U.S.C.G. Merchant Marine Exam

Assistant Engineer – Limited

Q610 Motor Plants

(Sample Examination)

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

1. The load is always placed on the lower half of the main bearings in a _____.

   A. two-stroke cycle engine
   B. four-stroke cycle engine
   C. reverse cycle engine
   D. double acting engine

   Correct answer: A

2. Opposed-piston diesel engines are classified as _____.

   A. two-stroke cycle single acting
   B. two-stroke cycle double acting
   C. four-stroke cycle single acting
   D. four-stroke cycle double acting

   Correct answer: A

3. On an opposed-piston engine, increasing the lower crank lead will result in which of the listed operating conditions?

   A. Exhaust ports will uncover after the air intake ports
   B. Exhaust ports will uncover before the air intake ports
   C. Duration of air intake will increase
   D. Duration of air intake will decrease

   Correct answer: B

4. Fuel combustion in a diesel engine cylinder should begin just before the piston reaches top dead center and should _____.

   A. end when fuel injection has been completed
   B. end at bottom dead center
   C. continue through the afterburning period
   D. be completed exactly at top dead center

   Correct answer: C

5. Bearing "crush" as applied to diesel engine main bearings, will result in _____.

   A. positive seating of the bearings in their housings
   B. above normal operating temperatures
   C. damage to the journals
   D. damage to the bearings

   Correct answer: A

6. The diesel engine connecting rods shown in the illustration are distinctively named _____. Illustration MO-0226

   A. male and female
   B. hook and nail
   C. fork and blade
   D. left hand and right hand

   Correct answer: C

7. Large slow-speed diesel engines have cylinder liners that are manufactured from which of the following materials?

   A. Unalloyed carbon steel
   B. Cast steel with chromium
   C. Pearlitic cast iron with flake graphite
   D. High alloyed forged steel with chromium

   Correct answer: C

8. The piston shown in the illustration is a _____. Illustration MO-0011

   A. double-acting crosshead piston
   B. single-acting crosshead piston
   C. double-acting trunk piston
   D. single-acting trunk piston

   Correct answer: D

9. The use of push rods becomes necessary in a diesel engine when _____.

   A. the camshaft is located some distance below the valve gear
   B. the rocker arms are pivoted near their centers
   C. two or more valves must be opened and closed at the same time
   D. hydraulic valve lash adjusters are used

   Correct answer: A

10. In a modern two stroke, slow speed, internal combustion diesel engine, what is the part of the engine that houses the crankshaft?

    A. bedplate
    B. sump
    C. cylinder block
    D. frame

    Correct answer: A

11. In comparison to exhaust valves, intake valves of diesel engines may be fabricated from low-alloy steels because _____.

    A. the beveled edges of the intake valves provide for self-centering during seating
    B. intake valves utilize stellite-coated valve seat inserts which reduce wear
    C. the effective volume of air passing through intake valves is less than the effective volume of air passing through exhaust valves
    D. intake valves are not affected by the corrosive action of exhaust gases

    Correct answer: D

12. In the diesel engine shown in the illustration, the purpose of the part labeled "P" is to _____. Illustration MO-0003

    A. Ensure one way air flow into the air header
    B. Boost the scavenge air pressure
    C. Cool the scavenge air
    D. Provide turbulence in the scavenge air

    Correct answer: A

13. What is the function of component "13" shown in the illustration? Illustration MO-0122

    A. The inlet jumper directs cooling water to the cylinder liner.
    B. The sample tube monitors the cylinder for evidence of piston blow-by.
    C. The device delivers the oil for piston cooling, in addition to liner lubrication.
    D. The water pipe is the mechanism in which the "shaker" method of piston cooling is accomplished.

    Correct answer: C

14. A diesel engine crankcase ventilation system _____.

    A. Prevents spark generation
    B. Removes combustible gases
    C. Determines the level of combustible gases
    D. Provides inert gas generation in crankcase

    Correct answer: B

15. The thrust bearing shown in the illustration has over eight years of ahead running time. Measurements show "i1" is 4 mm and "i2" is 1 mm. Which of the following conditions is indicated and what steps should be taken, if any? Illustration MO-0121

    A. No appreciable wear has occurred, and the proper maintenance procedures should continue to be followed.
    B. A wear rate of 1.6 mm per year occurred. Although not excessive, this condition may require more frequent monitoring.
    C. The stops in which the thrust bearing block rides are worn, and it is necessary to return these to their original specifications.
    D. A wear rate of 1.6 mm per year is excessive and requires immediate assistance from the manufacturer's field support.

    Correct answer: A

16. The vessel to which you are assigned is fitted with generator engines as shown in the illustration. What statement is true concerning the cylinders? Illustration MO-0163

    A. The cylinder walls are integral (non-replaceable) to the cylinder block.
    B. The cylinder liners are of the wet type and are replaceable inserts.
    C. The cylinder liners are of the dry type and are replaceable inserts.
    D. The cylinder liners are of the jacketed type and are replaceable inserts.

    Correct answer: B

17. When starting an auxiliary diesel engine in preparation for operation, what parameter must be checked FIRST upon start-up to avoid immediate engine damage?

    A. Winch gear oil pump discharge pressure
    B. Cylinder jacket water pump discharge pressure
    C. Engine lubricating oil supply header pressure
    D. Fuel oil supply header pressure

    Correct answer: C

18. In order to minimize the abrasive action of dust particles entering the combustion spaces of the diesel engines used on the vessel to which you are assigned, each engine is protected with a heavy-duty air intake filter. Which one of the listed air intake filter elements is periodically cleaned as opposed to being periodically replaced with a new element?

    A. Oil bath wire-mesh filter element
    B. Multi-tube filter element
    C. Round pleated filter element
    D. Spiral-rotor filter element

    Correct answer: A

19. An engine that runs rough or expels large amounts of black smoke may indicate a misfiring cylinder. Assume that the auxiliary diesel engines on your vessel have a fuel injection system that permits the injectors to be disabled for troubleshooting purposes by loosening the high-pressure fuel injection line fitting at the injector nozzle while the engine is running and noting the engine response. If before the injector is disabled the engine is running rough and expelling large amounts of black smoke, and after the injector is disabled, the engine runs even rougher, but continues to produce equally dense black smoke, what is indicated?

    A. This indicates that the cylinder associated with the disabled injector is firing properly, and all other injectors are firing properly.
    B. This indicates that the cylinder associated with the disabled injector is misfiring, but all other injectors are firing properly.
    C. This indicates that the cylinder associated with the disabled injector is misfiring, and at least one other injector is misfiring.
    D. This indicates that the cylinder associated with the disabled injector is firing properly, but at least one other injector is misfiring.

    Correct answer: D

20. Starting a large low-speed propulsion diesel engine on diesel fuel during cold weather conditions will be made easier by _____.

    A. increasing the quantity of starting air
    B. increasing the lube oil pressure
    C. heating the engine fuel supply
    D. heating the engine coolant

    Correct answer: D

21. In a direct cylinder admission air starting system, once the engine begins to fire, the air starting check valve illustrated, is closed by _____. Illustration MO-0107

    A. the starting air pressure
    B. the spring force and cylinder pressure
    C. a valve actuating cam
    D. a pneumatic bellows assembly

    Correct answer: B

22. Hydraulic starters are installed on many lifeboat diesel engines instead of comparable air start systems, because _____.

    A. hydraulic starters are the least expensive of all starting systems
    B. the system does not require high-pressure piping
    C. hydraulic systems turn diesel engines at higher rates of speed than air starters
    D. the system can be manually recharged

    Correct answer: D

23. Proper lubrication of the main bearings is more easily obtained in a single acting four-stroke cycle diesel engine than in a single acting two-stroke cycle diesel engine because _____.

    A. pressure on the journals of a four-stroke cycle single acting diesel engine is continually reversed
    B. pressure on the journals of a two-stroke cycle single acting diesel engine is continually reversed
    C. the maximum bearing pressure is higher in a single acting two-stroke cycle diesel engine
    D. two-stroke cycle diesel engines require more complicated lubrication piping

    Correct answer: A

24. The lube oil strainer shown in the illustration is used on the reduction gear of a mid-size diesel engine. The strainer elements consist of _____. Illustration MO-0057

    A. pleated paper
    B. wire mesh
    C. fibrous braid
    D. metal disks

    Correct answer: D

25. Mechanical lubricators for diesel engine cylinders are usually small reciprocating pumps which are _____.

    A. operated manually once each hour
    B. operated until the engine has started
    C. placed into operation only at maximum load
    D. adjustable to meet lubrication requirements

    Correct answer: D

26. Which of the following test indicators should be considered the most significant factor in determining whether a diesel-generator's lube oil should be drained and renewed?

    A. An extremely high neutralization number.
    B. An extremely low precipitation number.
    C. The oil appears black in color.
    D. An increase in flash point.

    Correct answer: A

27. The unit of measure expressed as centistokes (cSt) is a measure of what fuel property?

    A. Viscosity
    B. Cetane rating
    C. Heating value
    D. Density

    Correct answer: A

28. 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

29. What actions should you take if the separator shown in the illustration trips due to excessive vibration? Illustration MO-0127

    A. Open the bowl with shooting water to release all liquid. Stop the separator. Determine the cause of vibration and rectify. Reset the vibration switch. Restart separator.
    B. Stop the separator. Reset the vibration switch. Adjust down the setpoint of the vibration switch. Restart separator.
    C. Stop the separator and keep the bowl filled with liquid during rundown. Determine the cause of the vibration and rectify. Reset the vibration switch. Restart separator.
    D. Separators do not have vibration switches fitted due to other vibrations in engine room.

