

# **General Motors**

## **2027 MY Common Section Document**

### **Freedom Of Information Act (FOIA)**

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## **(d)(1) Correspondance and Communication Information**

### **MAILING INFORMATION**

- CERTIFICATES OF CONFORMITY WILL BE TRANSMITTED ELECTRONICALLY TO GENERAL MOTORS
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### **AUTHORIZED AGENT OF SERVICE**

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## GENERAL MOTORS CONTACT LIST

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**(d)(3) Description of Applicable Evaporative /**  
**Refueling Families**

## **EVAPORATIVE AND ORVR FAMILY DESCRIPTION**

EVAPORATIVE AND ORVR FAMILY: VGMXR010235A

## EVAPORATIVE AND ORVR CONTROL SYSTEM: C/CCP/IC

## **Certification and In-Use Evaporative, ORVR and Spitback Standards:**

	<u>Running Loss</u>	<u>2-Day Evap</u>	<u>3-Day Evap</u>	<u>Spitback Test</u>	<u>ORVR</u>
Federal Full Useful Life *	0.01 g/mi	0.350 g/test	0.350 g/test	1.0 g/test	0.20 g/gal.
California Full Useful Life	0.05 g/mi	0.350 g/test	0.350 g/test	1.0 g/test	0.20 g/gal.
Certification DF (Additive)	0.00	0.00	0.00	NA	0.00
Canister Bleed (4K)	NA	0.020 g/test	NA	NA	NA

\*1 Federal LEV 2 evaporative standard levels apply at altitude. Altitude standards are FEL adjusted downward by 25 mg.

Type of Vapor Storage Device	Canister+Intake Carbon
Basic Canister Design:	
Working Capacity - Grams Adsorption	102 (1.70L/15 BWC) (Canister Code: 1)
System Configuration	Single Canister
Canister Geometry/Construction/Materials	Rectangular / Inner Partition / Plastic
Intake Carbon Design	Non-Flow Thru (675 mg Min. Capacity)
Fuel System	Fuel Injection
Type of Refueling Emission Control System	Integrated
Fill Pipe Seal Mechanism	Liquid Trap
Vapor Control System or Method of Controlling Vapor Flow Through the Vapor Line to the Canister	No AECD Control
Purge Control System	Purge Solenoid - CCP
Vapor Hose Material	Metal + Plastic
Fuel Tank Material	Plastic

## **Evaporative Code Applications**

Canister Code:	1	1
Model/Engine (RPO)	Equinox FWD, Terrain FWD (D2UC-2, D2UG-2)/ 1.5L (LSD)	Equinox AWD, Terrain AWD (D2UC-2, D2UG-2)/ 1.5L (LSD)
Tank Code:	1	2
Fuel Tank Size	14.8 gal.	15.6 gal.
GVWR	0-6000	0-6000

### **RUNNING LOSS ROAD SCHEDULE TEMPERATURE PROFILE (RSTP)**

Representative road fuel tank temperature profiles were generated for each engine displacement/car line/fuel tank combination available in the test group. Per CARB Advisory Circular #96-05, GM is using the option to certify and in-use test using the EPA evaporative test procedure (95°F temperature and 9 RVP fuel). Therefore, all profiles are corrected to a 95°F starting temperature. GM will supply, upon request, either a computer disk or E-mail file with the corrected profile data so that EPA or CARB can conduct a running loss test on an in-use GM vehicle.

### **ORVR SYSTEM SAFETY - CARRYOVER STATEMENT**

Following the guidance in EPA Dear Manufacturer letter number CCD-05-03 dated February 15, 2005; GM states that the ORVR applications in this family have not substantially changed from last years certified evaporative/ORVR family TGMXR010235A. Also, there have been no in-use ORVR problems.

## **TEST VEHICLE DESCRIPTION**

	<u>Evap &amp; ORVR EDV(1)</u>	<u>Spitback</u>
Test Group	VGMXJ01.5080	Waived per FR 86.1810-01(l)(1)
Displacement-Liters	1.5L (LSD)	
Engine Code	1	
Canister Code	1	
Tank Code	2	
Evap Emission Control System	C/CCP/IC	
Model	1PT26+F48	
Transmission Type	A8	
LVW Test Weight-Lbs	3875	
Final Drive Ratio	3.47	
Vehicle/GM Config No.	151SXV5644/002	

(1) Evap and ORVR Selection Justification – The selected vehicle was chosen as the worst case evap and ORVR vehicle in the evap/ORVR family because it has the smallest engine displacement and largest usable tank capacity. This configuration is expected to have the highest evap emissions because it combines low canister purge with a tank size that has the potential for high vapor generation.

