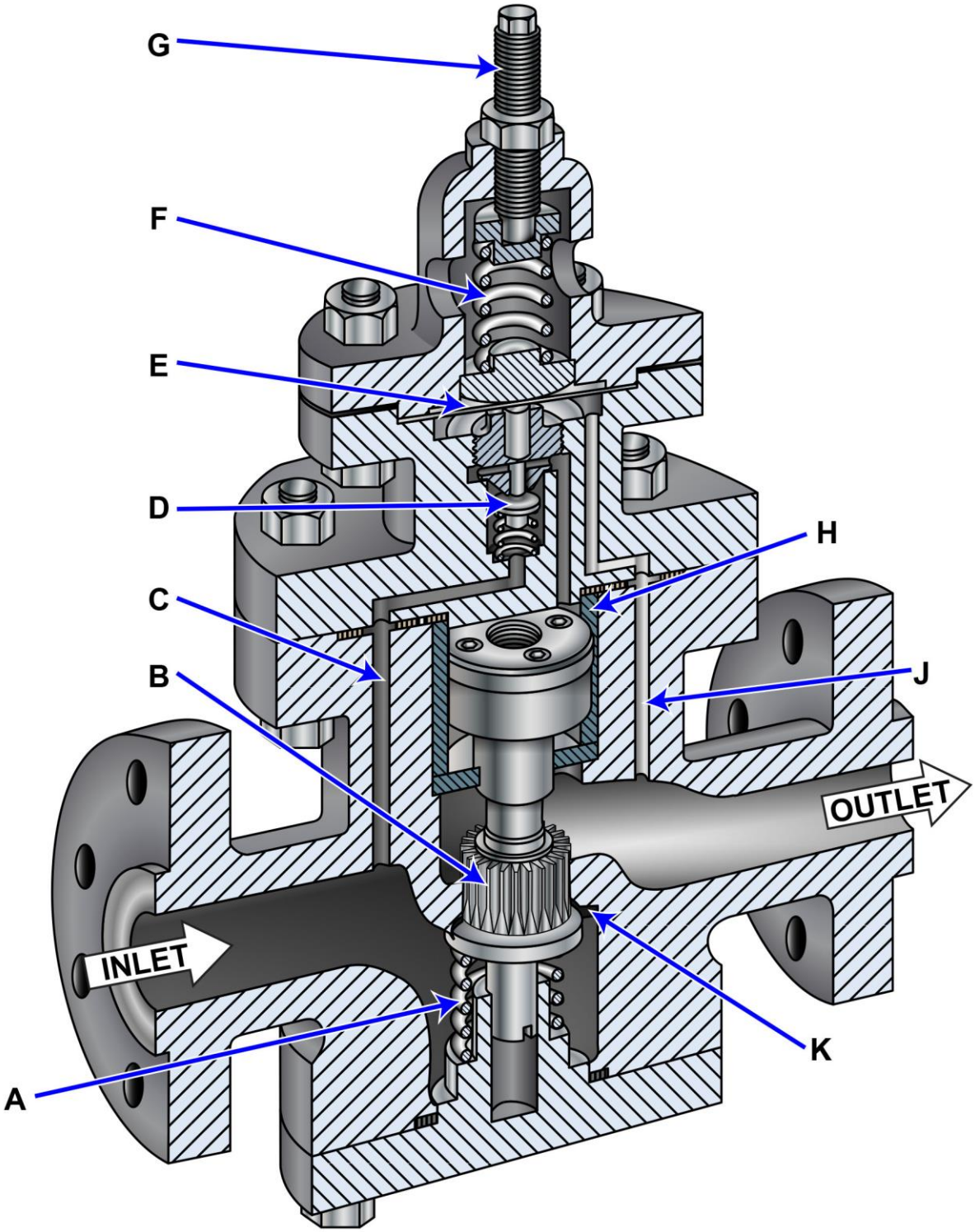

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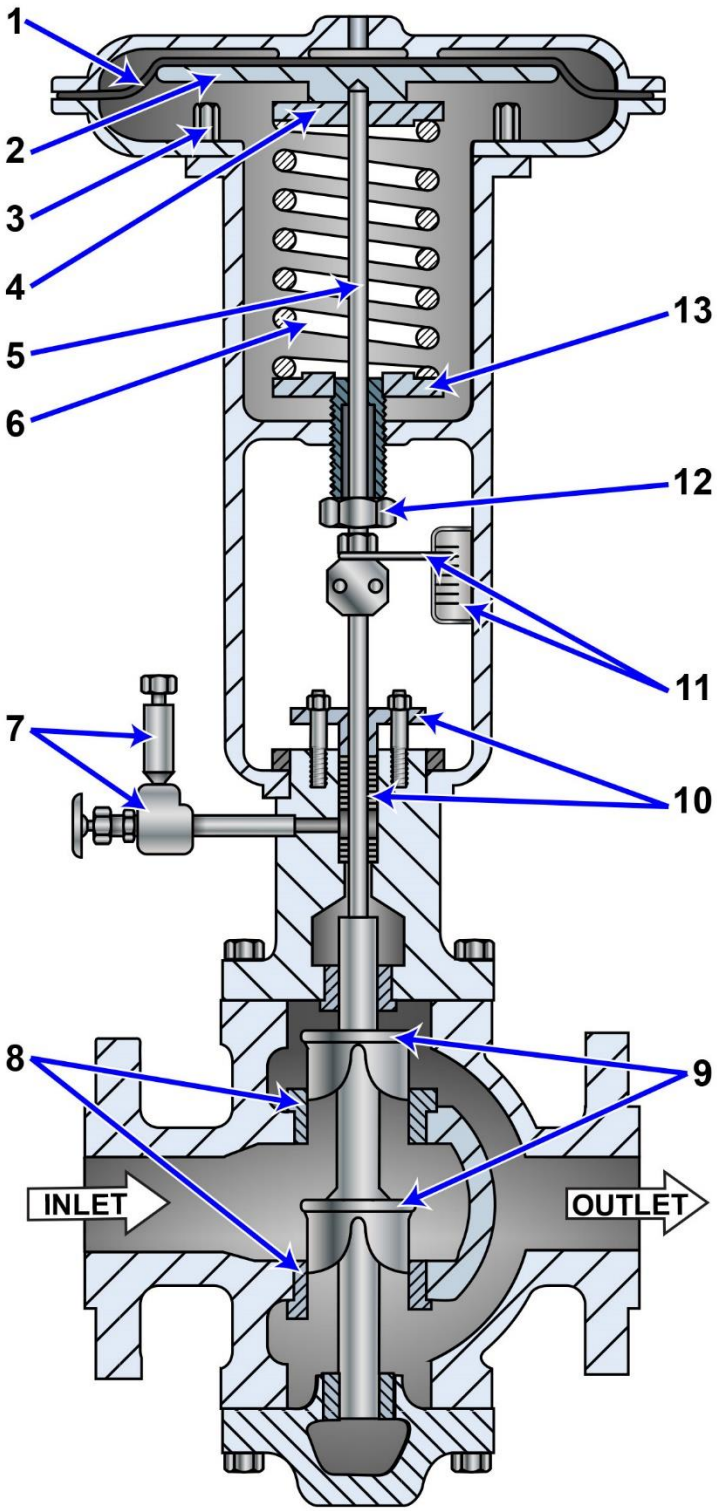

