U.S.C.G. Merchant Marine Exam

QMED

Q800 Junior Engineer – Part I

(Sample Examination)

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

1. While underway on a steamship, the main condenser is operating under a 28.09 "Hg vacuum gauge. According to the illustrated properties of saturated steam table, how much condensate depression would there be if the condensate temperature leaving the main condenser hot well is 96.0°F? Illustration SG-0026

   A. 1.83°F
   B. 2.24°F
   C. 8.71°F
   D. 70.15°F

   Correct answer: B

2. Which of the following conditions would prevent a steam reciprocating pump from delivering its rated capacity?

   A. Air trapped in the discharge expansion chamber
   B. Excessive suction lift
   C. A leaking snifter valve allowing air to enter the suction side of the pump
   D. All of the above

   Correct answer: B

3. Lube oil pumps taking suction from the sump of most small marine engines are usually _____.

   A. eductor type
   B. diaphragm type
   C. positive displacement type
   D. centrifugal type

   Correct answer: C

4. What is the reason that P-type or S-type traps are fitted on the sinks in a head?

   A. to reduce water velocity and minimize erosion
   B. to create a strong siphon effect
   C. to provide a cushion of water to reduce the effects of water hammer
   D. to provide a seal against sewer gas rising into the compartment

   Correct answer: D

5. What is the danger if a boiler is brought on the line with its steam pressure much higher than that of the boiler already on the line?

   A. low water
   B. thermal shock
   C. an overloaded superheater
   D. priming and carryover

   Correct answer: D

6. Where is the air charge for an air starting system stored?

   A. Air compressor
   B. Pressurized tank
   C. Distributor assembly
   D. Cylinder check valve

   Correct answer: B

7. Prior to initial light off of an idle boiler, what must first be done to prevent boiler flareback?

   A. The furnace must first be purged of combustible vapors with the forced draft blower while the air register doors are open.
   B. The furnace must first be purged of inert vapors and oxygen with the forced draft blower while the air register doors are closed.
   C. The furnace must first be purged of inert vapors and oxygen with the forced draft blower while the air register doors are open.
   D. The furnace must first be purged of combustible vapors with the forced draft blower while the air register doors are closed.

   Correct answer: A

8. The expansion tank in a diesel engine closed freshwater cooling system is located at _____.

   A. or near the floor plate level
   B. or near the tank top level
   C. the highest point in the system
   D. the lowest point in the system

   Correct answer: C

9. Which of the listed devices would be installed in the air compressor discharge line between the compressor and receiver of a control air system?

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

   Correct answer: A

10. The component shown in the illustration, labeled "I", is the _____. Illustration SE-0013

    A. first reduction pinion
    B. first reduction gear
    C. second reduction gear
    D. second reduction pinion

    Correct answer: B

11. Which of the following could be the cause of leaking valves in an air compressor?

    A. abrasion, dust, and dirt
    B. irregular compression strokes
    C. excessive discharge pressure
    D. excessive compressor speed

    Correct answer: A

12. Which of the following statements is correct concerning heat transfer?

    A. Heat is given off from a high temperature region known as a heat sink.
    B. Heat transfer rate is affected most by the size of the heat sink involved.
    C. Heat transfer rate is affected most by the temperature difference between the heat source and the heat sink.
    D. Heat transfer by radiation will occur only by mass motion of a fluid substance.

    Correct answer: C

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

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

    Correct answer: D

14. The DC heater automatic level dump valve is used to _____.

    A. divert excess feedwater to the distilled water tank
    B. maintain a proper condensate level in the condenser hotwell
    C. divert the flow of condensate from the first stage heater to the vent condenser
    D. recirculate condensate to the atmospheric drain tank

    Correct answer: A

15. Which of the components listed prevents water from flowing back into the auxiliary exhaust line if the deaerating feed tank becomes flooded?

    A. Exhaust piping
    B. Check valve
    C. Pumps
    D. Reverse-acting relief valve

    Correct answer: B

16. Which of the listed order of valves represents the proper installation of the main feedwater supply line to a marine propulsion boiler?

    A. Regulator, stop, stop-check
    B. Stop, regulator, stop-check
    C. Stop-check, regulator, stop
    D. Stop-check, stop, regulator

    Correct answer: C

17. A dirty diesel engine oil filter element can best be detected by _____.

    A. decrease in oil viscosity from the filter
    B. visual inspection of the elements
    C. high lube oil sump temperature
    D. the pressure drop across the filter

    Correct answer: D

18. Item 4 shown in the illustration represents a _____. Illustration GS-0125

    A. manifold
    B. suction line
    C. bilge system
    D. vacuum branch line

    Correct answer: A

19. Fuel oil settling tanks are used to _____.

    A. precipitate out water and solids
    B. store oil for immediate use
    C. facilitate the stripping of sludge and water
    D. all of the above

    Correct answer: D

20. The atmospheric drain tank (ADT) normally drains to the _____.

    A. main and/or auxiliary air ejector condenser
    B. main and/or auxiliary condenser
    C. distillate tank
    D. reserve feed tanks

    Correct answer: B

21. How is lube oil pressure provided to a turbogenerator when starting the unit in an automated plant?

    A. a line from the other generator
    B. the main lube oil pump
    C. a line from the gravity tank
    D. the hand-operated or auxiliary lube oil pump

    Correct answer: D

22. Which of the following descriptions best identifies the operating principal of a flash type evaporator?

    A. Sea water is heated to boiling temperature while under a vacuum.
    B. Sea water is forced through a heated eductor.
    C. Heated sea water is injected into a vacuum chamber.
    D. Sea water is passed over heated plates in a thin film.

    Correct answer: C

23. Fuel oil is regularly transferred to the day tank in order to _____.

    A. allow impurities to settle out of the fuel
    B. make fuel available for immediate use
    C. allow for decanting of water
    D. all of the above

    Correct answer: D

24. In terms of the completeness of combustion, in viewing the condition of the stack, what would be the indication of the MOST complete combustion and HIGHEST boiler efficiency?

