# 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, 17 May 2019**

**1400-1600 hrs**

Examination paper inserts:

Notes for the guidance of candidates:

1. Non-programmable calculators may be used.
2. All formulae used must be stated and the method of working and ALL intermediate steps must be made clear in the answer.

Materials to be supplied by examination centres:

**MARINE DIESEL ENGINEERING**

**Attempt ALL questions**
**Marks for each part question are shown in brackets**

1. With reference to cylinder power balance of diesel engines:

   (a) explain why it must be kept within limits; (3)

   (b) explain how restoration is achieved; (4)

   (c) state the factors that may affect balancing. (3)

2. (a) State FIVE defects that may be found when carrying out an overhaul of a medium speed diesel engine cylinder head. (5)

   (b) State FIVE reasons why a diesel engine cylinder head may crack during service. (5)

3. (a) Describe the sequence of events that may cause a crankcase explosion. (6)

   (b) Describe TWO methods of detecting a potential crankcase explosion. (4)

4. With reference to scroll type fuel injection pumps:

   (a) describe how the delivered quantity of fuel may be varied; (5)

   (b) explain the purpose of the delivery valve; (3)

   (c) describe how fuel oil is prevented from spraying out if the high pressure pipe fails in service. (2)

5. (a) List FIVE products directly obtained from the distillation of Crude Oil, stating a typical use for EACH on board a vessel. (5)

   (b) With reference to ISO 8217, aluminium & silicon oxides in fuel, state EACH of the following:

      (i) how they get there; (2)

      (ii) what effect they will have on engine performance; (2)

      (iii) how they are removed from the fuel. (1)

6. (a) Describe how contamination of fuel oil by EACH of the following can occur:

(i) microbes; (2)

(ii) sodium. (2)

(b) Describe how to avoid fuel system and engine related problems with reference to the TWO contaminants in part (a). (6)

7. Describe all the checks that should be made to ascertain the reasons why an engine with an electric starter motor is failing to start. (10)

8. Describe the possible causes of abnormal diesel engine noises during operation. (10)

9. Describe, with the aid of a sketch, the operation of a diesel engine propulsion system fluid coupling. (10)

10. With reference to the lubrication of main gearboxes:

(a) explain why the oil temperature is critical; (6)

(b) state FOUR reasons why the oil temperature may increase. (4)