UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
NATIONAL VEHICLE AND FUEL EMISSIONS LABORATORY
2565 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105-2498

OFFICE OF
AIR AND RADIATION

March 16, 2020

CD-2020-03 (LDV/LDT/HDV/ICI/LIMO)

SUBJECT: Use of GF-6, FA-4 and CK-4 Engine Oil in EPA Test Vehicles

Dear Manufacturer:

The purpose of this letter is to provide updated guidance for engine oils used in gasoline, diesel, CNG and flexible-fueled certification and fuel economy test vehicles. More specifically, this guidance letter clarifies how manufacturers can ensure that the engine oil used in EPA test vehicles is "representative of a vehicle which the manufacturer intends to produce under the provisions of a certificate of conformity" under 40 CFR 600.007(b)(6). It is applicable to light-duty vehicles, light trucks and heavy-duty Class 2b and 3 chassis-tested vehicles, ICIs/Limos. The guidance provided in this letter supersedes the guidance provided in EPA guidance letter CISD-10-11, July 1, 2010, beginning with 2021 model year (MY) vehicles. The primary changes from CISD-10-11 are as follows:

- Provides guidance for manufacturers who recommend the use of GF-6A and GF-6B engine oil (API Service Category "SP" engine oil) in 2021 and later model year vehicles;
- Provides guidance for manufacturers who recommend the use of API Service Category FA-4 and CK-4 engine oil in 2021 and later model year diesel vehicles;
- Provides guidance for manufacturers who recommend other specific brands of oil, e.g. in addition to GF-6A or GF-6B energy conserving oil;
- Provides guidance for manufacturers who recommend the use of oils which use a different licensing/registration process than the API GF-6 licensing/registration process, e.g. guidance for manufacturers who recommend the use of Dexos 1 and Dexos 2 oils.
- Clarifies manufacturer reporting requirements in the EPA application for certification.

The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies.

Background:

On July 1, 2010 EPA issued guidance letter CISD-10-11 with the subject title: Use of GF-5 Engine Oil in Gasoline Fueled EPA Test Vehicles. That guidance letter identified circumstances when EPA would generally accept the use of GF-5 5W-20, 5W-30, and 10W-30 oils in the certification process for 2011 and later model year gasoline fueled vehicles.

On September 18, 2008 EPA issued letter CISD-2008-11 with the subject title: Use of 0W Multi-grade Engine Oils in Gasoline Fueled EPA Test Vehicles, which identified circumstances when EPA would generally accept the use of SAE 0W viscosity grade oil in the EPA certification process.

Additional background information is provided in EPA guidance letters CISD-10-11 and CISD-08-11 and previous EPA engine oil guidance letters dating back to 1978. The basic principles in this and previous guidance letters remains the same and may be summarized as follows:

- The provisions of 40 CFR 600.007(b)(6) state, "Any vehicle tested for fuel economy, CO2 emissions, or carbon-related exhaust emissions purposes must be representative of a vehicle which the manufacturer intends to produce under the provisions of a certificate of conformity." EPA's view is that for a vehicle being tested to be representative, the engine oil used in the certification and fuel economy test vehicles should be no more fuel efficient than the engine oil that is used as the factory fill, or the engine oil recommended to the vehicle owner.

- The engine oil used in the certification process should be widely available throughout the oil distribution network, including dealerships, independent service providers, quick oil change facilities, and the do-it-yourself retail market.

On October 31, 2019 EPA met with representatives of the International Lubricant Specification and Advisory Committee (ILSAC), to discuss the new ILSAC GF-6A and GF-6B engine oil requirements for engine oils (for which the American Petroleum Institute (API) also approved new standards for Service Category "SP" and "SP Resource Conserving" engine oils). Representatives of Fiat-Chrysler Automobiles (FCA), Ford, General Motors and Toyota were present. At that meeting details of the new specifications for GF-6A and GF-6B classes of engine oils were discussed, including improved fuel economy performance, improved greenhouse gas performance (reduced CO2 emissions), rollout plans, communications provided to the oil distribution network, and data showing comparisons between GF-6 and GF-5 fuel efficiency requirements.