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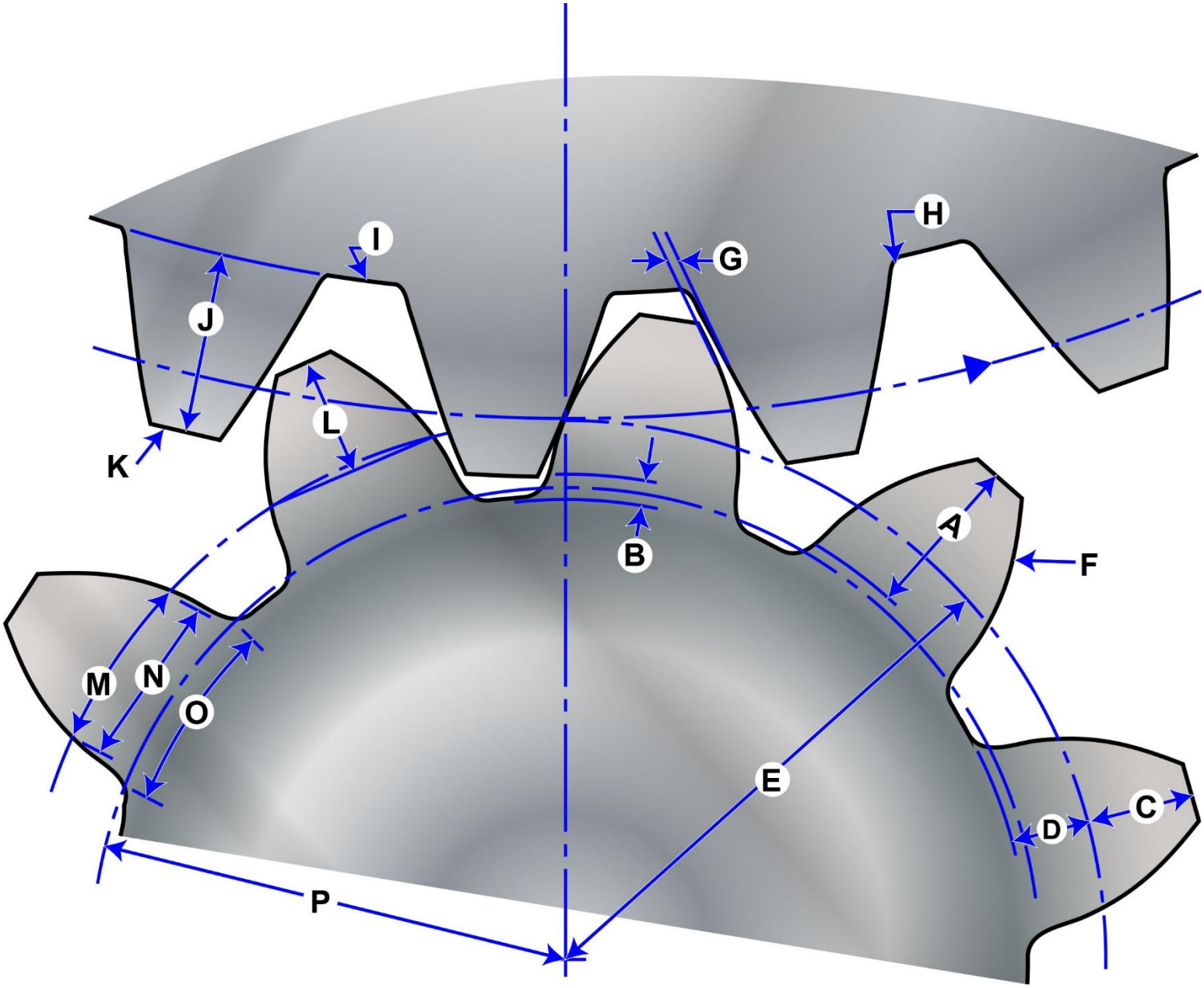

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