

# **CERTIFICATES OF COMPETENCY FOR ENGINEERS (YACHT)**

**EXAMINATIONS ADMINISTERED BY THE  
SCOTTISH QUALIFICATIONS AUTHORITY  
ON BEHALF OF  
MARITIME AND COASTGUARD AGENCY**

**SMALL VESSEL SECOND ENGINEER**

**060-01 - MARINE DIESEL ENGINEERING**

**FRIDAY, 21 October 2022**

**1400-1600 hrs**

Examination paper inserts:

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Notes for the guidance of candidates:

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| <ol style="list-style-type: none"><li>1. Candidates should note that 100 marks are allocated to this paper. To pass candidates must achieve 50 marks.</li><li>2. Non-programmable calculators may be used</li><li>3. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.</li></ol> |
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Materials to be supplied by examination centres:

Candidate's examination workbook
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## MARINE DIESEL ENGINEERING

Attempt ALL questions

Marks for each part question are shown in brackets

1. Explain the meaning of EACH of the following diesel engine terms:
  - (a) overlap; (2)
  - (b) scavenging; (2)
  - (c) afterburning; (2)
  - (d) compression; (2)
  - (e) expansion. (2)
  
2.
  - (a) State THREE desirable properties of piston rings. (3)
  - (b) State the materials commonly used for piston rings. (2)
  - (c) Sketch THREE different types of piston ring ends. (3)
  - (d) Explain why piston ring end clearance is necessary. (2)
  
3. Describe a procedure for manually testing the set points on a diesel engine lubricating oil low pressure alarm and shut down using a pressure calibrator. (10)
  
4. Describe, with the aid of a sketch, a typical distillate fuel supply system for a diesel engine, including ALL the safety devices. (10)
  
5. Explain what is meant by EACH of the following terms:
  - (a) cetane number; (3)
  - (b) calorific value; (3)
  - (c) density; (2)
  - (d) viscosity. (2)
  
6. Describe, with the aid of a sketch, a coalescer type distillate fuel oil filter. (10)

7. Describe how large medium speed diesel engine lubricating oil is kept in optimum condition. (10)
8. With reference to leaking cylinder air start valves:
- (a) describe how this may be detected whilst the engine is running; (2)
  - (b) describe the procedure on discovery; (4)
  - (c) list FOUR possible causes. (4)
9. Describe the procedure to be adopted prior to removing a diesel engine cylinder head, including safety precautions. (10)
10. With reference to reduction gearing:
- (a) explain the purpose of the magnetic filter in the lubricating oil system; (3)
  - (b) explain why the surface finish of the gear teeth is important; (4)
  - (c) state why a flexible coupling is fitted between the engine and gearbox. (3)