    A. White smoke
    B. Black smoke
    C. Light brown haze
    D. Clear stack

    Correct answer: C

25. Connecting rods in a diesel engine are used to connect the _____.

    A. engine to the bed
    B. crankshaft to the gear train
    C. rocker arm to the camshaft
    D. piston to the crankshaft

    Correct answer: D

26. The purpose of the engine-driven hydraulic pump in an auxiliary diesel engine hydraulic starting system is to _____.

    A. restore hydraulic pressure in the accumulator after starting
    B. engage the starter motor with the flywheel
    C. fill the sump and prevent low level in the system
    D. bypass the hydraulic motor when the engine is running

    Correct answer: A

27. The dirty oil inlet on centrifugal lube oil purifiers is located at the _____.

    A. top or bottom of the disk-type depending upon whether the unit is to be operated as a separator or clarifier
    B. bottom only of the disk-type
    C. bottom of the tubular bowl type
    D. top of the tubular bowl type

    Correct answer: C

28. As shown in the illustrated D type single furnace boiler, what does item "J" represent? Illustration SG-0008

    A. Desuperheater tubes
    B. Superheater tubes
    C. Generating tubes
    D. Screening tubes

    Correct answer: D

29. Which statement is true concerning drain inspection tanks?

    A. Inspection tanks collect all HP drains.
    B. They collect condensate from the cargo tank heating coils only.
    C. They are discharged to the condensate system just forward of the feed pump.
    D. Inspection tanks provide for a visual examination of condensate which could be oil contaminated.

    Correct answer: D

30. A three-way thermostatic control valve regulates the diesel engine cooling water temperature by passing a portion of the water _____.

    A. overboard
    B. around the engine
    C. around the cooler
    D. to the expansion tank

    Correct answer: C

31. What is a quick and effective way of determining whether or not a boiler water gauge glass is operating properly?

    A. Quickly opening and then reclosing the gauge glass upper root valve.
    B. Quickly opening and then reclosing the gauge glass drain valve.
    C. Watching for the level to fluctuate in the glass corresponding to ship movements such as pitching.
    D. Quickly opening and then reclosing the gauge glass lower root valve.

    Correct answer: B

32. Which of the listed substances can be satisfactorily removed from diesel fuel by centrifuging?

    A. Sludge
    B. Gasoline
    C. Fuel oil
    D. Lube oil

    Correct answer: A

33. In order for microbiological growths to thrive in a fuel tank it is necessary for _____.

    A. vanadium to be present
    B. low temperatures to exist
    C. moisture or water to be present
    D. electrolysis to be occurring

    Correct answer: C

34. The cubic inch (or liter) displacement of a cylinder is determined by the diameter of the piston and the _____.

    A. length of the crankshaft
    B. volume of the clearance space
    C. weight of the piston
    D. length of the stroke

    Correct answer: D

35. What would be the primary indication that a heavy fuel oil purifier supply pump suction strainer needed cleaning?

    A. An increased pressure drop across the strainer (more differential)
    B. A drop in purifier bowl speed
    C. A decreased pressure drop across the strainer (less differential)
    D. An increase in fuel oil supply temperature to the bowl

    Correct answer: A

36. Fuel injection pumps using the port and helix metering principle requires the use of a _____.

    A. crosshatched design
    B. lapped plunger and barrel
    C. variable stroke
    D. variable cam lift

    Correct answer: B

37. The DC heater functions to _____.

    A. remove air from feedwater
    B. store feedwater
    C. heat feedwater
    D. all of the above

    Correct answer: D

38. The component shown in the illustration, labeled "I", is the _____. Illustration SE-0013

    A. second reduction gear
    B. second reduction pinion
    C. first reduction pinion
    D. first reduction gear

    Correct answer: D

39. Cooling the intake air supplied to a diesel engine will _____.

    A. reduce mean effective pressure
    B. decrease average compression ratio
    C. decrease air charge density
    D. increase peak power output

    Correct answer: D

40. Fusible plugs are installed in fire-tube boilers to _____.

    A. provide a means of draining the boiler
    B. warn the engineer of low water level
    C. cool the crown sheet at high firing rates
    D. open the burners' electrical firing circuits

    Correct answer: B

41. After the steam leaves the low-pressure turbine, it enters the _____.

    A. main condenser
    B. turbine extraction valve manifold
    C. feed and filter tank
    D. first-stage feedwater heater

    Correct answer: A

42. Some diesel engines are supercharged with a _____.

    A. slam charger
    B. turbocharger
    C. fuel atomizer
    D. fuel injector

    Correct answer: B

43. The section of the turbocharger which would be connected to the aftercooler inlet is labeled _____. Illustration MO-0228

    A. B
    B. C
    C. H
    D. K

    Correct answer: A

44. Steam supplied to the main propulsion turbines is _____.

    A. wet steam
    B. superheated steam
    C. saturated steam
    D. desuperheated steam

    Correct answer: B

45. What is the main turbine gland sealing steam system designed to do?

    A. seal the turbine shaft against air leakage into the turbine casing
    B. regulate steam pressure to the glands when the main turbine is operating at reduced speeds
    C. allow minimal steam leakage out of the gland
    D. all of the above

    Correct answer: D

46. Which of the statements represents a characteristic of the thrust collar in a Kingsbury thrust bearing? Illustration SE-0012

    A. It turns with the shaft and the pivot shoes do not rotate.
    B. It is stationary and the shoes turn with the shaft.
    C. It is turned by the base ring of the bearing.
    D. It is held in position by the bearing base ring.

    Correct answer: A

47. What type of disinfection system has the disadvantage that it would fail to provide residual disinfectant in the potable water?

    A. An ultraviolet irradiator at the desalinator discharge to the potable water storage tank.
    B. A brominator located at the desalinator discharge piping to the potable water storage tank.
    C. A chlorinator located at the desalinator discharge piping to the potable water storage tank.
    D. A chlorinator located at the potable water storage tank recirculation line.

    Correct answer: A

48. Why would a flash type distilling unit be more efficient when operated in cooler sea water temperatures?

    A. Steam carryover between stages is reduced.
    B. Feedwater flow from the feedwater heater is increased.
    C. The amount of available flash steam is decreased.
    D. Evaporator vacuum is increased.