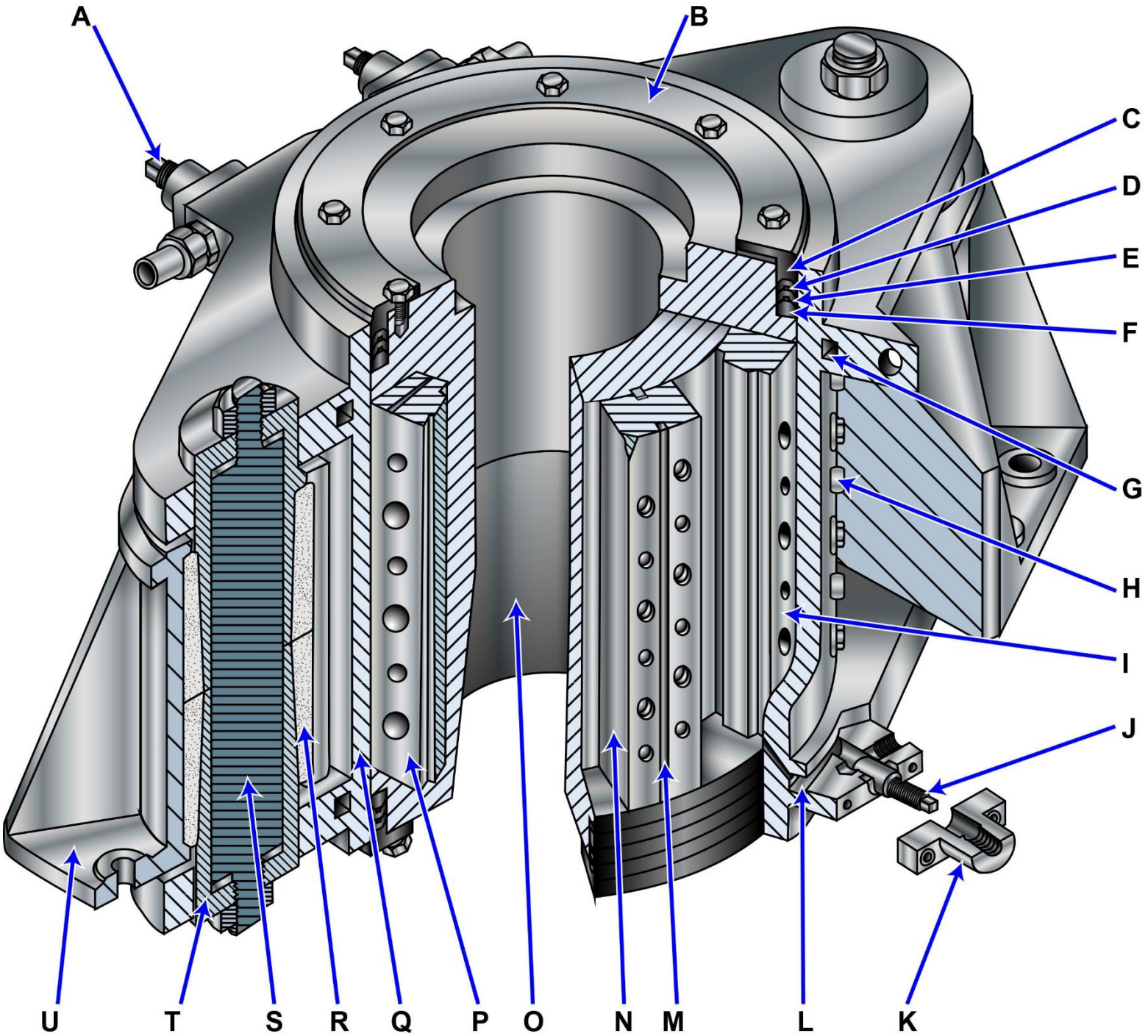

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