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Happy Holidays

Our 105th year in business saw numerous challenges and successes. With crude oil prices dropping early, we in turn lowered the price of many of our oils for the benefit of our customers. With lower commodity prices for corn, beans and milk, our customers have been forced to stretch their dollars farther making the extra protection, performance and benefits of our products even more valuable to them.

Several weeks ago someone asked; “how many people does Cen-Pe-Co have who perform customer service”. The answer surprised them because everyone associated with Cen-Pe-Co is involved with customer service. We are blessed to be associated with hundreds of hardworking, honest individuals who share in the responsibility for making our customers’ investments in us worthwhile.

Our customers have a noble cause. They built, transport and grow for the benefit of the whole world. Never have so few provided so much food for so many. We all should never take for granted the importance of both ours and our customer’s importance to the world’s food chain.

It seems that National elections have a way of trying to bring everyone down. While others spend so much time and money spreading negative this and negative that, we are the lucky ones who continue to work for a better world while wishing good will to all.

Getting it Right

By Blaine Ballentine, Lubrication Engineer

It is not always best to be first to market with a new product. Case in point is the CI-4 specification. After the point of no return, it was discovered that some of the Mack vocational trucks were producing a different type of soot that caused oil thickening far beyond what the laboratory test engines predicted. So, the limits were reset and CI-4 Plus was born.

There is a similar unexpected situation with the new API CK-4 specification, that was released December 1. Ford has seen valve train wear with some of the new formulations and is recommending CJ-4 oil or oil meeting Ford WSS-M2C171-F1. Meeting the Ford spec is a high hurdle right now, as Ford is not expected to have the 6.7 L engine test available until March 2017[1,2].

Following is some background, details, and how to choose the right lubricant for your Ford diesel engine.

CK-4 and FA-4

The API CJ-4 specification is being replaced with API CK-4, and a new FA-4 category is being added. The specifications are to enable the more fuel efficient 2017 diesel engines. We will discuss the new specs in more detail in a later issue of the Central News, but here is the executive summary.

CK-4 oils are intended to be a direct replacement for CJ-4 oils, including retrofitting them into old engines. FA-4 oils are thinner to improve fuel economy in some of the 2017 engines, but are not recommended for pre-2017 engines.

Here is where the confusion begins. FA-4 10W-30 is thinner than CK-4 10W-30.

Remember that SAE 10W-30 is defined by viscosity at 100° C., the Cold Crank Simulator, the Borderline Pumpability, and the High Temperature High Shear (HTHS) test. This last test differentiates CK-4 from FA-4.

Viscosity Test	10W-30 as defined by SAE	CK-4 10W-30	FA-4 10W-30
Cold Crank Simulator (-25 C)	<700 cP	<700 cP	<700 cP
Borderline Pumpability (-30 C)	<6000 cP	<6000 cP	<6000 cP
Kinematic Viscosity (100 C)	9.3 to 12.5 cSt	9.3 to 12.5 cSt	9.3 to 12.5 cSt
HTHS Viscosity (150 C)	**>2.9 cP**	**>3.5 cP**	**2.9 to 3.2 cP**

CK-4 and FA-4 oils have to meet all the same requirements, except HTHS. CK-4 10W-30 has a HTHS viscosity above 3.5 cP. FA-4 10W-30 has a HTHS viscosity between 2.9 and 3.2 cP.

Think of HTHS testing as a way to measure viscosity. Any shearing is temporary.

HTHS viscosity is measured by heating the oil to 150° C. (302° F.) and measuring the drag on an impeller turning in the oil sample. The turning impeller induces temporary shear

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to give a better indication of viscosity in a turning bearing.

The reason for API's different notation on the two very similar specs is the thinner one, the FA-4, can damage engines designed for CJ-4 10W-30 or 15W-40. They are using the unique FA-4 notation in an effort to keep it out of older engines that need the thicker CK-4 oils.

Mixed Fleet Oils

Until now, an oil displaying an API "C" spec first did not have to meet the tighter "S" spec's phosphorus limit. So, an oil labeled API CJ-4/SM did not have to meet the 800 ppm phosphorus limit of an oil labeled API SM. That has now changed.

Ford F550 Diesel

Under the new rule, an oil labeled API CK-4/SN has to meet every requirement of both the diesel and gasoline specs. Such an oil would have less than 800 ppm phosphorus to meet SN, even though CK-4 allows up to 1200 ppm phosphorus.

