U.S.C.G. Merchant Marine Exam

Assistant Engineer - Limited

Q610 Motor Plants

(Sample Examination)

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Illustrations: 20

Choose the best answer to the following Multiple Choice Questions:

1. Diesel engines are classified as reciprocating internal combustion engines because they _____.

- ○ (A) use a continuous combustion process to impart rotary motion to the pistons
- ○ (B) use energy from fuel burned outside their cylinders
- • (C) burn fuel in a closed chamber which imparts linear motion to pistons
- ○ (D) burn fuel in a combustion chamber that moves back and forth

If choice C is selected set score to 1.

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

If choice A is selected set score to 1.

3. The diesel engine shown in the illustration is a _____. Illustration MO-0007

- • (A) four-stroke cycle engine at the end of the compression stroke
- ○ (B) two-stroke cycle engine at the end of the compression stroke
- ○ (C) four-stroke cycle engine at the end of the exhaust stroke
- ○ (D) two-stroke cycle engine at the beginning of the power stroke

If choice A is selected set score to 1.

4. Which area of the indicator diagram illustrated, indicates the afterburning period in a diesel engine cylinder? Illustration MO-0033

- ○ (A) G
- ○ (B) H
- ○ (C) J
- • (D) K

If choice D is selected set score to 1.

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

If choice A is selected set score to 1.

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

- ○ (A) hook and nail
- ○ (B) male and female
- • (C) fork and blade
- ○ (D) left hand and right hand

If choice C is selected set score to 1.

7. Valve lash or clearance refers to the _____.

- • (A) clearance between the top of the valve stem and the valve lifting mechanism
- ○ (B) compression force of the valve springs
- ○ (C) clearance between the valve seat inserts and the valve head
- ○ (D) fuel injection cam profile

If choice A is selected set score to 1.

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

- ○ (A) double-acting trunk piston
- ○ (B) single-acting crosshead piston
- • (C) single-acting trunk piston
- ○ (D) double-acting crosshead piston

If choice C is selected set score to 1.

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

If choice A is selected set score to 1.

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

If choice A is selected set score to 1.

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

If choice D is selected set score to 1.

12. The exhaust ports shown in the illustration are identified with the letter "____". Illustration MO-0003

- (A) B
- (B) Q
- (C) T
- (D) U

If choice B is selected set score to 1.

13. The water inlet manifold for the diesel engine shown in the illustration is represented by the letter or number _____. Illustration MO-0122

- (A) "M"
- (B) "N"
- (C) "W"
- (D) "13"

If choice B is selected set score to 1.

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

If choice B is selected set score to 1.

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

If choice A is selected set score to 1.

16. Prior to starting an auxiliary diesel engine on your vessel, the crankcase oil level must be checked. At what checked level would you be required to add make-up oil?

- (A) When the oil level drops below the FULL mark on the dipstick.
- (B) When the oil level drops to where it is no longer visible on the dipstick.
- (C) When the oil level drops to between the ADD and FULL marks on the dipstick.
- (D) When the oil level drops below the ADD mark on the dipstick.

If choice D is selected set score to 1.

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

If choice B is selected set score to 1.

18. A diesel engine experiences a sudden loss in speed, accompanied by black exhaust smoke, with the fuel rack at maximum, and the speed remaining below normal. The probable cause is _____.

- (A) Engine overload
- (B) Leaky valves
- (C) Stuck or broken piston rings
- (D) Low air injection pressure

If choice A is selected set score to 1.

19. The turbocharged, four-stroke, diesel generator set drive engines on your vessel are protected with dry-type air intake filters. The filter element condition can be evaluated by attaching a water manometer to measure the vacuum in the air duct between the air intake filter and the turbocharger blower inlet. Assume that the manometer reads 10" of water column (negative) at rated engine rpm under full load with a clean, properly sealing filter element. What would a reading of 20" of water column (negative) indicate at rated engine rpm under full load?

- (A) The filter element is severely restricted with dust and requires immediate replacement.
- (B) The filter element is being slightly bypassed due to an improper seal and can be ignored until time is available for re-seating.
- (C) The filter element is being severely bypassed due to an improper seal and should be immediately re-seated.
- (D) The filter element is slightly restricted with dust but does not yet require replacement.

If choice A is selected set score to 1.

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

If choice D is selected set score to 1.

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

If choice B is selected set score to 1.

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

If choice D is selected set score to 1.

23. Which of the listed diesel engine operating conditions should be checked immediately after any diesel engine is started?

- (A) Exhaust temperature
- (B) Lube oil level
- (C) Lube oil pressure
- (D) Water level in the expansion tank

If choice C is selected set score to 1.

24. Where would a coarse screen wire mesh strainer normally be found on a diesel engine lubrication system?

- (A) pump discharge line
- (B) gravity tank inlet line
- (C) filter bypass return line
- (D) pump suction line

If choice D is selected set score to 1.

25. The illustrated device is used to _____. Illustration MO-0050

- (A) supply cylinder lubricating oil to the engine
- (B) meter fuel oil to the injectors
- (C) admit the correct amount of starting air to the cylinders in proper order
- (D) actuate exhaust valves in the correct sequence

If choice A is selected set score to 1.

26. Which of the following test indicators should be considered the most significant factor in determining as to whether or not 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.

If choice A is selected set score to 1.

27. Which of the following statements is true concerning the cetane number of diesel fuel?

- (A) The cetane number affects the amount of injection lag.
- (B) The cetane number is an indication of the fuel's viscosity.
- (C) Ignition lag is reduced with fuels having a high cetane number.
- (D) The cetane number is of little significance in the combustion process.

If choice C is selected set score to 1.

28. For optimum results, centrifugal purification of heavy fuel oil should be accomplished with the fuel at the lowest practicable _____.

- (A) throughput
- (B) additive percent
- (C) cetane number
- (D) TBN number

If choice A is selected set score to 1.

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.

If choice C is selected set score to 1.

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

If choice D is selected set score to 1.

31. The purpose of the delivery check valve used in a diesel fuel injection jerk pump is to _____.

- (A) assist in a quick cutoff of fuel injection
- (B) allow oil backflow from the injector to the helix
- (C) reduce fuel oil pressure between injection strokes
- (D) meter the quantity of fuel delivered

If choice A is selected set score to 1.

32. Fuel injector nozzles are usually of the multi-orifice type with the number and placement of the holes arranged according to the _____.

- (A) type of piston rings
- (B) pressure of the fuel system
- (C) size of the pump plunger spring
- (D) design of the combustion chamber

If choice D is selected set score to 1.

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

If choice C is selected set score to 1.

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

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

If choice D is selected set score to 1.

35. According to the illustration, initial timing of fuel injection into the cylinder is controlled with the component that is identified as the letter _____. Illustration MO-0097

- (A) C
- (B) H
- (C) K
- (D) I

If choice A is selected set score to 1.

36. When a nozzle tester is used to check the spray pattern of a diesel fuel injection nozzle, which of the following statements is true?

- (A) The valve should normally begin to open at 1/2 the popping pressure
- (B) The needle valve spring should always be removed first before testing
- (C) A serious hazard of blood poisoning exists if the fuel spray penetrates the skin of the operator
- (D) The needle valve should remain open after the nozzle pops open

If choice C is selected set score to 1.

37. Fuels as produced in a refinery are generally sterile; however, contamination can occur as fuels are _____.

- (A) stored on the vessel
- (B) stored at the refinery
- (C) transported to the distribution sites
- (D) all of the above are correct.

If choice D is selected set score to 1.

38. In a naturally aspirated diesel engine, the volume of air intake is directly associated with engine _____.

- (A) compression ratio
- (B) displacement
- (C) fuel pressure
- (D) cylinder clearance volume

If choice B is selected set score to 1.

39. Which of the air intake systems listed will result in the lowest specific fuel consumption?

- (A) Natural aspiration
- (B) Turbocharged
- (C) Roots blower
- (D) Piston blower

If choice B is selected set score to 1.

40. Exhaust pipes for separate main propulsion diesel engines can be combined only when _____.

- (A) space limitations prevent separately run pipes
- (B) the engines are small auxiliary units
- (C) they are arranged to prevent gas backflow to each engine
- (D) a waste heat boiler is installed

If choice C is selected set score to 1.

41. A water jacket is placed around the exhaust manifolds of propulsion diesel engines to _____.

- (A) Reduce heat radiation to the engine room
- (B) Aid in preventing turbocharger overheating
- (C) Condense and drain moisture from exhaust gases
- (D) Dampen exhaust gas pulsations in the manifold

If choice A is selected set score to 1.

42. The expansion tank for a diesel engine closed cooling system is designed to maintain a constant head on the system and _____.

- (A) Provide an air-cushion
- (B) Reduce water temperature
- (C) Reduce water turbulence
- (D) Allow for an increase in water volume as the engine warms up

If choice D is selected set score to 1.

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

If choice C is selected set score to 1.

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

- (A) Freezing point depression
- (B) Biological growth inhibition
- (C) Boiling point elevation
- (D) Corrosion inhibition

If choice D is selected set score to 1.

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

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

If choice B is selected set score to 1.

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

If choice B is selected set score to 1.

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.

If choice D is selected set score to 1.

48. Which of the designs listed will keep the lobes from making contact in a Roots-type blower?

- (A) Drive chain
- (B) Blower timing gears
- (C) Air trapped between blower lobes
- (D) Oil filter between blower lobes

If choice B is selected set score to 1.

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 turbo-chargers
- (C) Cooler operation of the exhaust system
- (D) Effective constant pressure for turbo-charger operation

If choice A is selected set score to 1.

50. The pinion gear shown in the illustration, is located _____. Illustration MO-0086

- (A) below #1 and #3
- (B) between #1 and #3
- (C) below #2 and #4
- (D) between #2 and #4

If choice B is selected set score to 1.

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

If choice B is selected set score to 1.

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

- (A) Michell bearing
- (B) Kingsbury thrust bearing
- (C) Axial/radial bearing
- (D) Collar bearing

If choice A is selected set score to 1.

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 normal play on both sides of the shaft will be one tenth 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 clearance on one side of the shaft at the axis will be one twentieth of a millimeter.

If choice A is selected set score to 1.

54. When an additional load is applied to a diesel engine which is using an inadequately inflated air bladder clutch unit, you can expect _____.

- (A) Pneumatic seizure
- (B) Overheating because of slipping shoes
- (C) Chipped reduction gear teeth
- (D) Excessive wear on the thrust bearings

If choice B is selected set score to 1.