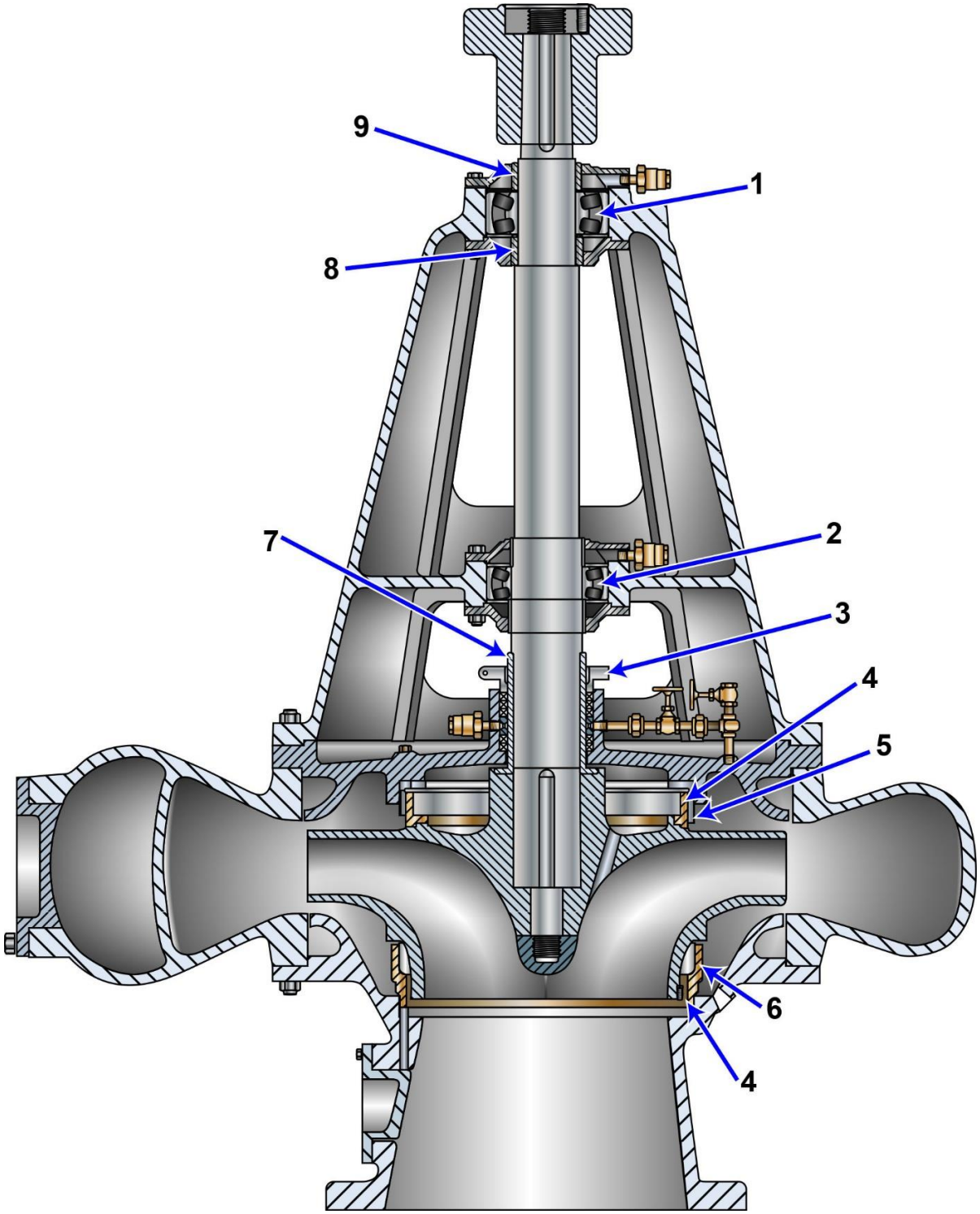

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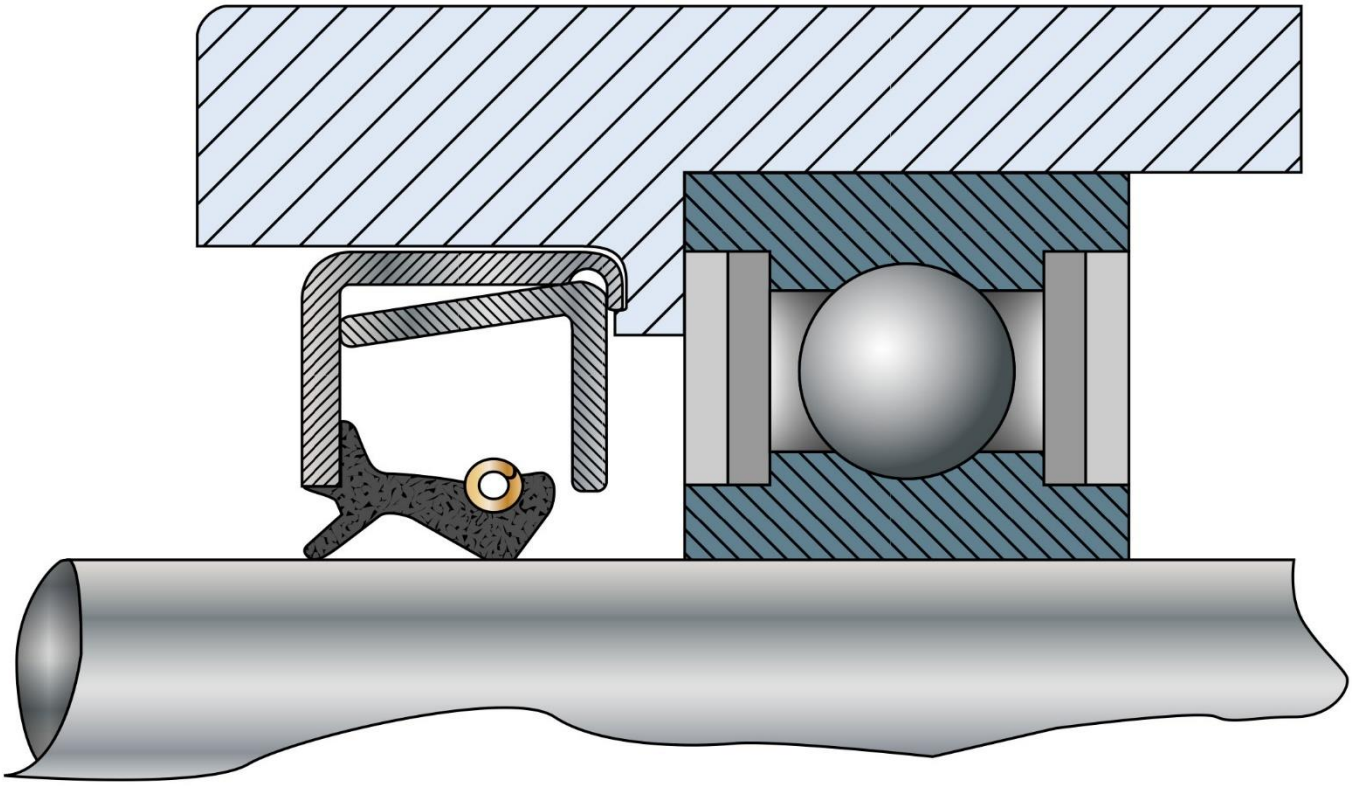