**(d)(4) Durability (Procedure) Information**

## **DESCRIPTION OF GENERAL MOTORS EXHAUST EMISSIONS DURABILITY PROCESS**

As required under the provisions of 40 CFR 1823-08, General Motors has provided EPA with detailed information regarding the procedures used by GM for developing aged exhaust emissions components for durability certification. This included a meeting with EPA on July 27, 2006 as well as materials submitted to EPA on December 14, 2006 responsive to EPA follow-up questions provided to GM on November 6, 2006. EPA provided GM with formal approval of these procedures in the document "Durability approval letter\_GM\_121906.pdf". As approved by EPA, the Alternate Durability Process (ADP) utilizes GM's internal validation programs and processes and is acceptable to CARB (reference CARB approval letter C-90-34). The ADP contains the following parts: 1) deterioration factor (DF) determination, 2) emission component/system durability demonstration, and 3) in-use emission verification testing. The ADP is based on the assumption that engine-out emissions are stable over the useful life of the vehicle and that loss in exhaust emission performance is primarily due to thermal degradation of the catalytic converter.

### **EMISSION CONTROL SYSTEM/COMPONENT DURABILITY DEMONSTRATION:**

General Motors demonstrates emission control system/component durability using any one or combination of methods: 1) laboratory (bench) testing of components and systems, 2) whole-vehicle road durability testing, 3) field performance data, and/or 4) other GM internal validation processes.

### **DF DETERMINATION:**

The ADP durability vehicle is selected to represent the durability group based on expected worst-case emission deterioration as specified in 40 CFR 86.1822-01. The ADP vehicle accumulates 4,000 equivalent miles following either the appropriate GM durability driving schedule or the AMA driving schedule. The vehicle is emission tested at least three times to establish the low mileage emission performance levels. The vehicle is then operated according to the appropriate GM durability schedule and catalytic converter operating temperature profile data is obtained. The catalyst operating temperature data is used to determine the amount of bench aging (General Motors Aging Cycle (GMAC) or General Motors Burner Cycle (GMBC)) hours needed to age the catalyst to the high mileage point. As an option, catalyst temperature data that was gathered during development testing may be used to determine the amount of GMAC hours needed to age the catalyst to the high mileage point. The catalyst(s) is removed from the vehicle and bench-aged to the appropriate number of GMAC (or GMBC) hours. The bench-aged catalyst is reinstalled on the ADP vehicle. Optionally, catalysts that have been aged to at least 110% of the required GMAC (or GMBC) aging hours may be used for high-mileage testing in place of the original ADP catalysts. The oxygen sensors are removed from the vehicle and vehicle-aged or bench-aged oxygen sensors are installed on the ADP vehicle. The ADP vehicle is emission tested at least three times to establish the high mileage emission performance levels. According to an agreement between GM and CARB, the number of valid emission tests performed at the high mileage point will be the same as the number of valid tests performed at 4K. Additive emission constituent DF's are calculated in accordance with 40 CFR 86.1823-01(a)(3)(i).

**EMISSION CONTROL SYSTEM/COMPONENT WHOLE-VEHICLE DURABILITY  
DEMONSTRATION:**

The whole-vehicle durability used currently by General Motors for diesel engine equipped vehicles follows 40 CFR 86.1823-08. The EPA Standard Road Cycle (SRC) described in Appendix V to Part 86 is used for durability mileage accumulation. The durability vehicle is selected to represent the durability group based on expected worst-case emission deterioration as specified in 40 CFR 86.1822-01.

## GENERAL MOTORS PROCESS FOR CREATING AND USING AGED COMPONENTS

### **IN-USE VERIFICATION:**

The ADP includes an in-use verification test program. This program involves exhaust emission testing customer-owned vehicles as specified in 40 CFR 86.1845-04. In accordance with 40 CFR 86.1823-01(a)(3)(ii), GM intends to utilize aged components in certain situations to demonstrate compliance with exhaust emission standards.

#### Component Aging

Catalytic converter temperature data will be collected while a representative vehicle is being driven according to the appropriate GM durability driving schedule or EPA Standard Road Cycle (SRC). This data will be used to determine the minimum amount of General Motors Aging Cycle (GMAC) or General Motors Burner Cycle (GMBC) hours that a converter would have to endure in order for it to be representative of useful life. Converters that have been aged to at least the minimum amount of GMAC (or GMBC) hours will be used in emission data vehicle testing.

GM will also use oxygen sensors that have either been vehicle- or bench-aged to useful life.