ILSAC has developed two new sets of performance standards for GF-6 engine oils: one for GF-6A class of engine oils (e.g. SAE 0W/5W-20, 0W/5W-30 and 10W-30 viscosity grade oils), and one for GF-6B class of engine oils (e.g. SAE 0W-16 viscosity grade oil). The ILSAC GF-6

engine oil performance standards provide a new, more stringent set of engine oil performance requirements for spark-ignition internal combustion engines, resulting in a more robust class of engine oils capable of meeting the needs of current and future gasoline engines.

At that meeting it was stated by the ILSAC representatives that GF-6A and GF-6B oils would be used as the factory fill oil, would be widely available in the marketplace, and therefore would meet EPA's usage expectations as described above.

GF-6A Oils:

Oils that meet the ILSAC GF-6A requirements are fully backward compatible with GF-5 oils and may be used in in-use vehicles that currently use GF-5 oils (including in-use vehicles using "SN Plus" oil and "SN Plus" Resource Conserving (RC) oils which were introduced in the spring of 2018). Therefore, we expect that there will be no negative impacts on emissions or fuel economy of the in-use fleet as GF-6A oils are introduced in the marketplace.

After this new class of GF-6A API service category oils becomes commercially available in May 2020, consumers can ensure that their oil meets the latest ILSAC/API requirements by looking for the API "Starburst" symbol on the oil container (as shown below). The "Starburst" symbol indicates that the oil 1) has been licensed by API as meeting minimum engine protection standards set by API and the vehicle/engine manufacturers, and 2) delivers improved fuel economy performance and emission system protection compared to:

- API-licensed oils which don't display a "Starburst" symbol; and
- GF-5 and earlier generations of oils (which do display the API "Starburst" symbol).

API "Starburst" Symbol for GF-6A Engine Oil

GF-6B Oils:

Oils that meet the ILSAC GF-6B requirements for SAE 0W-16 viscosity grade oils are not fully backward compatible with GF-5 oils. However, the new class of GF-6B (0W-16) oils are backwardly compatible with SN/RC and SN PLUS/ RC SAE 0W-16 viscosity grade oils and

may be used in in-use vehicles that were previously designed to use and operate on SAE 0W-16 viscosity grade oil. Thus, similar to GF-6A oils, we expect that there will be no negative impacts on emissions or fuel economy of the in-use fleet as GF-6B oils are introduced in the marketplace.

After this new class of GF-6B oils becomes commercially available in May 2020, consumers can ensure that their GF-6B (SAE 0W-16 viscosity grade) oil meets the latest ILSAC/API requirements by looking for the API Certification Mark "Shield" symbol on the oil container (as shown below). The "Shield" symbol indicates that the oil 1) has been licensed by API as meeting minimum engine protection standards set by API and the vehicle/engine manufacturers and 2) delivers improved fuel economy performance and emission system protection compared to SN/RC and SN PLUS/RC oils which don't display a "Shield" symbol.

It is our understanding that API introduced this new "Shield" at the request of automakers to prevent confusion and ensure that 0W-16 oils are used only in applications where 0W-16 oils are recommended by the engine manufacturer.

API Certification "Shield" for GF-6B Engine Oil

SP and SP/RC Oils:

After this new class of SP and SP/RC API category oils becomes commercially available in May 2020, consumers can ensure that their oil meets the latest API requirements by looking for the API "Donut" symbol on the oil container (as shown below). The "Donut" symbol indicates that the oil; 1) has been licensed by API as meeting minimum engine protection standards set by API and the vehicle/engine manufacturers, and 2) SP/RC delivers improved fuel economy performance and emission system protection compared to:

- API-licensed oils which don't display a "Donut" symbol; and
- SN, SN/RC, SN PLUS/RC and earlier generations of oils (which do display the API "Donut" symbol).