55. The main engines on your vessel are fitted with speed control governors based on the operating principle shown in the illustration. What statement is true concerning the illustrated pressure-compensated governor? Illustration MO-0159

- (A) With the speeder spring compression force and the flyweight centrifugal force in equilibrium, the flyweights are pivoted to vertical and the pilot valve plunger can be positioned in any position.
- (B) With the speeder spring compression force and the flyweight centrifugal force in equilibrium, the flyweights are pivoted to vertical and the pilot valve plunger will be in the centered position blocking off the control port.
- (C) With the speeder spring compression force and the flyweight centrifugal force in equilibrium, the flyweights are pivoted outward and the pilot valve plunger will be in the lowered position aligning the control port to the drain port.
- (D) With the speeder spring compression force and the flyweight centrifugal force in equilibrium, the flyweights are pivoted inward and the pilot valve plunger will be in the raised position aligning the control port to the pressure port.

If choice B is selected set score to 1.

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

- (A) Moisture
- (B) Dirt
- (C) Acid
- (D) Air

If choice B is selected set score to 1.

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) critical state
- (C) latent contact
- (D) sensible contact

If choice A is selected set score to 1.

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

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

If choice A is selected set score to 1.

59. The boiler shown in the illustration would be classed as _____. Illustration MO-0064

- (A) two-pass, water-tube
- (B) forced circulation, coil-type
- (C) two-pass, scotch marine
- (D) single-pass, fire-tube, scotch marine

If choice D is selected set score to 1.

60. A photoelectric cell installed in an automatically fired auxiliary boiler burner management system _____.

- (A) Must be bypassed at low firing rates
- (B) Detects a flame failure by monitoring radiant heat from glowing refractory
- (C) Opens the burner circuit upon sensing a flame failure
- (D) Requires mechanical linkage to secure the burner fuel supply

If choice C is selected set score to 1.

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

If choice C is selected set score to 1.

62. Why should the main steam stop valve of an auxiliary boiler be eased off its seat and then gently closed before lighting off?

- (A) To examine the valve stem for scars or nicks.
- (B) To check for a tight bonnet seal.
- (C) To ensure that the valve will not be seized shut when hot.
- (D) To check the valve packing.

If choice C is selected set score to 1.

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) Copper
- (B) Titanium
- (C) Tungsten
- (D) Chrome-moly steel

If choice A is selected set score to 1.

64. You are observing the flame condition on an oil-fired auxiliary boiler through an observation window peep-hole. 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) White smoke
- (C) Light brown haze
- (D) Clear stack

If choice A is selected set score to 1.

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

If choice B is selected set score to 1.

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

If choice C is selected set score to 1.

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 shutdown the engine, then investigate the cause for the low pressure alarm.
- (C) Monitor closely oil pressures, temperatures, and levels while continuing to run the engine.
- (D) Immediately add make-up oil or service lube oil coolers, strainers, and filters, as appropriate.

If choice B is selected set score to 1.

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

If choice C is selected set score to 1.

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

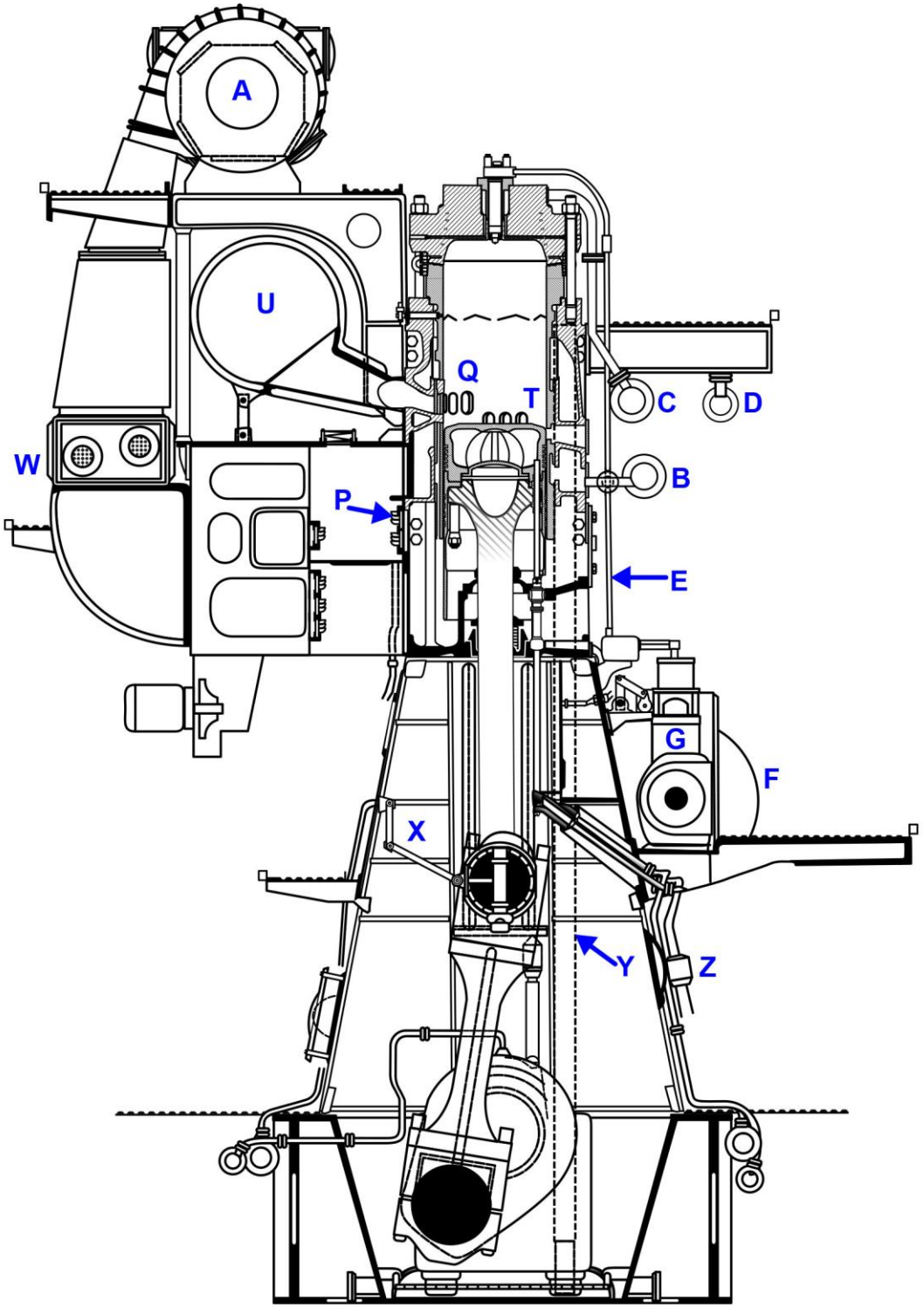
If choice B is selected set score to 1.

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 inlet air and/or fuel 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 control electrical power 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 lubricating oil 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 starting air supply to stop the engine in case there is an over speed on start-up.

If choice A is selected set score to 1.

MO-0003



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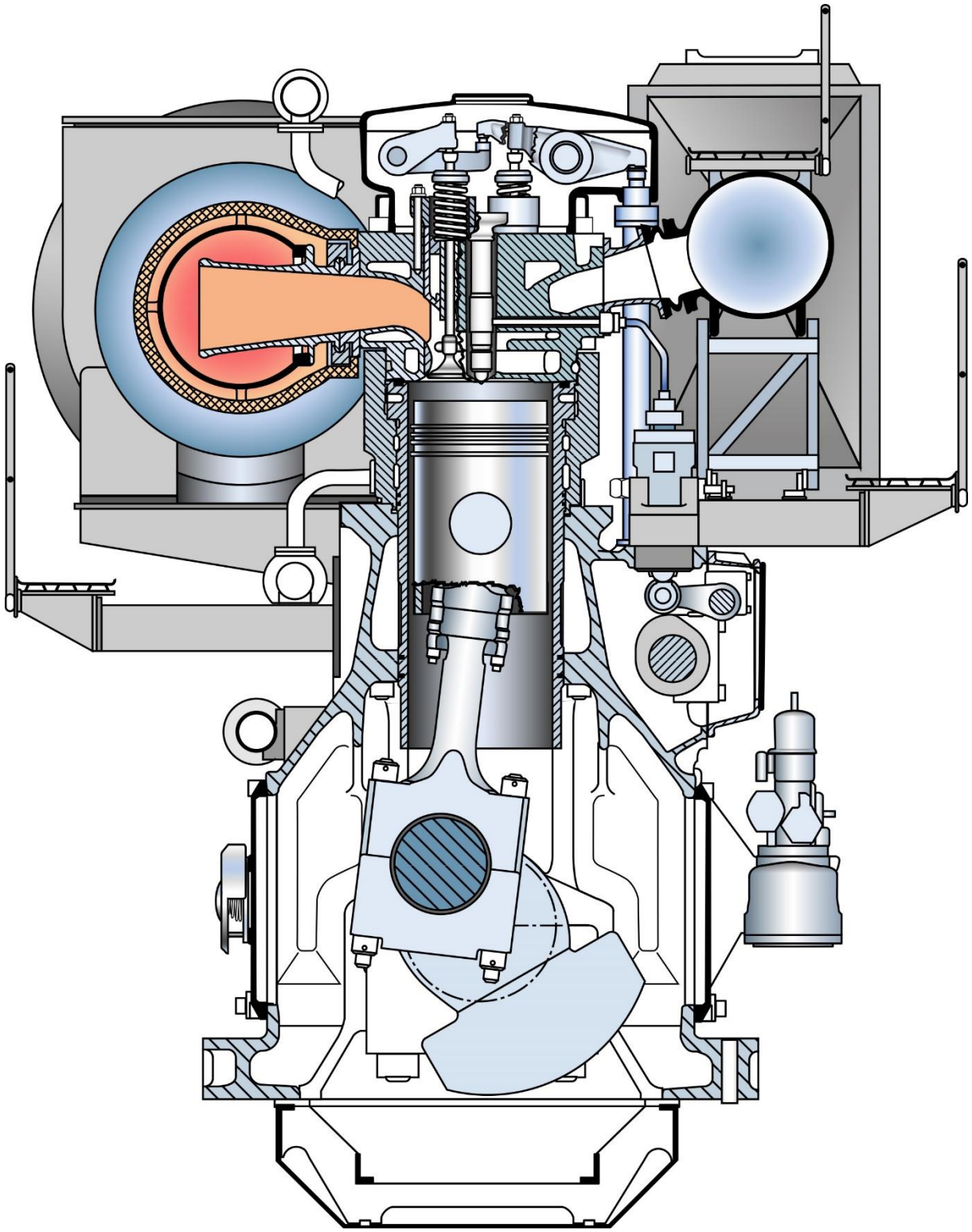