#### Emission Data Vehicle Testing with Aged Components

Emission data vehicles will first be stabilized with the equivalent of 4000 miles of mileage accumulation. Exhaust and evaporative (if necessary) emission tests will be performed at 4K to demonstrate compliance with 4K exhaust emission standards and useful life evaporative standards. Subsequent to 4K testing, catalytic converters and O2 sensors that have been aged to represent useful life will be installed in the vehicle. The vehicle is then emission tested to demonstrate compliance to the intermediate and full useful life standards. If any emission values exceed the intermediate useful life standard, a catalyst that has been aged to the intermediate useful life point would be installed on the vehicle and the vehicle would be retested to demonstrate compliance with the intermediate useful life standards.

Battery electric emissions data vehicles will first be stabilized with 2000 miles of mileage accumulation, using the EPA approved Standard Road Cycle (SRC) or an approved Modified SRC. The vehicle and all range effecting components will be aged as a system. Energy Consumption and Range tests will be performed as per SAEJ1634 revision 2012 or revision 2017 beginning at 2K to demonstrate zero emissions performance.

#### Fuel Economy Vehicle Testing with Aged Components

GM may or may not use aged components when testing for fuel economy purposes. If it is not feasible to test fuel economy data vehicles with aged components, a deterioration factor (DF) will be calculated in order to determine whether a fuel economy test passes the emission standards. A DF will be created from the 4K and useful life testing performed on the emission data vehicle. This DF will be used for fuel economy purposes only.

## **DESCRIPTION OF GENERAL MOTORS EVAPORATIVE EMISSIONS, RUNNING LOSS AND ORVR DURABILITY PROCESS**

### **Regulatory Requirement:**

#### Evaporative and Running Loss Durability Process

EPA - Manufacturer develops process using good engineering judgment (40 CFR Subpart S 86.1824). For evaporative emission durability vehicles, all mileage accumulation must use gasoline that contains ethanol in the highest concentration allowed by law (generally 10%).

CARB - "California Evaporative Emission Standards and Test Procedures" (adopted August 5, 1999) requires:

1. a bench test (Part II A. 2.3)
2. evaporative emission testing of exhaust durability vehicles (Part II A. 2.4 (a)) - OR - if the bench test procedure includes on-road useful life deterioration of the evaporative test vehicle, an evaporative emission test only at the end of exhaust emission durability vehicle testing (Part II A. 2.4 (b)).

#### ORVR Durability Process

EPA and CARB - Manufacturer develops process using good engineering judgment (40 CFR Subpart S 86.1825).

### **Evaporative and Running Loss Durability Process:**

General Motors uses a bench test process approved by CARB to demonstrate durability and establish deterioration factors (DF's) for our evaporative and running loss systems. This bench test procedure is described in Attachment A.

The additional CARB requirement to conduct evaporative DF testing on exhaust durability vehicles is not required since GM's evaporative bench test process includes on-road useful life deterioration of the bench test vehicle. Therefore, per CARB regulations (Part II A. 2.4 (b)), an evaporative test is only conducted at the end of exhaust durability testing. The test sequence is the EPA 2-day test. If the 2-day test result is less than or equal to the 3-day test standard, no further testing is required. If the 2-day result is greater than the 3-day standard but less than the 2-day standard, then a passing 3-day test must also be performed. This evaporative emission data is not used in the DF calculation. CARB has approved this test sequence in the past.

GM uses the CARB 3-day test procedure to generate evaporative and running loss DF data. The 3-day DF data is carried across to the 2-day test, as previously approved by CARB.

### **Evaporative and Running Loss Durability Process (continued):**

GM has run all evaporative emission durability mileage accumulation using E10 fuel. Note the one exception was evaporative emission durability vehicle 48KP3141, which did not run its mileage with E10 fuel. Reference attachment E-1 for what was done to satisfy the ethanol requirement for this vehicle.

The above described evaporative and running loss bench test process has been approved by CARB for the pre-CAP 2000 model years (see the following summary of CARB approvals). The process remains the same for subsequent model years; therefore, a new CARB approval is not required per Part II A. 2.3 of the CARB evaporative emission regulations. EPA has also accepted it in the past by the issuance of a certificate of conformity.

### **SUMMARY OF CARB APPROVALS**

<b><u>MODEL YEAR</u></b>	<b><u>GM LETTER / DATE</u></b>	<b><u>CARB APPROVAL</u></b>
1999	ML-XG005A / 7-31-97	08-04-97 (1)
	MLXG164 / 4-9-98	04-30-98 (1)
1998	ML-WG007A / 7-29-96	47-26-96 CARB ref. #C-96-053 (1)
	ML-WG030 / 12-9-96	12-12-96 CARB ref. #C-96-097 (1)
	ML-GM515 / 4-24-97	05-02-97 CARB ref. #C-97-034 (1)
	ML-WG103 / 5-29-97	06-24-97 CARB ref. #C-97-051 (1)
1997	ML-VG073 / 1-22-96	
	ML-VG135 / 4-9-96	
	ML-VG148 / 5-31-96	06-05-96 CARB ref. #C-96-041 (1)
1996	ML-TG038 / 12-5-94	
	ML-TG043 / 12-16-94	01-11-95 CARB ref. #C-94-058 (CARB letter)
	ML-TG113 / 6-28-95	07-13-95 (1)

(1) GM letter stamped, approved and signed by CARB representative

### **ORVR Durability Process:**

General Motors also uses a bench test process to demonstrate durability and establish DF's for our ORVR systems. It is a manufacturer defined bench test process that is described at the end of Attachment B. This bench test process has been accepted by EPA and CARB since 1998 and remains the same for subsequent model years.