Example of API "Donut" Symbol for an SP/RC Engine Oil

Discussion

Since EPA issued the guidance letter CISD-10-11, July 1, 2010, the automobile and oil industries have made improvements to engine oils used in light-duty vehicles and in heavy-duty class 2b and 3 vehicles. Some of these oil improvements are not addressed in the previous guidance letter. This letter provides additional guidance in the following areas:

1. Spark Ignition Engine Oils - As discussed above, ILSAC and API recently approved two new standards (GF-6A and GF-6B) for engine oil used in spark ignition internal combustion engines. Consequently, API introduced new engine oil performance standards for "SP" service category oil (a new service category of engine oil succeeding API "SN" service category engine oil). This letter provides guidance to manufacturers who wish to use GF-6A, GF-6B, SP or SP/Resource Conserving (RC) oil in their EPA certification and fuel economy test vehicles.

2. Compression Ignition Engine Oils – In December 2016, API began approving new Service Category FA-4 and CK-4 engine oils for use in diesel-fueled vehicles. Although EPA guidance letter CISD-10-11 was not directed at diesel vehicles for several reasons[1], manufacturers are still required to use good engineering judgment to ensure that the engine oil used in EPA diesel-fueled test vehicles is representative of the engine oil that the manufacturer intends to recommend for Factory Fill and Service Fill under the provisions of a certificate of conformity; ref. 40 CFR 600.007(b)(6). Since the market share of light-duty diesel-fueled vehicles has increased in recent years and Corporate Average Fuel Consumption (CAFC) and Greenhouse Gas (GHG) requirements now apply to diesel-fueled class 2b and 3 heavy-duty vehicles, the Agency believes that it is reasonable and appropriate to provide engine oil guidance in this letter for diesel-fueled

[1] For example, in 2010 at the time EPA guidance letter CISD-10-11 was written, light-duty diesel-fueled vehicles represented a relatively small percentage of the total light-duty passenger car and light-duty truck market share and Heavy-Duty Class 2b and 3 diesel-fueled vehicles were not required to meet fuel economy labeling, Corporate Average Fuel Consumption (CAFC), or fleet average Greenhouse Gas (GHG) requirements.

vehicles. Such guidance is intended to assure that the fuel economy and GHG performance of the engine oil used in diesel-fueled test vehicles is consistent with the fuel economy and GHG performance of the engine oil used in production vehicles and in-use vehicles.

This guidance letter doesn't provide fuel economy improvement (FEI) requirements for API FA-4 and CK-4 oils because the API registration process for these oils currently doesn't include fuel economy improvement requirements. However, the Agency believes it is appropriate to ensure that the inherent fuel efficiency properties of the engine oil used in compression ignition test vehicles are representative of 1) the engine oil recommendations to customers and 2) the engine oil used for factory fill. Thus, as outlined in Sections 1, 3 and 4 of Enclosure I, we believe that manufacturers should use good engineering judgment to assure that the engine oil used in compression ignition test vehicles is expected to be 1) the same API category, 2) the same SAE viscosity grade and 3) equal to or less fuel efficient than (or compared to) the engine oil recommended to customers and the engine oil used for factory fill.

3. Heavy-Duty class 2b and Class 3 Vehicle Engine Oils - The previous engine oils guidance letter was written before EPA greenhouse gas and NHTSA fuel consumption requirements became effective for HD 2b/3 vehicles. However, even though the previous guidance letter (CISD-10-11) was not directed at HD 2b/3 vehicles, manufacturers indicate that they have been following the guidance provided in that guidance letter for HD 2b/3 vehicles. This guidance letter confirms the applicability of this engine oil guidance to HD 2b/3 vehicles tested on chassis dynamometers (assuring consistency of oil requirements for EPA test vehicles, in-use recommendations, factory fill and oil availability to the infrastructure for HD/2b/3 vehicles).