    Correct answer: D

49. A pump shaft that is bent or distorted should normally be _____.

    A. replaced with a satisfactory spare
    B. reconditioned by metalizing and machining
    C. straightened by applying heat and torsion
    D. repaired by a suitable welding process

    Correct answer: A

50. In a diesel engine, a leaking exhaust valve can cause _____.

    A. misfiring
    B. pre-ignition
    C. interrupted scavenging
    D. reduced scavenging

    Correct answer: A

51. The process of scavenging a two-stroke cycle diesel engine serves to _____.

    A. improve fuel flow volume
    B. cool the exhaust valves
    C. reduce the intake air charge density
    D. increase the temperature of exhaust gases

    Correct answer: B

52. The diesel engine component labeled "3", shown in the illustration is called the _____.
    Illustration MO-0122

    A. cylinder liner
    B. cylinder head
    C. scavenging air space
    D. head valve assembly

    Correct answer: B

53. Heat exchangers are most commonly found in a small auxiliary diesel engine _____.

    A. fuel oil system
    B. governing system
    C. air starting system
    D. lube oil system

    Correct answer: D

54. When an air started, four-stroke cycle diesel engine is being cranked over, the starting air is admitted to each cylinder during the beginning of its _____.

    A. intake stroke
    B. compression stroke
    C. power stroke
    D. exhaust stroke

    Correct answer: C

55. Which of the following conditions is indicated by oil flowing through a lube oil gravity tank overflow sight glass?

    A. Turbine bearing failure has occurred.
    B. Insufficient oil is being pumped to the gravity tank.
    C. Excessive oil is stored in the gravity tank.
    D. Sufficient oil flow is being supplied to the gravity tank.

    Correct answer: D

56. What statement is true concerning a propulsion steam turbine turning (jacking) gear?

    A. The jacking gear splined clutch is associated with the low-pressure turbine first reduction pinion.
    B. The jacking gear splined clutch is associated with the low-pressure turbine second reduction pinion.
    C. The jacking gear splined clutch is associated with the high-pressure turbine second reduction pinion.
    D. The jacking gear splined clutch is associated with the high-pressure turbine first reduction pinion.

    Correct answer: D

57. To properly clean a burner tip, you should use _____.

    A. a jack knife
    B. light sand blast grit
    C. a wire brush
    D. a soft metal tool

    Correct answer: D

58. Air accumulated in the intercondenser of the air ejector assembly is discharged directly to the _____.

    A. main condenser
    B. high-pressure turbine
    C. atmosphere
    D. aftercondenser

    Correct answer: D

59. As found in a reduction gear drive system, thrust bearings serve to _____.

    A. hold the main engine in place
    B. increase the shaft speed
    C. limit the radial movement of the shaft
    D. transmit the force produced by the propeller to the structure of the ship

    Correct answer: D

60. The automatic recirculating valve in the main condensate recirculating line is controlled by a temperature sensor which is located at the _____.

    A. main condensate pump discharge
    B. air ejector condensate discharge
    C. condensate inlet to the main air ejectors
    D. main condensate pump suction

    Correct answer: B

61. When the compressed air reservoir is placed in line with an air compressor and is used as an aftercooler, what must be done with the reservoir?

    A. It must be frequently drained of condensed water
    B. It must be fitted with a moisture trap at the inlet
    C. It must be fitted with a sight glass
    D. It must be fitted with a manhole

    Correct answer: A

62. In a gravity lube oil system, a sight glass is installed in a line near the operating platform. What two things does this line connect?

    A. gravity tank overflow and the sump
    B. gravity tank overflow and the lube oil headers
    C. bottom of the gravity tank and the sump
    D. bottom of the gravity tank and the lube oil headers

    Correct answer: A

63. The power consumed during the scavenging process of a diesel engine is known as the _____.

    A. compression loss
    B. valve loss
    C. back pressure loss
    D. pumping loss

    Correct answer: D

64. What device on the bridge shows the rudder's position?

    A. rudder angle indicator
    B. follow-up gear
    C. telemotor position
    D. Rapson slide indicator

    Correct answer: A

65. As shown in the illustration, what component would normally be installed at location "I"? Illustration MO-0231

    A. Boiler sootblower unit
    B. Boiler water level indicator
    C. Flue gas smoke indicator
    D. Oil fired mechanical burner

    Correct answer: D

66. Serious tube leaks in the air ejector aftercondenser assembly may cause _____.

    A. fouled nozzles
    B. an overflow of the atmospheric drain tank
    C. an overflow of the contaminated drain inspection tank
    D. clogged steam strainers

    Correct answer: B

67. After which of the following is the air cock to be closed when raising steam on a cold boiler?

    A. steam has formed and all air is vented
    B. all burners have been lit and firing normally
    C. the boiler is cut in on the line
    D. the economizer drain is closed

    Correct answer: A

68. A bearing using an oiling ring as a means of static oil feed must occasionally be serviced by removing the wear particles, grit, and moisture. How is this accomplished?

    A. Draining the bottom of the strainer housing
    B. Rotating the handle of the lube oil strainer
    C. Draining the bottom of the bearing lube oil sump
    D. Changing the filter element

