

The biggest **OIL CHANGE** **IN A DECADE**

A Castrol White Paper

How does Castrol Vecton fit into the picture?

Sustainability is playing an increasingly important role in modern engineering and is quickly becoming a key aspect of truck engine development, too – driven especially by ever-tightening emissions regulations in Europe, the US and Japan. The resulting new generation of cleaner, more fuel-efficient diesel engines relies on higher-performing diesel engine oils to protect them – which is where companies like Castrol come into play to make them available to the transport industry. In fact, Castrol has been involved in designing the new standard as part of the API – ensuring the transport industry will be able to reap all the benefits of a modern engine oil while still protecting the environment and taking responsibility for future generations.

How can Castrol Vecton help me?

Castrol was one of the first lubricant companies in Australia to react to the new specification by launching a backwards compatible CK-4 range in December 2016, with a more complete range following in 2017 and 2018. Not only will these new Vecton products be some of the first to market, Castrol has also made the unprecedented step of ensuring it will be certified carbon neutral against the Australian Government's National Carbon Offset Standard (NCOS). This brings the new product in line with the full Vecton range, which has already gained carbon neutral certification. Consumers thus can have the confidence that Castrol Vecton will not only help them meet the latest standards, but also help reduce their overall carbon footprint.



“Castrol’s new CK-4 engine oils will deliver better protection for modern engines in Australia’s hot operating conditions when compared to CJ-4 oils. Castrol Vecton is known for having a strong commitment to Australia’s truck workshops and sponsors the ATA’s annual Craig Roseneder Award for technical and maintenance excellence, as well as the Castrol Vecton Industry Achievement Award.”

Noelene Watson, Chair, Australian Trucking Association



2017 saw
the most
fundamental
shift in lubricant
technology in
more than
a decade.

It's no secret that a modern diesel engine is more efficient with a good quality high performance lubricant inside, which is why engine oil has become equally important to the commercial road transport industry than the actual hardware around it.

According to global oil specialist Castrol, modern-day diesel engine oil is not only formulated to keep moving metal surfaces cool, clean and lubricated, but also reduce wear and extend vehicle life in general and reduce fuel consumption along the way.

As if these stringent requirements for diesel engine oil weren't big enough already, a new variable has been added to the equation – sustainability. The American Petroleum Institute (API) has created a new category for heavy-duty diesel engine oils named CK-4. Introduced in 2016 it is considered the biggest step change the industry has seen since API CJ-4 was introduced back in 2006 and has helped transport businesses, both reducing greenhouse gas emissions as well as fuel consumption.

Why the changes?

PC-11 has been designed in response to the US Environment Protection Agency's (EPA) latest emission and fuel economy legislation for diesel-powered commercial transport vehicles. Having come into effect in 2017, it will provide significant improvements in fuel consumption to help the industry reduce carbon dioxide emissions.

The EPA's move created the need for a new category of lubricant specifications, collectively called PC-11 during their development. North American OEMs have actively promoted it because they know that only a high-performing engine oil will ensure next generation engines can achieve their full potential for fuel economy without compromising hardware durability.

What does the new specifications entail?

Not one, but two new oil standards will be licensed under the PC-11 label: API CK-4 and FA-4. They

are designed to deliver superior performance over current generation oils, both on a sustainability level and with view to fuel usage. The first is backwards-compatible and offers better protection on new and older engine models alike, superseding the old API CJ-4 standard.

The second, API FA-4, which is not backwards compatible, focuses on highly advanced lower viscosity oils that deliver better fuel economy in new generation diesel engines.

What's the difference between CK-4 and FA-4?

According to oil specialist, Castrol, a CK-4 oil has improved oxidation resistance, shear stability and aeration control, with similar viscosity grades to a current CJ-4 product. That's because it is meant to replace oils for current technologies and will have a minimum high-temperature, high-shear (HTHS) viscosity of 3.5 cP.

FA-4 oils, meanwhile, will have a lower HTHS viscosity (2.9–3.2 cP) in a move to provide an additional fuel economy benefit. As lower viscosity oils can form thinner films, designing products for wear protection will be critical for oil formulators like Castrol.

How will the new specifications affect me?

APICK-4 might affect the entire engine oil market and give you access to a suite of new, high-tech products optimised for modern-day engines. PC-11 is taking into account recent technical advancements in diesel engine design and will provide improved protection from higher engine operating temperatures as well as oil shearing, while also reducing fuel consumption. As such, the new specifications will be a win-win for the transport industry.

Does API CK-4 even matter in Australia?

Australia is traditionally following US and European examples in regard to engine emission standards, so it is likely the new standard will quickly become prevalent in Australia too – especially given the prevalence of US and European OEMs locally.

As such, leading lubricant manufacturers like Castrol have been doing extensive product trials on their API CK-4 products right here in Australia to ensure their new products stand up to the rigorous work conditions that Australian fleet have to handle. According to Castrol, the company has actively worked with fleets using Cummins, Detroit and Mack equipment to ensure Australia is ready for the next generation of Lubricants.

How do suppliers make sure a new oil will work?

Every new oil formulation has been subjected to rigorous tests. The new CK-4 and FA-4 specifications continue to use many of the current CJ-4 tests, even though some of them have more stringent limits to reflect the needs of future engine hardware. Two new tests have been introduced to ensure that next-generation oils can cope with the oxidation stability and aeration control needs of modern technology making for a total of three stringent tests.



Oxidation test

Oxidation is a chemical reaction of oil with oxygen and can significantly deteriorate engine oil over time.

It is accelerated by high stress conditions such as high temperatures – an environment we increasingly see in modern engines. Oxidation needs to be better controlled due to the detrimental effects it has on lubrication performance.

Oxidation reactions cause sludge and deposit formation which may lead to wear and blocked oil galleries and oil pick-ups. Filter blockages due to deposits will also put added strain on the engine and compromise fuel economy. The new CK-4 diesel engine oils are blended to deliver outstanding oxidation resistance to meet the demands of hard working equipment in Australia.



Aeration test

Aeration is a physical process in which small bubbles of air become entrapped in the lubricant and directly affects the intended lubrication properties of the oil. A high level of entrapped air will degrade the ability of the oil film to protect engine parts – potentially causing engine wear and ultimately meaning greater costs for operators. The new CK-4 engine oils meet or exceed the new category test for aeration control in a move to deliver higher levels of engine protection through robust oil film formation.



Shearing test

Multi-grade engine oils are formulated with viscosity modifiers – additives

which control oil viscosity under different operating temperatures. Under stress, these molecules may 'shear', affecting their ability to control viscosity. As such, shear stability is a measure of the ability of an oil to stay in SAE viscosity grade, even after repeated use. The viscosity specs of any engine oil are precisely matched to the application and operating conditions it is recommended for, so a drop in viscosity can potentially harm the engine.

API CK-4 and FA-4 engine oils are formulated with viscosity modifiers that significantly improve the oil's shear stability for new levels of stay-in-grade performance and better protection of high-tech hardware.

