**Report On**
**Sequence IIIGB Evaluation**

**Version**

Conducted For

| | |
|---|---|
| | **V** = Valid |
| | **I** = Invalid |
| | **N** = Results Cannot Be Interpreted As Representative Of Oil Performance (Non-Reference Oil) And Shall Not Be Used For Multiple Test Acceptance |

| | |
|---|---|
| | **NR** = Non-Reference Oil Test |
| | **RO** = Reference Oil Test |

| **Test Number** | | | | | |
|---|---|---|---|---|---|
| Test Stand | | Stand Test | | Lab Test | |
| Oil Code | | | | | |
| Formulation/Stand | | | | | |
| Alternate Codes | | | | | |
| EOT Date | | EOT Time | | | |

| |
|---|
| In my opinion this test been conducted in a valid manner in accordance with ASTM Test Method D 7320 and the appropriate amendments through the information letter system. The remarks included in the report describe the anomalies associated with this test. |

Submitted By: _____
Testing Laboratory

_____
Signature

_____
Typed Name

_____
Title

**Form 2**

**Sequence IIIGB**

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**Sequence IIIGB**

**Form 3**

**Summary of Test Method**

The Sequence IIIGB Test is a fired-engine, dynamometer lubricant test for generating a used oil sample to evaluate the ability of an oil to retain Phosphorus after operation in a high-temperature environment. Such oils include both single viscosity grade and multi-viscosity grade oils that are used in spark-ignition, gasoline-fueled engines, as well as diesel engines. The Sequence IIIGB Test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIGB test engine is an overhead valve design (OHV) and uses a single camshaft operating both intake and exhaust valves via pushrods and hydraulic valve lifters in a sliding-follower arrangement. The engine uses one intake and one exhaust valve per cylinder. Induction is handled by a modified GM port fuel injection system setting the Air-to-Fuel ratio at 15:1. The test engine is overhauled prior to each test, during which critical engine dimensions are measured and rated or measured parts (pistons, camshaft, valve lifters, etc.) are replaced.

The Sequence IIIGB Test consists of a 10-minute operational check, followed by 100 hours of engine operation at moderately high speed, load, and temperature conditions. The 100-hour segment is broken down into five 20-hour test segments. Following each 20-hour segment, and the 10-minute operational check, oil samples are drawn from the engine.

The Sequence IIIGB Test is operated at the following test states during the 100-hour portion of the test:

| Parameter | Set Point |
|---|---|
| Engine Speed | 3600 r/min |
| Engine Load | 250 N-m |
| Oil Filter Block Temperature | 150 $^{o}$C |
| Coolant Outlet Temperature | 115 $^{o}$C |
| Fuel Pressure | 377.5 kPa |
| Intake Air Temperature | 35 $^{o}$C |
| Intake Air Pressure | 0.05 kPa |
| Intake Air Dew Point | 16.1 $^{o}$C |
| Exhaust Back Pressure | 6 kPa |
| Engine Coolant Flow | 160 L/min |
| Breather Tube Coolant Flow | 10 L/min |
| Air-to-Fuel Ratio | 15.0:1 |
| Condenser Coolant Outlet Temperature | 40 $^{o}$C |

**Sequence IIIGB**

**Form 4**

**Test Result Summary**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| | | | |
|---|---|---|---|
| Date Started | | Engine No. | |
| Time Started | | Fuel Batch | |
| Date | | SAE Viscosity | |
| Time | | TMC Oil Code[A] | |
| Test Length | | | |

| **Pass/Fail Results** | |
|---|---|
| | **Phosphorus Retention** |
| Original Units | |
| Industry Correction Factor | |
| Corrected Result | |
| Severity Adjustment | |
| Final Original Unit Result | |

| **Additional Results** | | | |
|---|---|---|---|
| Oil Consumption Hours, h | | Oil Consumption, L | |

[A]Reference Oil Tests Only

**Sequence IIIGB**

**Form 5**

**Operational Summary**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| | Parameter | Units | QI Threshold | EOT QI | Target | Average | Standard Deviation | Number of Samples | Number of BQD |
|---|---|---|---|---|---|---|---|---|---|
| **Controlled Parameters** | Speed | r/min | 0.000 | | 3600 | | | | |
| | Load | Nm | 0.000 | | 250 | | | | |
| | Oil Filter Block | °C | 0.000 | | 150.0 | | | | |
| | Engine Coolant Out | °C | 0.000 | | 115.0 | | | | |
| | Condenser Coolant Out | °C | 0.000 | | 40.0 | | | | |
| | Left Air-to-Fuel Ratio | | 0.000 | | 15.0 | | | | |
| | Right Air-to-Fuel Ratio | | 0.000 | | 15.0 | | | | |
| | Left Exhaust Back Pressure | kPa | 0.000 | | 6.0 | | | | |
| | Right Exhaust Back Pressure | kPa | 0.000 | | 6.0 | | | | |
| | Intake Air | kPa | 0.000 | | 0.05 | | | | |
| | Engine Coolant Flow | L/min | 0.000 | | 160.0 | | | | |
| **Non-controlled Parameters** | Oil Sump | °C | | | | | | | |
| | Pump Outlet Pressure | kPa | | | | | | | |
| | Gallery Pressure | kPa | | | | | | | |
| | Engine Coolant In | °C | | | | | | | |
| | Fuel Inlet | °C | | | | | | | |
| | Intake Air | °C | | | | | | | |
| | Intake Air Dew Point | °C | | | | | | | |
| | Intake Vacuum | kPa | | | | | | | |
| | Crankcase | kPa | | | | | | | |
| | Fuel Pressure | kPa | | | | | | | |

