



OIL, ENGINE, SERVICE FILL SAE 5W-20

WSS-M2C948-B

1. SCOPE

These material specifications defined the minimum acceptable performance requirements and physical/chemical properties of engine oils to be used by Ford Motor Company in its worldwide engine/vehicle manufacturing operations.

2. APPLICATION

These specifications are released in Europe for initial fill engine oils used for lubrication of spark ignition engines using gasoline. The Section 3.1 titled APPROVED SOURCES applies only to engine oils supplied directly to Ford Motor Company and / or its affiliates.

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

3.2.1 General Test Requirements

Where applicable, the required engine tests shall be conducted in accordance with the most recently approved procedures as described in the ACEA C2 or A5/B5 2016, or the latest ACEA sequence, with exceptions as listed below.

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.

All engine performance testing used to support a claim of compliance with the ACEA sequences must be generated according to the EELQMS. Suppliers must demonstrate commitment to comply with the ATIEL Code of Practice.

3.2.2 ACEA Seq. 2.1 (2012) High Temperature Deposits, Ring Sticking, Oil Thickening

To meet or exceed the requirements of ACEA C2, when tested in accordance with CEC-L-088-02, (TU5JP-L4) 72 Hour Test.

Or

If TU5 test results are not available, meet or exceed the requirements of Seq. 2.1 ACEA C2 2016 (Gasoline DI Engine Cleanliness) when tested in accordance with CEC-L-111-16 (EP6CDT).

3.2.3 ACEA Seq. 2.2 Low Temperature Sludge

To meet or exceed the requirements of ILSAC GF-5, when tested in accordance with ASTM D6593-00 (Sequence VG), under protocol & requirements of API.

Or

Date	Action	Revisions	Rev. 02
2017 04 19	Revised	See Summary of Revisions	K. Jablonka, FoE
2014 10 30	Revised	See Summary of Revisions	R. Haigh, EU
2011 08 22	Activated		R Haigh, EU



If Sequence VG test results are not available, meet or exceed the requirements of Sequence VHA (Consult with Ford Engineering for requirements)

- 3.2.4 ACEA Seq. 2.3, Valve Train Scuffing Wear
To meet or exceed the requirements of ACEA C2 2012, when tested in accordance with CEC-L-038-94 (TU3M).

Or

If TU3 test results are not available, meet or exceed the requirements of Sequence IVB (Consult with Ford Engineering for requirements).

- 3.2.5 ACEA Seq. 2.4, Black Sludge
To meet or exceed the requirements of ACEA C2, when tested in accordance with M271 procedure.

Or

If M271 test results are not available, meet or exceed the requirements of ACEA C2 when tested in accordance with CEC-L-107 (M271 Evo).

- 3.2.6 ACEA Seq. 2.6 (2012) Medium Temperature Dispersivity
To meet or exceed the requirements of ACEA C2, when tested in accordance with CEC-L-093-04 (DV4TD).

Or

If DV4 test results are not available, meet or exceed the requirements of Seq. 2.6 ACEA C2 2016 (DI Diesel Oil Dispersion at Medium Temperature) when tested in accordance with CEC-L-106 (DV6C).

- 3.2.7 ACEA Seq. 2.7, Wear
To meet or exceed the requirements of ACEA C2, when tested in accordance with CEC-L-099-08 (OM646LA).

- 3.2.8 ACEA Seq. 2.8, DI Diesel Piston Cleanliness & Ring Sticking
To meet or exceed the requirements of ACEA A5/B5, when tested in accordance with CEC-L-078-99 (VW TDI).

- 3.2.9 ASTM D7320 Sequence IIIGA or ASTM D7528 ROBO, Aged Oil Low Temperature Viscosity
Meet the requirements of ILSAC GF5, to be measured in accordance with ASTM D4684

- 3.2.10 In House Fuel Economy Test
Demonstrate a Fuel economy improvements of 0.7% over the reference fluid XE-M2CX659-A (SAE 5W20 to WSS M2C925 B) when tested in accordance with test procedure T0386-2014.

Consult Ford Motor Company for further details.