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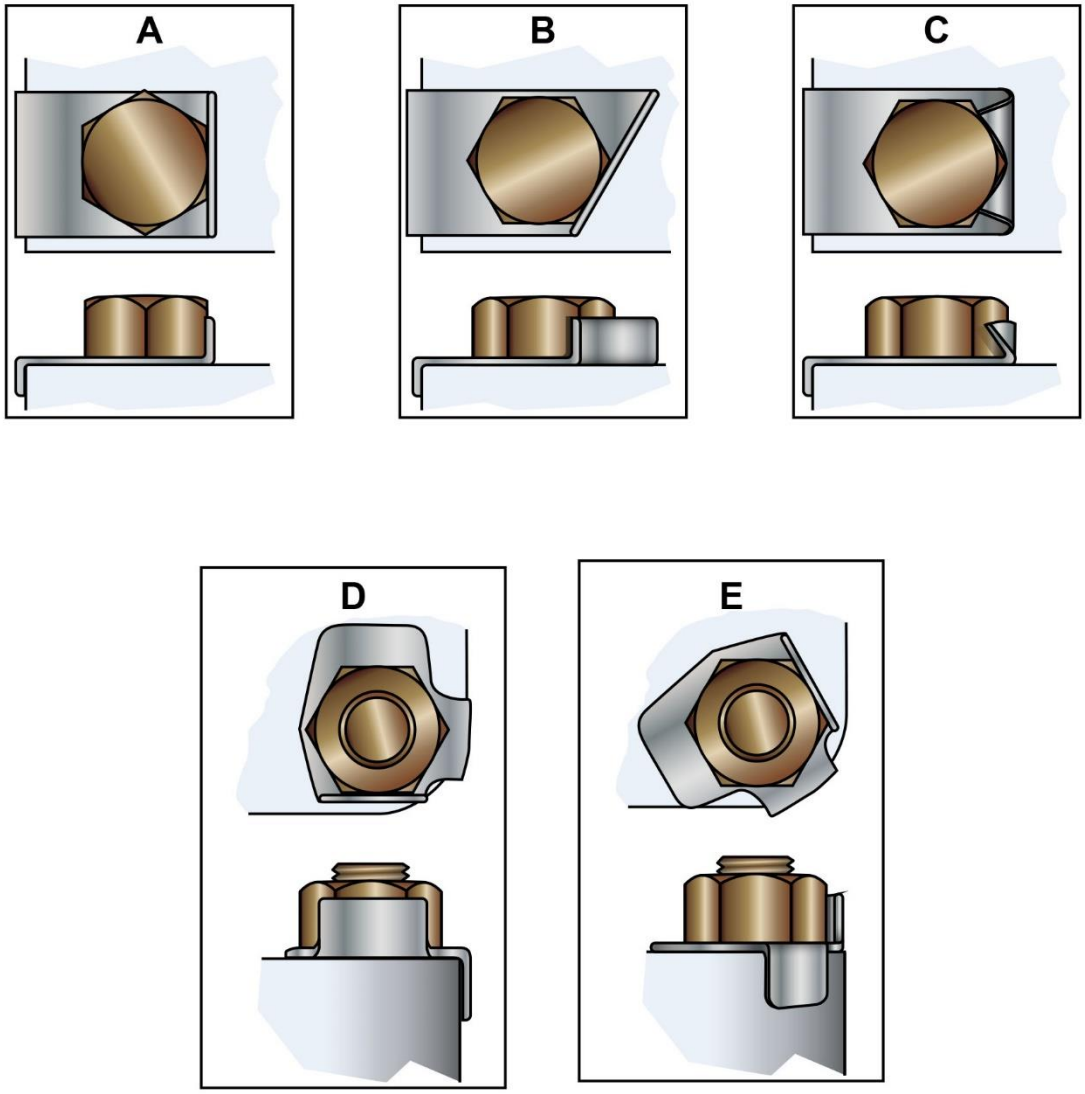

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