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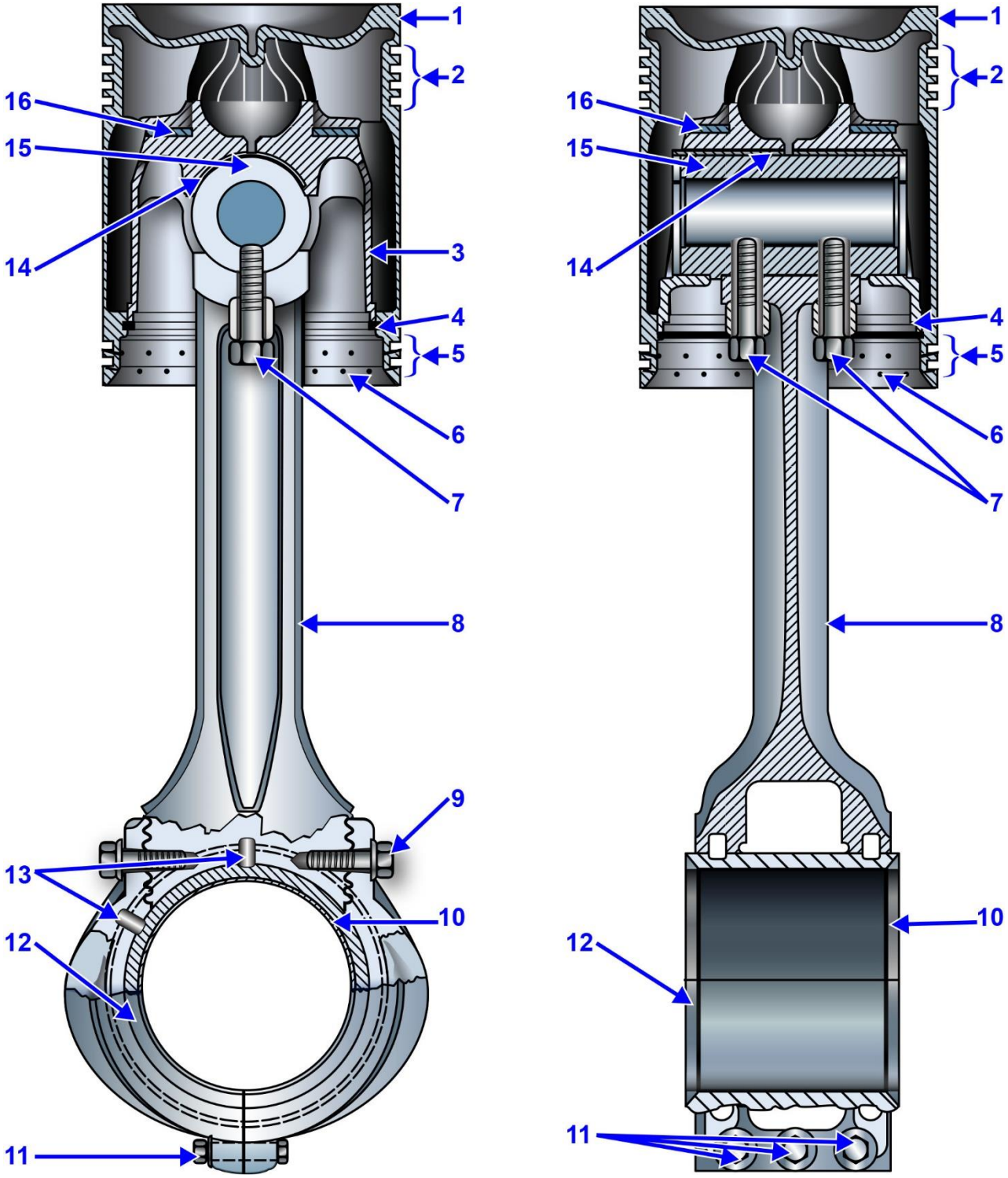

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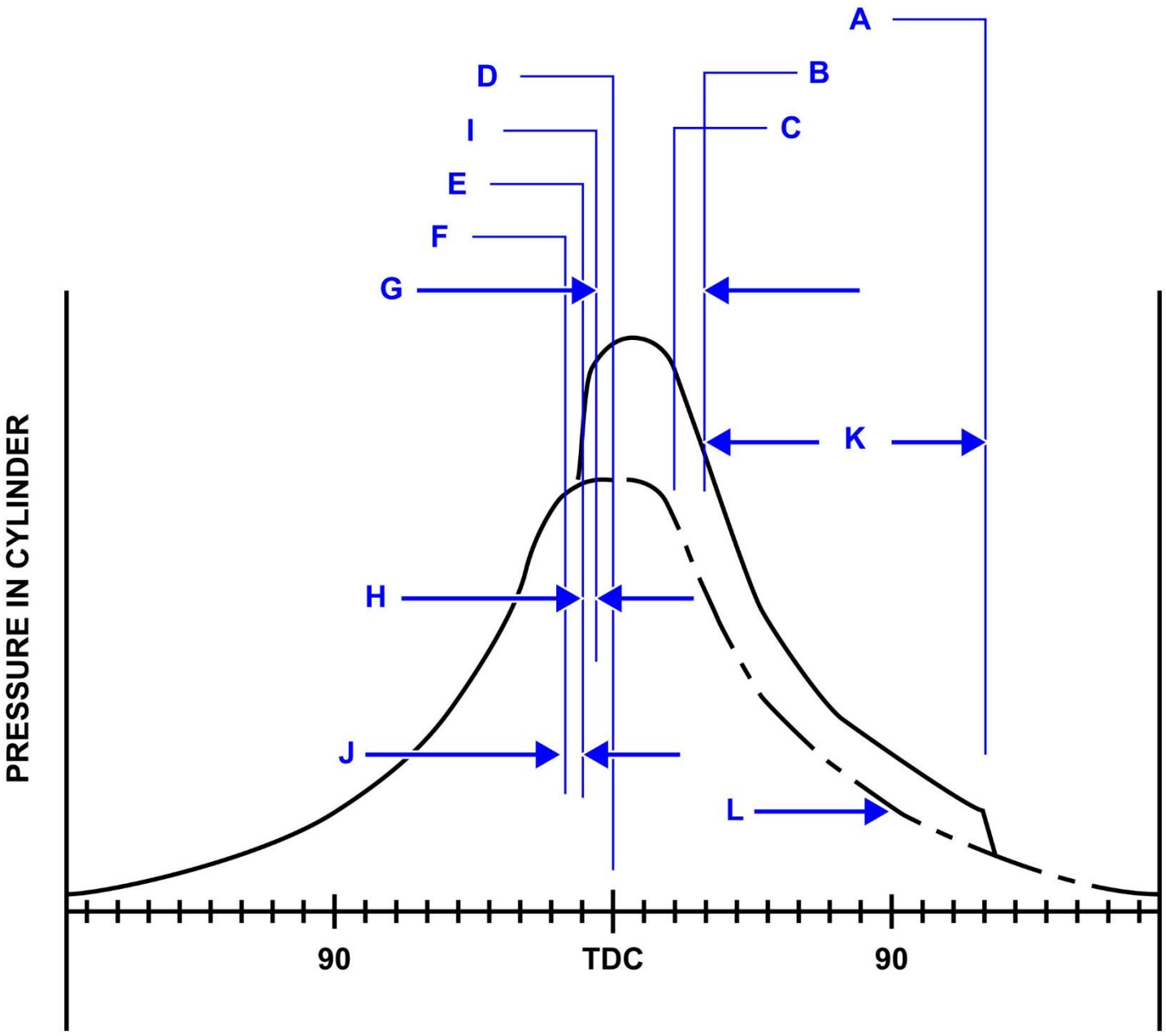

