

# Lubricants for 2010 engines

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What you need to know about lubricants to protect new engines

With each EPA mandated emissions level for on-highway heavy-duty diesel engines since 1988, there has meant a change in lubricant requirements. However, that may not be the case with the upcoming 2010 emissions standards. The consensus among oil suppliers is that SAE API CJ-4 oils, which were formulated for the demands of EPA 2007 engines with exhaust gas recirculation (EGR) technology and diesel particulate filters (DPFs), should be suitable for all 2010 engines.

## SCR technology

Mark Betner, heavy-duty lubricants product manager for CITGO, says the selective catalytic reduction (SCR) technology that will be used by all but one engine maker for on-highway engines has not created different lubricant needs. EGR is still in use by those engine builders who will be using SCR technology with diesel exhaust fluid (DEF) that may provide some advantages, which may even improve oil durability, so ultimately the API CJ-4 oils will be compatible with SCR technology.

Shawn Ewing, technical coordinator for heavy-duty lubricants, ConocoPhillips Lubricants, agrees. There are no anticipated engine oil category changes for the 2010 complaint engines. The current CJ-4 oil will serve the needs.

Dan Arcy, OEM technical manager for Shell Lubricants, says to optimize DPF service life, he recommends that fleets to go with low sulfated ash API CJ-4 oil to meet those requirements.

Corey Taylor CLS, senior heavy-duty tech support technologist, grease technology manager, BP Lubricants USA Inc., anticipates that the technology employed in API CJ-4 lubricants will be sufficiently robust to meet the performance demands of 2010 EGR/SCR engines.

West Alexander, product specialist, heavy-duty motor oils, Chevron Global Lubricants, indicates that North American OEMs see no difference in lubricant needs for 2007 and 2010 engines. "Going from 1.6 g/m NOx for 2007 to 0.2 g/m in 2010 required the addition of SCR, but no change in crankcase lubricant technology. The low sulfated ash, phosphorus, and sulfur (SAPS) oils that were defined by API CJ-4 will perform adequately for 2010." The Engine Manufacturers Association (EMA) is not proposing a new API service category for 2010 engines, he notes.

## CI-4 PLUS vs. CJ-4

According to the American Petroleum Institute (API), the "CI-4 PLUS" designation identifies oils formulated to provide a higher level of protection against soot-related viscosity increase and viscosity loss due to shear in diesel engines.

CJ-4 oils are superior in virtually all areas of diesel engine protection, says CITGO's Betner, who believes that in the critical areas of engine protection both in older and newer engines, CJ-4 oils have demonstrated improved performance capability. "The only reason to stay on CI-4 PLUS oils is lack of solid performance information, which is more of an educational issue, or the fleets do not have engines equipped with diesel particulate filters and they have been able to purchase CI-4 PLUS oils at a lower cost. Ultimately, it is recommended that fleet managers get the right information and consider the facts about oil technology. "Too often false economy drives purchasing decisions, and when one considers the small amount of cost savings from buying a lesser performing product, it really does not make sense compared to the possible cost saving opportunities with premium CJ-4 technology."

Engines equipped with DPFs should be using API CJ-4 oil for maximum exhaust after-treatment

protection, according to ConocoPhillips' Ewing. He says his company's customers also are seeing benefits of CJ-4 lubricants in older diesel equipment. The use of CJ-4 lubricants and ultra low sulfur fuel has been very good for diesel engine longevity. "Once fleets begin to get engines that require CJ-4 engine oil, my advice is to make the transition across the entire fleet."

"Our recommendation is to move to CJ-4 because it's a better quality product and will give you longer service life out of your DPF," says Shell's Arcy. Benefits of CJ-4 oils include up to 50% better wear protection than CI-4 PLUS, better oxidation control and improvements in soot control. It has long-term benefits with keeping DPFs cleaner longer, which can provide additional comfort to help keep maintenance costs down.

Chevron's Alexander itemizes the benefits this way: "API CJ-4 defines the performance of a heavy-duty crankcase engine oil that offers exhaust aftertreatment compatibility, better oxidation protection and soot dispersancy, reduced oil consumption and corrosion, fewer piston deposits, less ring, liner and valve train wear, and less filter plugging than API CI-4 PLUS engine oils.

"CI-4 PLUS oils usually have higher sulfated ash and TBN than CJ-4 oils, but with ULSD fuels, the effect of this difference has been minimized," Alexander states. "The chemical limits on CJ-4 oils should directionally maximize the maintenance interval for exhaust aftertreatment systems compared to the high ash, high phosphorus oils of CI-4 PLUS. In short, CJ-4 is the one oil for new and legacy engines."

CJ-4 lubricants, designed specifically for 2007 and later model year engines, are formulated to provide the optimum level of protection for exhaust aftertreatment systems, notes BP Lubricants' Taylor. "As exhaust after-treatment systems become more complex with the addition of SCR, we recommend upgrading to the highest performance level available, which is offered by CJ-4 oils," Taylor advises.

