



## GM dexos™ 1:2015 Base Oil Interchange Rules

Base oil interchange (BOI) is offered to dexos™ oil manufacturers, marketers, and blenders for flexibility in formulating with various base oils. BOI reflects the current state of knowledge in the industry and GM's experience with previous dexos formulations.

BOI is permitted for ASTM/CEC tests run to qualify dexos oil formulations under the new dexos 1:2015 specification (released Dec. 2014). However, test results used to qualify oils under a superseded engine oil category of any kind will not be permitted to be used for BOI. BOI is generally not applicable to new test procedures developed by General Motors for which there is little experience. BOI applicability to dexos formulations for specific tests is described below.

Guidelines for minor formulation modifications follow Appendix H, ACC Code of Practice (Dec. 2010). Therefore, the definition of a minor modifications must be agreed to by GM. Test sponsors are encouraged to notify GM of a minor modification beforehand; otherwise, GM reserves the right to not recognize it as suitable support for licensure.

Licensed dexos oil formulations are subject to field quality audits. The licensee is responsible for ensuring that all engine and bench test results meet specification and for the actual performance of the licensed product sold as factory fill and/or service fill oil whether or not BOI is used. The licensee is required to develop an action plan to rectify nonconformance identified during a field quality audit which may include requalifying the formulation for the failed test. GM reserves the right to revoke a license for a pattern of nonconformance.

These rules may be modified as new information or new specification limits are introduced. The latest version must always be used.

API 1509, Appendix E (rev:01-Sep-2011)

- ASTM D6593 (Sequence VG)
- ASTM D7589 (Sequence VID)
  - **Use of equation E.1.0 is not permitted**

ATIEL Code of Practice (Issue 19, Sept. 2013)

- CEC-L88-T-02 (TU5)
- CEC-L-54-T-96 (M111 fuel economy)
- CEC-L-38-A-94 (TU3)
- M271 sludge test will use M111SL rules

Other rules

- GMPTE-T-DUR021 (RNT)
  - KV40, KV100, and HTHS150 of read-across formulation must be equal to or higher than the tested formulation.

Case-by-case basis

- GMPTE-T-DUR020 (OP1)
- GMW17244 (pre-ignition) – consideration will be given to candidate formulations where the calcium content is equal to or less than the calcium content of a final formulation that has passed the dexos 1:2015 pre-ignition testing requirements.

BOI not permitted – test must be run on final formulation

- ASTM D6709 (Sequence VIII) – see Use of Level 2 Support for temporary requirement during period of test unavailability.
- GMW17043 (oxidation and deposit)
- GMW17295 (aeration)
- GMW17299 (turbocharger coking)
- ISP Method T0384-2014 (GME fuel economy)

## GM dexos™ 1:2015 Viscosity Grade Read-Across Interchange Rules

Viscosity grade read-across (VGRA) is offered to dexos™ oil manufacturers, marketers, and blenders for flexibility in formulating various viscosity grades using the same additive package. VGRA reflects the current state of knowledge in the industry and GM's experience with previous dexos formulations.

VGRA is permitted for ASTM/CEC tests run to qualify dexos oil formulations under the new dexos 1:2015 specification (released Dec. 2014). However, test results used to qualify oils under a superseded engine oil category of any kind will not be permitted to be used for VGRA. VGRA is generally not applicable to new test procedures developed by General Motors for which there is little experience. VGRA applicability to dexos formulations for specific tests is described below.

Guidelines for minor formulation modifications follow Appendix H, ACC Code of Practice (Dec. 2010). Therefore, the definition of a minor modifications must be agreed to by GM. Test sponsors are encouraged to notify GM of a minor modification beforehand; otherwise, GM reserves the right to not recognize it as suitable support for licensure.

Licensed dexos oil formulations are subject to field quality audits. The licensee is responsible for ensuring that all engine and bench test results meet specification and for the actual performance of the licensed product sold as factory fill and/or service fill oil whether or not VGRA is used. The licensee is required to develop an action plan to rectify nonconformance identified during a field quality audit which may include requalifying the formulation for the failed test. GM reserves the right to revoke a license for a pattern of nonconformance.

These rules may be modified as new information or new specification limits are introduced. The latest version must always be used.