    Correct answer: C

30. The area indicated by the letter "W", shown in the illustration is correctly termed the _____. Illustration MO-0112

    A. closing chamber
    B. parting chamber
    C. upper sliding piston chamber
    D. opening chamber

    Correct answer: D

31. Fuel injection systems are designed to primarily meter fuel, atomize fuel, and _____.

    A. create turbulence in the combustion chamber
    B. aid in completing cylinder scavenging
    C. inject fuel at the proper time
    D. minimize fuel penetration into the cylinder

    Correct answer: C

32. Differential needle valves used in fuel injectors are directly closed by _____.

    A. cam action
    B. spring force
    C. fuel oil pressure
    D. firing pressure

    Correct answer: B

33. The amount of fuel delivered by a unit injector is controlled by the _____.

    A. camshaft
    B. main spring
    C. rack position
    D. engine speed

    Correct answer: C

34. As shown in the illustration of the fuel injection pump, the component labeled "J" would be identified as the _____. Illustration MO-0061

    A. delivery check valve assembly
    B. plunger and barrel spring
    C. control rack and sleeve
    D. control rack and pinion

    Correct answer: A

35. The component shown in the illustration would be identified as a/an _____. Illustration MO-0097

    A. slow-speed engine cylinder liner lubricator
    B. slow-speed engine fuel pump
    C. centrifugal flyweight governor
    D. injector cooling system pump

    Correct answer: B

36. Because of the close tolerances used in diesel engine fuel oil pumps, a worn plunger requires _____.

    A. Grinding the spare plunger to the barrel
    B. Replacing the plunger and the barrel
    C. Highly polishing both the plunger and barrel
    D. Replacing plunger only

    Correct answer: B

37. The microbiological growths that affect fuel supplies can easily be transported from one location to another by _____.

    A. roaches and other insects
    B. other non-hydrocarbon fuels
    C. air, solids, or liquids
    D. all of the above

    Correct answer: C

38. An increase in the air inlet manifold pressure of a diesel engine will result in a/an _____.

    A. decrease in maximum cylinder pressure
    B. increase in ignition lag
    C. decrease in fuel consumption per horsepower-hour
    D. decrease in exhaust manifold pressure

    Correct answer: C

39. Compared to a naturally aspirated diesel engine, a supercharged diesel engine has _____.

    A. a cylinder air charge of higher pressure
    B. reduced cylinder mean effective pressure
    C. less valve overlap
    D. reduced blow-by

    Correct answer: A

40. In a diesel engine exhaust system, the cooling of the exhaust gases below their dew point, will result in _____.

    A. increased engine back pressure
    B. sulfuric acid corrosion
    C. surface pitting of the turbocharger compressor blades
    D. moisture impingement on the turbocharger compressor blading

    Correct answer: B

41. Which of the diesel engine exhaust mufflers listed is usually equipped with a spark arrestor?

    A. A wet-type exhaust muffler
    B. A constant pressure muffler
    C. A dry-type exhaust muffler
    D. A constant velocity muffler

    Correct answer: C

42. Diesel engine closed, re-circulating cooling water systems are particularly prone to cavitation corrosion/erosion. Which of the listed cooling system/engine components has surfaces in contact with the coolant that are most susceptible to this type of corrosion and erosion?

    A. Engine exhaust cooling water jackets
    B. Cylinder cooling water jackets
    C. Cylinder head cooling water passages
    D. Wet-type cylinder liners

    Correct answer: D

43. Due to environmental and safety concerns, the diesel engine cooling water system on your vessel is treated with propylene glycol for protection against freezing. According to the illustration, what would be the limit of protection if 40 pints of propylene glycol are used in treating a cooling water system with a volumetric capacity of 10 gallons? Illustration MO-0209

    A. 10°F
    B. -6°F
    C. -30°F
    D. -53°F

    Correct answer: C

44. In a closed, re-circulating freshwater cooling system used for the main engines on your vessel, what function would chemical treatment with molybdate primarily perform?

    A. Corrosion inhibition
    B. Boiling point elevation
    C. Freezing point depression
    D. Biological growth inhibition

    Correct answer: A

45. What may cause a diesel engine cylinder head to crack?

    A. Overheated intake valves
    B. Scale on cooling passages
    C. A leaking oil control ring
    D. Heat transfer from exhaust valves

    Correct answer: B

46. 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

47. Which of the following statements is correct regarding a turbocharged four-stroke cycle diesel-generator?

    A. At zero load the intake manifold pressure is greater than the exhaust manifold pressure.
    B. At full load the intake manifold pressure and exhaust manifold pressure are equal.
    C. At full load the intake manifold pressure is less than the exhaust manifold pressure.
    D. At full load the intake manifold pressure is greater than the exhaust manifold pressure.

    Correct answer: D

48. In a Roots-type rotary blower, the volume of air delivered is directly proportional to _____.

    A. Engine speed
    B. Engine load
    C. Brake horsepower
    D. Brake specific fuel consumption

    Correct answer: A

49. During the valve overlap period, the exhaust pressure of a turbo-charged, four-stroke cycle diesel engine must be less than the intake manifold pressure to ensure _____.

    A. Effective cylinder scavenging and cooling
    B. Constant pressure from the turbochargers
    C. Cooler operation of the exhaust system
    D. Effective constant pressure for turbocharger operation

    Correct answer: A

50. Clutching takes place nearest the bearing shown in the illustration, located at number _____. Illustration MO-0086

    A. 1
    B. 2
    C. 3
    D. 4

    Correct answer: A

51. Reduction gear casings are vented in order to _____.

    A. Allow windage to exist for cooling the gears
    B. Avoid a buildup of pressure within the gear case
    C. Minimize lube oil foaming within the case
    D. Allow for axial clearance between the gears

    Correct answer: B

52. What type of bearing is shown in the illustration? Illustration MO-0120

    A. Michell bearing
    B. Axial/radial bearing
    C. Kingsbury thrust bearing
    D. Collar bearing

    Correct answer: A

53. What is the normal bearing clearance permitted at the horizontal axis of the shaft for the bearing shown in the illustration? Illustration MO-0121

    A. The clearance on one side of the shaft at the axis will be one twentieth of a millimeter.
    B. The clearance is determined by the thickness of the hydrodynamic wedge formed and is not usually measured while underway.
    C. The tolerances established are dependent on machining processes used and will vary amongst manufacturers.
    D. The normal play on both sides of the shaft will be one tenth of a millimeter.

    Correct answer: D

54. The gear drive, shown in the illustration, can have the backlash determined best by using a _____. Illustration MO-0091

    A. Feeler gauge
    B. Lash indicator
    C. Lead wire
    D. Red dye indicator

    Correct answer: A

55. The direct acting mechanical governor used with some small diesel engines, controls fuel flow to the engine by _____.

    A. Governor flyweight action on a pilot valve which controls fuel injection
    B. Positioning a butterfly valve in the fuel delivery system
    C. Governor flyweight motion acting on fuel controls through suitable linkage
    D. Positioning a servomotor piston attached to the fuel controls

    Correct answer: C

56. The most common contaminate of governor hydraulic fluid is _____.

    A. Moisture
    B. Dirt
    C. Acid
    D. Air

    Correct answer: B

57. When vapor is in contact with and remains at the same temperature as the boiling liquid from which it was generated, the vapor and liquid are said to be in which of the following?

    A. saturated condition
    B. latent contact
    C. sensible contact
    D. critical state

    Correct answer: A

58. Large steam drums are not required in the design of a coil-type auxiliary water-tube boiler because _____.

    A. the heat of combustion is sufficient to remove all moisture from the steam
    B. automatic burner cycling controls steam volume and quality
    C. the steam-water mixture that exits the coils is separated in a flash chamber
    D. the volume of steam is small at low pressures

    Correct answer: C

59. Which of the following statements concerning fire-tube boilers is correct?

    A. Flames impinge on the tubes.
    B. Combustion occurs in the tubes.
    C. Combustion gases flow through the tubes.
    D. Water flows through the tubes.

    Correct answer: C

60. Which of the following actions takes place in the control circuit of an automatically fired auxiliary boiler when the desired steam pressure is obtained?

    A. A temperature sensing device opens the circuit breaker in the burner motor.
    B. The stack relay actuates the low limit control which breaks the ignition circuit.
    C. The high limit control secures power to the entire oil firing system.
    D. The stack relay secures power to the high voltage side of the ignition transformer.

    Correct answer: C

61. Which of the following statements describes how the fuel oil enters the whirling chambers of the sprayer plates used in an auxiliary boiler return flow fuel oil system?

    A. Through the outer barrel tube
    B. Through the sprayer plate drilled passages
    C. Through tangential slots in the sprayer plate
    D. Through baffles in the orifice plate

    Correct answer: C

62. If the water level as indicated by the gauge glass of an auxiliary boiler is in question, it should be blown down. Which of the following statements represents the proper procedure for performing a gauge glass blow down?

    A. The gauge glass should be blown down once with the lower cut-out valve open.
    B. The gauge glass should be blown down once with both the upper cut-out and lower cut-out valves open simultaneously.
    C. The gauge glass should be blown down twice; first with the lower cut-out valve open and then with the upper cut-out valve open.
    D. The gauge glass should be blown down twice; first with the upper cut-out valve open and then with the lower cut-out valve open.

    Correct answer: C

63. When cleaning burner atomizers associated with an oil-fired auxiliary boiler, which of the following metals would be recommended to use in fabricating a tool for the purposes of carbon removal?

    A. Titanium
    B. Chrome-moly steel
    C. Tungsten
    D. Copper

    Correct answer: D

64. You are observing the flame condition on an oil-fired auxiliary boiler through an observation window peephole. The flame is a reddish color accompanied by a noticeably panting/pulsating furnace. What would be the correlating color of the gases exhausting from the stack under these conditions?

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

    Correct answer: A

65. As shown in the illustration, if the vessel was operating at full sea speed, the area labeled "L" would be used to _____. Illustration MO-0231

    A. Superheat the steam generated by the oil-fired mechanical burner
    B. Collect steam and flash the heated water generated in area "B" into steam
    C. Preheat the feedwater to the waste heat boiler
    D. Collect stack gas

    Correct answer: B

66. The correct procedure for giving an auxiliary boiler a bottom blow, is to begin _____.

    A. when the boiler has been cooled to ambient temperature
    B. only after raising the water level to within 1/2 inch of the high-water cutout
    C. when the boiler has been secured long enough for most solids to settle
    D. only after bypassing the low-pressure pressuretrol

    Correct answer: C

67. While warming up the main engines on your vessel at the pier, one of the main engines suddenly sounds the low lube oil pressure alarm. What is the appropriate initial response?

    A. Reduce the load and speed on the engine and continue to monitor the oil pressure.
    B. Immediately add make-up oil or service lube oil coolers, strainers, and filters, as appropriate.
    C. Immediately shutdown the engine, then investigate the cause for the low-pressure alarm.
    D. Monitor closely oil pressures, temperatures, and levels while continuing to run the engine.