### **Oil drain changes**

Drain intervals for 2010 and all engines is predicated on a number of factors including: fuel consumption, oil consumption, service duty cycle, oil quality, used oil analysis, and engine manufacturers recommendation, says Chevron's Alexander.

CJ-4 oils do have improved performance capability, but there are too many operational variables for a lubricant provider to "suggest" hard line engine oil service intervals, says CITGO's Betner. Operating conditions such as critical engine systems maintenance, engine idling time, loads, environmental issues, filter quality, fuel quality—and most importantly, engine manufacturer recommendations for a specific engine model—must be taken into consideration. He thinks too much weight is placed on oil quality and the need to determine an engine oil drain interval. "Ultimately, oil analysis needs to be implemented to assist with a final decision on engine oil service interval, but this is not the final word and all factors must be weighed," Betner says.

"There are fleets successfully extending engine oil service intervals and protecting engine warranties and engine life, but it must be done analytically and not just relying on oil performance claims." His advice to fleet maintainers is not to ask an oil provider how far you can go on any brand or category of oil but to know the capability of your fleet's total maintenance program.

Always follow OEM-suggested drain intervals for the type of service, cautions ConocoPhillips' Ewing. "If the operator wants to explore extended drains, then this should be done with oil analysis and the use of premium-tier lubricants," he adds.

Engine OEs will set the intervals, Shell's Arcy reminds us. He anticipates the intervals will remain similar for 2010 engines and adds that he knows of no big changes in drain intervals being requested by any engine manufacturers at this time.

### **Used oil analysis**

Performing used oil analysis has advantages for current fleets, some believe, but it may take on greater importance as 2010 engines are added to existing fleets.

"The 2010 engines do not represent a greater need for oil analysis just because of those engines utilizing SCR technology," says Betner at CITGO. However, other factors such as utilization of biodiesel fuel and

operating conditions could be factors for fleets, he cautions.

Oil analysis data from new engines may reveal some positives. The new engines have the potential to run “cleaner” and many are now equip-ped with larger oil pan capacities. So, depending on the type of service, longer oil life may be on the horizon.

“We strongly recommend doing oil analysis,” says Arcy at Shell Lubricants. The 2010 trucks will cost more, so there’s greater incentive to do used oil analysis. “Downtime costs more, so we feel especially that for the 2010 engines, it’s more advantageous to run oil analysis.”

Used oil analysis is a valuable tool not only measuring the performance of the oil, but also more importantly, monitoring the condition of the engine and identifying problems before they become catastrophic, says BP’s Taylor.

For those fleets utilizing oil analysis, it is important to consult with your oil analysis provider and update yourself on oil analysis, CITGO’s Betner advises. There can be some misinterpretation in the areas of metal analysis or elemental analysis that can be misleading, he warns. “For example the elements copper, aluminum, potassium and lead can in some cases show abnormal or critical levels, leading a fleet manager to believe there are serious wear or coolant contamination problems when in fact those are indicators of other factors that may not threaten engine life. “In other words,” he emphasizes, “know what to look for and there should be no problem.”

Ewing at ConocoPhillips says that all operators should be aware of the potential impact on oil life that comes with the use of alternative fuels.

#### **Other factors to monitor**

While extending oil drain intervals can be important, don’t neglect the other opportunities to improve lubrication, says Shell’s Arcy. Fuel-efficient lubes can offer small but cumulative improvements. “A synthetic lube oil can reduce fuel consumption 1%,” he says. “Also, a synthetic gear oil has demonstrated a 1% reduction in fuel consumption. A percentage here, a percentage there, it starts to add up.”

#### **CARB rules**

CARB compliance may require fleets to retrofit DPFs on APUs and reefer diesels. He recommends that customers use an API CJ-4 product to get longer life out of the DPF. For APUs especially, he recommends a synthetic oil. If you need to start at -20 degrees or 120 degrees F, synthetic oil provides coverage for the whole gamut. It’s a reliability issue, because if the APU doesn’t start, there’s no savings.

The key factors for fleets to monitor with a new engine are fuel consumption, oil consumption and the results of used oil analysis. Keeping track of these factors and following a strong preventative maintenance program are very important to the long-term health of the engine, Chevron’s Alexander reminds us.

#### **Use the manual**

Fleets should carefully follow the owner’s manual for the new vehicles, because the new engine designs and aftertreatment devices may present different parameters to be monitored, especially the SCR system, which will be entirely new to most fleets. From a lubricant perspective, it is anticipated that the standard suite of used-oil tests will continue to be effective for fleet monitoring.

Also worth noting for fleets using older engines is that on Aug. 31, 2009, API will discontinue licensing diesel engine oils against the API CG-4 performance specification. The Engine Manufacturers Association (EMA) has endorsed API’s decision.