



Engine Oil Efficiency Evaluation for dexos® Oil Qualification

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. To determine the efficiency performance of an engine oil with respect to a baseline engine oil in the World Harmonized Light Vehicle Test Procedure (WLTP) cycle using a full vehicle chassis dynamometer test.

1.2 Applicability. This test is required for dexos®: engine oil specification qualification. Testing will typically be conducted at independent laboratories.

1.3 Remarks. This test procedure specifies a General Motors engine oil test vehicle, test oils, test procedure, and test stand configuration items.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ASTM D4052 ISO 17025

2.2 GM Standards/Specifications.

None

2.3 Additional References.

- All GM dexos® testing forms and documentation are available from the GM test data center, gmtdc.org.

3 Resources

3.1 Facilities.

A facility conducting registered dexos® tests must be ISO 17025 accredited for the procedure. A fully equipped temperature controlled vehicle chassis roll type dynamometer testing laboratory with the ability to accurately simulate the vehicle loading via 3-term road load coefficients (F0, F1, F2), such as:

- ISP Salzbergen GmbH & Co. KG, Germany
- Southwest Research Institute, Texas

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.1.1 For a test stand and test vehicle to remain calibrated, the Cycling Test Monitoring System (TMS) must be followed. The Oil Efficiency Evaluation (OEE) TMS is available from the ASTM International (ASTM) Test Monitoring Center (TMC). The test facility, vehicle and equipment must be inspected by a GM and ASTM TMC representative prior to commissioning a test stand. Test stand pretest checks must be performed and testing with candidate oils cannot proceed if the checks indicate nonconformance.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Test Hardware.

3.2.1.1 Cooling Fan. Testing will be conducted with a road speed cooling fan placed in front of vehicle.

3.2.1.2 Fuel Flow Meter. Coriolis type flow meter plumbed in series with the fuel supply pipe prior to the engine connection.

3.2.1.3 Engine Control Module Electronic Control Module (ECM) with modified calibration. Calibration modifications include disabling Active Fuel Management (AFM) and other modifications as approved by GM dexos® test engineer.

3.2.1.4 Tires. Tires to be of original equipment dimensions and speed/load rating.

3.2.1.5 Charging System. Remove and isolate positive cable from generator. Install smart battery charger with ground connected on engine.

3.2.1.6 Test Vehicle Modification. Test vehicle modification, repair, maintenance including transmission fluid replacement and axle oil is to be reviewed and approved by GM dexos® test engineer.

3.3 Test Vehicle/Test Piece. 2018 General Motors regular production two-wheel drive light duty pick-up truck with 5.3L, 6 speed automatic transmission, and 3.42 axle ratio or equivalent as approved by GM.

3.4 Test Time.

Calendar time:	12 to 25 d
Test time:	0.5 h
Coordination time:	8 h

3.5 Test Required Information.

3.5.1 Test Fuel.

3.5.1.1 NA Laboratory. Environmental Protection Agency (EPA) Tier3 federal emissions test fuel.

3.5.1.2 EU Laboratory. EU6 certification gasoline.

3.5.2 Test Oils. Baseline, flush, and reference oils are described in the TMS.

3.6 Personnel/Skills. Person familiar with oil testing. Operator trained and familiar to run the test cell and equipment per laboratory standard operating procedure.

4 Procedure

4.1 Preparation.

4.1.1 Test Vehicle Preparation.

4.1.1.1 Install fuel flow meter.

4.1.1.2 Install thermocouples to measure fluid temperature in oil sump drain plug, coolant at outlet of thermostat, transmission sump, and rear axle drain plug.

4.1.1.3 Remove and isolate positive cable from generator. Install smart battery charger with ground connected on engine.

4.1.1.4 Leak test and seal the vehicle exhaust system.

4.1.1.5 Vehicle to have accumulated at least 5000 miles of break-in use.

4.1.2 Test Vehicle Reference Testing. Test vehicle shall be referenced by running high reference oil evaluation according to the guidelines in the TMS.

4.2 Conditions.

4.2.1 Environmental Conditions. Chassis Dyno and vehicle soak area temperature $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Baseline Engine Oil Test Preparation (pre-candidate engine oil test).

4.3.1.1 Operate engine with vehicle transmission in park or neutral at 2500 rpm for 10 to 12 minutes until a stable oil sump temperature of $90\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ is reached.

4.3.1.2 Remove oil sump drain bolt and drain engine oil.