    Correct answer: C

69. Babbitt is a metal alloy commonly used for lining _____.

    A. shim stock
    B. valve seats
    C. precision bearings
    D. saltwater piping

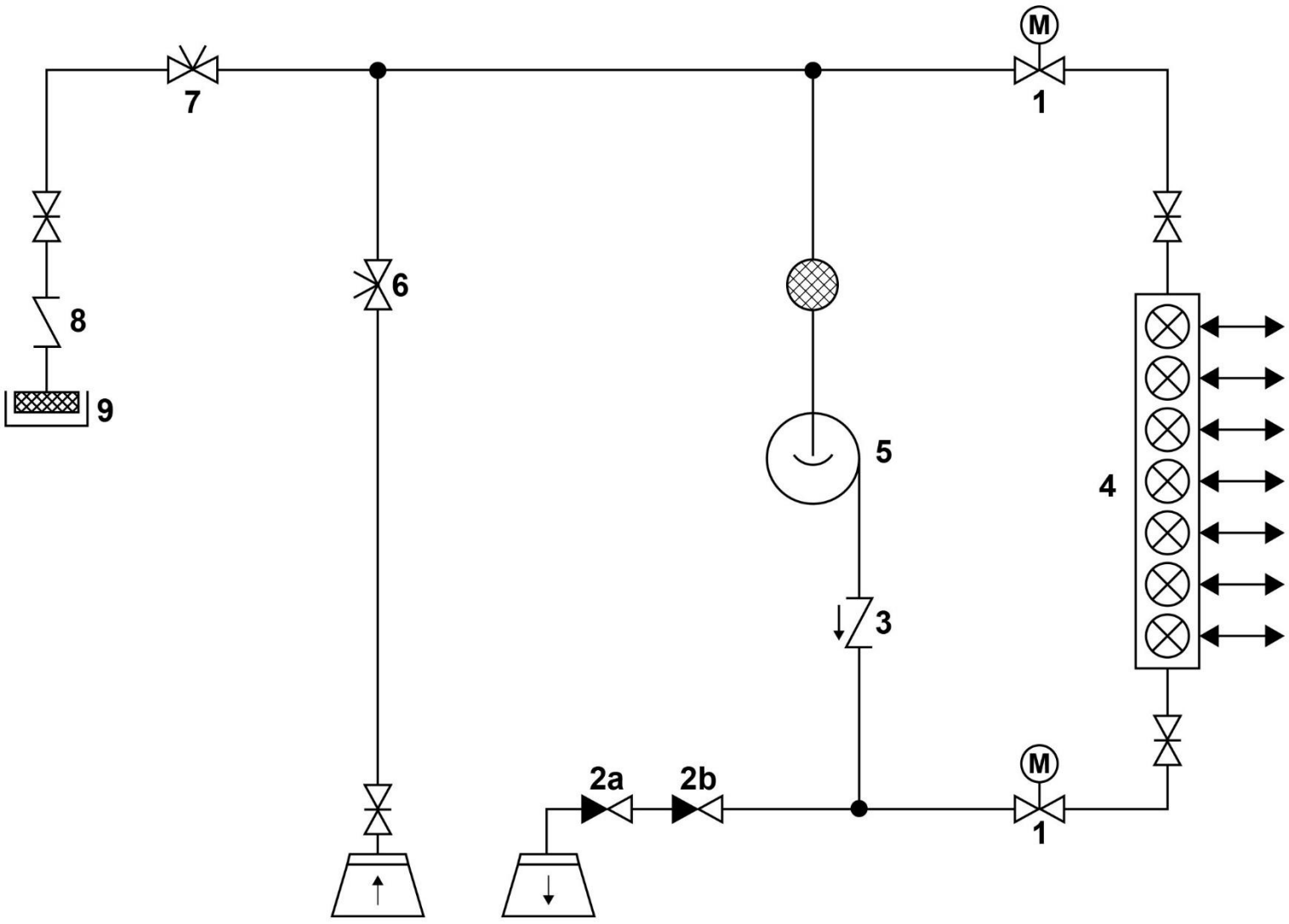
    Correct answer: C

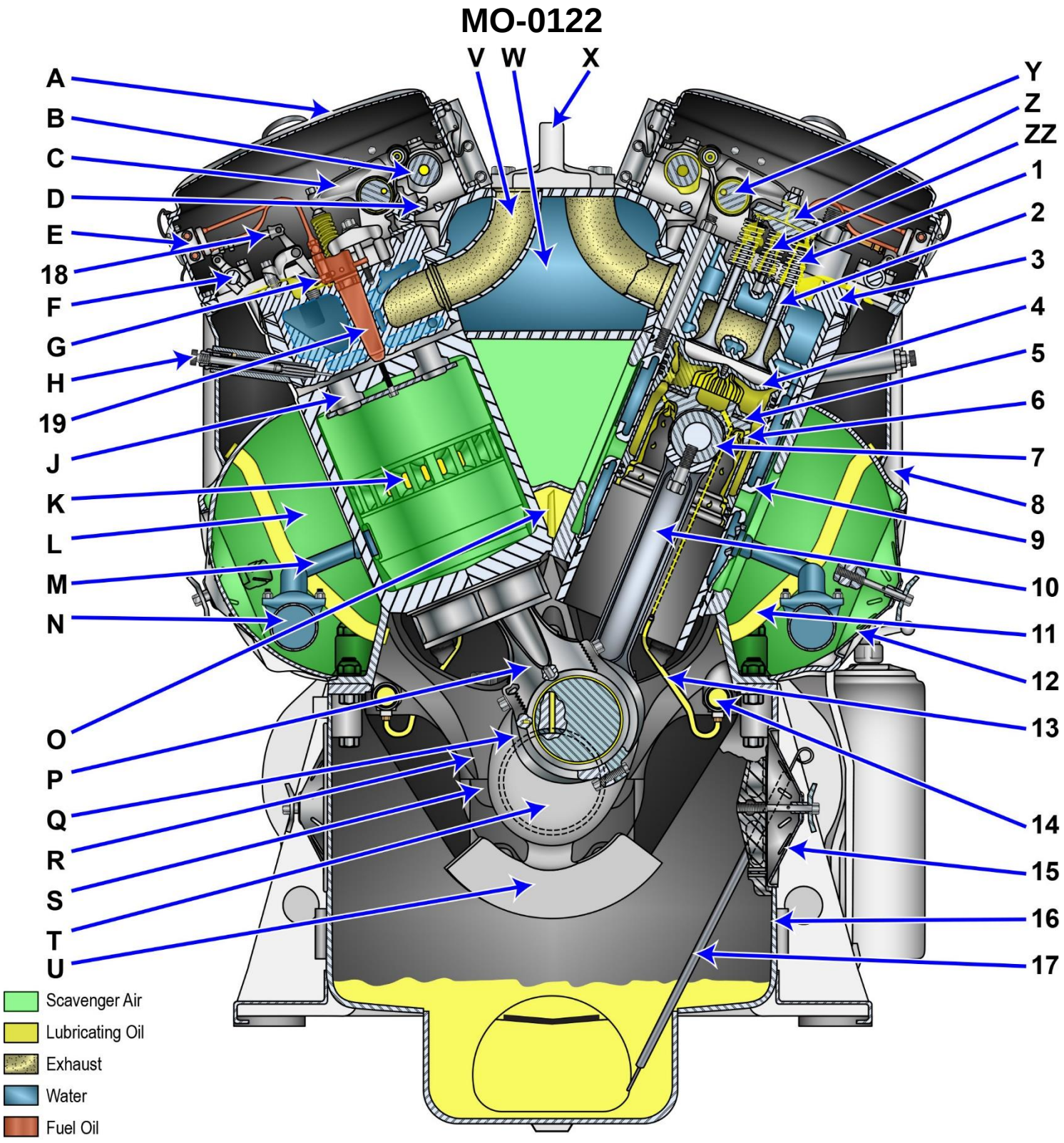
70. Which of the following labeled items of the illustrated air register and burner assembly represents the mechanism for operating the register air doors? Illustration SG-0016