### **Miscellaneous Information:**

GM will modify its durability process based on the results of in-use verification testing if it is deemed appropriate (40 CFR Subpart S 86.1845).

## ATTACHMENT E-1

E-Mail Sent to EPA (note CARB also verbally approved during cert preview)

**To:** hart.frederick@epa.gov, healy.stephen@epa.gov  
**cc:** bontekoe.eldert@epa.gov, Kevin Cullen/US/GM/GMC@GM, Randall C. Harvey/US/GM/GMC@GM  
**Subject:** 2005 Tier2 Evap Durability - E10 Mileage Accumulation Fuel Issue

Thank you for meeting with Kevin Cullen and myself on 9/24/02. This memo documents the issue discussed.

Because of recent product plan changes; GM's 2005 Tier2 Evaporative phase-in has fallen below the 25% requirement. The additional product that needs to be added to cover the shortfall needs an evaporative DF. We recently completed an evap durability vehicle for CARB LEVII on a full size pickup truck. The DF from this vehicle could be used since it is representative but it did not run mileage with E10 fuel as required by Tier2 regulations.

Based on the provisions of 86.1824-01(a)(2)(v), GM proposed running additional mileage on the CARB LEVII durability vehicle with E10 fuel and periodically emission testing until evaporative emissions are stable (we estimate 2-3 months). The new stabilized emission level would be used to adjust the DF as required. It was pointed out that this plan is worst case because:

- the CARB LEVII durability vehicle was aged to 150K and Tier2 only requires 120K
- the 4K data is lower than it would have been if E10 fuel had been used for mileage, resulting in a higher DF

We also noted that this is a one time special case and all future evap durability programs for both EPA and CARB will accumulate mileage with E10 fuel. Based on good engineering judgment GM believes this plan is appropriate and will document the DF process in its application.

It is our understanding that EPA has no issues and agrees with this certification plan. If you have any questions or require additional input please contact me (248-685-6520).

