

Biodiesel can lead to:

Thickening: Biodiesel is a unsaturated fuel and can cause the engine oil to thicken over time. This thickening can reduce the oil's ability to flow smoothly through the engine, leading to increased friction and wear on engine components.

Fuel Dilution: Biodiesel has different properties than conventional diesel fuel, and if it leaks into the engine oil, it can dilute the oil and reduce its effectiveness in lubricating and protecting engine components.

Degradation: Biodiesel can accelerate the degradation of engine oil by promoting oxidation and the formation of sludge and deposits. This can reduce the oil's ability to lubricate and protect the engine, leading to increased engine wear and potential damage.



Compatibility Issues: Biodiesel may not be compatible with certain engine oil formulations or additives, leading to chemical reactions that can degrade the oil and compromise engine performance.

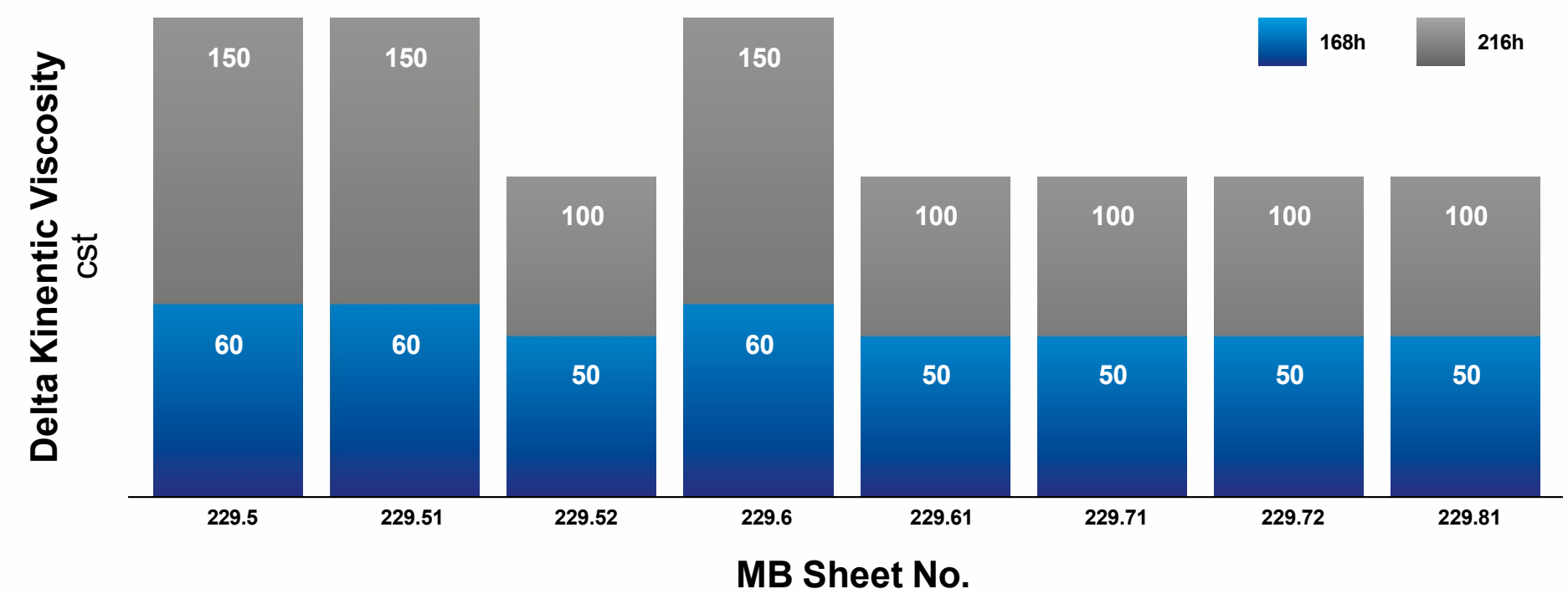
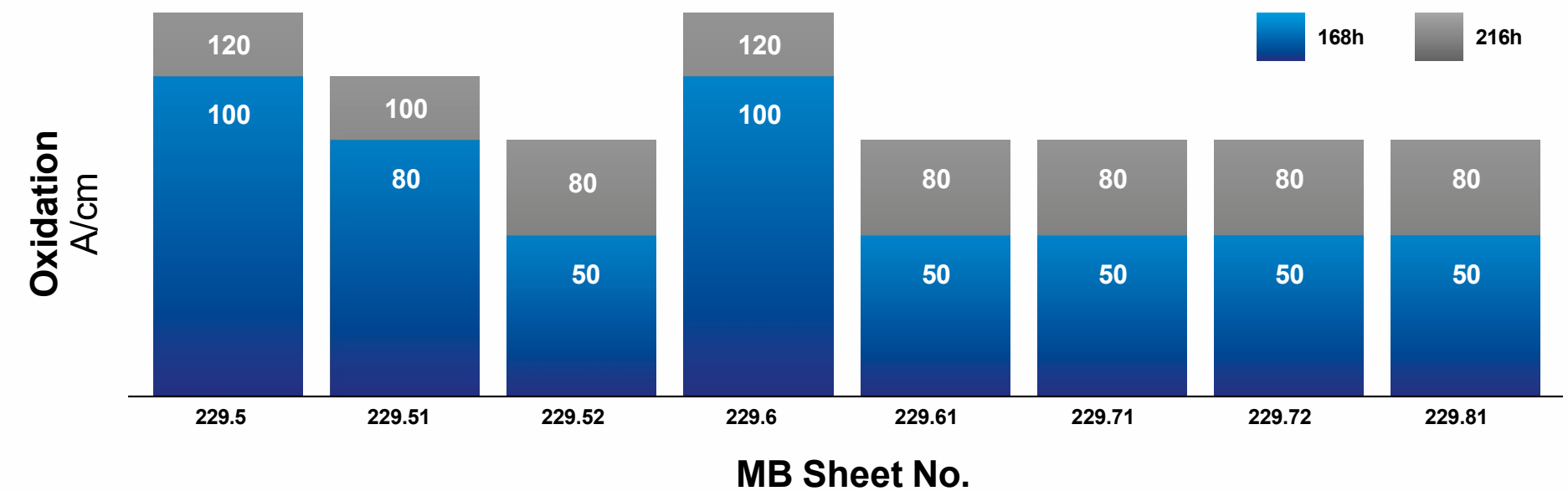
Filter Clogging: Biodiesel can increase the likelihood of filter clogging in the engine oil system due to its different chemical composition and potential for forming deposits.