    A. 2
    B. 4
    C. 6
    D. 12

    Correct answer: D

GS-0125





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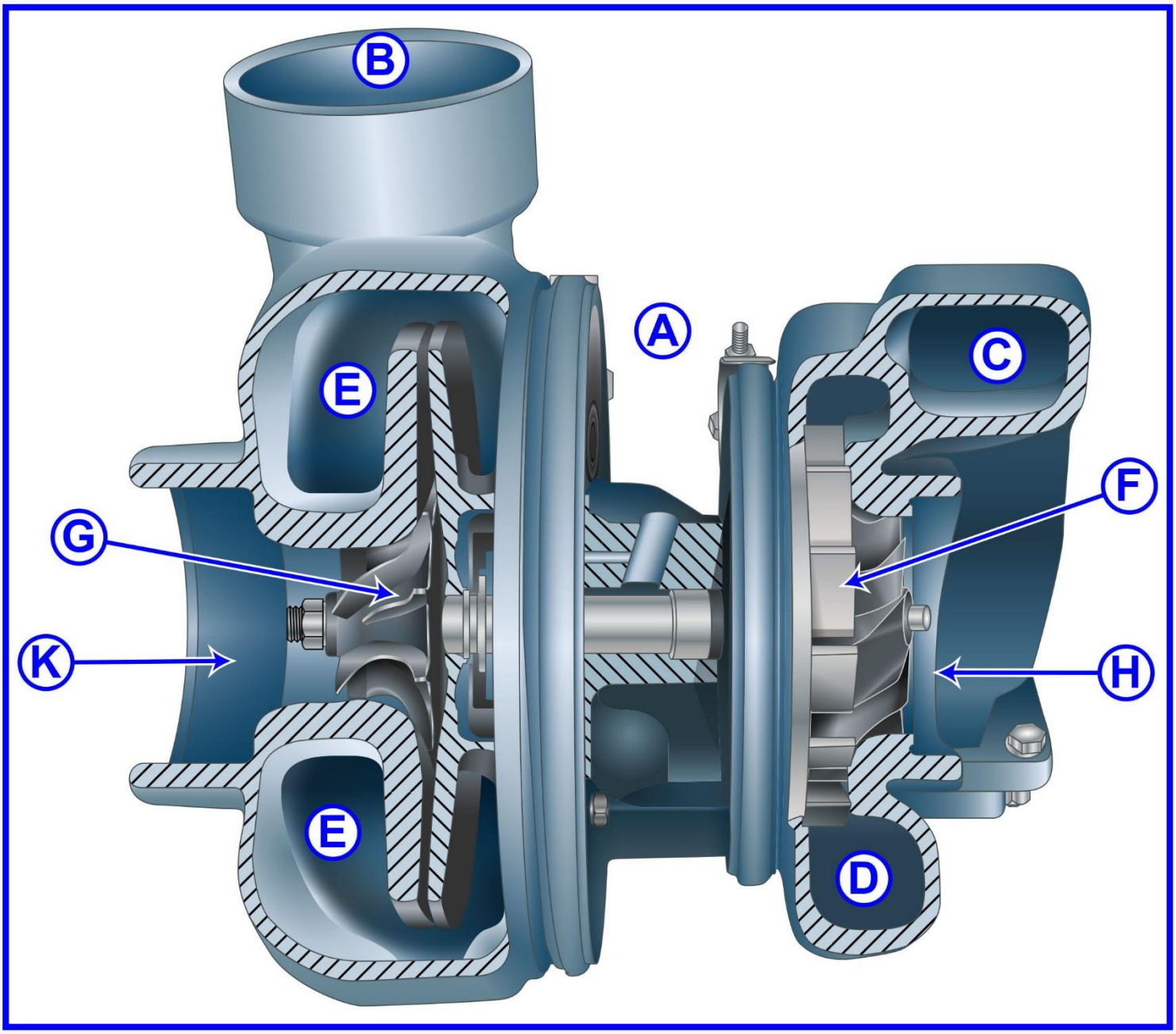