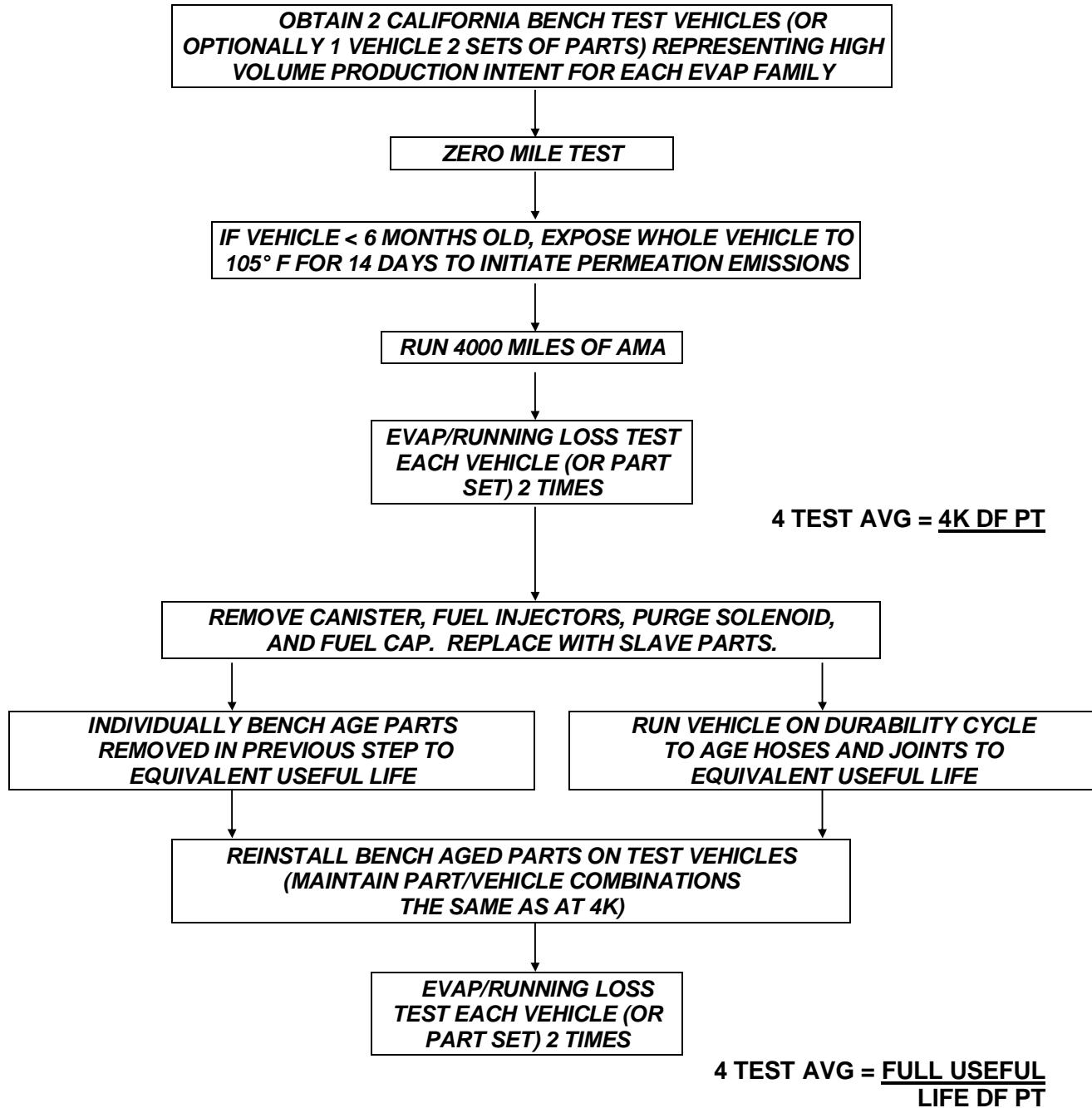
Sincerely,

Michael L Fedewa

## ATTACHMENT A

### EVAP AND RUNNING LOSS BENCH TEST FLOW CHART

**PARTS TESTED:** Canister, Fuel Injectors, Purge Solenoid, Fuel Cap, Hoses & Joints

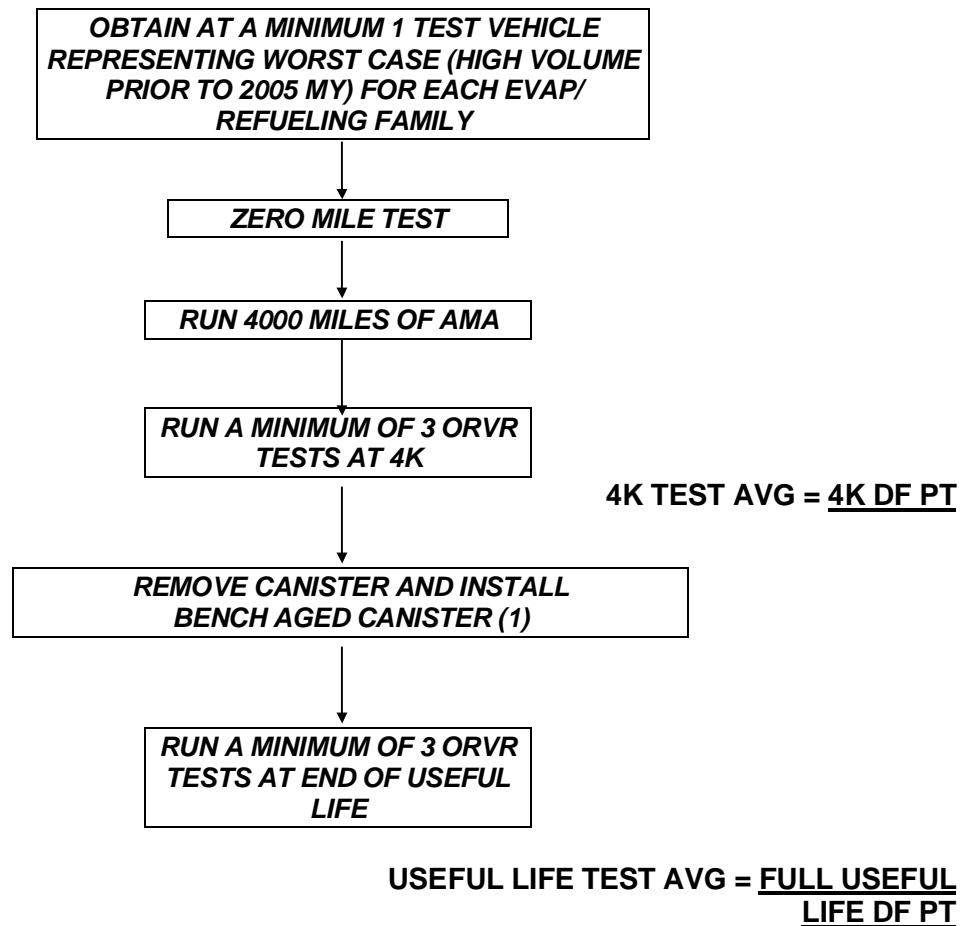


ADDITIVE DF = FULL USEFUL LIFE DF POINT MINUS 4K DF POINT (if <0 then 0)