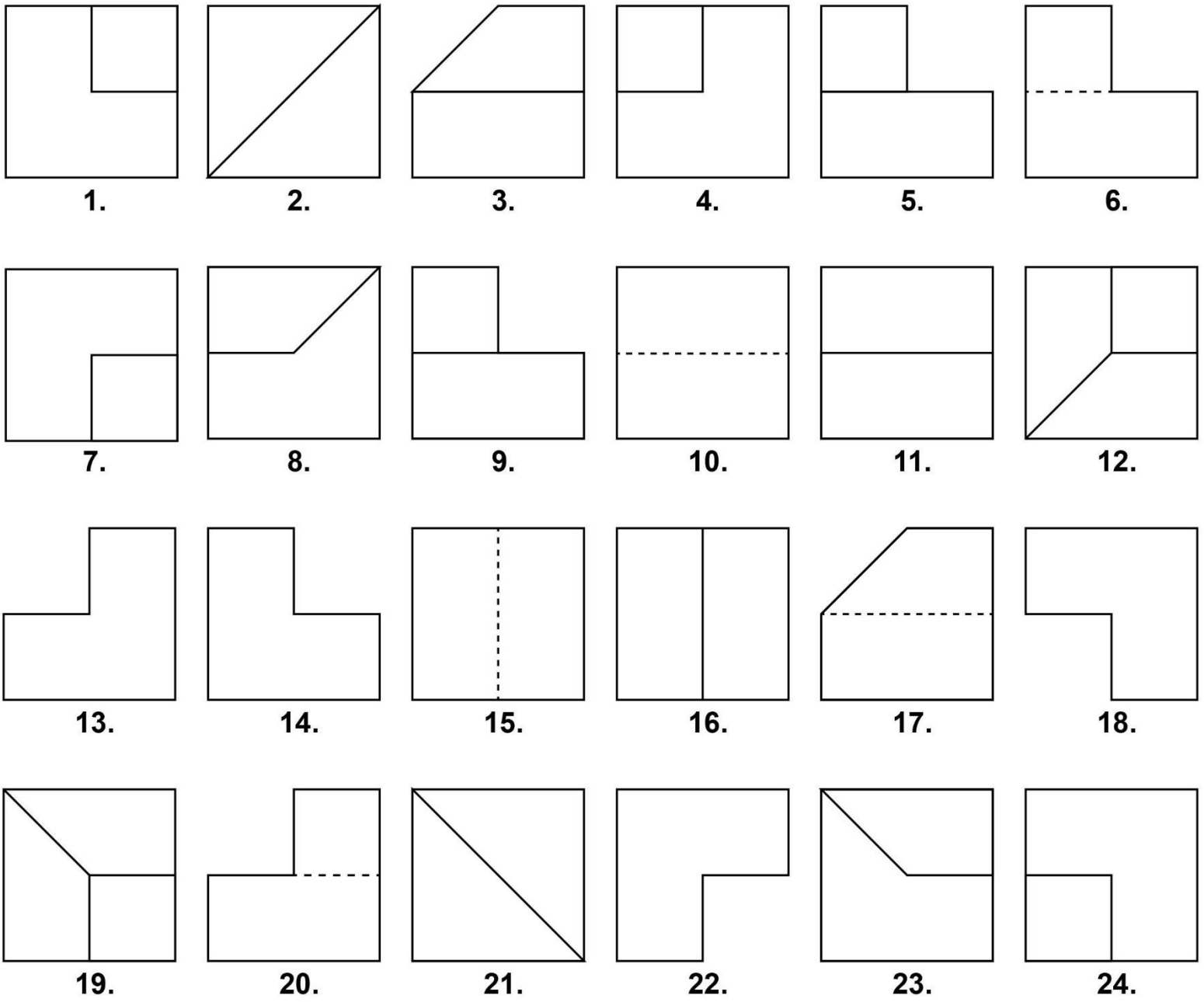

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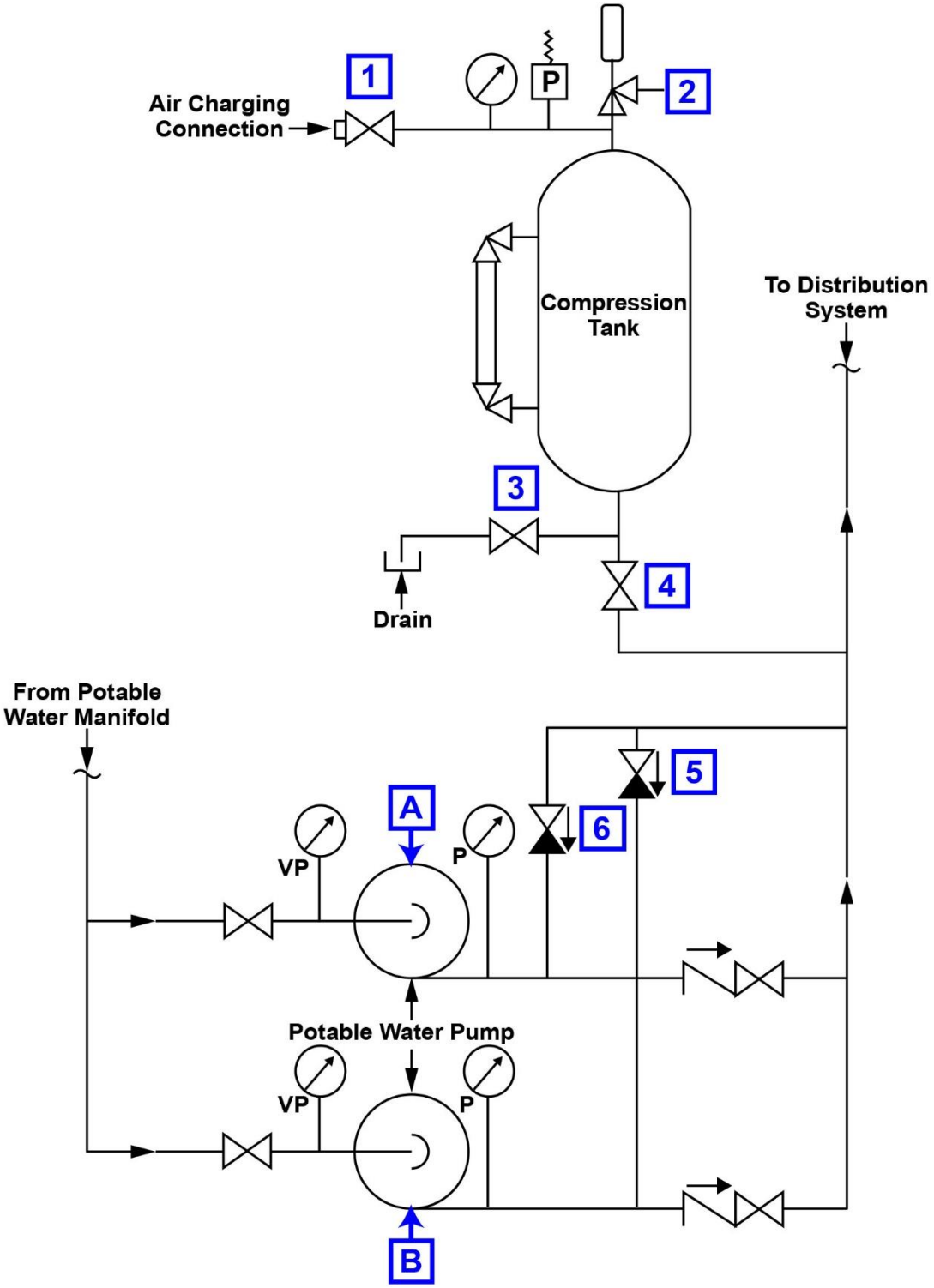

