
Q680 - Motor Plants

1. Poor combustion in a diesel engine can be caused by _____.

- **low compression temperature**
- high compression pressure
- high scavenge air pressure
- low exhaust pressure

Note:
Low compression temperature prevents adequate fuel ignition due to insufficient air temperature at the end of compression, resulting in poor combustion.

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2. On a diesel-propelled vessel operating with constant slip what is the effect on fuel consumption with an increase in shaft RPM?

- **fuel consumption varies as the cube of the shaft RPM**
- fuel consumption varies directly proportional to the shaft RPM
- fuel consumption varies as the square of the shaft RPM
- fuel consumption varies inversely with the shaft RPM

Note:
Fuel consumption increases as the cube of shaft RPM because power required to drive a displacement vessel rises proportionally to the cube of its speed, and ship speed is directly related to shaft RPM when propeller slip is constant.

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3. The rate of pressure rise during the period following fuel ignition in a diesel engine is influenced by the length of the ignition delay period. What else will influence the pressure rise?

- **Turbulence of the air charge**
- Volumetric efficiency
- Fuel efficiency
- Valve overlap

Note:
The rate of pressure rise following fuel ignition in a diesel engine is influenced by ignition delay and turbulence of the air charge, which affects fuel-air mixing and combustion speed.

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4. The purpose of an oil mist detector in a main propulsion diesel engine is to warn of _____.

- **a possible overheated bearing**
- excessively high crankcase vacuum
- low cylinder oil pressure
- excessive carbon buildup in the lube oil

Note:
Oil mist detectors identify increased oil vapor, typically caused by an overheated bearing, which poses a risk of crankcase explosion. These detectors monitor oil mist concentration, not crankcase vacuum, cylinder oil pressure, or lube oil carbon content; their purpose is to provide early warning of potentially dangerous conditions.

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5. After stopping a diesel engine with a high main bearing temperature, what is the time one needs to wait before a diesel engine crankcase can be opened?

- Not less than 15 minutes.
- **Not less than 30 minutes.**
- Not less than 60 minutes.
- Not less than 120 minutes.

Note:
Wait at least 30 minutes after stopping a diesel engine with a high main bearing temperature before opening the crankcase to allow for temperature reduction and oil mist dissipation, preventing potential ignition hazards.

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6. Ring groove inserts are occasionally used on aluminum alloy pistons to _____.

- **reduce the ring groove wear rate**
- seal against crankcase vapors
- lessen the wear on aluminum parts of the cylinder
- allow for the greater expansion rate of aluminum

Note:
Ring groove inserts on aluminum pistons reduce wear to the ring groove by providing a harder surface.

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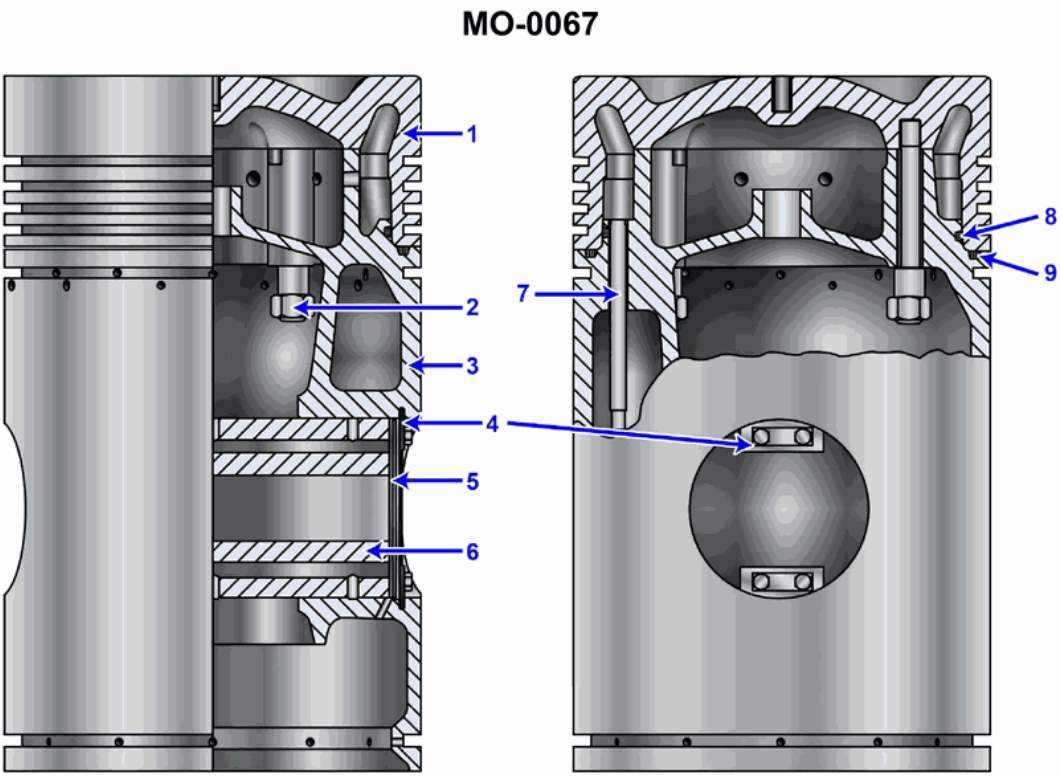
7. According to the illustration, which of the following is true



- The piston has five compression rings.
- The piston has one oil scraper ring.
- **The piston has a replaceable crown.**
- All of the above.

Note:
The illustration depicts a piston with a replaceable crown, which is a separate, bolted-on component. Options A and B are incorrect because the piston has four compression rings and no distinct oil scraper ring. Option D is incorrect because it requires all statements to be true, and A and B are false.

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8. The service life of a worn aluminum piston for an auxiliary diesel, for which no spares are readily available, can be extended by _____.

- turning down the piston skirt to concentric values
- building up the piston skirt with a liquid epoxy material and then re-machining
- **knurling the piston skirt surface**
- increasing the dimensions of the ring land grooves

Note:
Knurling the piston skirt restores a workable fit and oil-retaining surface by displacing metal, slightly increasing the effective diameter without weakening the piston.

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9. Piston cooling fins are located _____.

- on top of the piston crown
- **underneath the piston crown**
- at the base of the piston skirt
- inside the cylinder liner cooling water jacket

Note:
Piston cooling fins are located on the underside of the piston crown to maximize heat transfer to the cooling oil, as the top surface requires a smooth contour for proper combustion.

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10. Trunk type diesel engine pistons are effectively cooled when heat is _____.

- radiated through the engine block
- **transferred to water cooled cylinder walls**
- conducted through the piston crown
- transferred to escaping exhaust gases

Note:
Heat is most effectively removed from a trunk-type diesel piston by transferring it to the water-cooled cylinder walls, which serve as the primary heat sink. This is the main cooling pathway, as heat flows from the piston crown through the piston material and rings into the cylinder liner, which is cooled by circulating water. While heat conduction within the piston and some radiative and exhaust losses occur, they are secondary to the transfer to the water-cooled cylinder walls.
