Piston failure analysis

1. Bad fuel-oil ratio (a)
   - Insufficient quantity of oil

2. Incorrect oil (b, m)
   - Bad oil or oil for outboard, diesel, 4-stroke engines; does not lubricate enough the engine

3. Overspeeding (g, h, l)
   - Incorrect mixing ratio, fuel with low octane level or old fuel, wrong sparkplug thermal grade, defected ignition system and carbon deposit
   - Air leaks: from engine, crankshaft seals, crankcase gasket, impulse tube, leaning fuel mixture and make the engine work over speeding, as a wrong carburettor adjustment does

4. Lean carburettor adjustment (c, h)
   - Insufficient lubrication normally associated with overheating. Damage caused by lean carburettor adjustment

5. Overheating (e)
   - Overheating expands the piston skirt on the exhaust side. Damage caused by overheating

6. Worn, damaged or missing air filter (d)
   - Dust particles and water go through the engine causing faster wear or components failure

7. Pre-ignition, detonation (f, h, i)
   - Fuel with low octane level or old fuel, wrong sparkplug thermal grade, defected ignition system and carbon deposit

8. Air leaks: from engine, crankshaft seals, crankcase gasket, impulse tube, leaning fuel mixture and make the engine work over speeding, as a wrong carburettor adjustment does

9. Oxygenated fuels or with alcohol/ethanol content: clean fuels are formulated with higher levels of oxygen, which can increase combustion chamber temperatures and pressure, the consequences are similar to a unit which has very lean setting

10. Old fuel or fuel with low octane level: it does not burn properly creating an excessive pressure on internal components

11. Dirty fuel filter: it stops the fuel going inside carburettor and the engine works using too much air. Carburettor inspection and cleaning is suggested

12. Carbon deposit: excessive carbon deposits can build up and seize the piston. The rings can stick because of oil carbon allowing gases to pass the piston and cause exhaust side seizures

Diamond marks are easily noticeable. These are important to use as reference for further description.