

**Report On**  
**Sequence IIIGVS 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 |          |  |

|   |
|---|
| <p>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.</p> |
|---|

Submitted By: \_\_\_\_\_

Testing Laboratory

Signature

Typed Name

Title

## Sequence IIIGVS

### Form 2

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<sup>A</sup> ACC Conformance Statement is required for only ACC registered tests

**Sequence IIIGVS  
Form 3**

**Summary of Test Method**

The Sequence IIIGVS test is a fired-engine, dynamometer lubricant test for evaluating automotive engine oils for certain high-temperature performance characteristics, including oil thickening and oil consumption. 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 IIIGVS test utilizes a 1996 General Motors Powertrain 3800 Series II, water-cooled, 4 cycle, V-6 engine as the test apparatus. The Sequence IIIGVS 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 (pistons, camshaft, valve lifters, etc.) and replaced.

The Sequence IIIGVS 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 kinematic viscosities of the 20-hour segment samples are compared to the viscosity of the 10-minute sample to determine the viscosity increase of the test oil.

The Sequence IIIGVS 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 °C     |
| Coolant Outlet Temperature           | 115 °C     |
| Fuel Pressure                        | 377.5 kPa  |
| Intake Air Temperature               | 35 °C      |
| Intake Air Pressure                  | 0.05 kPa   |
| Intake Air Dew Point                 | 16.1 °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 °C      |

**Sequence IIIGVS  
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 Completed |  | SAE Viscosity             |  |
| Time Completed |  | TMC Oil Code <sup>A</sup> |  |
| Test Length    |  |                           |  |

|                                  |                                       |
|----------------------------------|---------------------------------------|
|                                  | <b>Viscosity<br/>Increase<br/>(%)</b> |
| Original Units                   |                                       |
| Transformed Results <sup>B</sup> |                                       |
| Industry Correction Factor       |                                       |
| Corrected Transformed Result     |                                       |
| Severity Adjustment              |                                       |
| Final Transformed Result         |                                       |
| Final Original Unit Result       |                                       |

| <b>Additional Results</b>             |  |                    |  |
|---------------------------------------|--|--------------------|--|
| Oil Consumption Hours, h <sup>C</sup> |  | Oil Consumption, L |  |

<sup>A</sup>Reference Oil Tests Only

<sup>B</sup>Viscosity Increase uses LN(PVIS).

<sup>C</sup>Test Hours at which Oil Consumption was calculated

**Sequence IIIGVS  
Form 5  
Operational Summary**

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

| Controlled Parameters       | Parameter | Units | QI Threshold | EOT QI | Target | Average | Standard Deviation | Number of            |                  |
|-----------------------------|-----------|-------|--------------|--------|--------|---------|--------------------|----------------------|------------------|
|                             |           |       |              |        |        |         |                    | Samples <sup>A</sup> | BQD <sup>B</sup> |
| 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            |           | 0.000 |              |        | 15.0   |         |                    |                      |                  |
| Right Air-to-Fuel           |           | 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 | Parameter | Units | Average | Standard Deviation | Number of            |                  |
|---------------------------|-----------|-------|---------|--------------------|----------------------|------------------|
|                           |           |       |         |                    | Samples <sup>A</sup> | BQD <sup>B</sup> |
| 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   |         |                    |                      |                  |

| Oil Consumption Data   |                |  |  |  |  |  |
|------------------------|----------------|--|--|--|--|--|
| Hours                  | Initial Run-in |  |  |  |  |  |
| Level (ml) low         |                |  |  |  |  |  |
| Total Oil Consumed (L) |                |  |  |  |  |  |

| NO <sub>x</sub> Measurement |  |  |  |
|-----------------------------|--|--|--|
| Hours                       |  |  |  |
| NO <sub>x</sub> , ppm       |  |  |  |

<sup>A</sup> Total number of data points taken as determined from test length and procedural specified sampling rate.  
<sup>B</sup> Number of Bad Quality Data points not used in the calculation of the statistical measures.

**Sequence IIIGVS  
Form 6  
Used Oil Analysis Results**

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

| <b>Viscosity Increase Data (cSt at 40°C)</b> |                        |        |         |
|--|------------------------|--------|---------|
| Hours  | Viscosity <sup>A</sup> | Change | Percent |
| New Oil                                      |                        |        |         |
| Initial <sup>B</sup>                         |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |
|  |                        |        |         |