    Correct answer: C

68. If a tube ruptures in a water-tube auxiliary boiler due to low water, you should _____.

    A. Secure the fires and maintain feedwater to boiler to keep up the water level
    B. Not secure the fires until water level falls out of sight in the gauge glass
    C. Secure both the fires and the feed inlet valve
    D. Secure the fires when the pressure drops to 50% of the maximum allowable working pressure

    Correct answer: C

69. After a main diesel engine on your vessel has experienced a safety shutdown due to excessive crankcase pressure, why is it important to wait 2 hours before opening the crankcase to investigate the cause of the trip?

    A. Opening the crankcase before 2 hours has elapsed may result in excessively rapid cooling.
    B. Opening the crankcase before 2 hours has elapsed may result in crankshaft rotation.
    C. Opening the crankcase before 2 hours has elapsed may result in the engine spontaneously restarting.
    D. Opening the crankcase before 2 hours has elapsed may result in a crankcase explosion.

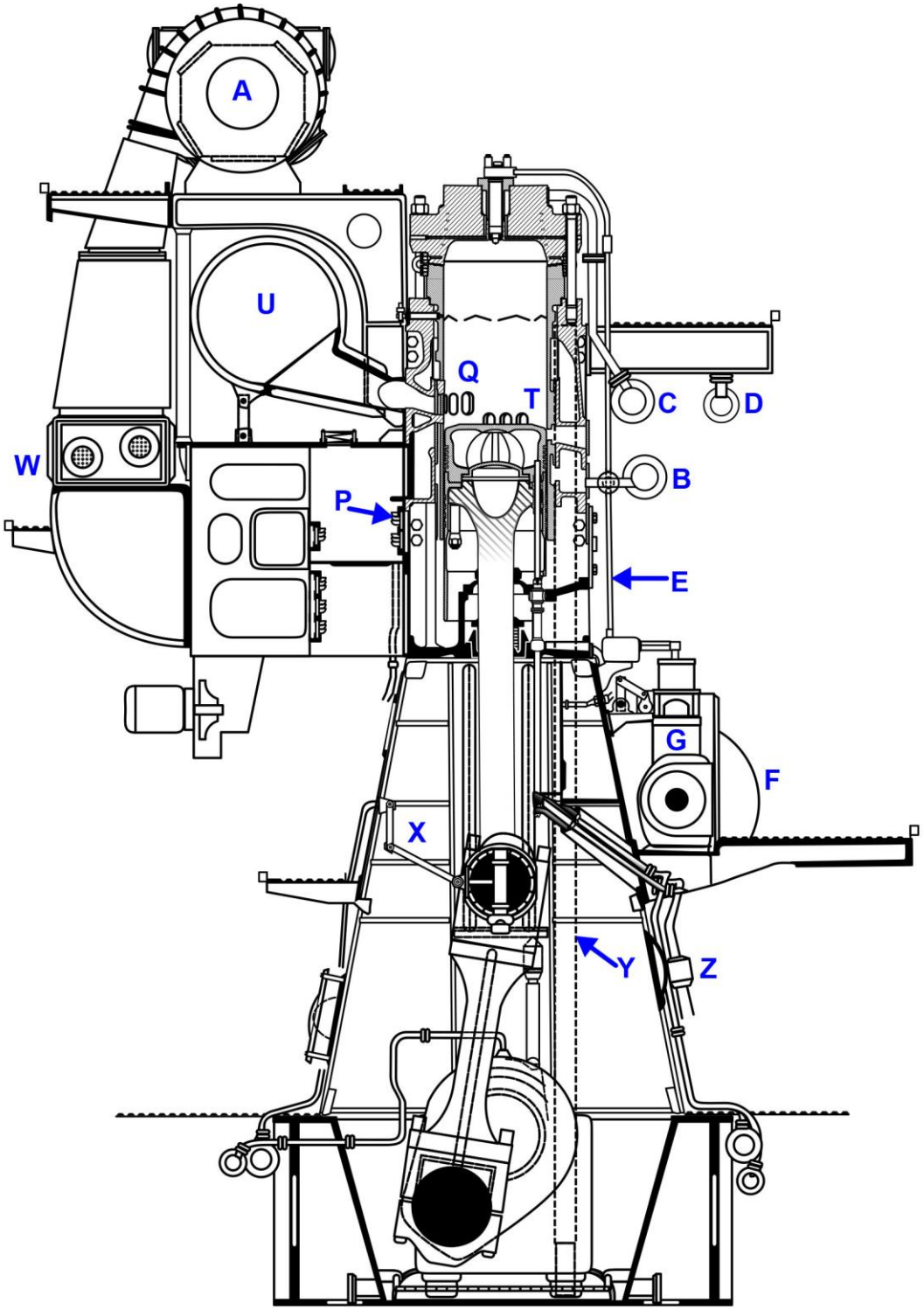
    Correct answer: D

70. After performing repairs on the fuel injection system or governor of a diesel engine on your vessel, what precaution should be taken prior to starting the engine?

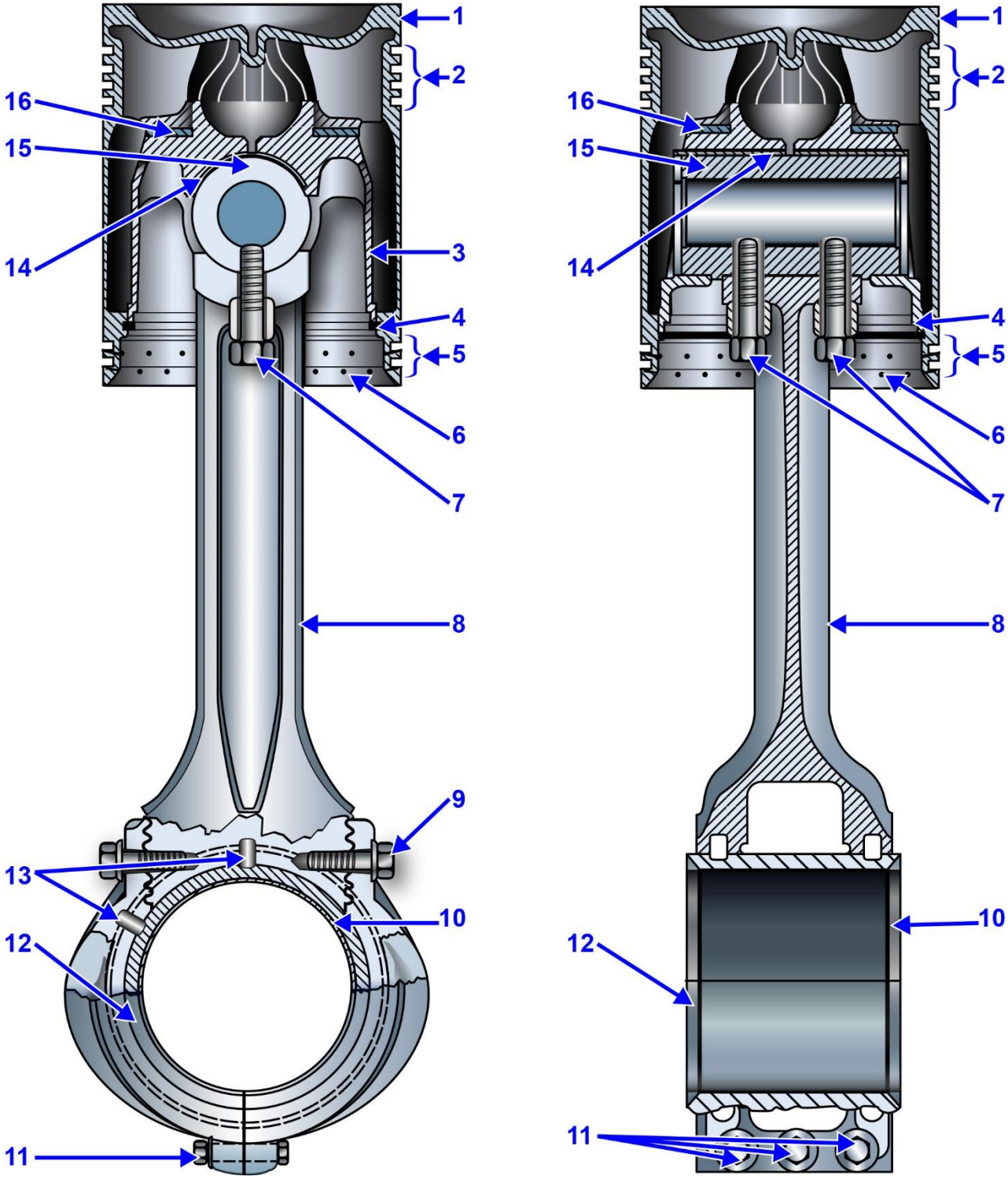
    A. Provisions should be made to shut off the engine's lubricating oil supply to stop the engine in case there is an over speed on start-up.
    B. Provisions should be made to shut off the engine's starting air supply to stop the engine in case there is an over speed on start-up.
    C. Provisions should be made to shut off the engine's inlet air and/or fuel supply to stop the engine in case there is an over speed on start-up.
    D. Provisions should be made to shut off the engine's control electrical power supply to stop the engine in case there is an over speed on start-up.