To address the issues that could arise from the usage of biodiesel, the additional tests have been introduced by many organizations e.g ACEA and equipment manufacturer e.g Mercedes. One of the most known test is CEC L-109-12*.

The CEC L-109 test is a lab-scale oxidation method that ages oil dosed with biodiesel fuel under carefully controlled conditions in laboratory glassware. Fresh diesel engine oil is treated with biodiesel in the presence of an iron catalyst used to accelerate the rate of reaction. The sample is heated to 150°C and aerated under controlled conditions for 216 hours. The samples are taken at 72, 144, 168, and 216 hours. The test duration could be 168 and 216 hours depends on the requirements, and it will indicate the end of test (EOT) duration.

The viscosity increases are measured by comparing Kinematic Viscosity at 100°C for the intermediate and EOT samples to the starting oil/ fuel start of test (SOT) mixture. Oxidation is measured with help of infrared spectroscopy technique for the same sample pairs. On the diagrams the limits for the viscosity increase and oxidation for different Mercedes specification are shown.

***CEC L-109-12 Oxidation Test – with Fuel Dilution 7% B100@150°C (FAME fr.OM646 Biodiesel Test)**





Here we see the supreme oxidation performance and cleanness of our product in presence of biodiesel. The oxidation and thickening at **168h** check point are **2,8 times** and **2,9 times** respectively **away from the limit**. More severe check at the 216h shown similar picture. The oxidation and thickening at **216h** (EOT) check point are **2,3 times** and **3,8 times** respectively **away from the limit**. The products that was developed to deal with malicious effect of the biodiesel are listed below with corresponding approvals by Mercedes.

RAVENOL SMP SAE 5W-30

MB-Freigabe 229.51

Parameters	Unit	Maximum	Result
Oxidation 168h	A/cm	80	28,66
Oxidation 216h	A/cm	100	34,63
Delta Kinematic Viscosity 168h	%	60	26,1
Delta Kinematic Viscosity 216h	%	150	39,8

Trucks

Product	Approval
RAVENOL Turbo Plus SHPD SAE 15W-40	DTFR 15B110 (228.3)
RAVENOL EURO IV Truck SAE 10W-40	DTFR 15C110 (228.51)
RAVENOL EURO VI Truck SAE 10W-40	DTFR 15C110 (228.51)
RAVENOL UDT Ultra Duty Truck SAE 10W-30	DTFR 15C110 (228.51)
RAVENOL SDT Super Duty Truck SAE 10W-40	DTFR 15C110 (228.51)
RAVENOL Ultra Synthetic Truck SAE 5W-30	DTFR 15C100 (228.31) DTFR 15C110 (228.51)
RAVENOL EDT Extra Duty Truck SAE 5W-30	DTFR 15C110 (228.51) DTFR 15C120 (228.52)
RAVENOL Performance Truck SAE 10W-40	DTFR 15B120 (228.5)

Cars

Product	Approval
RAVENOL EHS SAE 0W-20	MB-Approval 229.71, 229.72
RAVENOL FES SAE 0W-30	MB-Approval 227.61, 229.61
RAVENOL SSV SAE 0W-30	MB-Approval 229.6
RAVENOL HSW SAE 0W-30	MB-Approval 229.51 MB-Approval 229.52
RAVENOL HLS SAE 5W-30	MB-Approval 229.51 MB-Approval 229.52
RAVENOL REP SAE 5W-30	MB-Approval 226.5, 229.51, 229.52
RAVENOL VMO SAE 5W-40	MB-Approval 229.31, 229.51



RAVENOL®



THANK YOU



FOR YOUR ATTENTION



www.ravenol.de