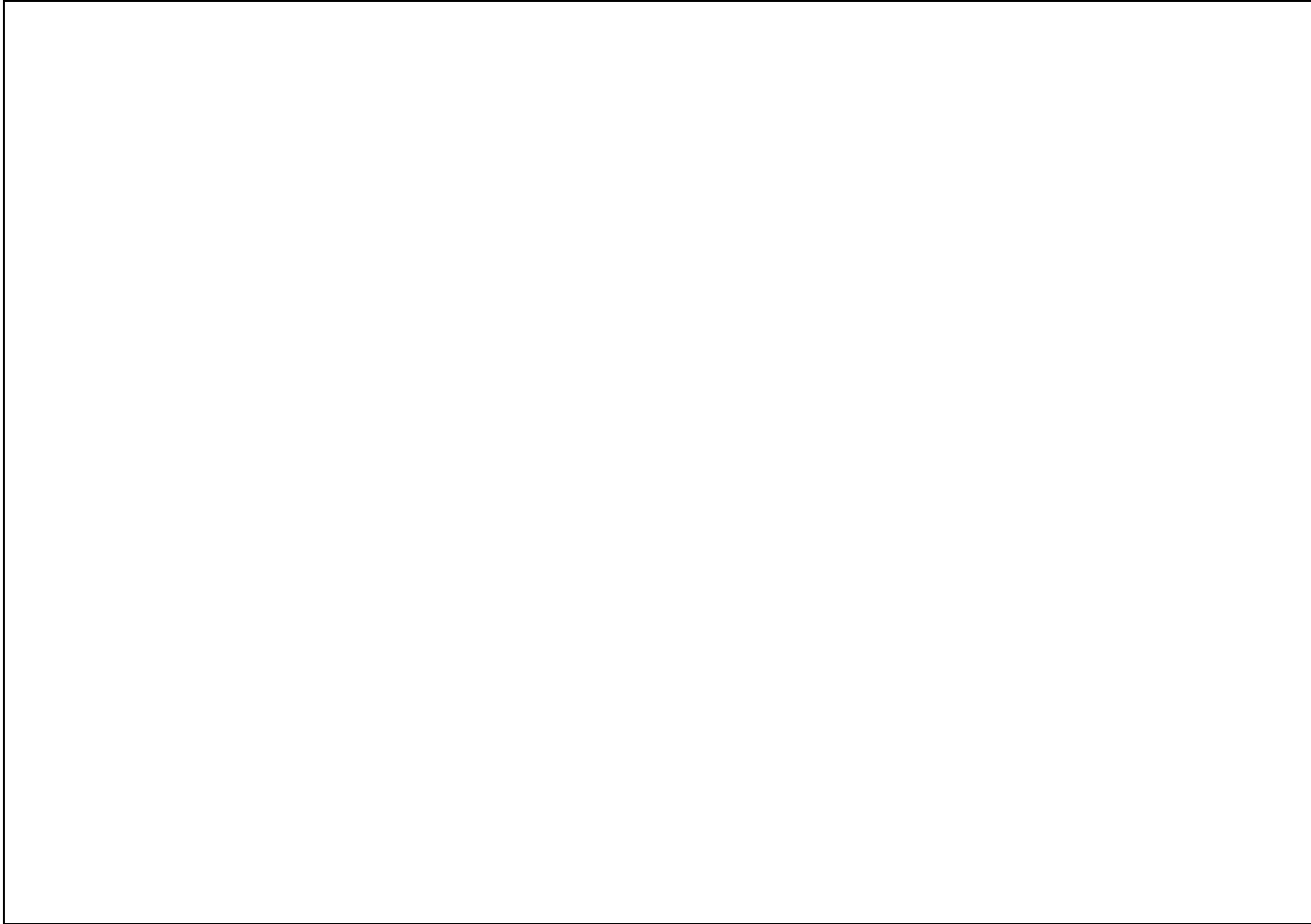
| <b>Results of ICP Analysis of Used Oil</b> |      |        |      |
|--|------|--------|------|
| Hours                                      | Iron | Copper | Lead |
| Initial                                    |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |
|  |      |        |      |

<sup>A</sup> 8000 cSt is maximum allowable viscosity  
<sup>B</sup> At end of leveling run