    Correct answer: C

MO-0003



MO-0011



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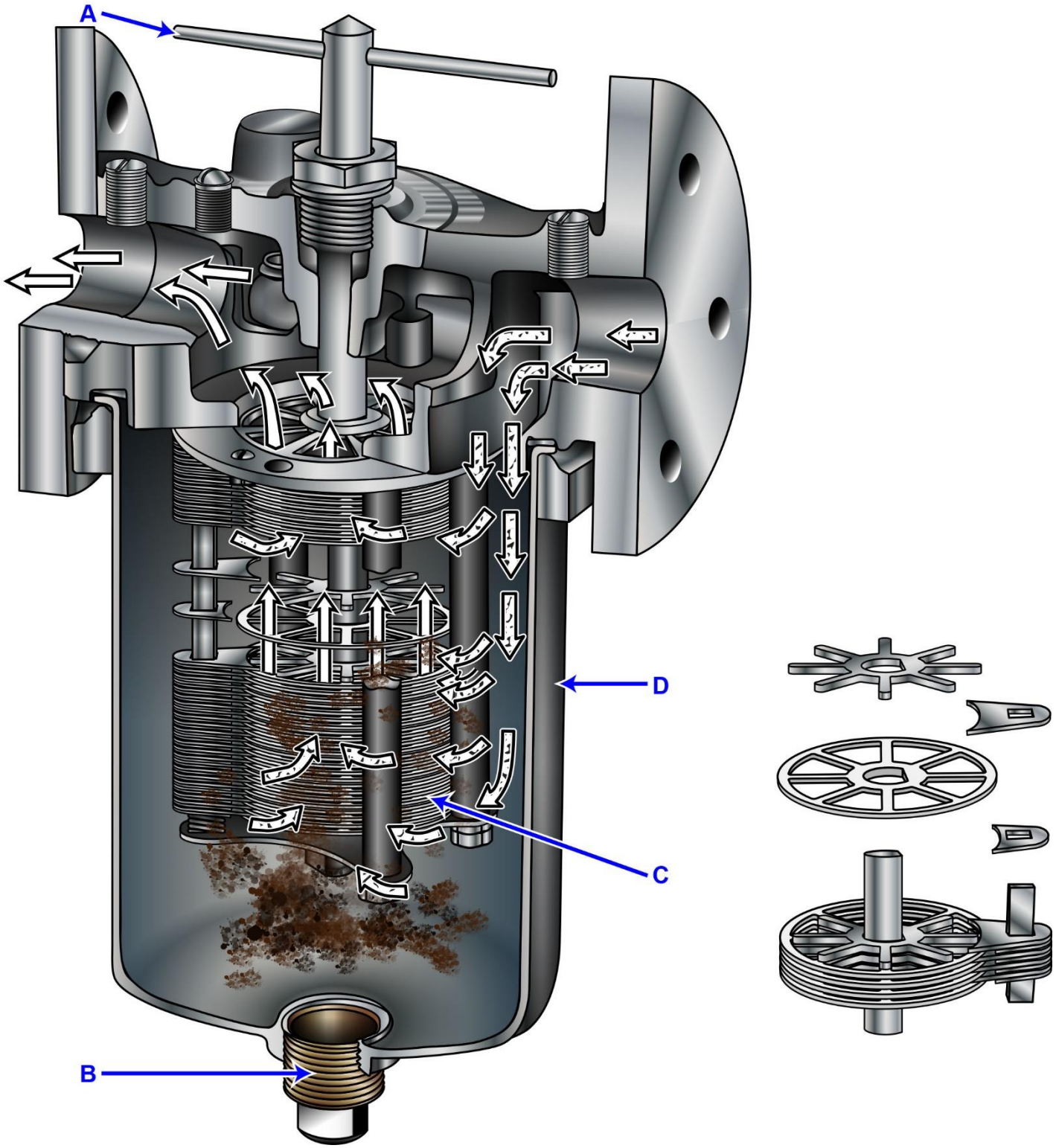

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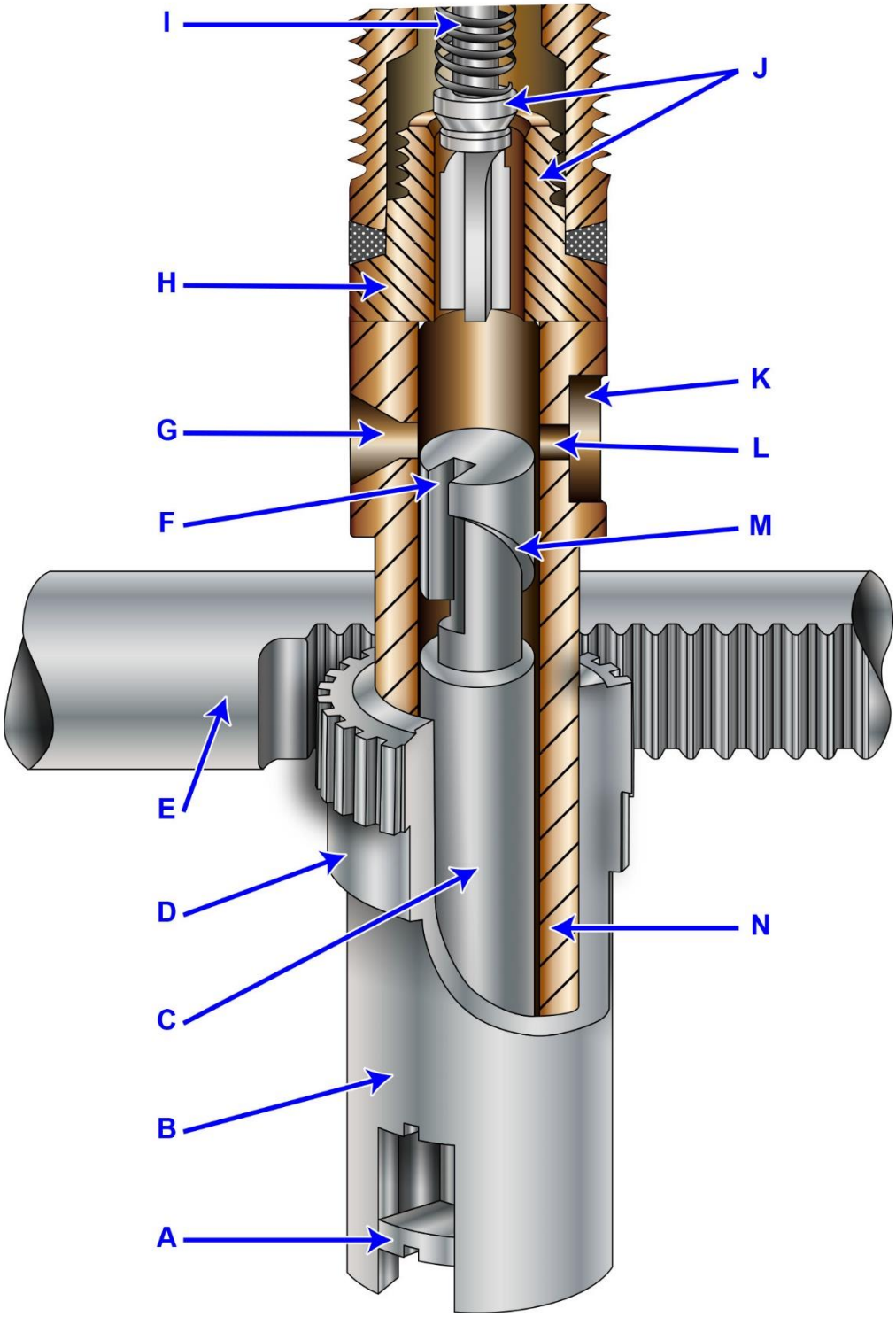

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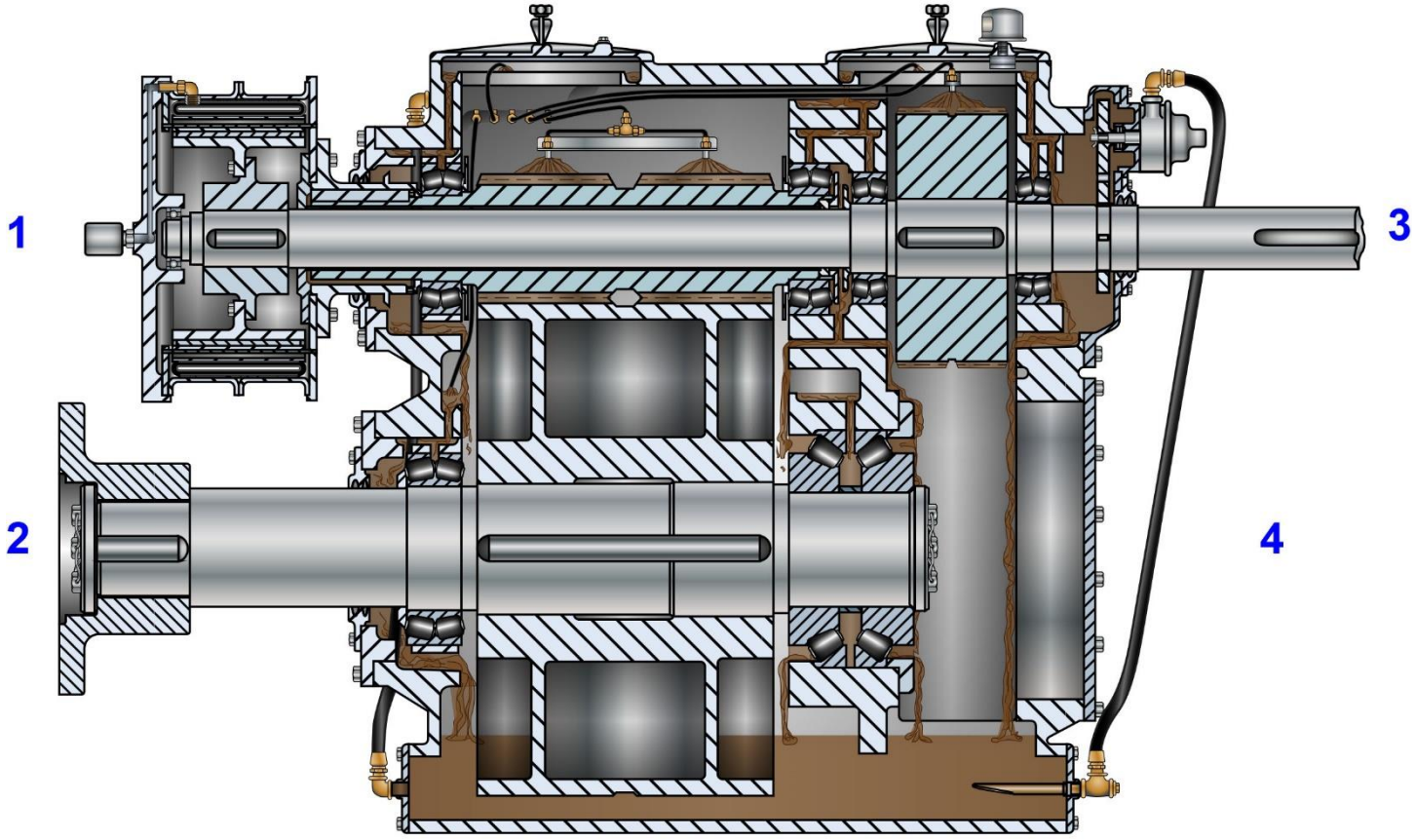