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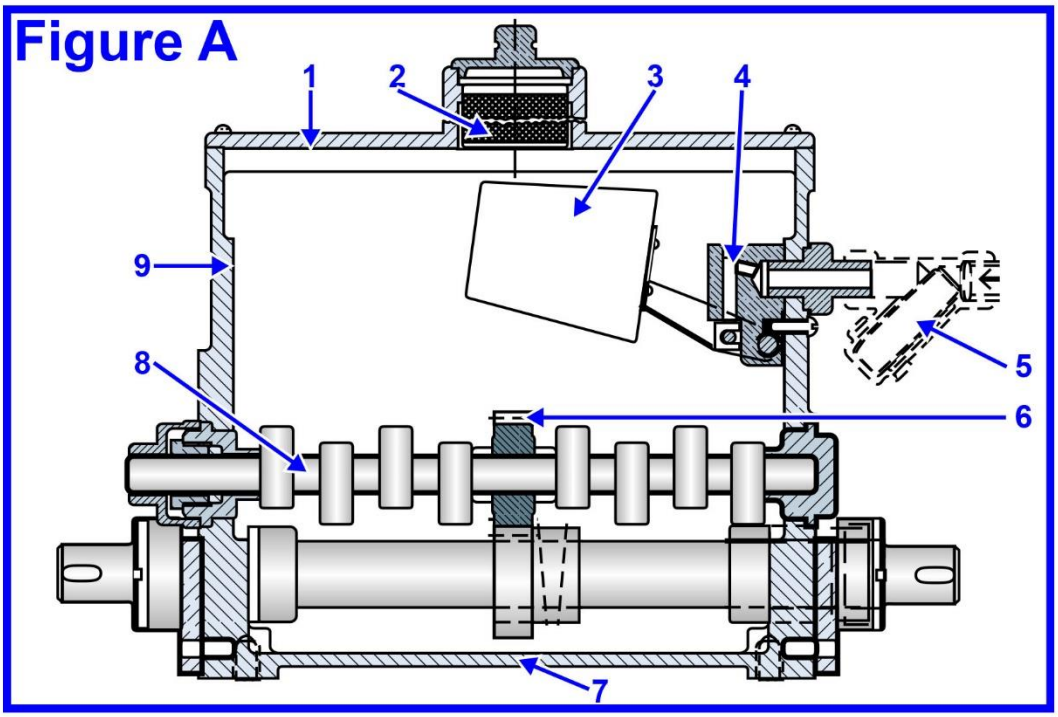
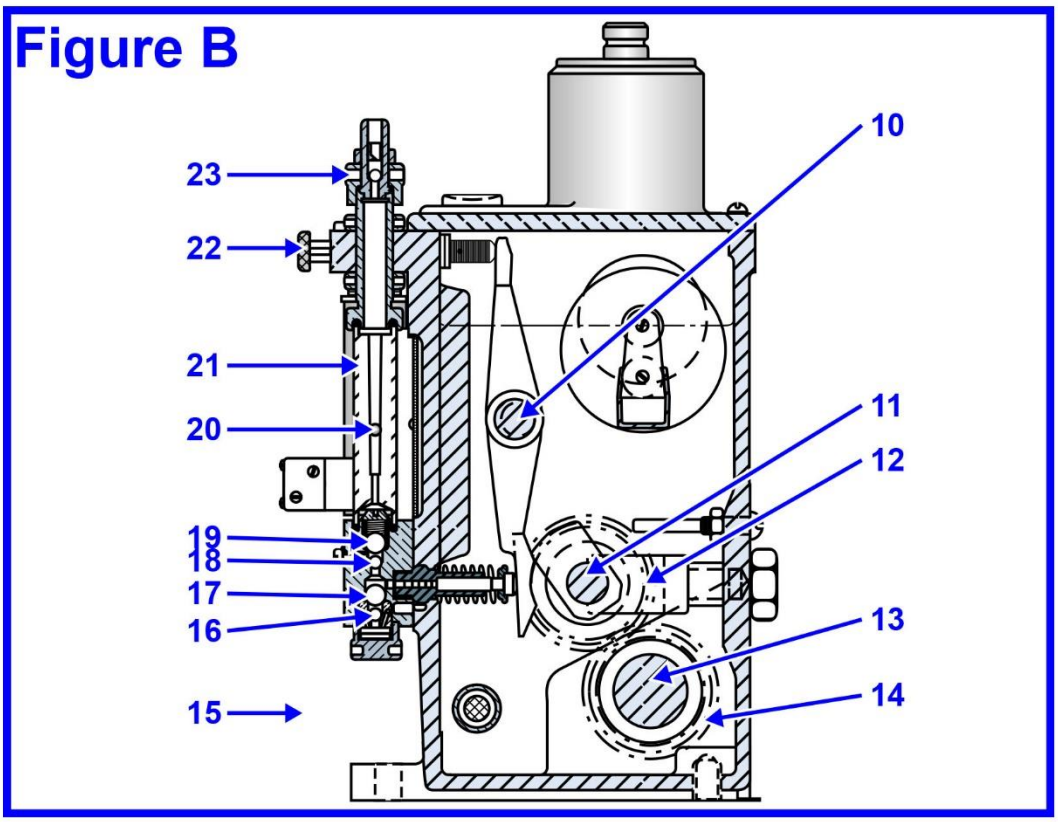
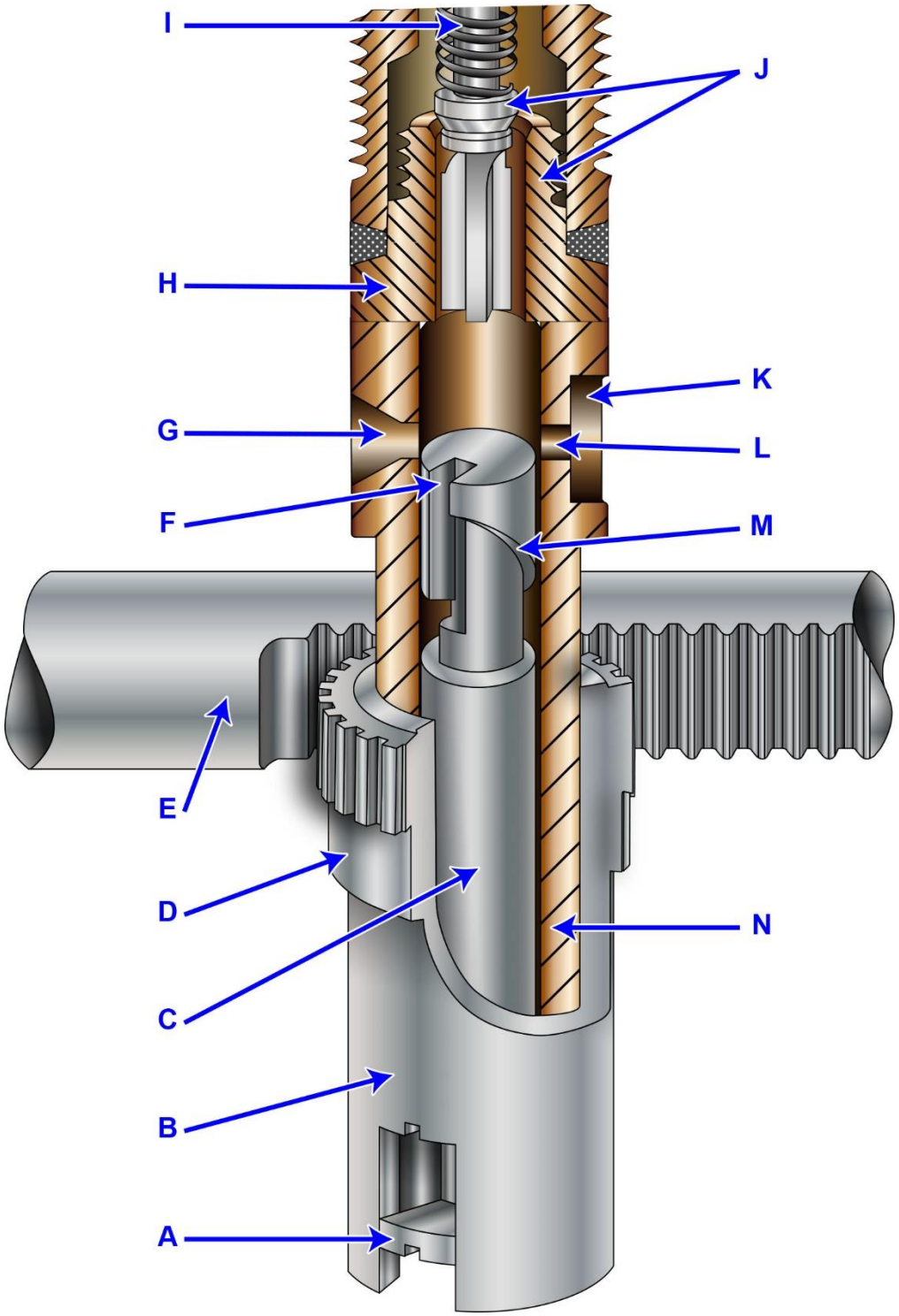
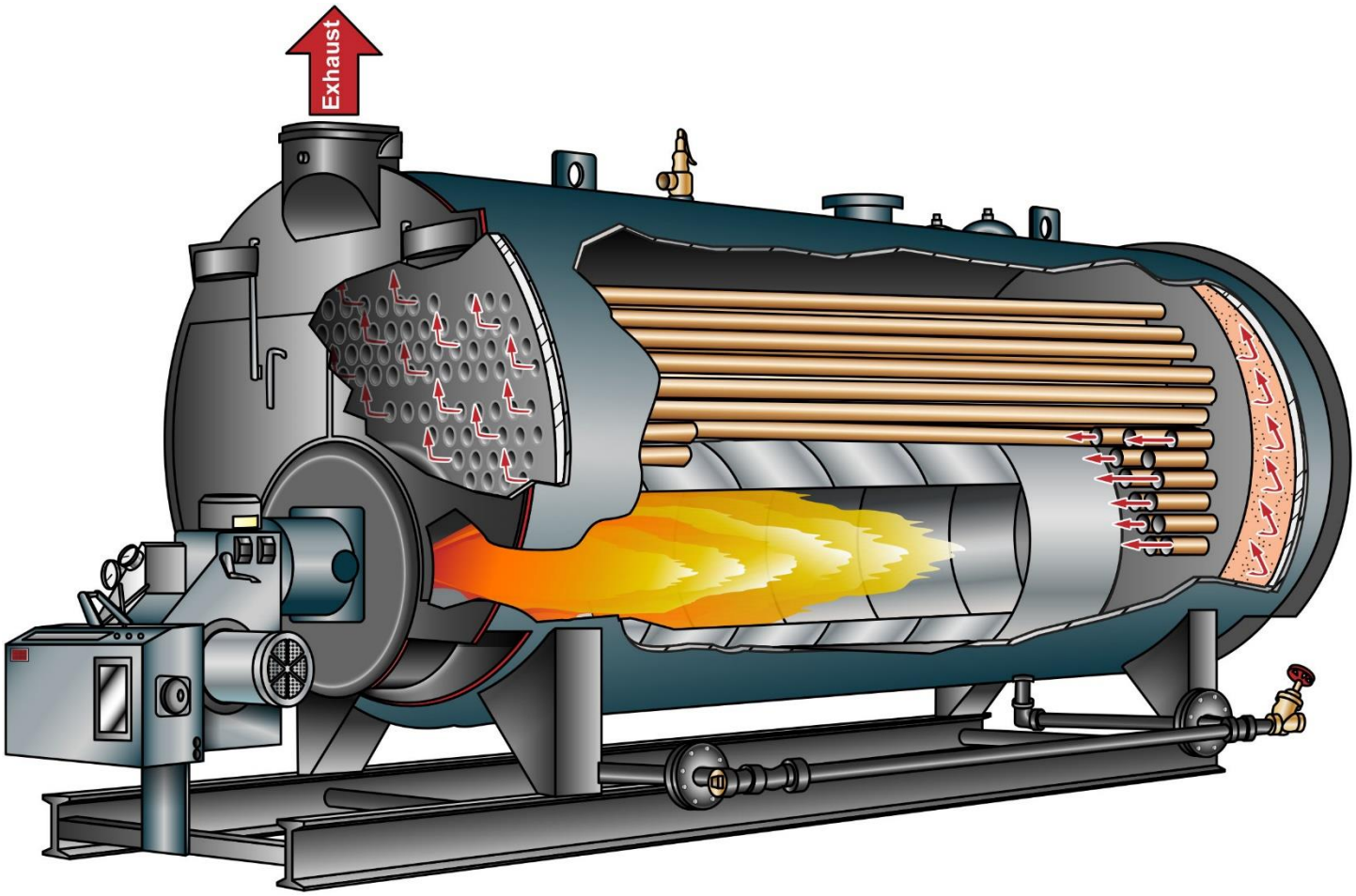




