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Arguments pertaining to engine oil consumption

BMW, MINI

Subject matter

Customers are often unsure when it comes to the subject of engine oil consumption. Is an engine allowed to consume oil? What are the most important causes of engine oil consumption?

The following explanations are intended to provide an aid to argumentation. They are aimed at all dealership staff who have contact with customers.

Functions of engine oil

Engine oil is one of the most important operating fluids in a combustion engine. The engine cannot work properly without engine oil. The main functions of engine oil are:

- Lubrication
- Cooling
- Prevention of corrosion and sedimentation

Lubrication

The lubricating film or the engine oil is exposed to a wide range of demands. The viscosity of the engine oil should not be too high at low temperatures so as to ensure optimum lubrication already at cold engine temperatures (e.g. cold starting). On the other hand, the engine oil should not be too thin-bodied at high temperatures as this can break down the lubricating film and nullify the lubricating effect entirely.

The most important function of the engine oil is to minimise friction between metal surfaces. This function is effected by a lubricating film which builds up during operation between the surfaces of the moving engine components. The thin oil film reduces friction significantly, which translates into lower wear and lower heat generation. As well as preventing piston seizures and

bearing damage, it extends the service life of all the relevant engine components and reduces fuel consumption.

Another function of the oil film is to seal the combustion chamber against the crankcase via the piston rings.

, cooling

The pistons already reach their operating temperature shortly after the engine is started. It can take a few minutes, depending on the ambient temperature, the engine design and the driving style adopted, for the engine block and thus the cylinder walls to reach their operating temperature. The engine needs a fully functioning cooling system to stop it from exceeding the operating temperature. Aside from the two classic cooling components - air and coolant - engine oil is often underestimated or even forgotten as a crucial cooling component. The engine oil is responsible for a significant degree of cooling inside the engine. Specifically to cool the piston crowns, virtually all BMW engines have oil spray nozzles which moisten the piston crowns with engine oil.

Prevention of corrosion and sedimentation

Last but not least, it is the job of the engine oil to protect the engine against corrosion and sedimentation. Aggressive combustion residues are neutralised by the lubricating oil and appropriate additives. The remaining combustion residues are carried by the oil circuit to the oil filter, where they are filtered, or settle in the oil sump.

Engine oil consumption

Engine oil consumption is dictated above all by the structural design of the individual assemblies or systems. Every combustion engine has a system-dictated consumption of lubricating oil. Decisive causes of engine oil consumption are:

- Pistons with piston rings
- Valve stem seals
- Crankcase ventilation

The surface topography used of cylinder barrel and piston ring is the primary variable which directly influences engine oil consumption, since the piston rings do not constitute a perfect seal, but instead act as a metering unit. With regard to design, there is a conflict of interests between engine oil consumption and friction loss. The letter has a direct effect on power and fuel consumption. In each piston stroke tiny quantities of engine oil are left on the cylinder walls and this oil is essential for lubricating the piston rings and the piston skirt (see above, lubricating film). During the piston downstroke the engine oil deposited on the cylinder wall

takes part in the combustion close to the wall and is discharged with the combustion gases. The higher the engine speed, the greater the effect, since more combustion cycles per unit of time take place. For this reason, engines with a high rpm concept (BMW M engines) tend to have a higher engine oil consumption than other BMW engines. The same applies to the lubricating film on the valve stems.

Note:

For BMW spark-ignition and diesel engines, the maximum permissible engine oil consumption is 0.7 l/1000 km.

Because of their increased power output and torque, M engines have a maximum permissible oil consumption of 1.5 l/1000 km.

The measurable result of an engine oil consumption is overridden by the quality of the fuel used and of the driving profile. If, for example, in winter a lot of short distances are driven (= high fuel entry since the vaporisation temperature is for the most part only briefly achieved) and then a longer distance is driven (fuel can now vaporise), a significant drop in the engine oil level is encountered on this trip. This does not constitute engine oil consumption, but instead merely a different engine oil level on account of the fuel content in the engine oil. Customer complaints can often be put down to this fact. The situation can arise where the engine oil level drops over a few 100 km by around 1 litre. Added to this is some engines is a degree of uncertainty of up to 0.3 litres by the relevant measuring system (oil dipstick/QLT).

Even the oil mist particles entrained via the crankcase ventilation (separation efficiency technically never 100 %) take part with the intake air in the combustion process. The design is particularly problematic here. On the one hand, engine oil should be separated as fully as possible; on the other hand; crankcase pressure requirements must be satisfied. Moreover, conventional separation systems function to optimum effect only with a specific gas flow rate; the separation effect decreases with lower or higher gas quantities.

Summary

Every internal combustion engine has a technically necessary engine oil consumption. The level of engine oil consumption is clearly influenced by the driveability and by the fuel used.

Oil consumption measurement

The level of engine oil consumption that may arise with a particular engine can be determined by the customer only from the amount of engine oil he or she tops up with. As soon as the engine oil level falls below the maximum mark on the dipstick, many customers top up the engine oil without paying attention to a number of basic rules, such as the vehicle must be standing on level ground, a certain period of time must be left to allow the oil to flow back to the sump. In such cases, the available container sizes (e.g. 1-litre can) make it easy to top up above the maximum mark. Excess engine oil can cause engine damage and is consumed more

quickly due to the effects of splash.

For this reason, it is advisable to let the engine oil level drop as far as the minimum mark and only then to add the required volume of engine oil. The difference between the two marks is approximately 1.0 to 1.5 litres.

The procedure for checking the oil level is given in the Owner's Handbook for the vehicle concerned.

The service delegates will only deal with claims made under warranty if exact measurements by weighing are available (see SBS 11 07 96 138, Enclosure 12).