4. Oils Using a non-API Licensing/Registration Process - This guidance is not intended to limit manufacturers to using only API-licensed engine oils in certification and fuel economy test vehicles, provided a manufacturer satisfies EPA's certification and testing requirements, including the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to EPA test vehicles and engine oil. For example, a new dexos oil licensing/registration process has been available for engine oil manufacturers since 2009 and dexos oil is currently being recommended and used in General Motors vehicles. EPA recommends that manufacturers consult with EPA prior to using an oil with a different licensing and registration process (than the API licensing/registration process) in

certification and fuel economy test vehicles. The purpose of consulting with EPA is so that EPA can ensure that the use of non-API licensed engine oils in EPA test vehicles meet the "representativeness" requirements of 40 CFR 600.007(b)(6) because those requirements are important for the validity of the testing and the certification/fuel economy process. In addition, EPA's review is intended to maintain equity for all manufacturers.

5. Recommending Specific Brands of Engine Oil – Currently, some automobile manufacturers also recommend the use of specific brand of engine oil to their customers (e.g. an oil which is marketed under the brand name of the automobile manufacturer). This guidance letter confirms that manufacturers may recommend "other" specific brands of engine oil to their customers (e.g. in addition to recommending oils which meet ILSAC GF-6A, ILSAC GF-6B, FA-4, or CK-4 requirements) provided the manufacturer uses good engineering judgment to assure that the engine oil used in EPA test vehicles is expected to be equal to or less fuel efficient than the fuel efficiency of the "other" recommended engine oil.

6. Documentation - This guidance letter also clarifies that manufacturers should document in the Application for Certification the specifications of the engine oil used in certification/fuel economy test vehicles and the specifications of the oil used for factory fill.[2] Documentation is needed in order to provide assurance that the engine oil used in EPA emissions and fuel economy test vehicles is representative of 1) the oil used in production vehicles and 2) the oil used for oil changes throughout the life of the vehicle, ref. 40 CFR 600.007(b)(6).

Summary

Based on the information outlined above in this letter, EPA will generally consider the use of GF-6A and GF-6B engine oils in 2021 and later model year gasoline, CNG and flexible-fueled certification and fuel economy test vehicles, under the conditions identified in this letter and its attachment to be a valid approach for satisfying the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to EPA test vehicles. Similarly, EPA will generally consider the use of FA-4 and CK-4 engine oils in 2021 and later model year compression ignition certification and fuel economy test vehicles under the conditions identified in this letter and its attachment to be a valid approach for satisfying the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to EPA test vehicles.

[2] The Part 1 Application is required to provide a description of "all vehicles for which testing is required…..to obtain a certificate of conformity;" and also a description of "all vehicles covered by each certificate of conformity to be produced and sold within the U.S." (which EPA believes should include the specifications of the engine oil used in test vehicles and in production vehicles); ref. 40 CFR 68.1844-01(d)(6) and (d)(12), respectively. EPA considers the specifications of the engine oil to be a necessary part of the description of the vehicle.

If you have questions concerning this guidance letter, please contact Dave Good at (734) 214-4450 or by email at good.david@epa.gov.

Sincerely,

Byron J. Bunker, Director
Compliance Division
Office of Transportation and Air Quality

Enclosure

Enclosure to CD-2020-03
EPA Guidance for Use of GF-6A, GF-6B, SP, SP/RC, FA-4 and CK-4 Engine Oil in EPA 2021 and Later Model Year Emission and Fuel Economy Test Vehicles

This enclosure provides an EPA-recommended approach for the use of GF-6A, GF-6B, FA-4 and CK-4 engine oils in EPA test vehicles. EPA considers this to be a valid approach for satisfying the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to the engine oil used in EPA test vehicles. Manufacturers using this approach are not required to obtain prior EPA approval. Manufacturers may use an alternate approach (or a variation of this approach) however EPA recommends that the manufacturer consult with EPA prior to using an alternate approach to ensure that the alternate approach satisfies the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to the engine oil used in EPA test vehicles. This guidance document is meant to clarify applicable EPA regulations and does not have the force of law.

Normally GF-6A and GF-6B oils are used in gasoline vehicles, CNG vehicles and flexible-fueled vehicles (FFVs). Normally FA-4 and CK-4 oils are used in diesel-fueled vehicles.