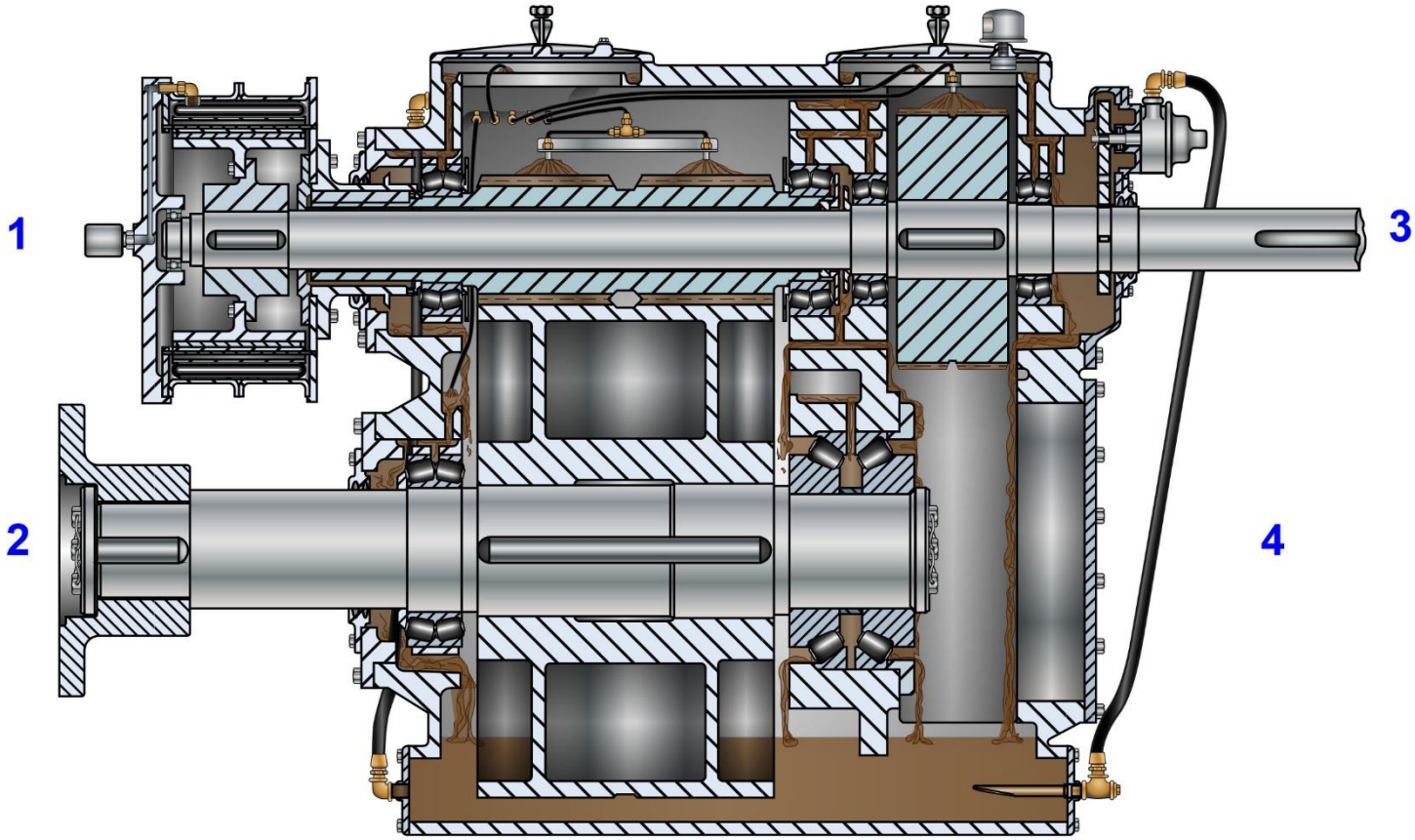
MO-0061



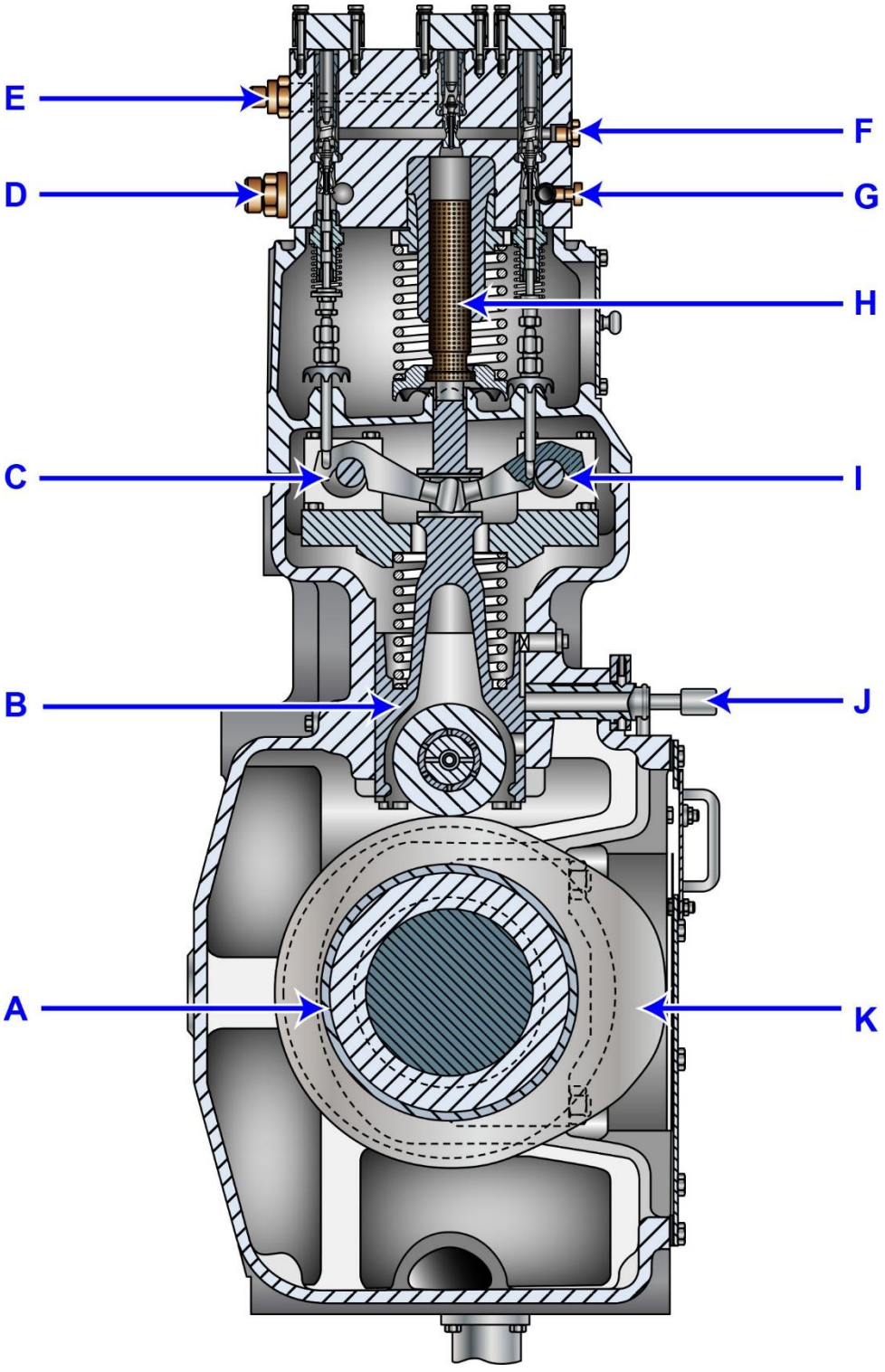
MO-0064



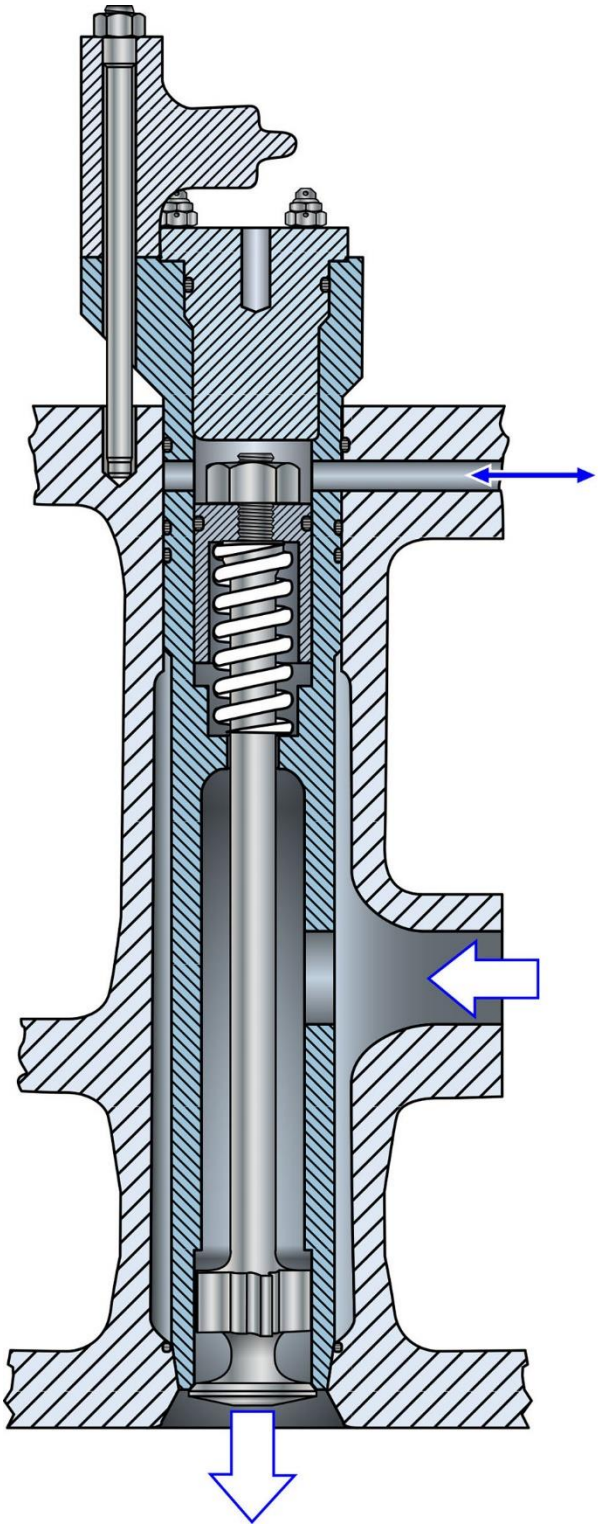
MO-0086



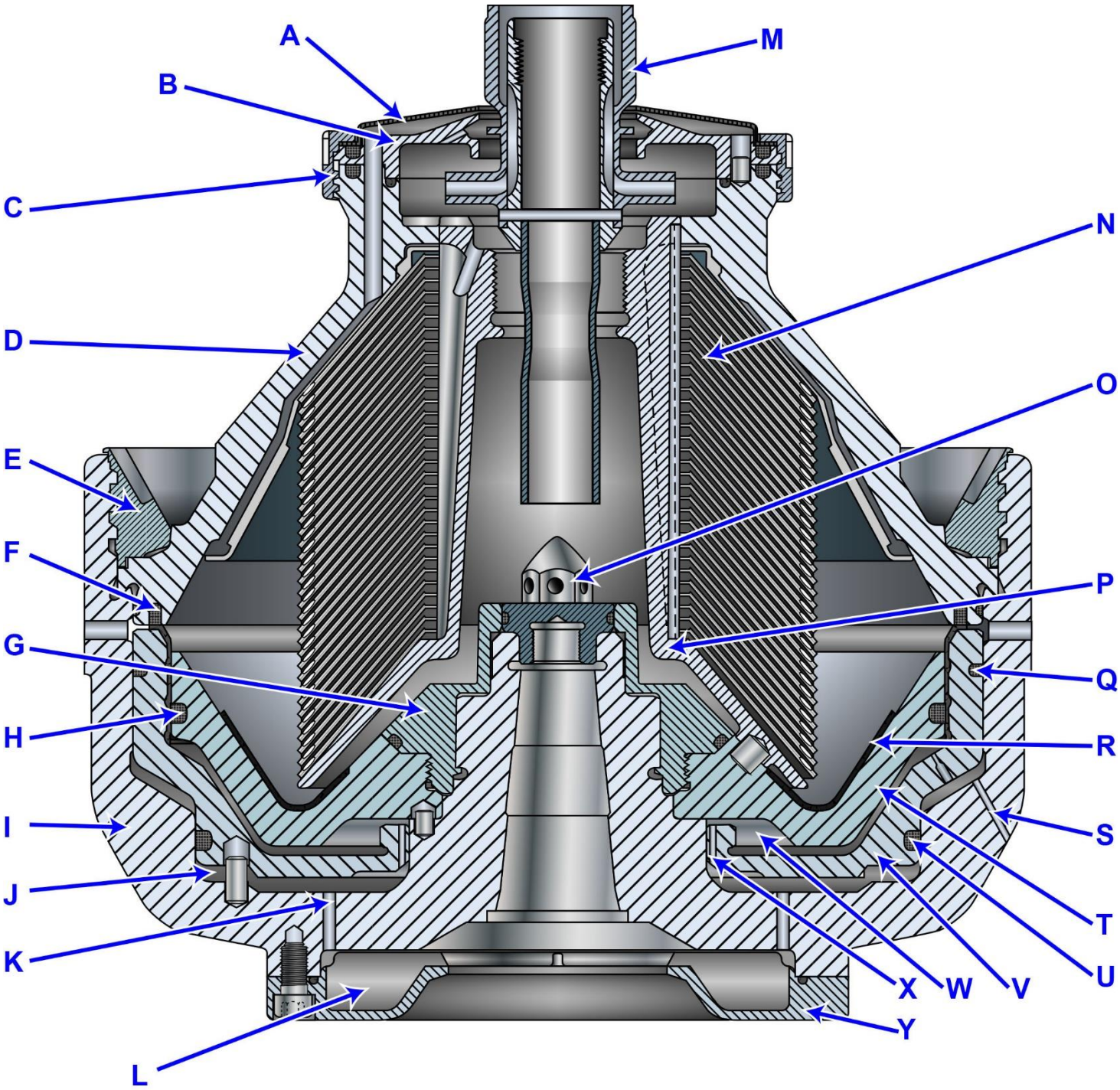
MO-0097



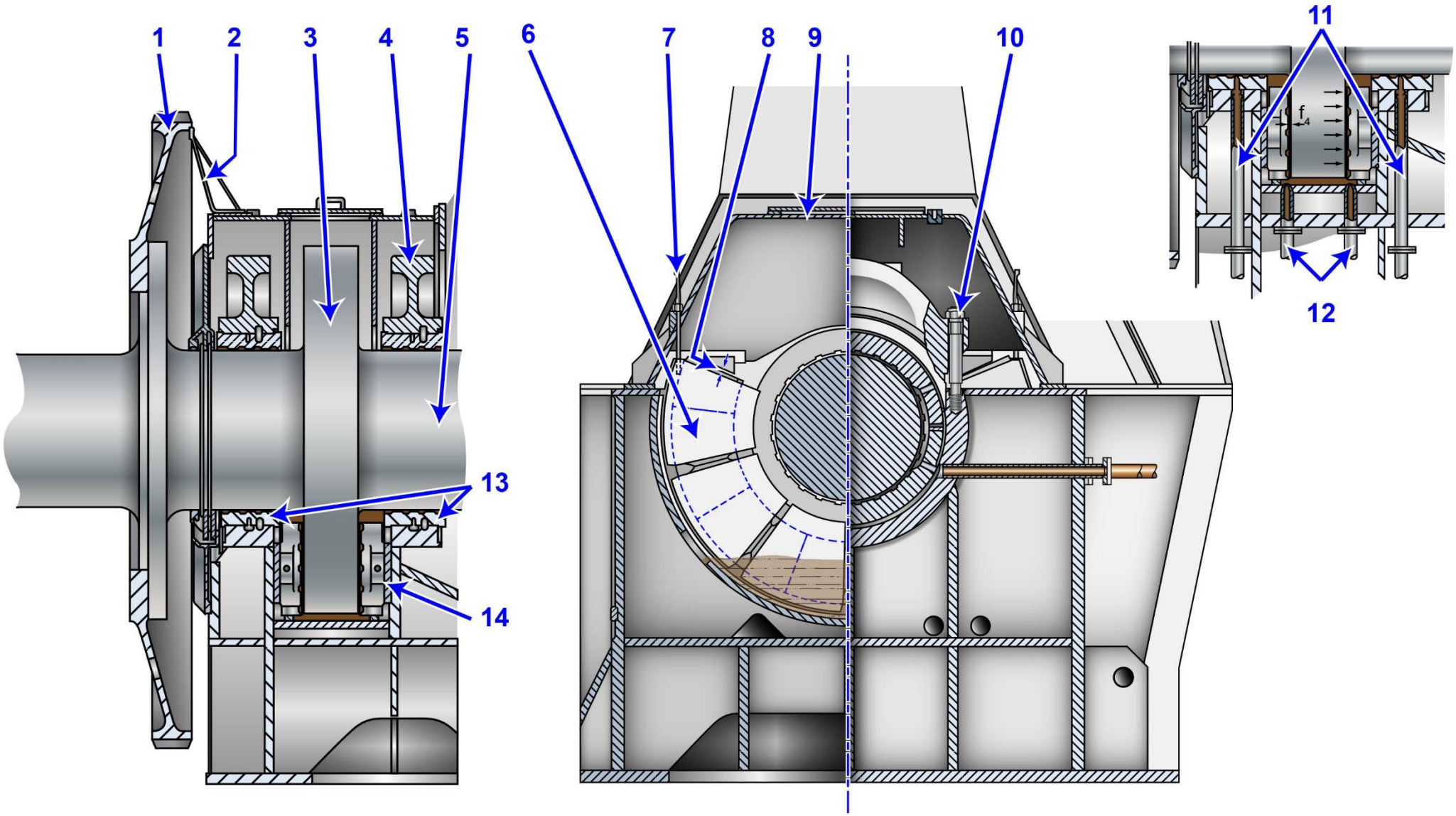
MO-0107



MO-0112

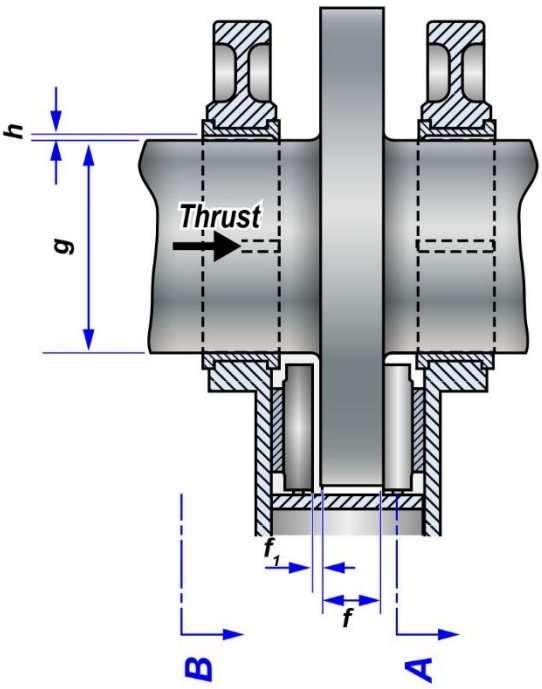


