

Shell Optimax and motorcycles

YOUR QUESTIONS ANSWERED

Shell Optimax is suitable for use in all engines that are designed to run on unleaded petrol.

Most bikes that run on unleaded petrol can benefit from the high octane, high density performance features of Optimax, however some bikes may need slight adjustments to ensure that you get the most from your bike and Optimax.

We have surveyed a large number of motorcycle dealers and workshops to put together an up-to-date list of the most common issues relating to the use of Optimax in motorcycles. Refer to the topic headings below for the relevant information provided by our Technical team. If you still have a query about Shell Optimax and your bike you can visit our website at www.shell.com.au/optimax and go to "your say" to send us your feedback and our Technical experts will answer your questions.

We recommend that all bike and parts modifications recommended or suggested on this web site are made in consultation with your bike's manufacturer.

Lean seizures

Shell Optimax will not cause any problems with lean seizure in engines as long as the engine is adjusted correctly. Lean seizing is caused by overheating due to an excess of oxygen in the combustion chamber (i.e. a lean air/fuel mixture). In two-stroke engines lean seizures are caused by a lack of oil in the fuel-oil mixture. In fact, due to its high density, Optimax is more likely to run too rich rather than too lean. (See section on Rich Running)

Optimax and older bikes

Optimax has a higher density than regular unleaded petrol, and therefore provides more burning power in a given quantity and, with correct engine adjustments, better performance for less fuel. The high density of Optimax can cause some bikes to run rich (see section on running rich) unless changes are made to the engine or the bike can adjust the amount of fuel injected (i.e. it is fitted with fuel injection and a lambda sensor).

Older bikes are generally fitted with carburettors, (rather than fuel injection systems) which won't actively adjust the volume of fuel injected into the engine. So if older bikes are running poorly on Optimax it generally means they are running rich. Reducing the size of carburettor jets or simply switching to a slightly hotter grade of spark plug can address this issue (always consult the engine manufacturer).

Some older bikes were designed to run richer (because emissions and fuel consumption were less of a consideration) and using a high density fuel like Optimax could lead to over-fuelling and consequently poor running. This doesn't necessarily have to mean less power but if a bike was previously 'enriched', the further increase in fuel in the mixture might cause incomplete combustion. One way to reduce the problem is to change back to standard jets or reduce the jet size to ensure the engine mixture is leaner.

Note: not all older bikes will suffer from poor running when changing to Optimax.



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Storage of Optimax

Oxidation and weathering are the two main causes of petrol going stale. Optimax meets required levels (legislated by the Australian Government) of resistance to oxidation reactions (oxidation stability). Weathering results from some of the volatile components in the fuel evaporating.

If stored in an airtight container (and therefore not subject to evaporative losses), Optimax will remain fresh for up to a year but if kept in a vented fuel tank or carburettors (also vented) then some of the components will evaporate and the fuel will start to go stale.

The volatility profile of Optimax allows the fuel to be delivered to the engine in the optimum way to ensure efficient combustion, resulting in smoother and greater power. If some of these volatile components evaporate off the fuel (from the carburettor float bowl for example) then the engine may be difficult to start initially and suffer from hesitation and stumble until warm and the fuel in the carburettor is replaced. One solution is to drain the carburettors if the bike is to be left in a warm situation for some time.

Optimax and Spark Plugs

Your bike's engine running richer (i.e. the proportion of fuel to air is too high) may mean that incomplete combustion will occur and excessive carbon deposits can form on the spark plug. This situation is more likely to occur if the bike is used around town and subject to frequent stop-start and low speed operation. This type of operation exacerbates the situation as the engine and spark plug won't get hot enough to allow the plug to reach its self cleaning temperature.

Ways to reduce this problem include changing the spark plug to a slightly hotter grade (always consult the engine manufacturer) or reducing the carburettor jets one size, to lean off the mixture. The latter is the preferred option.

Rich Running

When a bike is not tuned correctly to handle the high density of Optimax it may result in rich running. Not all bikes are affected but carburetted bikes are more likely to suffer from running too rich, especially if they are used frequently around town in stop-start situations. Some of the ways to overcome the bike running too rich include changing the plug to a slightly hotter grade (always consult the engine manufacturer), reducing the jet size on the carburettor, changing the carburettor needle, or a combination of the above. This will help the bike run well on Optimax and allow the rider the benefits of the high octane fuel – more power, especially at the high end and an advanced fuel additive to maximise engine cleanliness.

Jetting

Optimax is suitable for all engines designed to run on unleaded petrol. The design of the cooling system should have no influence on the suitability of the fuel used. Carburettor fed engines may need adjustment towards a leaner mixture but fuel injected engines with lambda sensors adjust to the higher fuel density and are generally less sensitive to fuel density changes. (See section on Rich Running)

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Optimax and two-stroke engines

All petrol in Australia, including Optimax, contains aromatics, which are a useful high octane component in petrol. The aromatics in petrol will not alter the effectiveness of two-stroke oil as an engine lubricant.

Shell's extensive testing in two stroke engines indicate that, like other Australian petrols, Optimax is suitable for mixing with two-stroke oils. In general a higher aromatic content of a fuel leads to better miscibility of fuel and two-stroke oil.

Octane levels

RON (Research Octane Number)

- simulates the octane number in relation to less-stressed low speed city running.