Some consider CK-4/SN to be a premium category where the mixed fleet owner does not have to worry about misapplication or cross contamination. After all, defeating the diesel engine test protocol with one-third less ZDDP takes some real formulating prowess.

Ford Diesels

Ford's bulletin recommending against CK-4 and FA-4 is a big deal. Ford's market share in medium duty diesel trucks in 2014 was 65%. Medium duty is DOT classes 4 through 6, like the Ford F450, F550, and F650 respectively, and includes many delivery trucks. In this medium duty diesel market, Ford outsells all of its competitors combined.

Ford does not recommend FA-4 in any of their vehicles at this time, due to its low viscosity. Their recent bulletin says they do not recommend CK-4 products because testing on "some CK-4 formulations have shown inadequate wear protection[3]…"

A Ford representative, Ron Romano, explained that testing in Ford 6.7 liter engines revealed valve train wear with some CK-4

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oils that had not been experienced in CJ-4 oils[4]. The wear included wear of rocker arm fulcrums and pads, and pushrod ends[5]. Romano went on to say the CJ-4 formulations had more than 1000 ppm phosphorus, but the CK-4 formulations that exhibited problems contained less than 1000 ppm phosphorus. Of course, phosphorus comes from zinc phosphate anti-wear additives (ZDDP).

Oils to Avoid

Obviously, some of CK-4 formulations do not have enough anti-wear additive. Phosphorus is being used as a proxy for ZDDP, which has been used as an anti-wear additive for 70 years.

Ford discovered the weakness, but we have to assume that other engines would be affected. Detroit Diesel advises that while CK-4/SN oils meeting Detroit requirements are acceptable, "their use is not as desirable as lubricants formulated specifically for diesel engines and having API FA-4, CK-4 and CJ-4 designations[6]."

Given the new rule on mixed fleet oils and comments from Ford and Detroit Diesel, common sense tells us to stay away from oils labeled API CK-4/SN, because we know they are limited to 800 ppm phosphorus.

This does not mean that oils labeled only with CK-4 are safe. Some brands have phosphorus levels that are too high to qualify for SN, but lower than that of their CJ-4 predecessor. Ford made the safe choice, because CJ-4 formulations generally had phosphorus levels between 1100 ppm and the 1200 ppm limit.

Patience is a Virtue

There is a lot of test data to review, and changing the formula of a product that works is a big decision. At Cen-Pe-Co we decided it was more important to get it right than to be among the first to market with a new formulation. There are very few 2017 diesels on the road at this time, and none of them require CK-4 of FA-4 oils. Although some of the engine manufacturers recommend the new specs, they all permit the use of CJ-4 oils in their 2017 models[7].

Cen-Pe-Co is not the only company slow to adopt. As of December 10, only 16% of CJ-4 oils have been transitioned to CK-4[8,9].

Extreme Duty will eventually make the jump to CK-4. When it does, you can rest assured that the phosphorus level will be bumping up against the 1200 ppm phosphorus limit and we will make a genuine improvement.

In the meantime, Extreme Duty is the best CJ-4 oil available and provides superior protection in Ford and every other brand of diesel engine.

References

1. ‘‘North American specification update” Infineum Insight, www.infineuminsight.com/insight/dec-2016/north-american-specification-update?utm_campaign=Infineum+Insight+Dec16 +email&utm_medium=email&utm_source=Infineum+Insight 12/14/16.

2. Chevron Product Bulletin CNALMKT3, 11/15/16.

3. Ford Motor Company API CK-4 / FA-4 Ford Position Statement, https://jobbersworldblog.files.wordpress.com/2016/05/ford-motor-company-ck-4-position-statement.pdf.

4. “Ford Shuns New API Heavy Duty Oils” Steve Swedburg, Lube Report, http://pubs.lubesngreases.com/lubereport/16_45/specs/-11266-1.html, 11/9/16.

5. Chevron Product Bulletin, Ibid.

6. “Lubricating Oil, Fuel, and Filters” Detroit Diesel publication DDC-SVC-BRO-0001 2017, p 9.

7. “North American specification update” Ibid.

8. “API’s CK-4 and FA-4 Licensed Oils List Available” OEM/Lube News, www.imakenews.com/lubritec/e_article003433921.cfm?x=bqNwyw2,bb3J02DJ, 12/12/16.

9. API Directory of Licensees, https://engineoil.api.org/Directory/EolcsResults?accountId=-1&serviceCategories=CJ-4, 12/13/16.