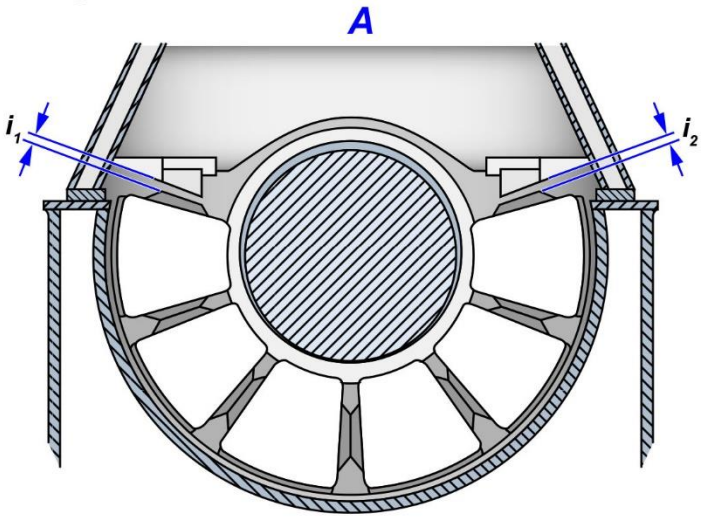
MO-0120

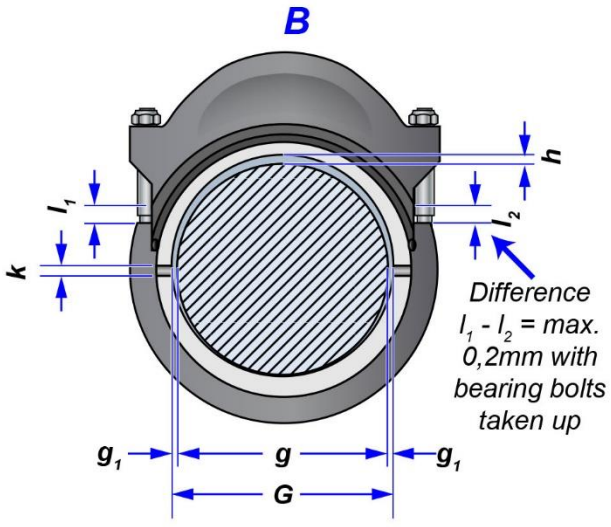


MO-0121

Thrust Bearing



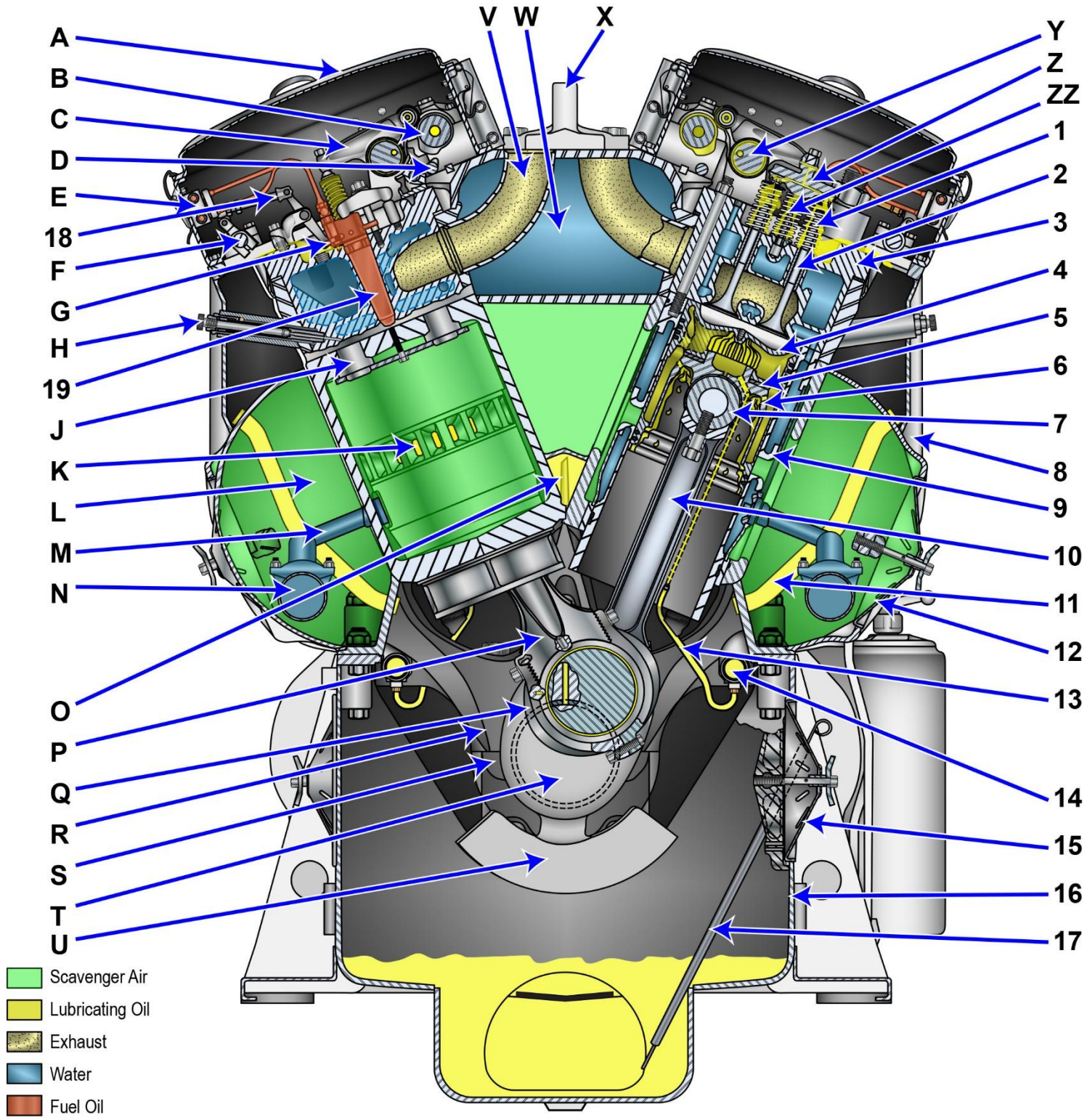




Nominal dimension	Normal play	Max. play (worn)
f = 200	f_1 = 1,0	2,0
g = 540 $^{+0}_{-0,08}$	g_1 = min. 0,10	
G = 540 $^{+0,38}_{+0,30}$	h = $^{+0,46}_{+0,30}$	0,8
	i_1,i_2 = 5	
k = 20		