DURABILITY DEMONSTRATED BY PASSING STANDARDS AT USEFUL LIFE TEST POINT

## ATTACHMENT B

### ORVR BENCH TEST FLOW CHART



(1) CANISTER IS BENCH AGED BY POURING LIQUID FUEL INTO CARBON BED UNTIL EPA CANISTER WORKING CAPACITY IS REDUCED TO A LEVEL THAT MATCHES THE LATEST IN-USE CANISTER PERFORMANCE.

#### DURABILITY DEMONSTRATED BY:

- PASSING STANDARDS AT USEFUL LIFE TEST POINT AND
- IN-HOUSE ORVR SYSTEM VALIDATION

ADDITIVE DF = FULL USEFUL LIFE DF POINT MINUS 4K DF POINT (if <0 then 0)

## **GENERAL MOTORS ASSIGNED DETERIORATION FACTORS**

The General Motors process for generating manufacturer assigned deterioration factors (DF's) was developed under the guidelines of the CAP 2000 regulations. As allowed by 40 CFR 86.1822-01(a) and 86.1834-01(b)(2), manufacturer assigned DF's may be applied to test groups in lieu of exhaust or evaporative durability demonstration. Whole test groups may use the assigned DF provisions if the total aggregate Federal sales are less than 15,000 units. Title 13 of the California Administrative Code, California Exhaust Emission Standards and Test Procedures for 2000 and Subsequent Model Year Light Duty Vehicles, Light Duty Trucks and Medium Duty Vehicles, and the amended provisions G-12.1, which replaces Subpart S, Part 86, Title 40 CFR 86.1834-01, allows manufacturer assigned DF's for test groups which represent less than 4500 unit sales in California. Whole test groups may use the assigned DF provisions if the total aggregate California sales are less than 4500 units. The assigned DF's for a test group will be calculated using all of the DF's generated by vehicles in the same weight class and emission category as the test group the DF's represent. As required by 86.1822-01(b)(2)(i)(A), the DF's shall represent the average OR the 70th percentile (whichever is less), of all the DF's generated. In cases where the 70th percentile cannot be calculated, General Motors will use the average. Refer to the test group Part 1 Application information for the specific deterioration factor calculation.

**(d)(8) Statements of Conformity**

## **(d)(8) Statements of Conformity**

### **FEDERAL STATE OF CERTIFIED ENERGY COMPLIANCE**

General Motors LLC attests that the Tier 4 phase in vehicles covered by this application are expected to comply with SOCE monitor accuracy requirements<sup>1</sup>.

### **FEDERAL STATE OF CERTIFIED ENERGY COMPLIANCE**

General Motors LLC attests that the Tier 4 phase in light-duty program vehicles covered by this application are expected to comply with the battery durability family minimum performance requirements<sup>2</sup>.

### **FEDERAL MONITOR ACCURACY AND BATTERY DURABILITY COMPLIANCE**

General Motors LLC attests that the Tier 4 phase in vehicles covered by this application are expected to comply with the monitor accuracy and battery durability requirements of § 86.1815-27 instead of submitting test data for certification.<sup>3</sup>

### **ELECTRIC AND FUEL CELL VEHICLE TESTING REQUIREMENTS COMPLIANCE**

General Motors LLC attests that all electric or fuel cell vehicles are expected to comply with the testing requirements of Part 86, Subpart S<sup>4</sup>.

### **CALIFORNIA FUEL FILL PIPE COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application are expected to comply with California fuel fill pipe and corresponding fill pipe access zone requirements<sup>5</sup>.

### **FEDERAL AND CALIFORNIA EMISSION CONTROL SYSTEM CONTINUITY**

General Motors LLC attests that the vehicles covered by this application, based on engineering evaluations of emission testing between 20°F and 86°F, are expected to show no discontinuity in emission performance of NMOG, PM, CO, CO<sub>2</sub>, NO<sub>x</sub>, N<sub>2</sub>O, CH<sub>4</sub> or HCHO as measured on the Federal Test Procedure and on the Highway Fuel Economy Test Procedure in the temperature range of 20°F to 86°F for vehicles<sup>6</sup>.

### **CALIFORNIA 50° EXHAUST EMISSION COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application are expected to comply with the California 50°F exhaust emission standards<sup>7</sup>.