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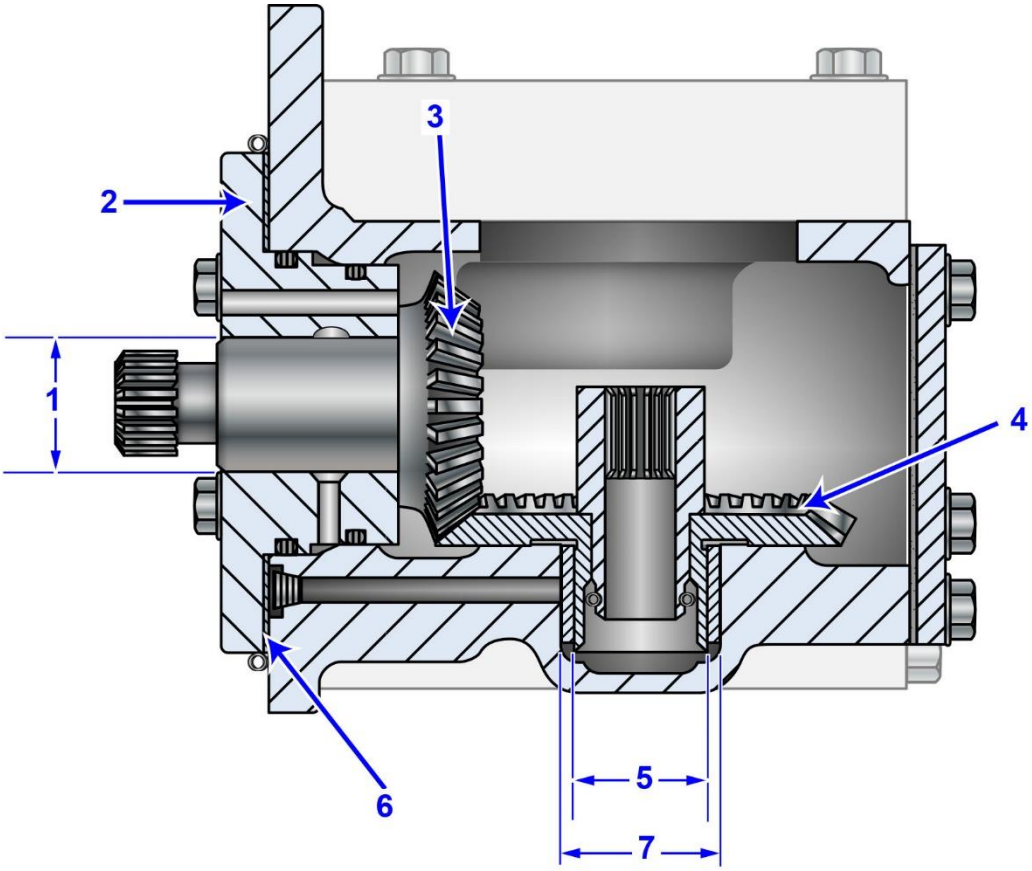
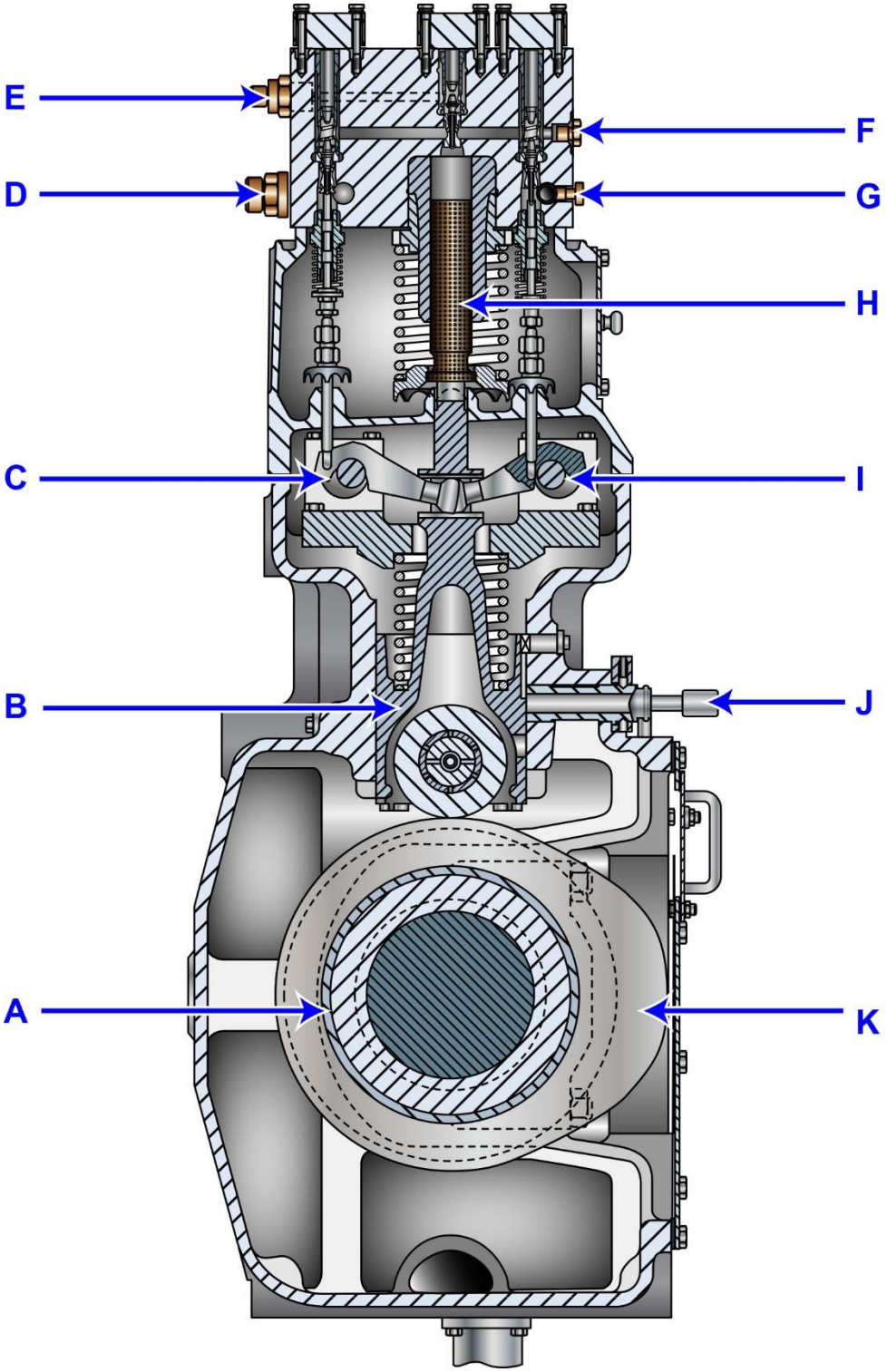


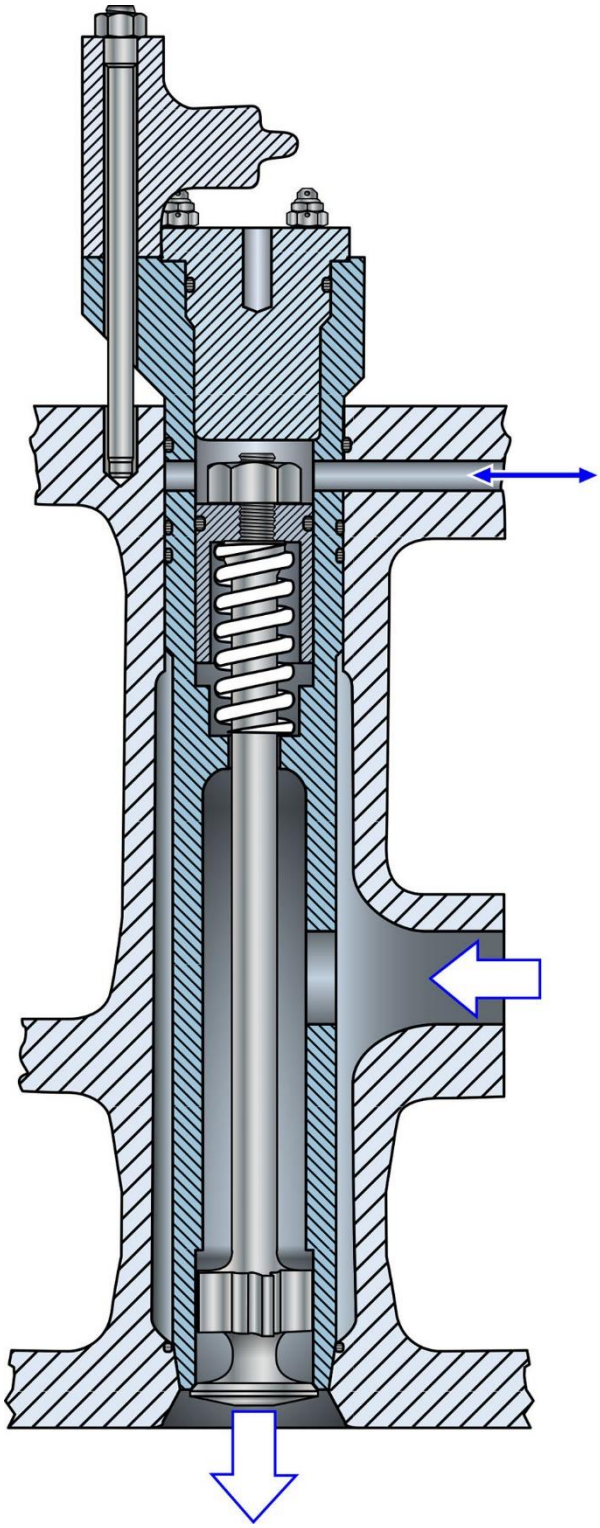
7N1889 & 8N9662 Drive Groups Used With UG8-L Woodward Governors
1W2135 Drive Group Used With Caterpillar 3161 Governors

1. Diameter of bore in adapter (2) ..... 34.072 ± 0.025 mm (1.3414 ± .0010 in.)
   Diameter of shaft on governor drive pinion (3) ..... 34.000 ± 0.013 mm (1.3386 ± .0005 in.)
2. Adaptor
3. Governor drive pinion
4. Bevel gear
5. Diameter of shaft on bevel gear (4)..... 34.000 ± 0.013 mm (1.3386 ± .0005 in.)
   Diameter of bore in bearing after assembly in drive housing ... 34.072 ± 0.039 mm (1.3414 ± .0015 in.)
6. Shims. Use as required to get a gear clearance (backlash)
   between pinion (3) and gear (4) of..... 0.100 + 0.050 or -0.025 mm (.0039 = 0.020 or - .0010 in.)
7. Diameter of bore in drive housing ..... 40.432 ± 0.025 mm (1.5918 ± .0010 in.)
   Diameter of bearing ..... 40.545 ± 0.013 mm (1.5963 ± .0005 in.)