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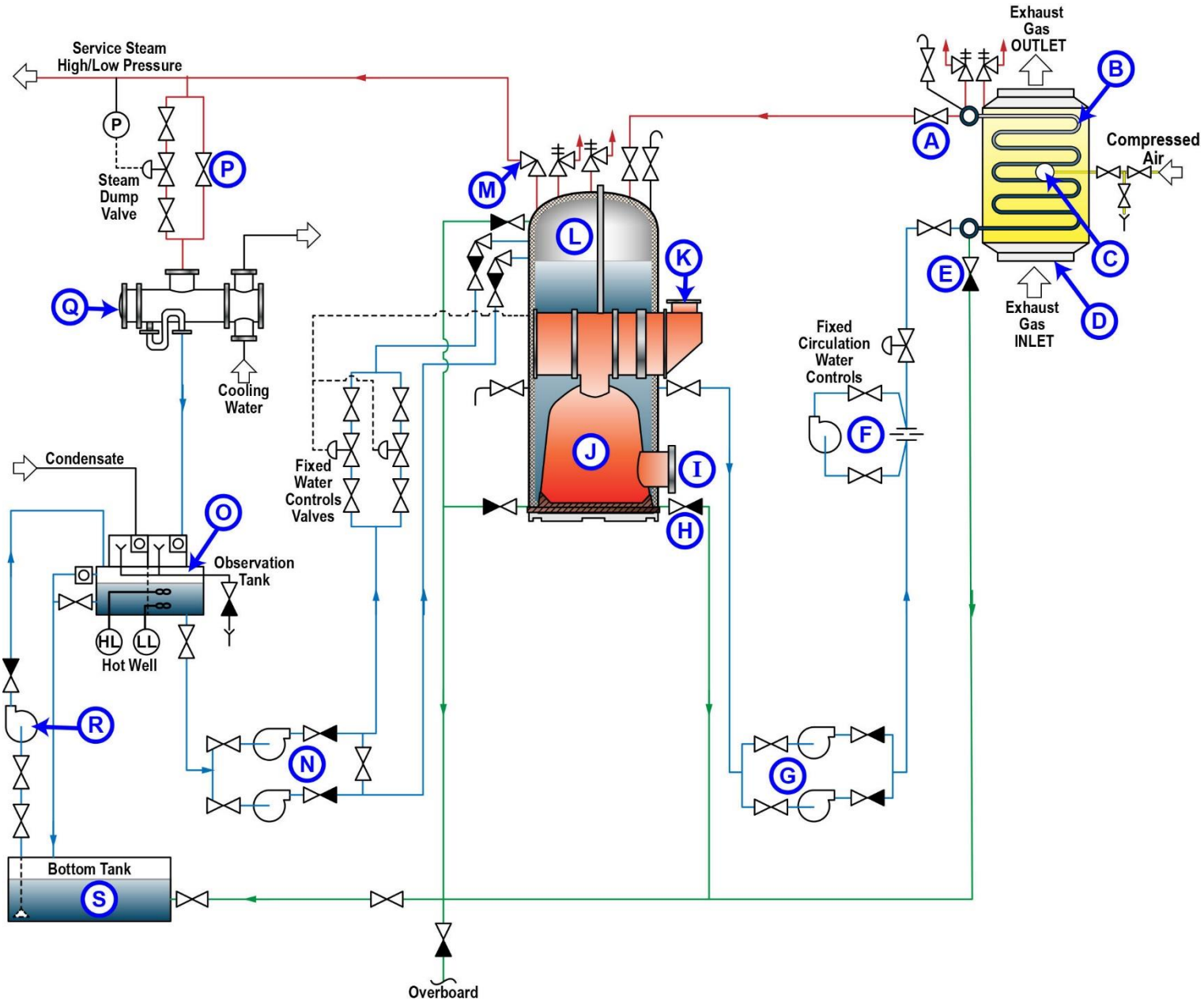

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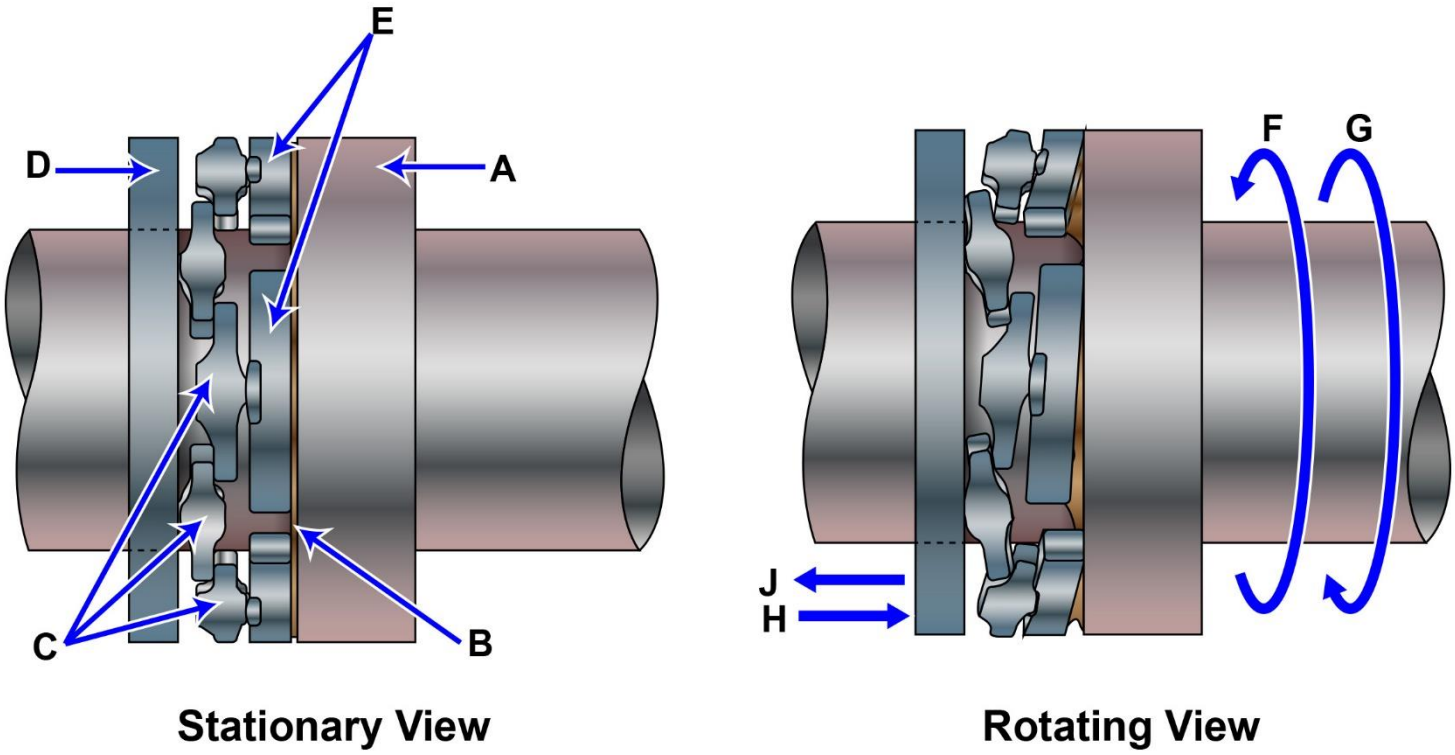
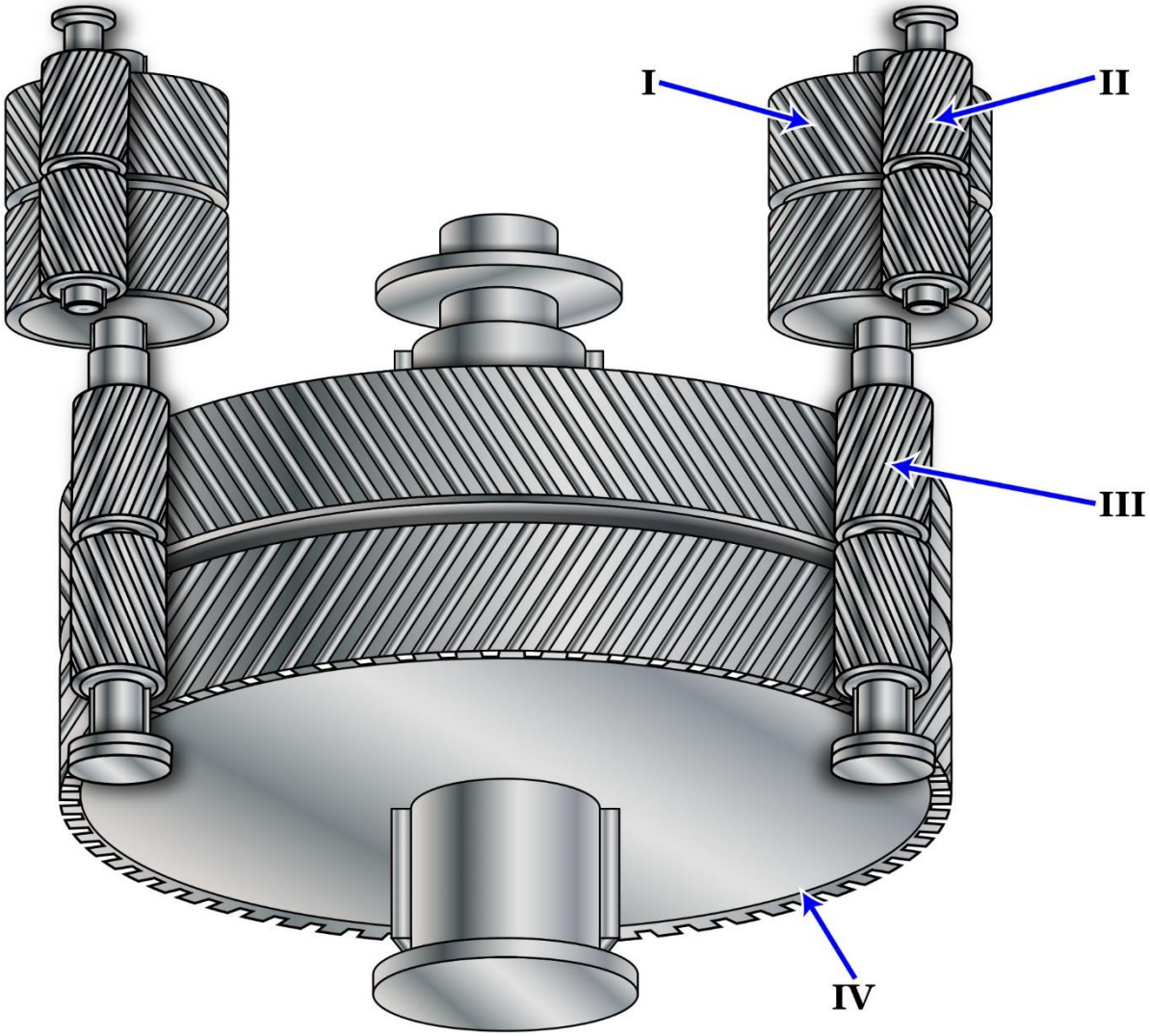


