

CYLINDER HEAD:

Material: Pearlitic or Nodular Graphite Cast Iron / Cast Steel.

Properties:

- Must be of sufficient strength to withstand the gas load at maximum pressure.
- Resist bending and be symmetrical in shape.
- Have a rate of thermal expansion compatible with adjacent parts and transfer heat readily.

Design Features:

- The cylinder head / cover forms the top part of the combustion space.
- The head is of intricate design.
- The cover lands on the top of the cylinder liner flange and is secured to the cylinder block by a number of cover studs and nuts. These are tightened hydraulically to maintain a gas-tight seal under fluctuating pressure and temperature conditions.
- The cover must also locate & support all the valves required to operate the engine together with securing studs.
- Large two-stroke engine covers are machined from solid steel forging drilled to give bore cooling.
- They are circulated with fresh water from the jacket cooling system which maintains moderate temperatures and allows intensive cooling of exhaust valve seating while making separate fuel valve cooling unnecessary.
- Four-stroke engine covers are usually formed from a casting, which may be of pearlitic or nodular graphite cast iron, or in some cases cast steel.

Cylinder Head Problems:

- Cracking → Due to overheating, casting strain.
- Burning → Due to flame impingement.
- Distortion → Due to uneven tightness of holding down studs.
- Deposits & Corrosion → Due to excessive scaling from untreated water.

Hot Corrosion:

- Vanadium Penta-oxide (V_2O_5) melting point 690°C and is a corrosive liquid.
- Complex of Sodium (Na), & Vanadium (V) salts melting point 559°C and is a corrosive liquid.
- At high temperature slag deposits on the valve seat, rock, casing and on cylinder head.
- When temperature reaches at this melting point, slag melts and creates hole at this place.
- This type of burning of exhaust valve and cylinder head is called hot corrosion.

EXHAUST VALVE:

Exhaust Valve Material:

- Valve Seat → Stellite material
- Valve Lid → Nitride/Nitronic
- Valve Spindle → Nimonic material
- Valve Cage → Pearlitic cast iron
- Valve guide → Pearlitic cast iron
- Valve Bush → Bronze

Material Properties:

- High tensile strength & creep resistance properties.
- Resistance at high temperature properties.
- Resistance to high temperature corrosion.

Exhaust Valve Improved Design:

- Bore cooling for efficient cooling system (as low as 327°C at full load).
- Valve rotational mechanism.
- Heat and corrosion resistant material used.
- Hydraulic path (oil) with controlled valve-lifting speed.
- Air spring (or increase number of spring with improved material) to reduce valve bouncing.
- Guide bush is sealed by pressurized air.
- For less obstruction of gases, use valve seat angle 30° instead of 45° .

Cause of Exhaust Valve Burning:

- Continuous overloading of engine or particular unit.
- Poor combustion (or after burning) of fuel due to dirty fuel injectors, incorrect fuel injection pressure, incorrect fuel temperature, late fuel injection timing, air starvation, water or impurities in fuel.
- Valve not closing properly due to incorrect tappet clearance or starvation of closing air supply.
- Insufficient cooling water supply may cause the valve to overheat.
- Hot corrosion due to bad quality fuel, which contains high vanadium, sodium etc.
- Unsuitable material used.

Indication of Exhaust Leaking:

- Indicates high exhaust temperature in that unit.
- Indicates low compression pressure and low peak pressure in the indicator diagram.
- Low compression pressure and low peak pressure can be a cause of shortage of air supply, but in that case, scavenge air or supercharging air pressure will increase abnormally.



Guide Marine Engineers By Abdul Hamid

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Guide Marine Engineers By Abdul Hamid:

Guide Marine Engineers By Abdul Hamid Book Review: Unveiling the Magic of Language

In an electronic digital era where connections and knowledge reign supreme, the enchanting power of language has become much more apparent than ever. Its capability to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Guide Marine Engineers By Abdul Hamid**," published by a highly acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound effect on our existence. Throughout this critique, we shall delve into the book's central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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