MO-0097



MO-0107



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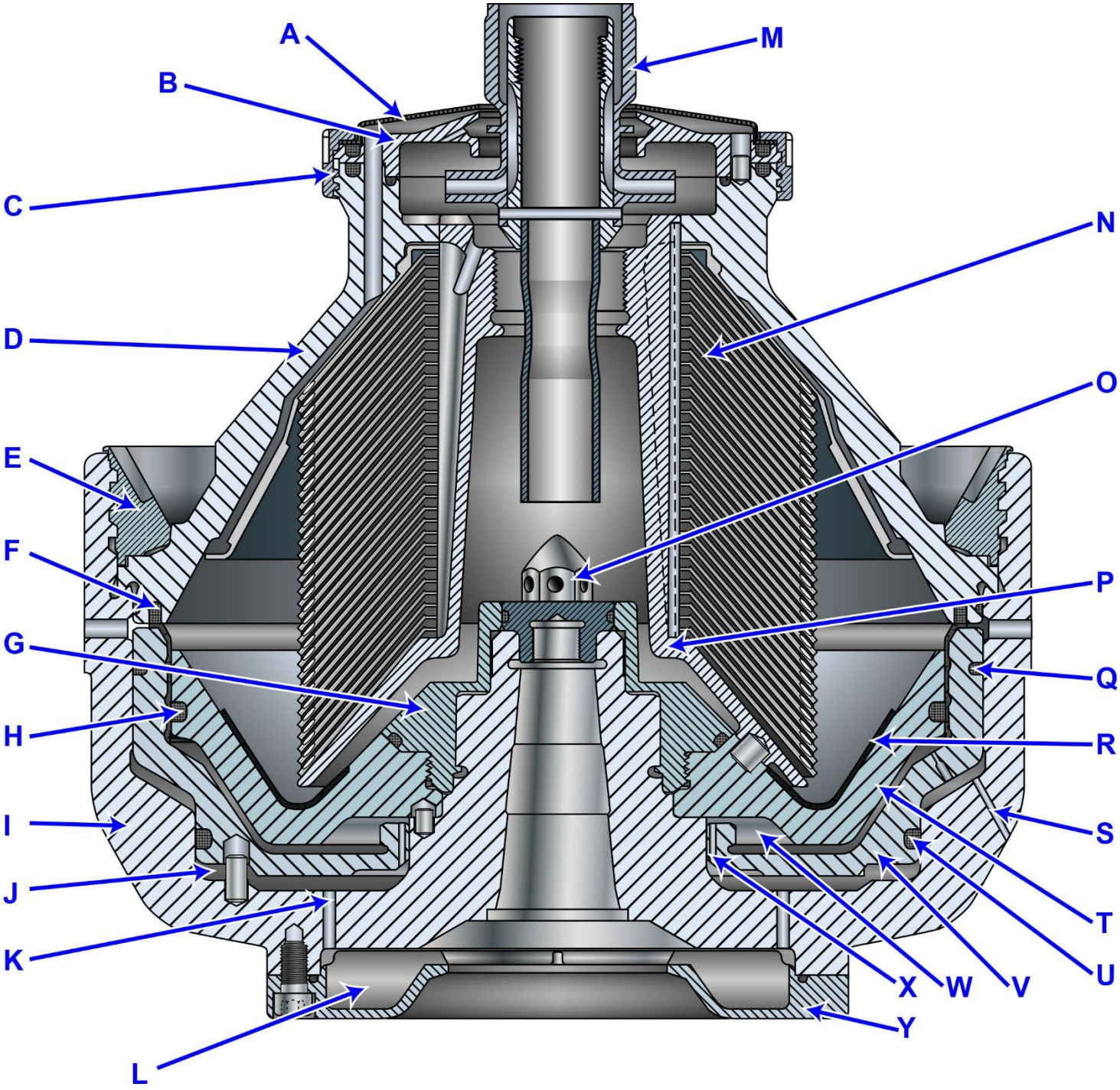

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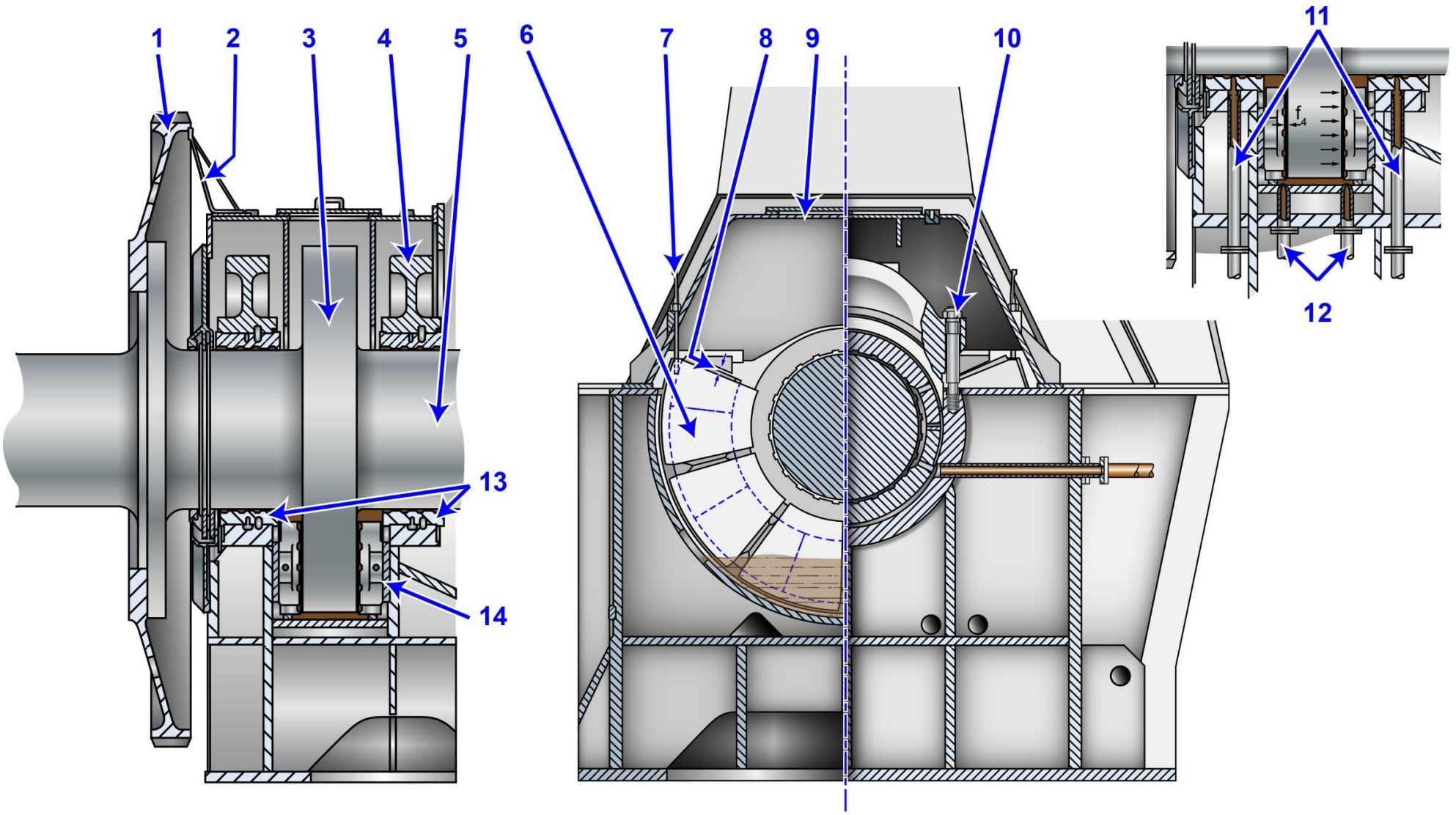
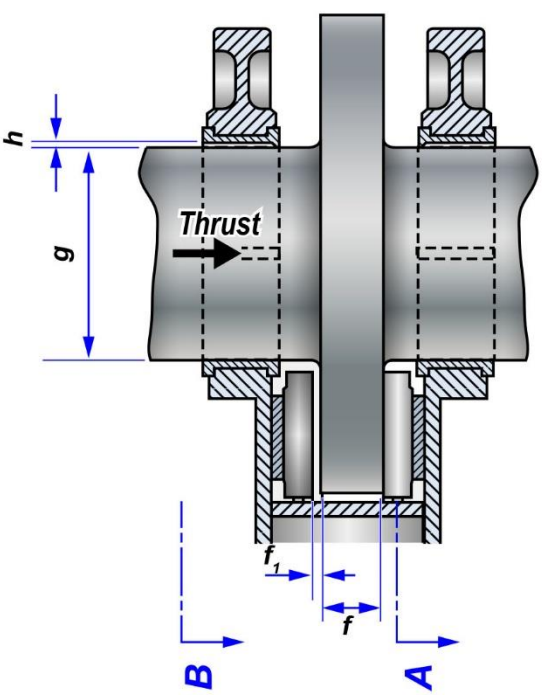
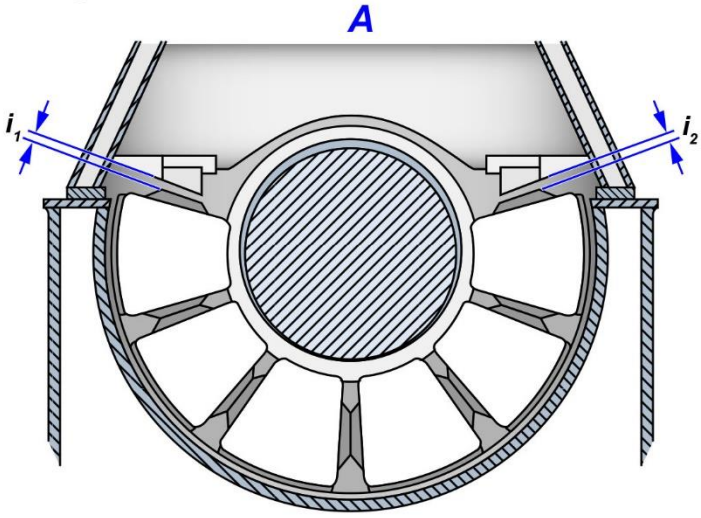
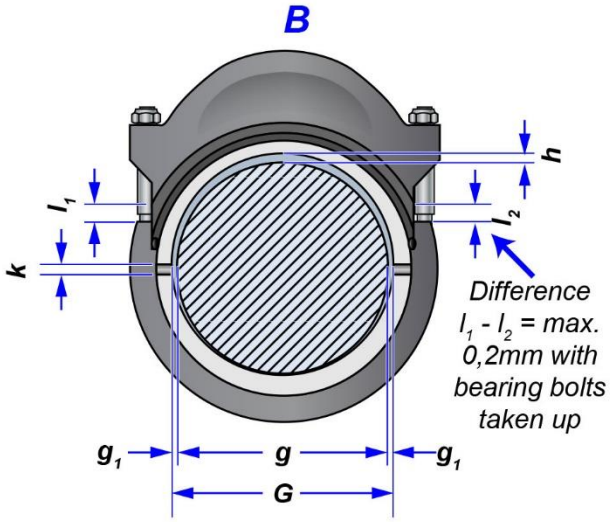