Stationary View

Rotating View

SE-0013



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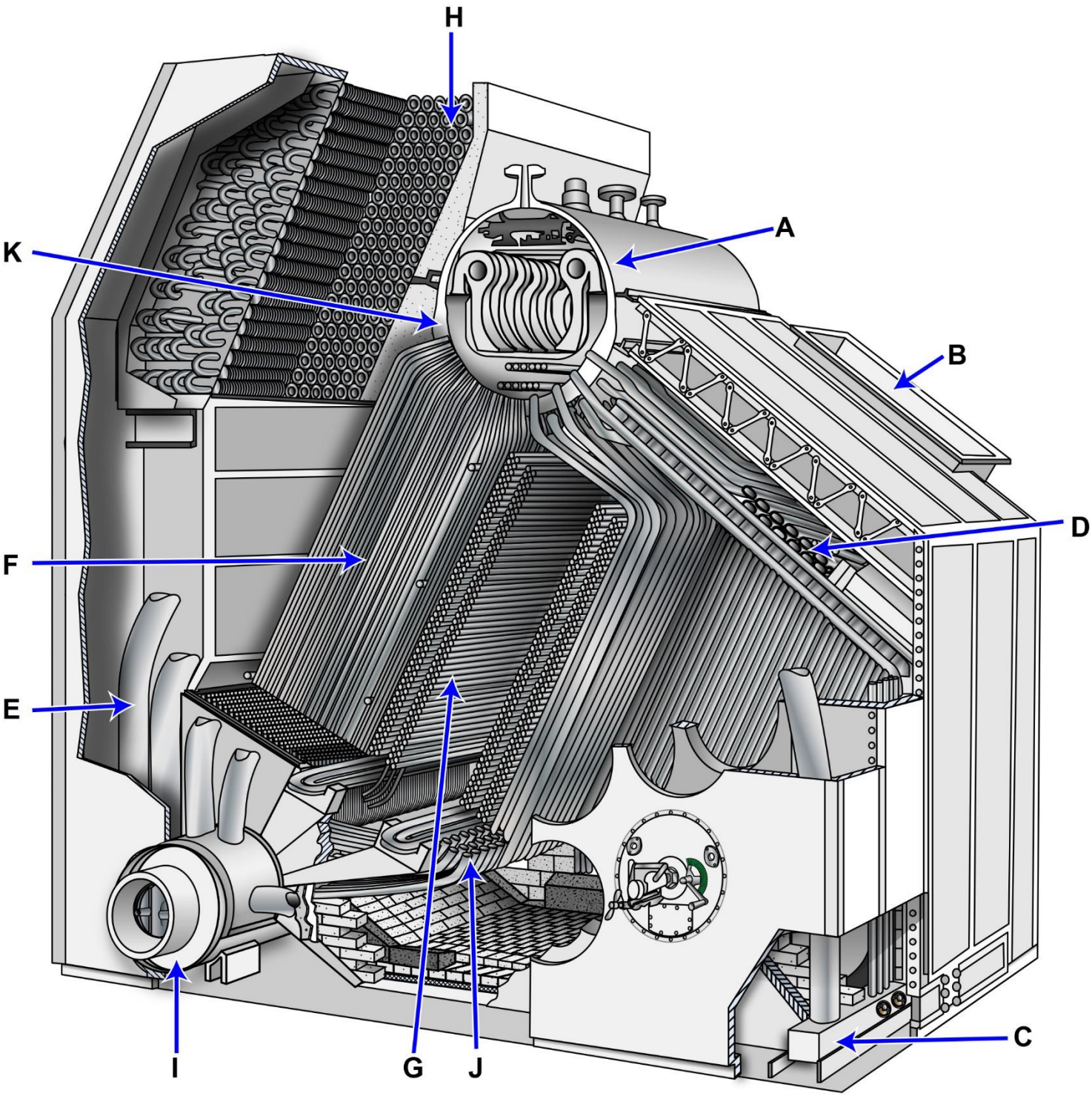