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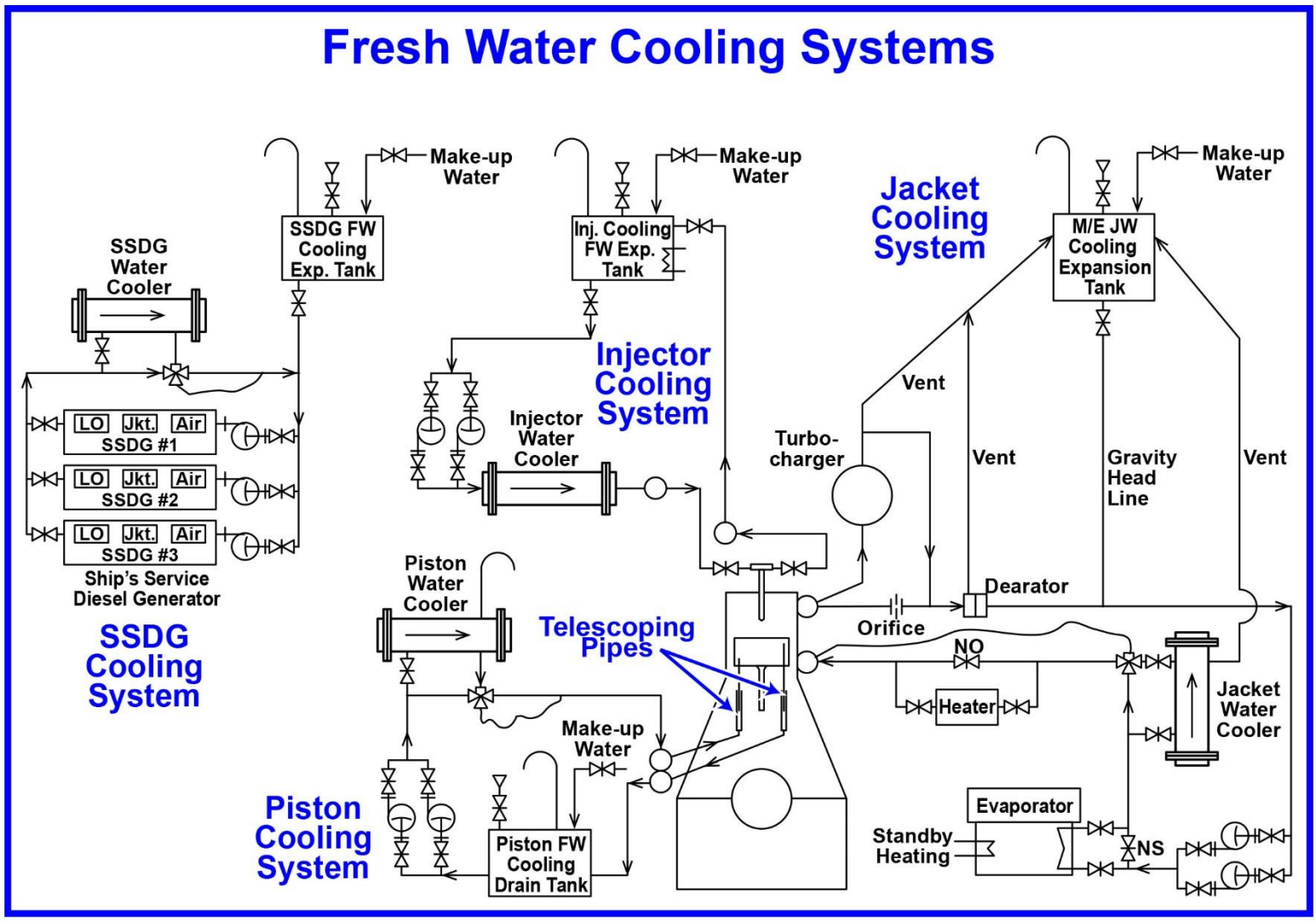