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

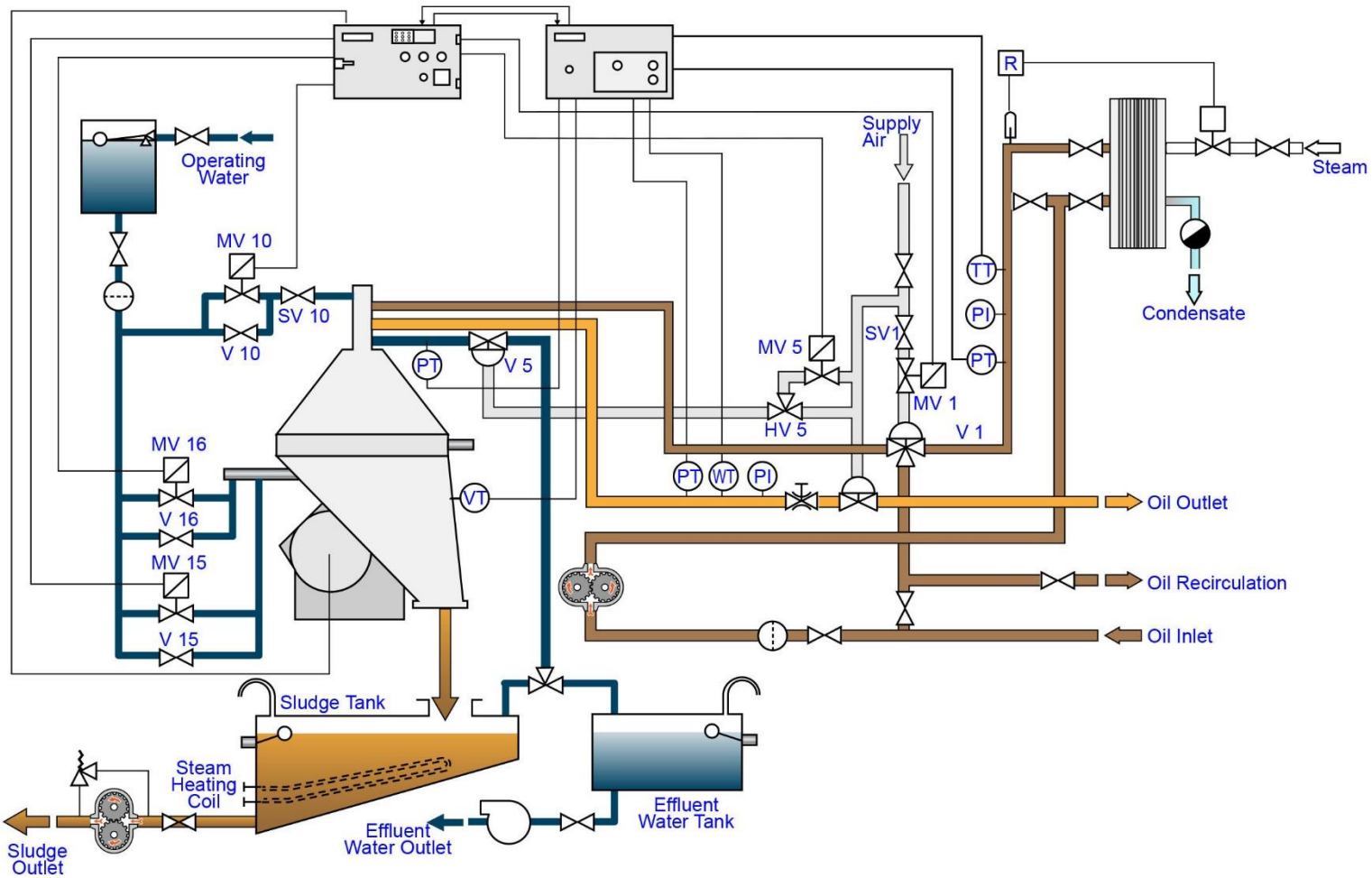
MO-0122



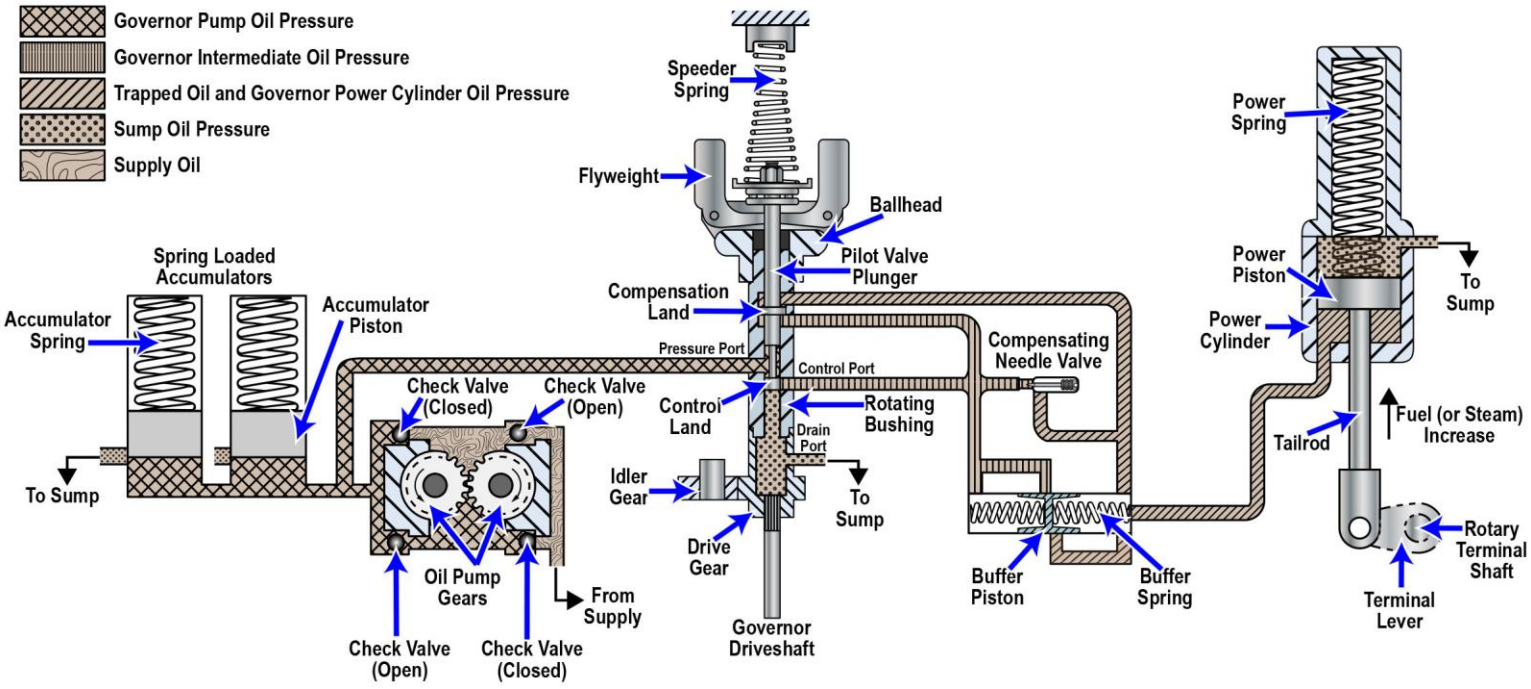
MO-0127

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

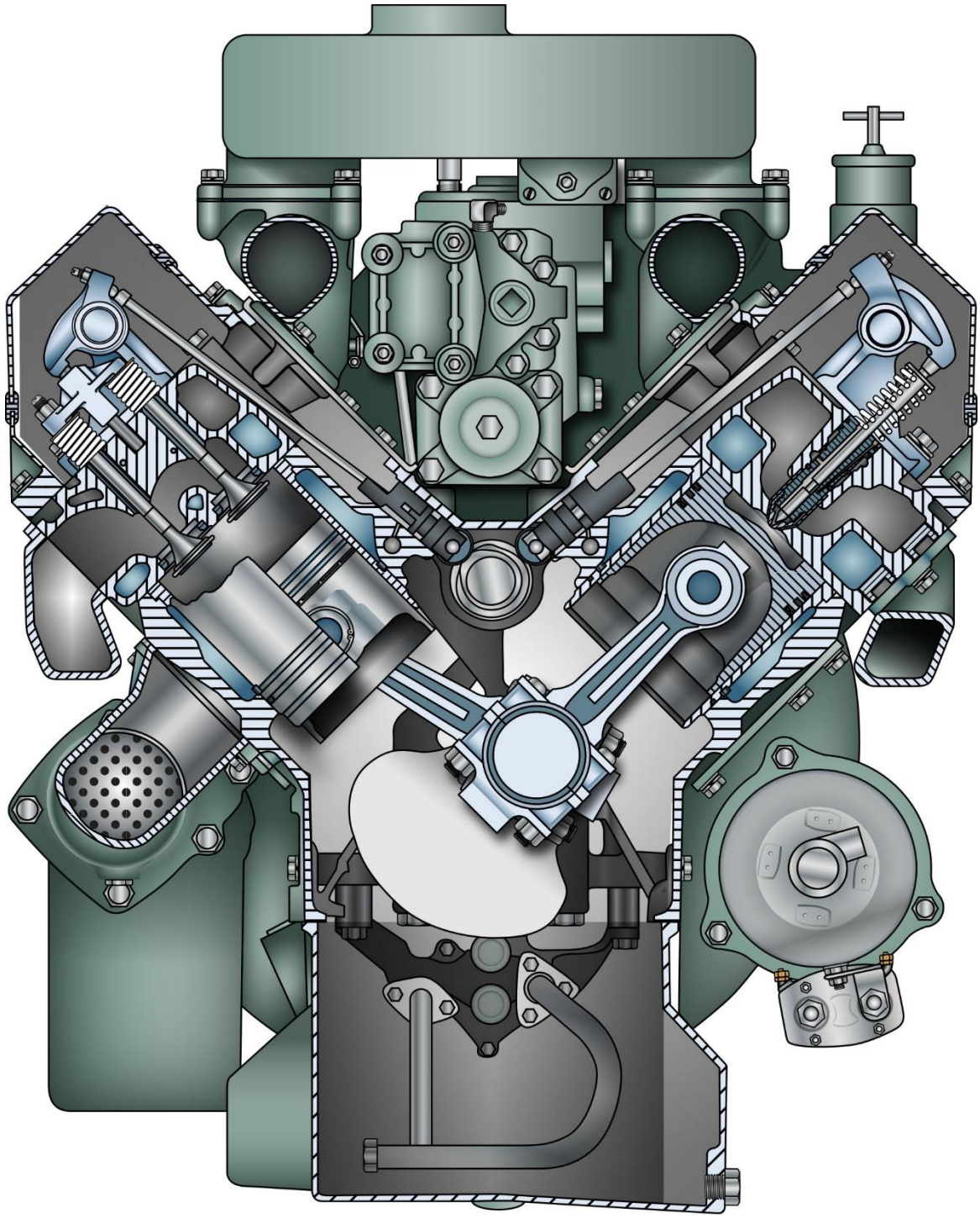
MARST1 Alarm Indications Program Unit			
A01	**A02**	**A03**	**A04**