1. Owner's Manual Language

   1.1 GF-6A, GF-6B, SP and SP/RC Engine Oils: Manufacturers who use GF-6A, GF-6B, SP or SP/RC energy conserving engine oil in their EPA test vehicles should provide engine oil recommendations in the owner's manual which are consistent with the engine oil used in their EPA test vehicles. For example, if GF-6A, GF-6B, SP or SP/RC oils are used in EPA test vehicles, the manufacturer should provide recommendations in the owner's manual that clearly specify the use of the applicable GF-6A, GF-6B, SP or SP/RC engine oil, as identified by the presence of 1) the American Petroleum Institute (API) "Starburst" logo, or 2) the API "Shield" logo, or 3) the API "Donut" logo, as applicable, provided the oil is licensed by API and meets applicable GF-6A, GF-6B, SP or SP/RC Standards for Passenger Car Engine Oils, as applicable. If the API starburst logo or the API "Shield" logo, or API "Donut" logo is used in the owner's manual in lieu of reference to ILSAC GF-6A, ILSAC GF-6B, SP or SP/RC requirements, the manufacturer should include a brief explanation of the importance of the logo(s). Manufacturer recommendations for the SAE viscosity grade of the oil should also be clearly stated in the owner's manual. Manufacturers may recommend or require the use of a lower SAE viscosity grade oil in extremely low temperatures where the normally recommended oil may not flow adequately. Inclusion of any qualifier word, "preferred" for example, associated with the oil viscosity is considered to introduce ambiguity into the instruction and should not be used.

In addition to the owner's manual recommendations discussed above, manufacturers may also recommend "other" brands of engine oil (e.g. Toyota Genuine Motor Oil, Motorcraft motor oil, etc.). If they do, the oil used in EPA test vehicles shall have the lowest fuel economy improvement factor of the "other" brand of engine oil and an engine oil meeting the fuel economy improvement factors provided in Section 3.2 (below).

1.2 FA-4 and CK-4 Engine Oils: Manufacturers who use FA-4 or CK-4 engine oil in their EPA test vehicles should provide engine oil recommendations in the owner's manual which are consistent with the engine oil used in their EPA test vehicles. For example, if FA-4 or CK-4 engine oils are used in EPA test vehicles, the manufacturer should provide recommendations in the owner's manual that clearly specify the API category and SAE viscosity grade. Manufacturer may recommend or require the use of a lower SAE viscosity grade in extremely low temperatures where the normally recommended oil may not flow adequately.

2. Labeling the Oil Filler Cap - The manufacturer should clearly indicate the oil viscosity on the engine oil filler cap, by label or other permanently attached means, (consistent with the SAE viscosity of the oil recommended in the owner's manual, used in EPA test vehicles and used for factory fill as outlined in Sections 1, 3 and 4 of this Enclosure). Alternatively, affixing a permanent easily visible label under the hood is also acceptable.

3. Oil Used in EPA Emission and Fuel Economy Test Vehicles

3.1 Oil Viscosity of GF-6A, GF-6B, SP, SP/RC, FA-4 and CK-4 Oils – Manufacturers should use good engineering judgment to assure that the viscosity of the oil used in EPA emission and fuel economy test vehicles is consistent with the SAE viscosity grade of the oil recommended to customers for normal ambient temperature (summertime) operation; see Sections 1 and 2 above.

3.2 Fuel Economy Improvement of GF-6A, GF-6B and SP/RC Oils –The engine oil that is used in emission and fuel economy test vehicles should have a combined (sum of the 16 hour plus 125 hour) fuel economy improvement factor (FEI Sum) measured in the Sequence VIE or VIF tests, which does not exceed the following limits:

ILSAC GF-6A Oils - ASTM D8114 Sequence VIE Test Procedure	
SAE Viscosity Grade	**FEI Sum (16 hrs. + 125 hrs.)**
0W-20/5W-20	4.7%
0W-30/5W-30	4.0%