MON (Motor Octane Number)

- simulates the octane number of the fuel under high load and high speed highway operation.

New Australian fuel specification regulations require both to be indicated, however usually only the RON will be displayed on the petrol pump. The difference between the two ratings represents the petrol's sensitivity and is usually around 10 but does vary according to the petrol's blending components.

Optimax has a minimum RON rating of 98 with slight increases in various batches.

Optimax and Cold Starting

Cold starting problems are generally a result of a low volatility fuel causing a lean mixture or problems with petrol atomisation. Optimax shouldn't cause cold starting problems if an engine is well set up.

If a bike has been left in warm conditions for several weeks, this may cause the petrol to lose some volatile components which can mean the engine suffers from poor fuel mixture distribution (i.e. unevenly distributed fuel droplets in the air-fuel mixture) during start-up and warm-up.

Sulphur Content and Pistons

The sulphur level in petrol is generally low compared with diesel and Optimax sulphur levels are significantly lower than those specified by Australian Government legislation. Accordingly, the sulphur content in Optimax will not damage fuel systems or engines that are correctly set up and designed for use with unleaded petrol. Any deposits in the piston ring area are usually caused by a combination of high combustion temperatures (due to a lean mixture or incorrect ignition timing) and unsuitable engine oil quality. We recommend checking the air-fuel mixture and using Shell Advance Ultra 4 as a lubricant.



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Knocking (detonation, pinging)

The correct technical term for this phenomenon is 'knocking', which happens when an engine;

- (a) Runs on fuel with an octane number that is too low, for the engine.
- (b) Runs too lean (air-fuel mixture is incorrect).
- (c) Has incorrect ignition timing.

The effects of (a) and (b) won't occur using Optimax because it has the highest octane number (98) available in Australia and as a result of the high density of Optimax, it tends to enrich the air-fuel mixture.

Generally the higher the engine compression ratio, the higher the fuels octane number needed to ensure that the fuel burns evenly. If the octane requirement of an engine is greater than the octane number of the fuel used, then the petrol will burn unevenly, producing shock waves that cause the engine to knock.

The ignition timing (c) should be checked and adjusted to comply with the engine manufacturers specifications.

Compression

The compression ratios of cars are usually around 9-1 or 10-1. Few run as high as 14.5-1. However, the higher the compression ratio, the higher the octane number the engine requires to run without pinging or knocking.

Bikes with high compression engines shouldn't be more prone to misfiring than bikes with lower compression engines. However, this problem may be caused by the way the petrol is stored in a bike (i.e. incorrect storage can reduce fuel volatility and cause hesitation and stumble until the engine is warmed up). The problem may also be affected by the type of running the bike is used for (round town stop/start low speed operation can result in rich running and plug fouling).

Petrol burning

Optimax is designed to produce smoother and greater power. The fuel's high octane number means pinging or knocking is less likely than with other fuels. The burning rate of petrol in an engine is more affected by the mechanical design of the combustion chamber than the fuel properties. Changes to the charge flow and turbulence of the mixture in the combustion chamber do have a large impact on flame speed. Nevertheless, heavier fuels can have an impact on burning speed but this shouldn't be noticeable to the rider.

Optimax and your health

Optimax is not classified as carcinogenic under Australian Government requirements, although all petrols (including Optimax) do contain certain ingredients, like benzene, which are known carcinogens. As such, when handling fuel of any kind care should be taken to avoid skin contact and vapour inhalation.

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Rubber seals

All rubbers are affected in some way when in contact with organic liquids. Optimax will not have a negative effect on rubber seals designed for use in unleaded petrol engines. However, if an incompatible rubber seal is substituted for the original equipment in the fuel system it could degrade quickly so it is important that you only use rubber components designed for use in petrol fuel systems. This is true for all types of petrol.

Cleansing additives

Optimax contains a high performance detergent additive to ensure fuel and engine inlet systems are kept clean and free from deposits. This will ensure that optimal fuel charge flow and charge distribution can occur in the cylinder. This will mean that good engine performance and response will be maintained.

Optimax and Outboard marine engines

Optimax is suitable for use in all engines designed to run on unleaded fuel. Optimax is a high density high octane fuel, and the same factors affecting air/fuel mixtures will apply for cars, bikes and marine engines.

Optimax Density

Optimax is a high density, high octane fuel, which usually means there will be some economic benefits to running your vehicle on Optimax. The higher density of the fuel will generally result in the same amount of fuel going further. However economy is ultimately dependent on a number of factors, including driving conditions, the way the bike is ridden and how well the bike is maintained.

Compatibility

Some bikes will be more suited to Optimax than others, but generally all bikes that are designed to run on unleaded petrol are suitable for use with Optimax. Although Optimax is compatible with most bikes there may be a requirement in some cases to make slight adjustments to the engine such as changing spark plugs, and reducing the size of carburettor jets, or a combination of both. Bikes used mainly for city running (and therefore subject to considerable stop-start running) are likely to need such adjustments when changed to Optimax. Some fine adjustments may also be required to ensure that when the bike is hot it runs smoother and with better overall performance and in particular there is more power at the top end.

Bikes that run well on Optimax without any of these changes are usually fitted with fuel injection and advanced fuelling systems



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