

## Overhaul and repair engines on land-based equipment

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### Overview

This standard covers the overhaul and repair of engines on land-based equipment. It includes two-stroke and four-stroke spark ignition and compression ignition engines and their configurations. It includes the identification and function of components, removal and replacement of engine assemblies and components and the dismantling, repairing and reassembly methods and techniques.

This standard covers engine systems and performance, incorporating the components (types, construction and function) used to deliver fuel and air in the correct proportions for the combustion process. To include carburettor and injection fuel systems, also naturally aspirated and pressure-charged intake systems.

It also includes the techniques used to diagnose and rectify mechanical engine faults and the process used to verify measurements.

This standard is for those who work in land-based engineering.

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### Performance criteria

*You must be able to:*

1. inspect the condition of **engines and components** on land-based equipment during overhaul and repair
2. investigate failed or worn parts
3. carry out tests to determine the cause of different **engine problems**
4. remove and replace engine and/or components from land-based equipment
5. identify and rectify engine system faults
6. where applicable dismantle, repair and reinstate engine system components to manufacturers' specifications and standards
7. test and set static and dynamic injection and ignition timing
8. adjust engine performance within specified operating limits
9. use appropriate measuring equipment to verify **compliance** of engine components

## Knowledge and understanding

*You need to know and understand:*

1. how to remove and replace engine and/or components on land-based equipment during overhaul and repair
2. how to dismantle, repair and reinstate engines and/or components to manufacturers' specifications and standards
3. the types, construction and operating principles of engines and components
4. how to diagnose and rectify the cause of engine problems
5. the equipment, methods and techniques for taking engine specific measurements
6. the effects of making enhancements to at least one of the following; fuel, induction or engine management systems
7. the procedure for verifying engine performance
8. the procedure for verifying correct engine timing for both static and dynamic timing
9. the causes of excessive engine wear

## Glossary

### **compliance** of engine components - e.g.

- piston ring gapping
- cylinder, liner, taper, ovality and protrusion
- crankshaft journal ovality and end-float
- piston/head clearances
- valve, guide, seat, train, operating system
- cylinder head/block distortion
- compression
- fuel and oil consumption

### **engines and components** - e.g.

- two-stroke and four-stroke spark ignition and compression ignition engines and their configurations
- air cooled and water cooled
- wet and dry liners, monoblock
- naturally aspirated and pressure charged (to include turbo compounding and supercharging)
- balancers and vibration suppression
- carburettors
- spark plugs
- injection pumps
- fuel delivery pumps
- injectors
- governors
- cold start aids
- air filtration systems
- exhaust systems

### **engine problems** - e.g.

- engine performance
- misfire
- backfire
- engine oil pressure
- overheating
- seizure
- abnormal noise
- non starting
- excessive crank case breathing

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- oil consumption
- fuel delivery and system pressures
- air intake charge pressures
- abnormal fuel usage,
- injection, camshaft and ignition timing
- emissions, e.g. blue, white or black smoke
- engine performance not in accordance with manufacturer's specifications
- weak and rich fuel mixtures
- restricted intake and exhaust air flow
- verifying governor operation
- operation of cold start devices

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