10W-30	3.7%

ILSAC GF-6B Oils - ASTM D8226 Sequence VIF Test Procedure	
SAE Viscosity Grade	**FEI Sum (16 hrs. + 125 hrs.)**
0W-16	4.9%

These limits are the sum of the 16-hour and 125-hour minimum fuel efficiency improvement (FEI Sum) specifications, plus 0.9 percent for GF-6A oils and plus 0.8 percent for GF-6B oils). The 0.9 and 0.8 percent values represent two standard deviations of the reproducibility distribution of fuel economy improvement rates of Sequence VIE (n=53) and Sequence VIF (n=14) engine oil qualifying tests, respectively, measured by the applicable ASTM D8114 or ASTM D8226 test procedure. EPA is recommending these limits because it is inappropriate for a manufacturer to select significantly better oil for fuel economy testing than the typical oil the customer will be using in their vehicles in the field, in which case the manufacturer would likely not satisfy the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to EPA test vehicles.

3.3 Fuel Economy Improvement of FA-4 and CK-4 Oils – Currently API Service Category FA-4 and CK-4 oils do not contain ASTM D8114 Sequence VIE or ASTM D8226 Sequence VIF fuel economy improvement (FEI) requirements. Therefore, manufacturers should use good engineering judgment to assure that the engine oil used in compression ignition test vehicles is the same API Category, the same SAE viscosity grade, and equal to or less fuel efficient than the engine oil recommended to customers.

4. Factory Fill Oil Requirements

4.1 GF-6A, GF-6B, SP and SP/RC Oils - The manufacturer should use a GF-6A, GF-6B, SP and/or SP/RC oil of the same SAE viscosity grade for factory fill that it recommends to customers. Furthermore, the fuel economy performance of the factory fill oil should be equivalent or superior to the oil used in EPA emissions and fuel economy test vehicles.

4.2 FA-4 and CK-4 Oils - The manufacturer should use an engine oil of the same API Category and the same SAE viscosity grade for factory fill as used in EPA test vehicles and as recommended to customers. In addition, the manufacturer should use good engineering judgment to assure that the fuel economy performance of the factory fill oil is equivalent or superior to the oil used in EPA emissions and fuel economy test vehicles.

5. GF-6A, GF-6B, SP and SP/RC Oil Availability at Dealerships - EPA expects manufacturers to inform their affiliated dealerships of the timing of the introduction of GF-6A, GF-6B, SP and SP/RC engine oil (as applicable) and the need to use it as recommended in order to avoid the possibility of fuel economy shortfalls.

6. GF-6A, GF-6B, SP and SP/RC Oil Availability in Other Segments of the Supply Network - The lubricant manufacturer or its trade association should provide consultation with quick oil change facilities and suppliers to the major retailers servicing the do-it-yourself market segment in order to inform these organizations of the purpose of the new GF-6A, GF-6B, SP and SP/RC engine oil (as applicable) and its market entry timing.

7. Oils with non-API Registration/Licensing Processes – EPA recommends that manufacturers consult with EPA prior to using an engine oil with a different licensing and registration process (than the API licensing/registration process) in certification and fuel economy test vehicles. In general, consistent with the guidance provided in this letter for GF-6A, GF-6B, SP, SP/RC, FA-4 and CK-4 engine oils, the purpose of EPA's review is to confirm that the non-API-licensed oil used in test vehicles has comparable fuel economy performance to the oil used in consumer vehicles, and meets the "representativeness" requirements of 40 CFR 600.007(b)(6) as it applies to engine oils used in test vehicles.

8. Reporting Requirements - Manufacturers should document in the Application for Certification the specifications of the factory fill oil and the specifications of the oil used in certification and fuel economy test vehicles, including the brand/supplier of oil; the type of oil, (e.g. full synthetic, synthetic blend, non-synthetic); the API Category and SAE Viscosity Grade; and (for GF-6A, GF-6B, and SP/RC oils) the percent fuel economy improvement rating of the oil (FEI Sum) using the applicable ASTM D8114 Sequence VIE or ASTM D8226 Sequence VIF test procedure as compared to the ASTM reference oil.