API 1509, Appendix E (rev:01-Sep-2011)

- ASTM D6593 (Sequence VG)
- ASTM D7589 (Sequence VID)
  - **Use of equation F.1.0 is not permitted**

ATIEL Code of Practice (Issue 19, Sept. 2013)

- CEC-L88-T-02 (TU5)
- CEC-L-54-T-96 (M111 fuel economy)
- CEC-L-38-A-94 (TU3)
- M271 sludge will use M111SL rules

Other rules

- GMPTE-T-DUR021 (RNT)
  - KV40, KV100, and HTHS150 of read-across formulation must be equal to or higher than the tested formulation.

- GMW17043 (oxidation and deposit)
  - Read-across is permitted if the following two conditions are met for the tested formulation:
    - PVIS is <44.0% and WPD is >6.0
  - For allowable viscosity grade read across, use API 1509, Appendix F (rev:01-Sep-2011)
    - **When using Table F-1, the provision in Note 4 is not permitted.**

Case-by-case-basis

- GMPTE-T-DUR020 (OP1)
- GMW17244 (pre-ignition) – consideration will be given to candidate formulations where the calcium content is equal to or less than the calcium content of a final formulation that has passed the dexos 1:2015 pre-ignition testing requirements.

VGRA not permitted – test must be run on final formulation

- ASTM D6709 (Sequence VIII) – see Use of Level 2 Support for temporary requirement during period of test unavailability.
- GMW17295 (aeration)
- GMW17299 (turbocharger coking)
- ISP Method T0384-2014 (GME fuel economy)

## **Use of Level 2 Support**

### **1. Results from a superseded engine oil category**

GM will evaluate Level 2 support generated under a superseded engine oil category on a case-by-case basis for ASTM and CEC tests. The specific case must be presented to GM for evaluation prior to FSP submission to ensure rejection will not occur after program completion. GM will not allow read-across from old versions to new versions of a test (i.e., VG to VH, VID to VIE).

### **2. Bracketing with a booster for GM tests and Sequence VIII**

For GM tests and Sequence VIII, the bracketing approach will be permitted for a booster. The low and high levels must be run to define the range, and read-across for levels within the range will be allowed. The bracketing approach for GM tests applies to final formulations. The formulations containing the low and high level of booster each must be capable of standing on their own as final formulations. Only if this condition is met can read across be applied to levels within the bracketed range.

### **3. Temporary suspension of Sequence VIII final formulation testing requirement**

The requirement to run Sequence VIII on the final formulation is temporarily suspended (effective February 3, 2016) due to the unavailability of the test. Therefore, on a temporary basis, General Motors will allow API 1509 BOI and VGRA for Sequence VIII and is willing to review other supporting data if offered. Each Formulation Submission Package will be handled individually, and approvals will be conditioned on passing Sequence VIII when it becomes available. Submission of BOI, VGRA, or other supporting data does not guarantee conditional approval of the formulation if GM does not deem the evidence adequate.

Once Sequence VIII is available either through a new batch of bearings or a severity adjustment factor, all formulations that have conditional approval must submit Sequence VIII test results on the final formulation within 90 days of the test becoming available. A passing result will lead to an unconditional formulation approval. Failure to meet the deadline or to obtain a passing test result will lead to termination of the conditional approval.

Release and revision history

<b>Version</b>	<b>Date</b>	<b>Description</b>
1	December 2014	Initial release
2	February 2015	M271 sludge test will use M111SL rules; reference to GMPTE-T-MEC024 (aeration) removed as it is not part of the dexos specification.
3	June 2015	Added ISP Test T0384-2014 (GME fuel economy).
4	August 2015	Corrected aeration test number. Added rules for use of Level 2 support and bracketing.
5	January 2016	Changed dexos identifier to <sup>TM</sup> . Removed dexos 2 tests. Removed rules for GMW17043 (oxidation) which are still to be determined.
6	April 2016	Removed rules for Sequence IIIG/IIIGA (ASTM D7320). Added rules for GMW17043 (GMOD). Revised rules for GMW17244 (GMSPI). Temporarily suspended requirement for Sequence VIII testing on final formulation and allowed read-across.