



OIL, ENGINE, DIESEL, SERVICE FILL

WSS-M2C171-F1

1. SCOPE

This material specification defines the minimum acceptable performance requirements and physical/chemical properties of all appropriate viscosity grades of engine oils to be used in Ford Motor Company vehicles in its global engine/vehicle service operations.

2. APPLICATION

This specification is released for all appropriate viscosity grades of service fill engine oils used for lubrication of compression ignition engines using diesel fuel. The Documentation, Performance Requirements and Quality Control subsections of the QUALIFICATION PROCEDURE apply only to engine oils supplied directly to Ford Motor Company

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification requires the use of approved sources. Only the sources identified on the Ford Approved Source List (ASL) can be used when this specification is listed on the drawing, CAD file, or other documents. The list of approved sources is located within Ford at www.mats.ford.com or available externally through a Ford Materials Engineer.

3.2 PERFORMANCE

Shall meet all the requirements of and be licensed to display API service category CK-4 or CJ-4 and also meet additional Ford test requirements.

All required engine tests shall be conducted in accordance with the most recently approved procedures as described in ASTM Standards and the applicable ASTM Standards Research Reports and Information Letters. All tests under surveillance by ASTM must be conducted using test equipment monitored by and calibrated to the requirements of the ASTM Test Monitoring Center.

- 3.2.1 Mack T-11 (ASTM D7916)
- 3.2.2 Mack T-12 (ASTM D7422)
- 3.2.3 Cummins ISB (ASTM D7484)
- 3.2.4 Cummins ISM (ASTM D7468)
- 3.2.5 Caterpillar C13 (ASTM D7549)
- 3.2.6 Caterpillar 1N (ASTM D6750)
- 3.2.7 Roller Follower Wear (ASTM D5966)
- 3.2.8 Engine Oil Aeration (ASTM D4087)
- 3.2.9 Oil Oxidation, (WK50204 / T-13)

Date	Action	Revisions	Rev. 0
2017 02 16	Released		



- 3.2.10 Valve-Train Wear, Ford Diesel Engine Test
(Consult Ford Engineering for test requirements)
- 3.2.11 Additional requirements:
Preliminary approval may be granted without the valve train wear test based on evaluation of other data by Ford Motor Company. This could include but is not limited to the following:
- 3.2.11.1 Previously licensed CJ-4 formulation (licensed prior to January 1, 2016) that also meets and is licensable to CK-4.
- 3.2.11.2 Previously licensed CJ-4 formulation (licensed prior to January 1, 2016), with only the addition of an antioxidant boost to pass the T-13 test that also meets and is licensable to CK-4. All other engine tests beside the T-13 and D4037 aeration tests must have been conducted on the original un-boosted CJ-4 formulation. Based on the type of antioxidant boost used, level 1 or 2 support data must be provided to show the antioxidant boost will not degrade oil performance in the other tests. Any other formulation rebalancing due to the addition of the antioxidant must also be supported with data to show no degradation in performance in other tests.
- 3.2.11.3 Vehicles testing conducted on F-Series 6.7L Super Duty vehicle(s). Testing program must be approved by Ford Motor Company
- 3.2.12 Once the Valve-Train Wear Test is available to run, all formulations approved against the requirements of 3.2.11 must be run and pass the test to stay on the list of approved formulations. The test must be run within 6 months of the test becoming available.

All required ASTM engine tests shall be conducted in accordance with the most recently approved procedures as described in ASTM Standards and the applicable ASTM Standards Research Reports and Information Letters. All tests under surveillance by ASTM must be conducted using test equipment monitored by and calibrated to the requirements of the ASTM Test Monitoring Center.

3.3 PHYSICAL/CHEMICAL PROPERTIES

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|-------|--|---------------|
| 3.3.1 | High Temp/High Shear Viscosity at 150 °C
(ASTM D4683) | 3.5 cP min |
| 3.3.2 | Phosphorus (ASTM D5951)
(minimum limit may be waived based on valve-train wear test results) | 0.10 - 0.12 % |
| 3.3.3 | Sulfated Ash (ASTM D874) | 1.0 % max |
| 3.3.4 | Noack Volatility (ASTM D5800) | 13.0 % max |
| 3.3.5 | Seal Compatibility (ASTM D7216) | |
| 3.3.6 | Physical Appearance and Odor
Shall be clear and bright with no objectionable odor. | |
| 3.3.7 | Contaminants
Shall be free of carcinogens, toxins, and metals not removed in refining or from previous use. | |



3.4 QUALIFICATION PROCEDURE

3.4.1 Documentation

Applicant must furnish to Fuels and Lubricants Engineering a completed and certified copy of the attached Supplement A, test reports demonstrating full compliance with all the requirements of this specification and a copy of the final ACC Monitoring Agency summary, if available. The need for ACC registration of tests will be determined by Fuels and Lubricants Engineering.