MO-0121

Thrust Bearing



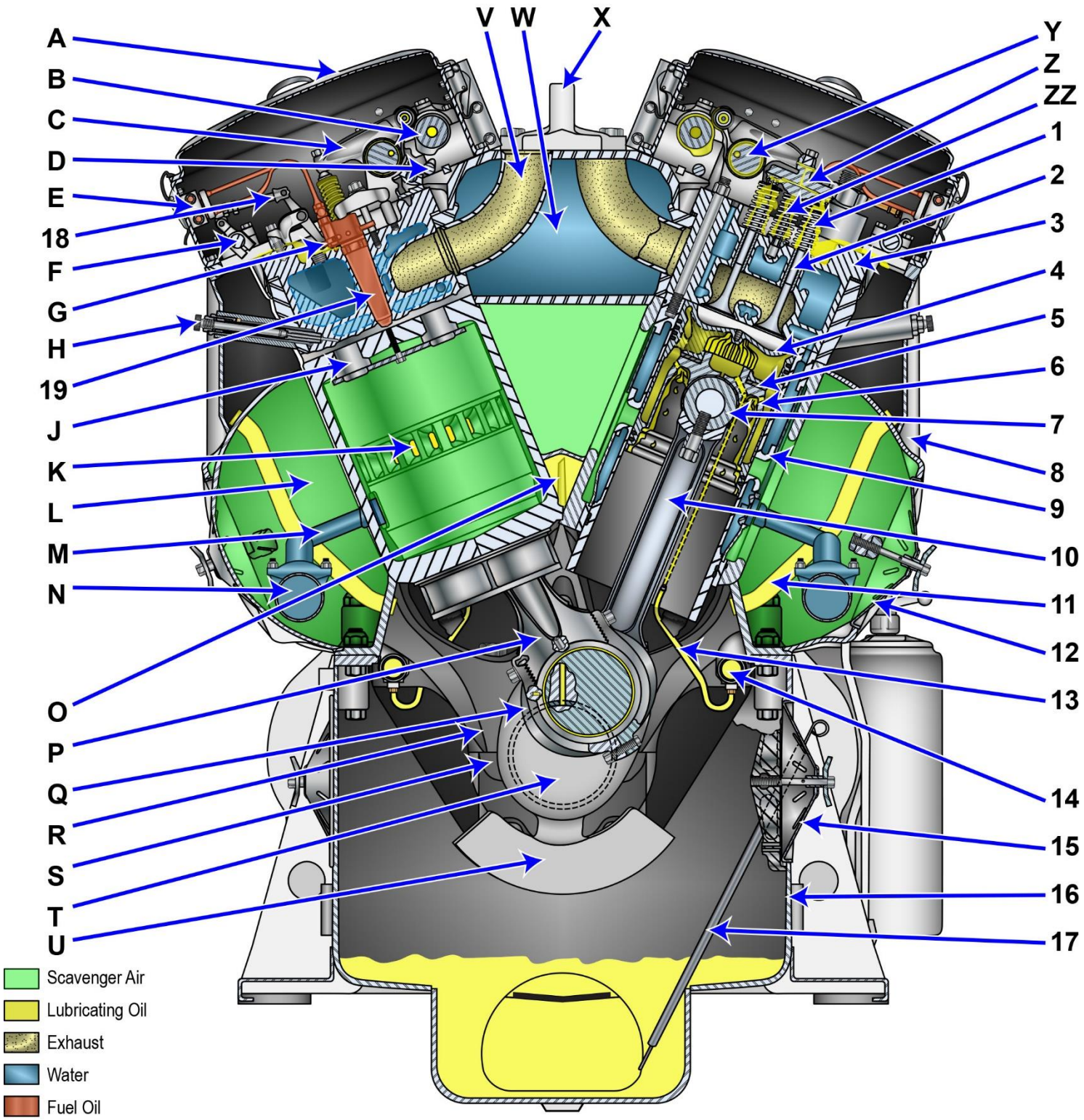




Nominal dimension	Normal play	Max. play (worn)
f = 200	f_1 = 1,0	2,0
g = 540 $^{+0}_{-0,08}$	g_1 = min. 0,10	
G = 540 $^{+0,38}_{+0,30}$	h = $^{+0,46}_{+0,30}$	0,8
	i_1,i_2 = 5	
k = 20		

RND 68	**Principal Clearances Crankshaft and Thrust Bearing**	All dimensions in mm	**7 354 366 - E**