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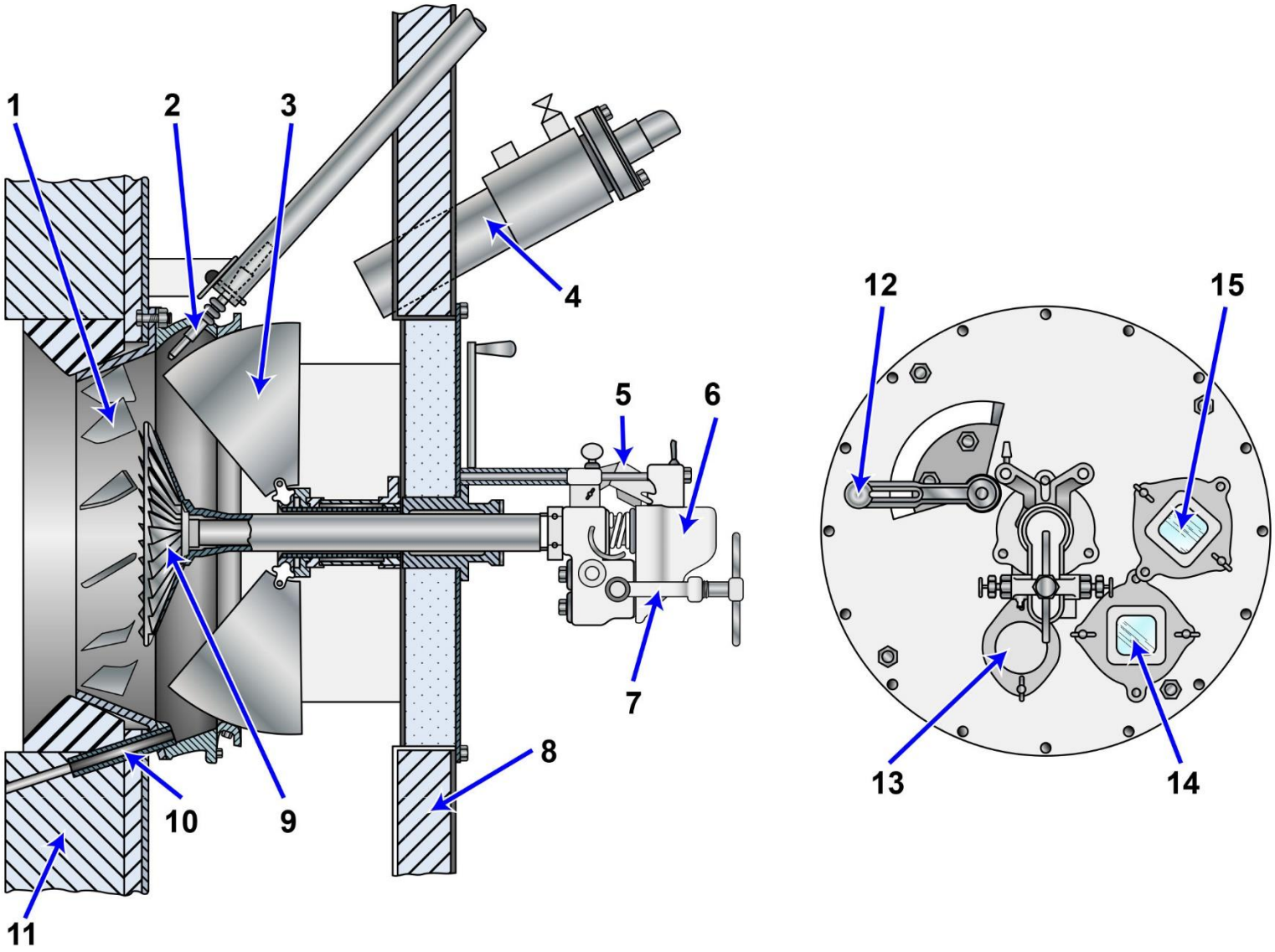

SG-0026

Properties of Saturated Steam

Vacuum Inches of Hg Gage	Temperature °C	Temperature °F
29.51	11.74	53.14
29.41	15.17	59.30
29.31	18.04	64.47
29.21	20.52	68.93
29.11	22.70	72.86
29.00	24.66	76.38
28.90	26.43	79.58
28.70	29.56	85.21
28.49	32.27	90.08
28.29	34.66	94.38
28.09	36.80	98.24
27.88	38.74	101.74
27.48	42.18	107.92
27.06	45.14	113.26
26.66	47.77	117.99
26.26	50.13	122.23
25.85	52.27	126.08
25.44	54.23	129.62
25.03	56.05	132.89
24.63	57.74	135.94
24.22	59.33	138.79
23.81	60.82	141.48
22.79	64.21	147.57
21.78	67.21	152.97
20.76	69.91	157.83
19.74	72.36	162.24
18.72	74.61	166.30
17.70	76.70	170.06
16.69	78.64	173.56
15.67	80.47	176.85
14.65	82.14	179.86
13.63	83.81	182.86
12.61	85.36	185.64
11.60	86.82	188.28
10.58	88.22	190.80
9.56	89.57	193.21
7.52	92.08	197.75
5.49	94.42	201.96
3.45	96.60	205.88
1.42	98.64	209.56