The test reports must include results on both the candidate oil and the appropriate ASTM reference oils. The standard photographs of the test components are considered an essential part of the required test documentation. The oil sample code used for identification in each test document must be consistent. Any deviation in sample code uniformity must be explained and shown on the cover of each test report.

All tests must be certified by a qualified and authorized representative of the test facility.

The applicant shall identify all the formulation changes and modifications that occurred in the test program that coincide with the tests listed in the ACC Monitoring Agency summary. Individual formulations should be listed in Supplement A, and for ACC registered tests, identified by the line item number and the formulation code.

Fuels and Lubricants Engineering will review all data and determine if it adheres to the requirements of this specification. After review of the data, Fuels and Lubricants Engineering will notify the applicant of its decision in writing.

If approved, the applicant will receive a letter of approval and will be placed on a list of approved formulations. At this time the applicant may display that their product is approve to this specification.

If the applicant's formulation is not approved, Fuels and Lubricants Engineering will contact them in writing with the reason for rejection and additional testing/documentation necessary to continue reviewing the formulation.

3.4.2 "Read Across" Guidelines

It is recommended that all performance tests be conducted on the final formulation. However, at the discretion of Fuels and Lubricants Engineering exceptions may be permitted with supportive supplementary data on similar formulations to allow for final approval in the absence of complete testing.

3.4.3 Fleet Testing

Materials which constitute a significant departure from conventional formulations, whether in base stocks, refining processes or additive packages, must be fleet tested, in addition to the requirements outlined herein. These tests must include the type(s) of service judged to be affected by the difference in formulation technology. Fuels and Lubricants Engineering should be consulted prior to testing.

3.4.4 Verification

Fuels and Lubricants Engineering reserves the right to conduct verification testing. If the test results do not support the originally submitted data, the fluid supplier must re-test the product in coordination with Fuels and Lubricants Engineering. This re-test must be conducted and certified by a mutually agreed upon test facility.





3.4.5 Chemical and Physical Properties

Applicant shall furnish appropriate chemical and physical properties as required on Supplement A along with the manufacturing limits that apply to the material as requested.

3.4.6 Performance Requirements

Conformance to the engine test requirements listed in Supplement A will be determined by using Multiple Test Acceptance Criteria (MTAC) and Tiered Limit Methods (TLM) where applicable. All data and reports from the tests used for MTAC and TLM must be provided by the applicant. Identify the engine tests on Supplement A that have been used to determine the MTAC and TLM results by the corresponding line item number on the ACC Monitoring Agency summary. Fuels and Lubricants Engineering reserves the right to use all tests when averaging in place of MTAC.

3.4.7 Quality Control

The applicant and Fuels and Lubricants Engineering shall establish mutually agreed upon quality control limits to be listed in Supplement B. These will be used for ongoing product verifications at mutually agreed upon frequencies. The infrared absorption spectra of the approved material shall constitute the reference standard and shall be kept on file. All samples shall produce infrared curves that correspond to the reference standard when tested under the same conditions as those specified on the master curve.

4. GENERAL INFORMATION

The information given below is provided for clarification and assistance in meeting the requirements of this specification. Contact gmfs@ford.com for questions concerning Engineering Material Specifications.

4.1 APPROVAL OF MATERIALS

Suppliers desiring approval of their materials shall first obtain an expression of interest from Purchasing, Design or Product Development, and Materials Engineering. The supplier shall submit a completed copy of their laboratory test reports, signed by a qualified and authorized representative of the test facility, demonstrating full compliance with all the requirements of the Material Specification. Tested material samples must be available for review upon request and kept for a minimum of one year. Upon request, the supplier will review the associated quality control documents (Process Failure Mode and Effects Analysis, Control Plans, Certification testing) with Ford.

4.2 SUPPLIER'S ONGOING RESPONSIBILITY

All materials must be equivalent in all characteristics to the material upon which approval was originally granted.

Prior to making any changes to the material originally approved, whether or not such changes affect the material's ability to meet the specification requirements, the supplier shall notify the affected Supplier Technical Assistance (STA), Purchasing, and Materials Engineering activities of the proposed changes (with reasons) by submission of a completed Suppliers Request for Engineering Approval, SREA.

For parts and components using Ford Engineering Material Specifications, all samples tested to the specifications for Design Verification (DV), Production Verification (PV) and Production Part Approval Process (PPAP) sign off must be kept until Job 1.