Fuel News

Why does my car knock?

Knock is evident by a high-pitched "pinging." noise, hence the common name "ping". Knocking can also be called "pinking". It normally only occurs at high throttle settings or when slogging a manual car at low engine speed.

Knock occurs near the end of the combustion process. It is the sound made when a small portion of the petrol/air mixture reaches a critical temperature and pressure, causing it to explode or detonate rather than burn smoothly.

Experience shows us that pinging in standard road engines does not cause any damage.

Knock occurs when the octane requirement of the engine is greater than the octane rating of the petrol it is using.

The octane rating of petrol is a measure of its ability to resist knock in an engine.

Engine requirement is basically set by engine design

Compression ratio
High compression ratios increase power and economy but also increase octane requirement.

Combustion Chamber design
The latest technology uses induction swirl and combustion turbulence to increase efficiency and reduce octane requirement.

Air/Fuel Ratio
In general maximum octane requirement will occur when the air/fuel ratio is near the chemically correct (stoichiometric) ratio. Enriching or leaning the air/fuel mixture will reduce the octane requirement because peak combustion temperatures are lowered.

Spark Timing
Is normally set for best performance. In some engine designs spark timing is deliberately retarded during critical operation to avoid knock. Retarding ignition timing by two degrees will reduce octane requirement by about one number.

Engine Variations
The manufacturing tolerance of components can result in variations between similar engines of 3 to 5 octane numbers and sometimes more. Some engines therefore exhibit knock when new, although in reality only do so under specific driving conditions.

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Other Factors that influence engine octane requirement

The engine octane requirement also changes with operating conditions.

Method of Driving
Using full engine power will sometimes cause knocking; easing up on the accelerator can alleviate it.

Temperature
The higher the air temperature, the greater the octane requirement. Summer driving can require 4 more octane numbers than winter driving. Engine water temperature also has a large influence on octane requirement, which highlights the need to maintain cooling systems in older vehicles.

Altitude
Higher altitude (lower air pressure) reduces the engine octane requirement. Going from 40% to 50% relative humidity at 30ºC means the engine will require one less octane number.

Combustion Chamber Deposits
Increase the engine's octane requirement. Carbon-like deposits gradually accumulate in the combustion chamber; up to about 4000km from new. Highway driving produces less deposit than city driving and can clean out loose deposits and so reduce the octane requirement.

Octane number is a measure of knock resistance
Octane ratings are determined using a single cylinder laboratory engine to compare the antilock characteristic of the fuel with a known reference fuel. This laboratory method determines the research octane number (RON) under mild conditions and motor octane number (MON) under severe conditions. RON is more important under low speed accelerating conditions, MON at high speed cruising.

The typical octane ratings of BP petrols are:

Petrol	RON	MON
BP Regular Unleaded	91	82
BP Premium Unleaded Petrol	95	82
BP Ultimate	98	87

The Octane Number of petrol does not vary significantly at each tank fill. If an engine knocks it is more likely to be caused by one of more of the external factors listed above.

For further information, please call the BP Lubricants and Fuel Technical Helpline 1300 139 700 local call or visit www.bp.com.au/fuelnews

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