**Sequence IIIGVS  
Form 7  
Blowby Values & Plot**

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

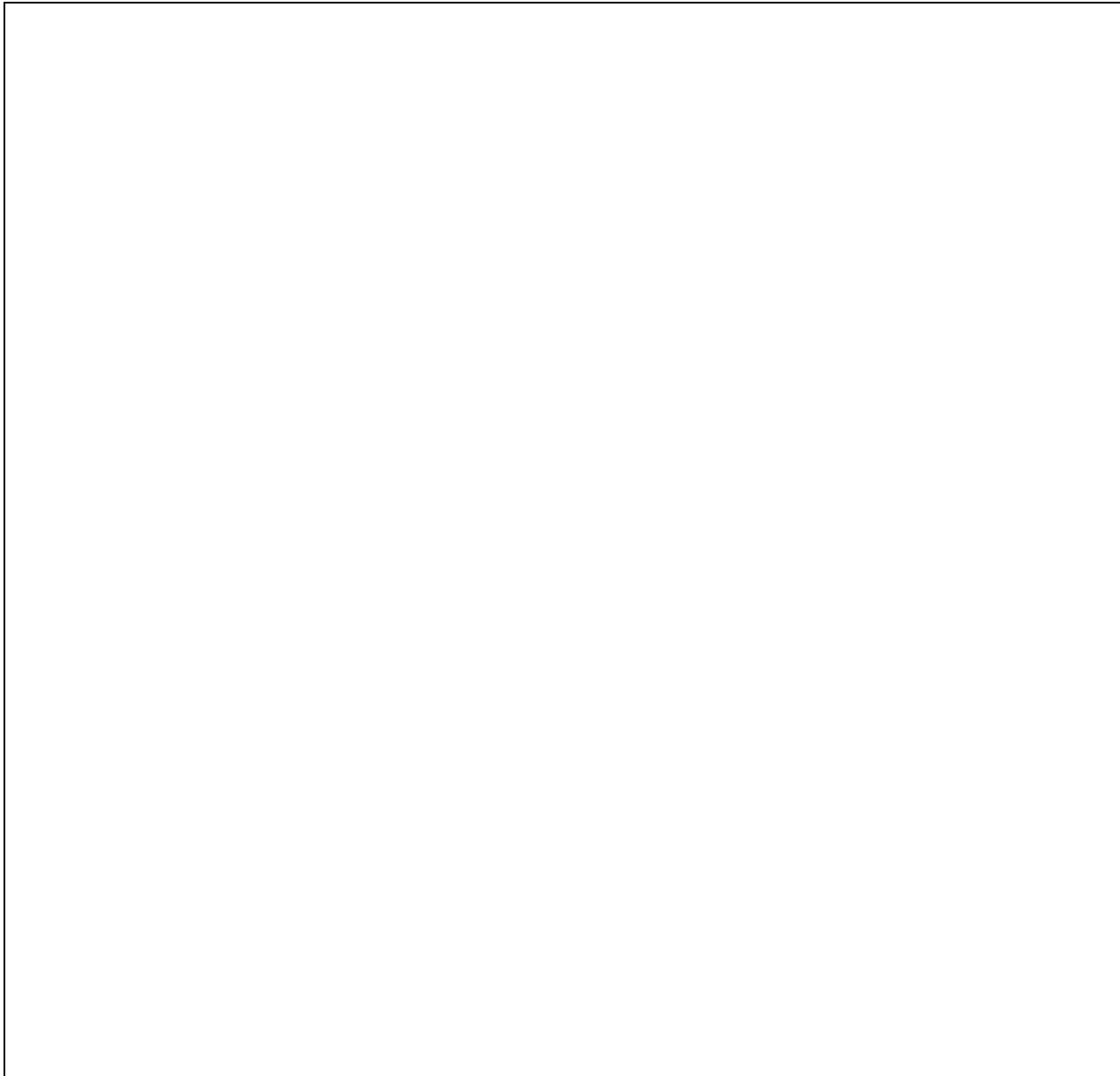
Blowby Plot



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

**Sequence IIIGVS  
Form 8  
Viscosity Increase Plot**

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





**Sequence IIIGVS  
Form 9  
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                      |  | Crankshaft Part Number             |  |
| FIFO | Oil Cooler Batch Code                   |  | Camshaft Serial Number             |  |
| FIFO | Valve Springs Batch Code                |  | Camshaft Phosphate Batch Code      |  |
| FIFO | Intake Valve Seals Batch Code           |  | Cylinder Head Serial Number, Left  |  |
| FIFO | Exhaust Valve Seals Batch Code          |  | Cylinder Head Serial Number, Right |  |
| FIFO | Main Bearings (M) Batch Code            |  | Top Ring Gap, mils                 |  |
| FIFO | Connecting Rod Bearings (CR) Batch Code |  | Bottom Ring Gap, mils              |  |
| FIFO | Camshaft Bushing (CB) Batch Code        |  | Bearing Kit Serial Number          |  |
| FIFO | Rocker Arm Batch Code                   |  | Cylinder Head Part Number, Left    |  |
| FIFO | Piston Batch (Code)                     |  | Cylinder Head Part Number, Right   |  |





**Sequence IIIGVS**  
**Form 11**  
**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)

|  |   |
|--|---|
|  | Operational review of this test indicates that the results should be included in the Multiple Test Acceptance Criteria calculations.      |
|  | *Operational review of this test indicates that the results should not be included in the Multiple Test Acceptance Criteria calculations. |

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

|          |
|----------|
| Comments |
|          |
|          |
|          |
|          |

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Typed Name

\_\_\_\_\_  
Title