**Sequence IIIGB**

**Form 6**

**Used Oil Analysis Results**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| **Calcium and Phosphorus Results by ICP (D 5185)** | | | |
|---|---|---|---|
| **Test Hour [A]** | **Calcium (Ca)** | **Phosphorus (P)** | **Phosphorus Retention [B]** |
| | **ppm** | **ppm** | **%** |
| **Initial[C]** | | | |
| | | | |
| | | | |
| | | | |
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| **Oil Consumption Data** | | | | | | |
|---|---|---|---|---|---|---|
| Hours | Initial[C] | | | | | |
| Level low (mL) | | | | | | |
| Total Oil Consumed (L) | | | | | | |

| **$NO_x$ Measurement** | | | |
|---|---|---|---|
| Hours | | | |
| $NO_x$ (ppm) | | | |

[A] Optional samples at test hours 20, 40, 60 and 80 are not required by procedure.

[B] Phosphorus Retention = $(Ca_{tI} / Ca_{t100})x(P_{t100} / P_{tI})x100$

where $Ca_{tI}$ and $P_{tI}$ are the analytical results from initial oil sample, removed from the engine following the initial run and $Ca_{t100}$ and $P_{t100}$ are the analytical results from the End of Test (100h). For oils where Calcium is not the highest concentration detergent metal, the highest concentration detergent metal should be substituted for Calcium into the equation.

[C] Initial = taken after the initial ten minute run.

**Sequence IIIGB**

**Form 7**

**Blowby Values & Plot**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

**Blowby Plot**

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Test Hours** | | | | | | | | | | |
| **Blowby, L/min.** | | | | | | | | | | |
| **Test Hours** | | | | | | | | | | |
| **Blowby, L/min.** | | | | | | | | | | |
| **Test Hours** | | **Average** | | | | | | | | |
| **Blowby, L/min.** | | | | | | | | | | |

**Sequence IIIGB**

**Form 8**

**Hardware Information**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| | | | | |
|---|---|---|---|---|
| FIFO | Piston Ring Batch Code | | Build Completion Date | |
| FIFO | Oil Control (OC) Batch Code | | Piston Size (Grade) | |
| FIFO | Expander Ring (EXP) Batch Code | | Block Serial Number | |
| FIFO | Oil Filter Batch Code | | Crankshaft Serial Number | |
| FIFO | Camshaft Pour Code | | Camshaft Serial Number | |
| FIFO | Oil Cooler Batch Code | | Camshaft Phosphate Batch Code | |
| FIFO | Valve Springs Batch Code | | Cylinder Head Serial Number, Left | |
| FIFO | Intake Valve Seals Batch Code | | Cylinder Head Serial Number, Right | |
| FIFO | Exhaust Valve Seals Batch Code | | Top Ring Gap, mils | |
| FIFO | Main Bearings (M) Batch Code | | Bottom Ring Gap, mils | |
| FIFO | Connecting Rod Bearings (CR) Batch Code | | Bearing Kit Serial Number | |
| FIFO | Camshaft Bushing (CB) Batch Code | | | |
| FIFO | Rocker Arm Batch Code | | | |
| FIFO | Piston Batch (Code) | | | |

**Sequence IIIGB**

**Form 9**

**Downtime & Outlier Report Form**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| **Number of Downtime Occurrences** | | | |
|---|---|---|---|
| **Test Hours** | **Date** | **Downtime** | **Reasons** |
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| | | | **Total Downtime (hours) – Maximum allowable downtime: 24 hours** |

| **Other Comments** | |
|---|---|
| **Number of Comment Lines** | |
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**Sequence IIIGB**

**Form 9A**

**Downtime & Outlier Report Form**

| | | | |
|---|---|---|---|
| Lab | | Oil Code | |
| Stand | | Test No. | |
| Laboratory Oil Code | | | |
| Formulation Stand Code | | | |

| **Number of Downtime Occurrences** | | | |
|---|---|---|---|
| **Test Hours** | **Date** | **Downtime** | **Reasons** |
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| | | | **Total Downtime (hours) – Maximum allowable downtime: 24 hours** |

| **Other Comments** | |
|---|---|
| **Number of Comment Lines** | |
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**Sequence IIIGB**

**Form 10**

**American Chemistry Council Code of Practice**
**Test Laboratory Conformance Statement**

| | | | | | |
|---|---|---|---|---|---|
| Test Laboratory | | | | | |
| Test Sponsor | | | | | |
| Formulation / Stand Code | | | | | |
| Test Number | | | | | |
| Start Date | | Start Time | | Time Zone | |

## Declarations

No. 1 All requirements of the ACC Code of Practice for which the test laboratory is responsible were met in the conduct of this test. Yes _____ No_____ *

No. 2 The laboratory ran this test for the full duration following all procedural requirements; and all operational validity requirements of the latest version of the applicable test procedure (ASTM or other), including all updates issued by the organization responsible for the test, were met.

Yes _____ No_____*

If the response to this Declaration is "No", does the test engineer consider the deviations from operational validity requirements that occurred to be beyond the control of the laboratory?

Yes _____* No_____

No 3. A deviation occurred for one of the test parameters identified by the organization responsible for the test as being a special case. Yes _____* No_____ *(This currently applies only to specific deviations identified in the ASTM Information Letter System)*

Note: *Supporting comments are required for all responses identified with an asterisk.*

| **Comments** |
|---|
| |
| |
| |
| |

_____ _____
Signature Date

_____ _____
Typed Name Title