Abnormal water content	Transducer signal minimum value	No discharge feedback signal	Drain valve insufficient
A05	**A06**	**A07**	
Micro-processor error	Liquid indication	Transducer fault	



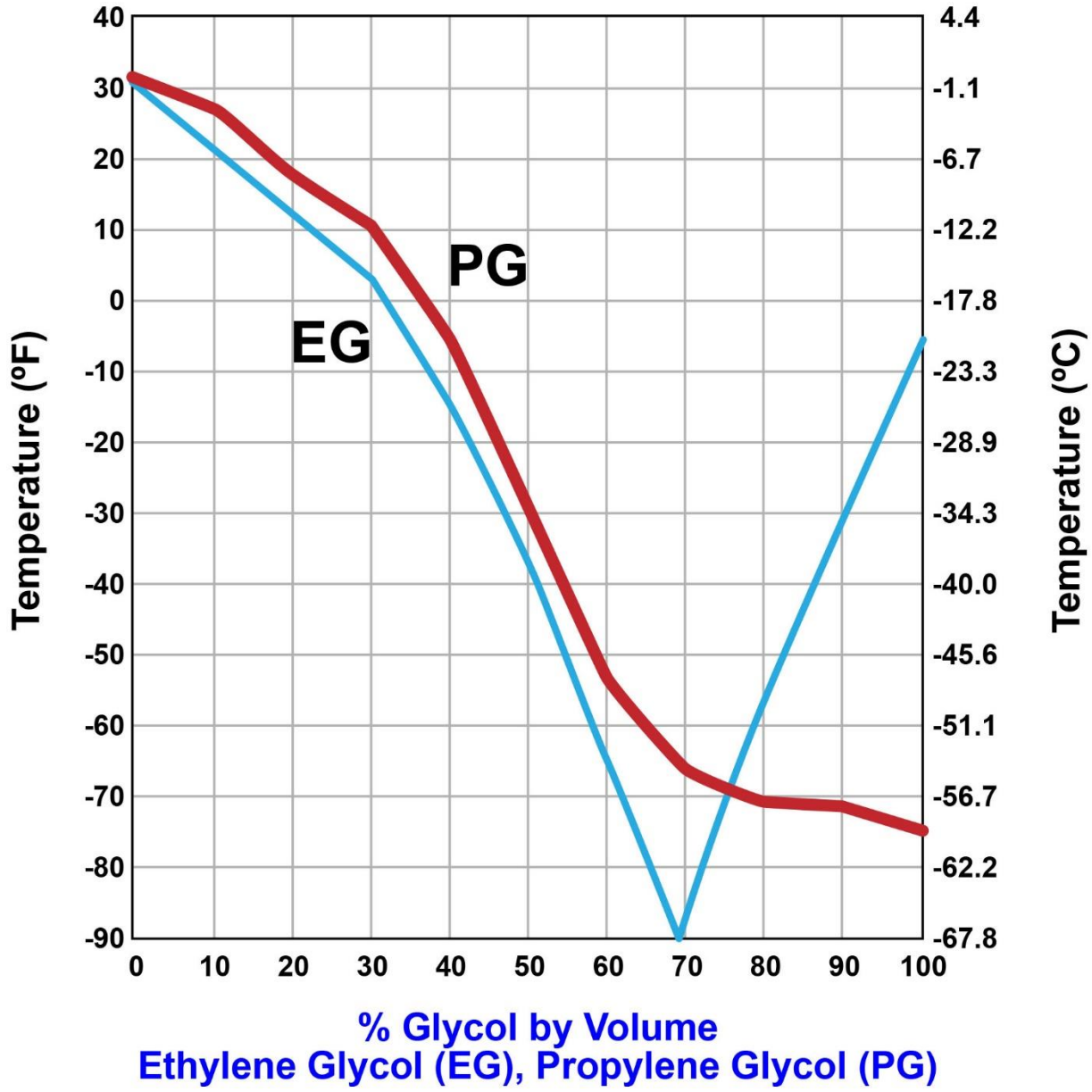
MO-0159
Basic Woodward Type PG Governor



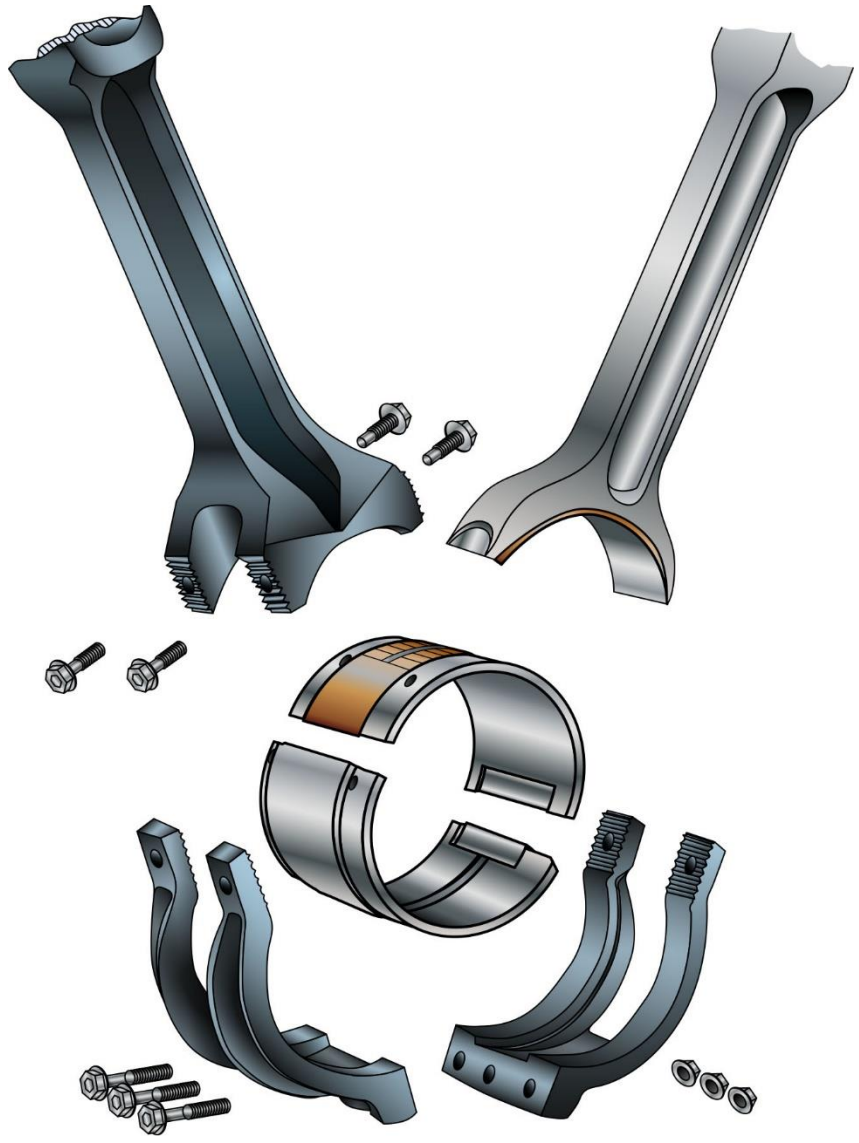
MO-0163



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



MO-0226



MO-0231