3.3 Viscosity Grade

- 3.3.1 Shall meet all the requirements of the applicable SAE viscosity grade as defined in SAE Standard J300 (latest revision), "Engine Oil Viscosity Classification"
- 3.3.2 Low Temperature Pumping 60,000 mPa.s
Viscosity at -35°C, max (ASTM D 4684, MRV TP-1)

3.4 PHYSICAL/CHEMICAL PROPERTIES

- 3.4.1 Copper Corrosion, 1b max
(ASTM D 130 or ISO 2160, 3 h at 100 °C) (Dark Orange)
- 3.4.2 Shear Stability
To meet the requirements of ACEA C2, when tested in accordance with CEC-L-014-93 or ASTM D6278.
- 3.4.3 Gelation Index 12 max
(ASTM D 5133, Scanning Brookfield)
- 3.4.4 Foaming Tendency
To meet the requirements of ACEA C2, when tested in accordance with ASTM D892.
- 3.4.5 High Temperature Foaming Tendency 100/0 ml, max
ASTM D 6082.
- 3.4.6 Evaporative Loss
To meet the requirements of ACEA C2, when tested in accordance CEC-L-040-93 (Noack)
- 3.4.7 TBN
To be greater than or equal to 7.5mgKOH/g, when tested in accordance with ASTM D2896.
- 3.4.8 Phosphorus
Percentage mass to be between 0.06 – 0.08 when tested in accordance with ASTM D5185.
- 3.4.9 Sulphated Ash Products
To be no higher than 0.8% m/m, when tested in accordance with ASTM D874.
- 3.4.10 Sulphur
To be no higher than 0.3% when tested in accordance with ASTM D5185.
- 3.4.11 Seal Compatibility
Shall be compatible with all current production component materials.
- 3.4.11.1 ACEA Seq. 1.10 (2012) Oil/Elastomer Compatibility
Shall meet or exceed the requirements of ACEA C-categories when tested in accordance with CEC-L-039-96.
- Or
- If CEC-L-039-96 test results are not available, meet or exceed the requirements of Seq. 1.10 ACEA C-categories 2016 (Oil – Elastomer Compatibility) when tested in accordance with CEC-L-112





- 3.4.11.2 In House Timing Belt Compatibility Test
When tested in accordance with CEC-L-039-96 (7days at 150°C, closed cup testing), the belt rubber samples shall meet the requirements listed in the attached table.
Contact Ford Motor Co for the procedure for obtaining rubber samples.

Fox Belt in Oil Compatibility Test		
Criteria	Unit	Limits
Micro Hardness Difference	IRHD	-5 to +6
Relative Change in Volume	%	-5 to +5
Relative Change in Tensile Strength	%	-30 to +20
Relative Change in Elongation Rupture	%	-35

- 3.4.12 Physical Appearance and Odor
Shall be clear and bright with no objectionable odor.
- 3.4.13 Contaminants
Shall be free of carcinogens, toxins, metals not removed in refining or from previous use.

3.5 "READ ACROSS" GUIDELINES

All performance tests must be conducted on the final oil formulations for consideration for initial fill. Exceptions may be permitted with supporting supplementary data on similar formulations to allow for approval in the absence of complete testing.

3.6 QUALIFICATION PROCEDURE

3.6.1 Documentation

Supplier must furnish to the affected Materials Engineering activity 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 American Chemistry Council (ACC – formerly CMA) and ERC summaries if available. The need for ACC-MA and ERC registration of tests will be determined by the affected Materials Engineering activity. The copy of the ACC-MA and ERC summaries should be sent directly from Registration Systems Inc. and ERC to the Materials Engineering activity unless specifically instructed by that activity.

The test reports must include results on both the candidate oil and the appropriate 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 supplier shall identify all the formulation changes and modifications that occurred in the test program that coincide with the tests listed in the ACC and ERC Summaries. Individual formulations should be listed in Supplement A, and for registered tests, identified by the line item number and the formulation code.



3.6.2 Verification

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

3.6.3 Chemical and Physical Properties

Supplier shall furnish appropriate chemical and physical properties as required on Supplement A along with the manufacturing limits that apply to the material upon which approval is requested.

3.6.4 Performance Requirements

Conformance to the engine test requirements listed in Supplement A will be determined by using Multiple Test Acceptance Criteria (MTAC), where applicable. All data and reports from the tests used for MTAC must be provided by the supplier. On Supplement A identify the engine tests that have been used to determine the MTAC results by the corresponding line item number on the ACC Summary. The affected Materials Engineering activity reserves the right to use all tests when averaging in place of MTAC.

3.6.5 Quality Control

Upon engineering approval, supplier and affected Materials Engineering activity shall establish mutually agreed upon quality control limits, to be listed on Supplement B, and 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 spectra that correspond to the reference standard when tested under the same conditions as those specified on the master spectra.

3.7 FLEET TESTING

Materials which, in the opinion of the affected Materials Engineering activity, 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. The affected Materials Engineering activity should be consulted prior to testing.

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