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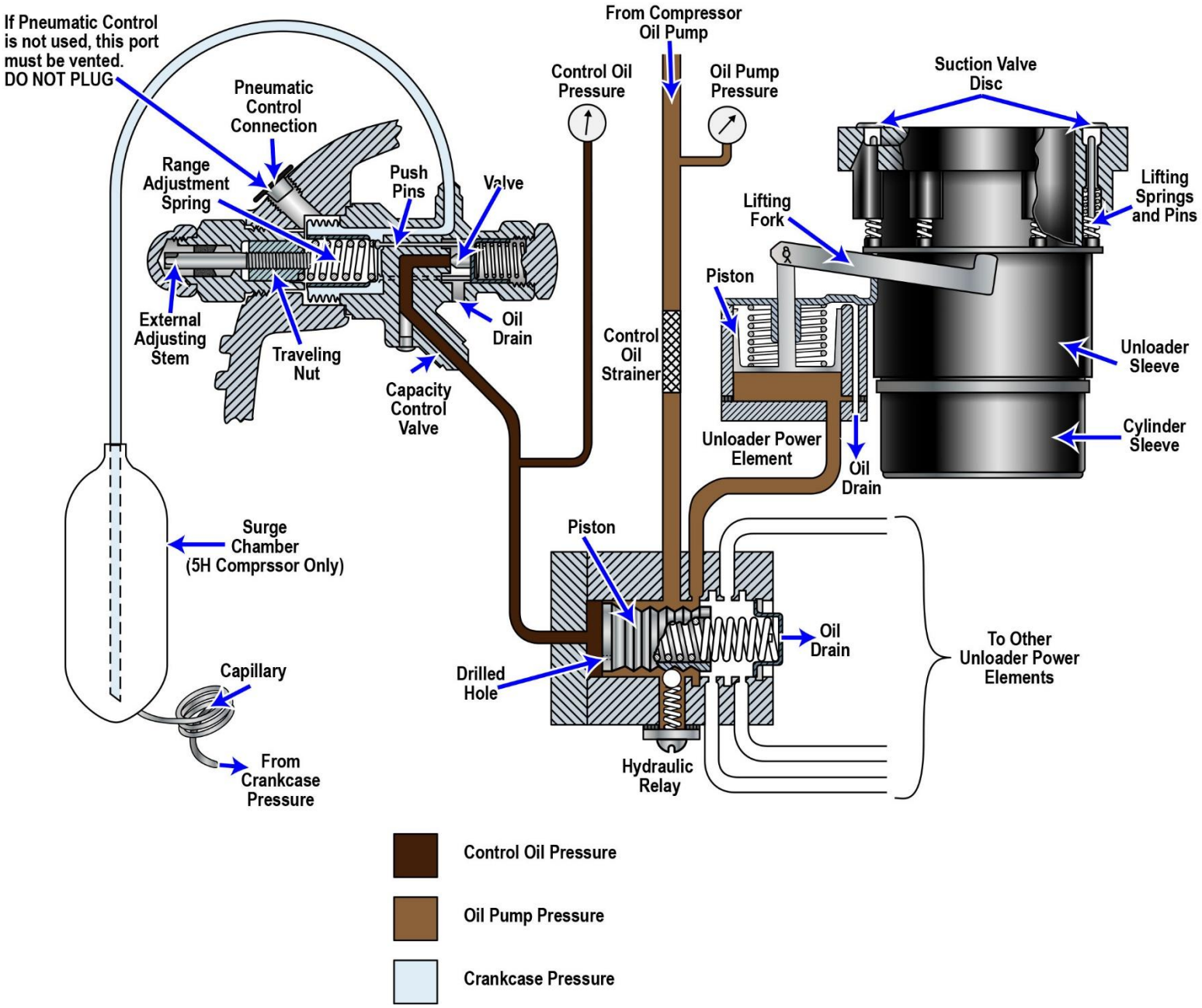

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