### **FEDERAL MID-TEMPERATURE INTERMEDIATE SOAK EXHAUST EMISSION COMPLIANCE**

General Motors LLC attests that the Tier 4 phase in vehicles covered by this application are expected to comply with the mid-temperature intermediate soak standards for soak times not covered by testing<sup>8</sup>.

### **FEDERAL TIER3 COLD PM COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application are expected to comply with the PM standard for -7 °C temperature testing when not tested<sup>9</sup>.

<sup>1</sup> In accordance with §86.1844-01(d)(19)(iii)

<sup>2</sup> In accordance with §86.1844-01(d)(19)(iv)

<sup>3</sup> In accordance with § 86.1829-15(a)(2)

<sup>4</sup> In accordance with §86.1829-15(f)

<sup>5</sup> In accordance with "SPECIFICATIONS FOR FILL PIPES AND OPENINGS OF 2015 AND SUBSEQUENT MODEL MOTOR VEHICLE FUEL TANKS" amended May 31 2019

<sup>6</sup> In accordance with 40 CFR §86.1809-12(e)

<sup>7</sup> In accordance with 13 CCR §1961.4(d)(2)(D) or 13 CCR §1961.4(e)(2)(B)

<sup>8</sup> In accordance with §86.1829-15(d)(7)

<sup>9</sup> In accordance with §86.1829-15(d)(9)

### **FEDERAL AND CALIFORNIA LBT+4% COMPLIANCE**

General Motors LLC attests that the otto cycle vehicles covered by this application are expected to comply with the Lean Best Torque +4% requirement when operated on the US06 cycle<sup>10</sup>.

General Motors LLC further attests that engine protection AECD's with additional commanded enrichment are intended to be engineered to be utilized only to the extent necessary<sup>11</sup> to protect from engine or emission control hardware failures. Please refer to the AECD descriptions for further information.

### **FEDERAL AND CALIFORNIA A/C SPECIFIC CALIBRATIONS**

General Motors LLC attests that the otto cycle vehicles covered by this application are expected to comply with A/C-on specific calibration requirements. General Motors LLC specifically attests that these vehicles are intended to be calibrated to avoid unnecessarily reduce emission control effectiveness during A/C-on operation when the vehicle is operated under conditions that may reasonably be expected during normal operation and use<sup>12</sup>.

### **FEDERAL AND CALIFORNIA LEAN ON CRUISE CALIBRATIONS**

General Motors LLC attests that the otto cycle vehicles covered by this application are not intended to contain lean on cruise calibration strategies that significantly reduce vehicle emission control effectiveness over the operating conditions in which they are employed<sup>13</sup>.

### **FEDERAL AND CALIFORNIA FORMALDEHYDE EMISSIONS COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application, based on an engineering evaluation of formaldehyde emission test data, are expected to comply with the formaldehyde emission standards<sup>14</sup>.

### **91 RON FUEL TESTING COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application are not expected to activate knock sensor controls during the FTP (or the SFTP as applicable) and the HWFET cycles, and that the calibration is intended to operate on 91 RON gasoline without the need for spark adjustment.

General Motors LLC further attests that the city and highway fuel economy test result differences when comparing 91 RON operation and 96 RON operation is expected to be within 3% and that, with regard to Tier 2 compliance, we expect no emissions increases (beyond normal test variability) arising from using 91 RON fuel when tested on the FTP (or SFTP, as applicable).

### **FEDERAL AND CALIFORNIA OTTO-CYCLE, PARTICULATE MATTER EMISSIONS COMPLIANCE**

General Motors LLC attests that the Tier 3 vehicles covered by this application, based on an engineering evaluation of particulate matter emission test data are expected to comply with the particulate matter emission standards<sup>15</sup>.

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<sup>10</sup> In accordance with §86.1811-17 (d)(1)

<sup>11</sup> In accordance with §86.1811-17 (d)(2)

<sup>12</sup> In accordance with §86.1811-17(d)(3)

<sup>13</sup> In accordance with §86.1811-17(d)(4)

<sup>14</sup> In accordance with §86.1829-15(d)(4)

<sup>15</sup> In accordance with §86.1829-15(d)(1)

### **FEDERAL HIGH ALTITUDE EMISSIONS COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application, based on an evaluation of high altitude emission test data, are expected to comply with the FTP, HWFET, Cold CO (20degF), evaporative and ORVR emission standards at high altitude<sup>16</sup>.

### **FEDERAL REFUELING COMPLIANCE**

General Motors LLC, attests that the vehicles covered by this application are expected to comply with EPA's refueling emissions standard<sup>17</sup> including the partial refueling test performed on vehicles with pressurized fuel tanks.