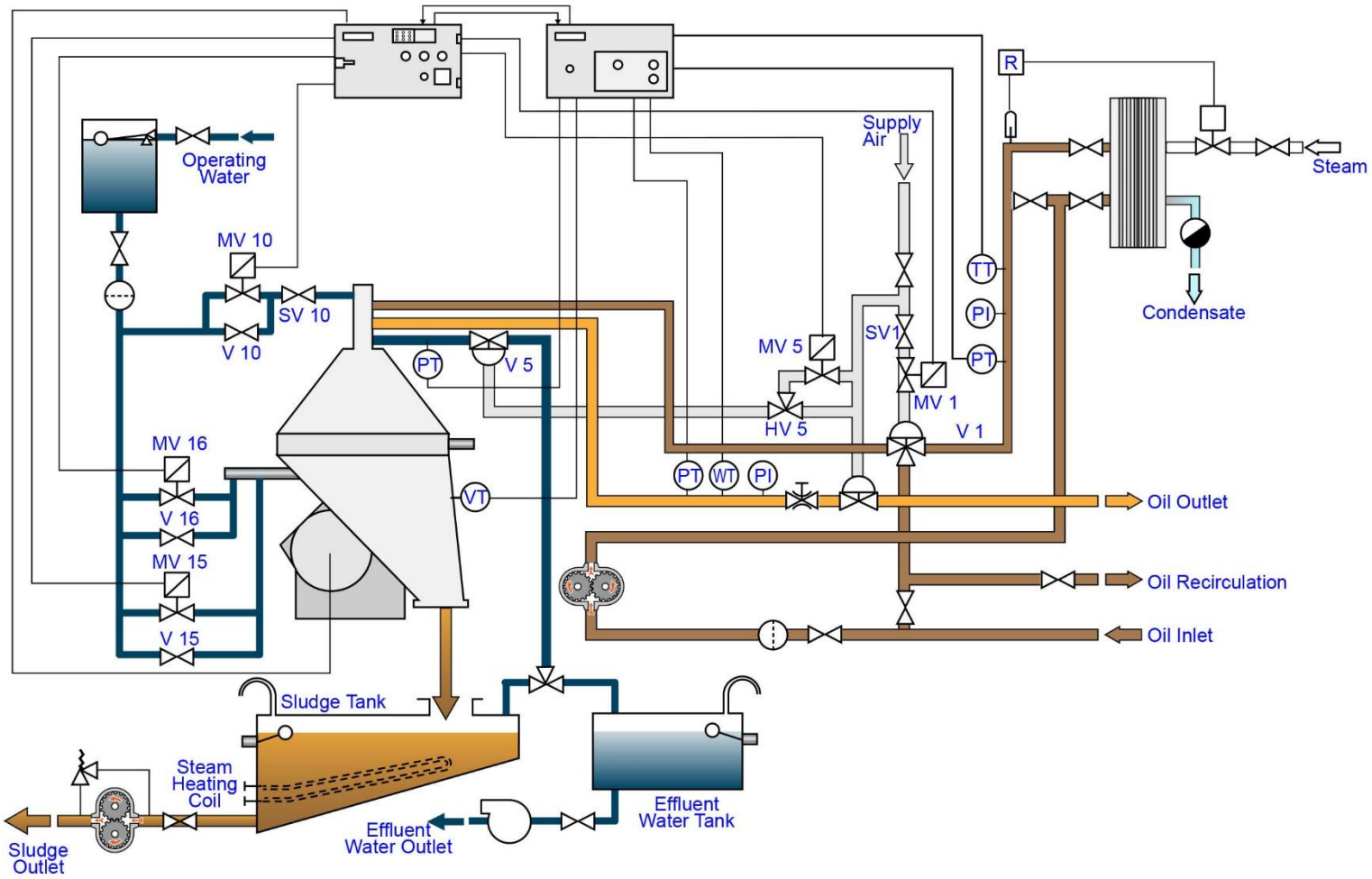
MO-0122



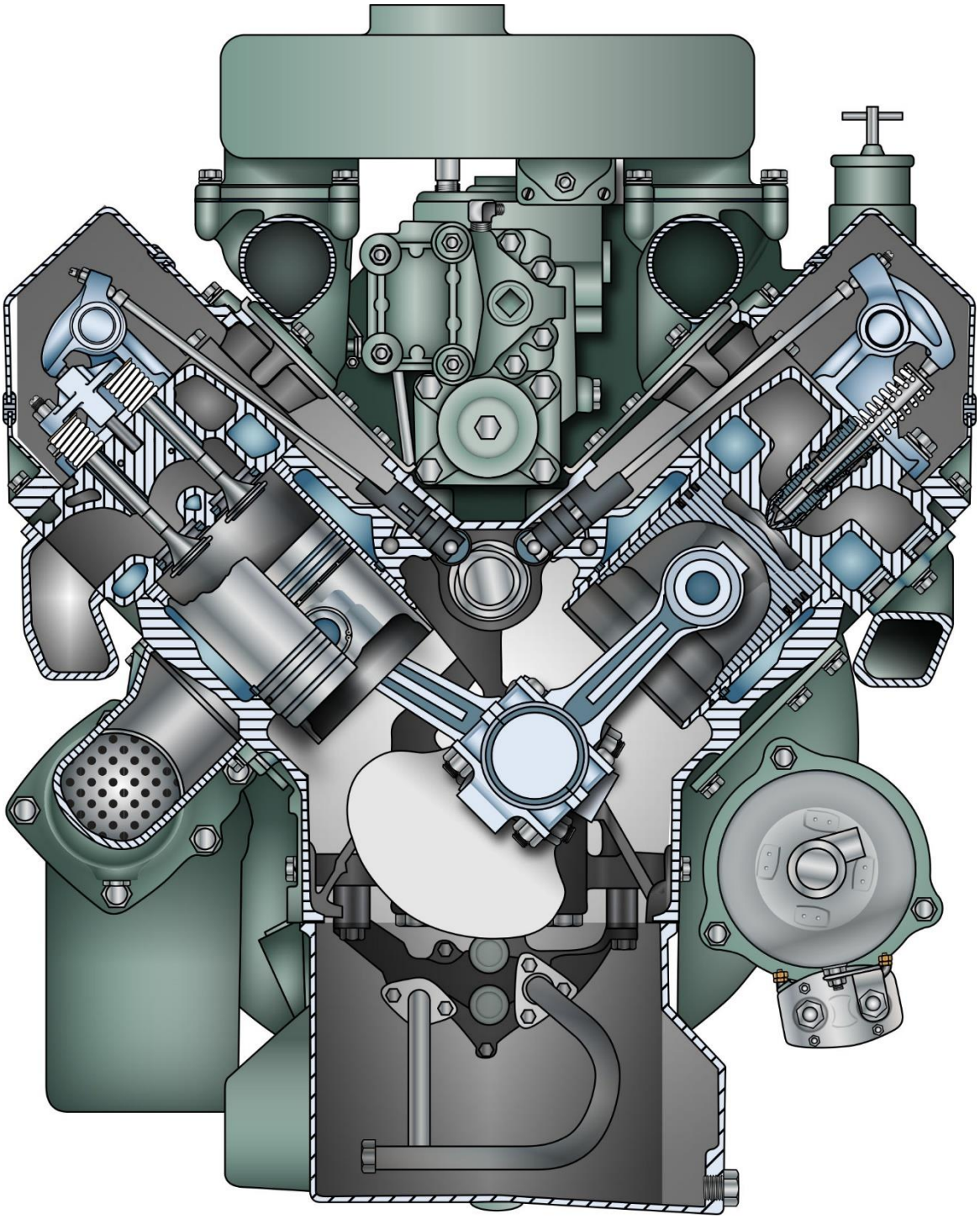
MO-0127

EPC Alarm Indications Program Unit			
○	○	○	○
Alarm from MARST1	Low pressure in oil outlet	High oil temperature after preheater	Low oil temperature after preheater
○	○	○	○
Emergency stopping or vibrations	No discharge	Logically wrong signal from 1st separator	Remote alarm signal only

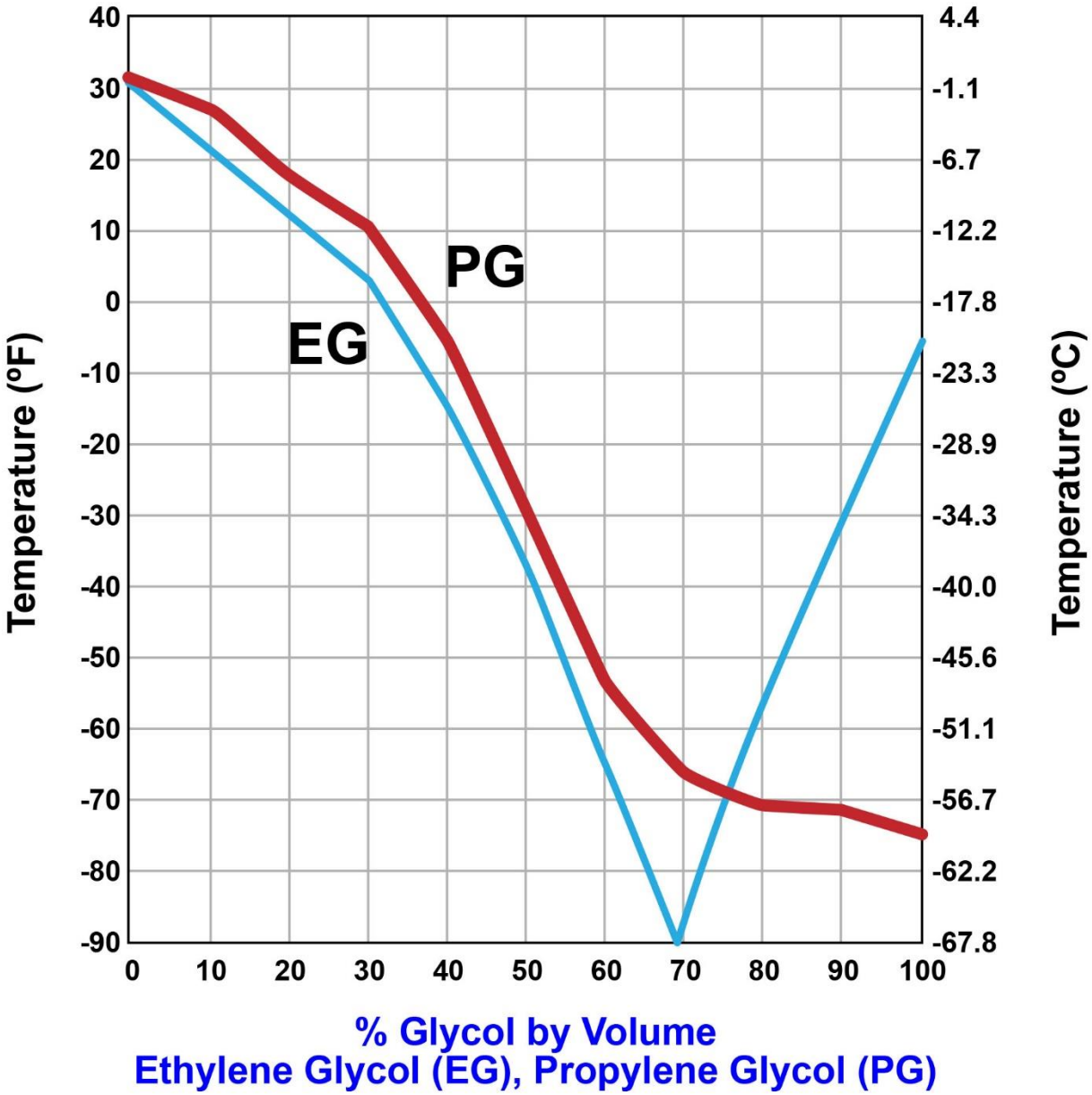
MARST1 Alarm Indications Program Unit			
A01	**A02**	**A03**	**A04**
Abnormal water content	Transducer signal minimum value	No discharge feedback signal	Drain valve insufficient
A05	**A06**	**A07**	
Micro-processor error	Liquid indication	Transducer fault	



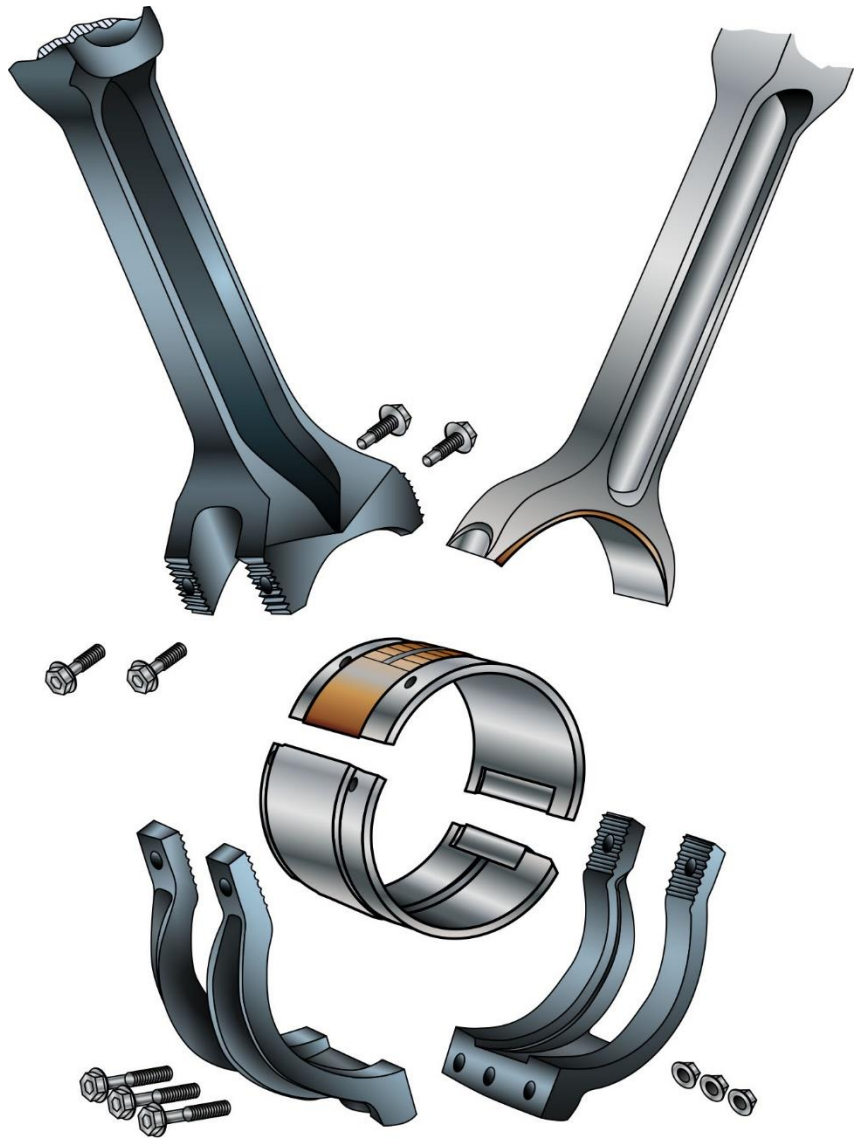
MO-0163



MO-0209
Freezing Point of Coolant as a Function of Glycol Concentration



MO-0226



MO-0231