### **FEDERAL SPITBACK EMISSIONS COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application utilizing on-board refueling vapor recovery (ORVR) systems are expected to meet the fuel dispensing spitback standard<sup>18</sup>.

### **FEDERAL AND CALIFORNIA DIESEL-CYCLE ORVR EMISSIONS COMPLIANCE**

General Motors LLC attests that diesel-fueled vehicles covered by this application are expected to meet the applicable refueling emission standards<sup>19</sup>.

### **FEDERAL LEAK-FREE EXHAUST**

General Motors LLC attests that the vehicles covered by this application have been designed with a leak-free exhaust system. A "leak-free" exhaust system is one in which leakage is controlled so that it will not lead to a failure of the certification exhaust emission standards in-use<sup>20</sup>.

### **EXHAUST, EVAPORATIVE AND REFUELING EMISSIONS USEFUL LIFE COMPLIANCE**

Based on good engineering judgment, General Motors LLC attests that the vehicles covered by this application are expected to comply with all applicable useful life chassis certified exhaust emissions, evaporative emissions and refueling emissions standards.

### **HIGH ALTITUDE COLD NMHC AND CREE/CO2 COMPLIANCE**

General Motors LLC attests that vehicles covered by this application are intended to use common hardware and calibration control strategies at low and high altitudes. Any deviation from low altitude emission control practices is described in the auxiliary emission control device (AECD) description<sup>21</sup>.

### **FEDERAL AND CALIFORNIA DEFEAT DEVICE AND AECD COMPLIANCE**

Based upon our review prior to submitting the application for certification and to the best of our current information and belief, General Motors LLC attests that the vehicles covered by this application do not employ defeat devices, and do not use alternative maps, or AECDs that have not been declared. We are submitting this statement to you in good faith. If, in the future, we identify any new relevant information, we will notify EPA and ARB in a timely fashion.

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<sup>16</sup> In accordance with §86.1829-15(c)

<sup>17</sup> In accordance with §86.1844-01(d)(7)(v)

<sup>18</sup> In accordance with §86.1810-01(l)(1)

<sup>19</sup> In accordance with § 86.1829-15(e)(1)

<sup>20</sup> In accordance with §86.1844-01(d)(16)(i)(A)

<sup>21</sup> In accordance with §86.1818-12(a)(2)

### **FEDERAL AND CALIFORNIA ON-BOARD DIAGNOSTIC (OBD) COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application, based on 40 CFR 1806-17(a), are expected to comply with Federal OBD requirements<sup>22</sup>.

### **CALIFORNIA INSPECTION AND MAINTENANCE COMPLIANCE**

General Motors LLC attests that the vehicles covered by this application are expected to meet the idle mode and the Acceleration Simulation Mode (ASM) loaded mode California inspection and maintenance (I/M) requirements when preconditioned and tested at ambient temperatures ranging from 35°F to 68°F. Moreover, based on an engineering evaluation of I/M test data, General Motors LLC attests that all vehicles in this test group are expected to comply with the idle mode and the Acceleration Simulation Mode (ASM) loaded mode California I/M standards.

### **FEDERAL AND CALIFORNIA LEAK DETECTION COMPLIANCE**

Based on an engineering evaluation, General Motors LLC attests that all gasoline fueled vehicles covered by this application are expected to comply with the 0.020 inch fuel system leak-detection and leak standard requirements<sup>23</sup>.

### **PERFORMANCE WARRANTY TEST COMPLIANCE**

General Motors attests that the vehicles covered by this application carry emission control on-board diagnostic systems that are expected to comply with the performance warranty test.

### **CALIFORNIA WARRANTY COMPLIANCE**

General Motors LLC, attests that the vehicles covered by this application are expected to comply with the California warranty requirements of Title 13, CCR, Sections 2037, 2038 and 2039.

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<sup>22</sup> In accordance with California OBD requirements in §1968.2 for 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles

<sup>23</sup> In accordance with §86.1806-17(b)(vi) and §86.1829-15(e)(4)

**(d)(12) Shift Schedule Cross Reference List**

**GM/EPA Shift Schedule Cross Reference List**

GM <u>Sched</u>	EPA <u>Sched</u>														
	HWS	259	49	338	80	388	124	459	171	518	518	569	569	619	619
27	1	265	52	339	81	389	125	460	172	519	519	570	570	620	620
58	4	269	33	340	82	390	126	461	173	520	520	571	571	621	621
59	217	270	41	341	87	391	127	462	174	521	521	572	572	622	622
71	2	271	34	342	88	392	128	463	175	522	522	573	573	623	623
72	5	272	23	343	89	393	129	464	176	523	523	574	574	624	624
83	3	273	53	344	90	394	130	465	177	524	524	575	575	625	625
84	6	274	61	345	91	395	131	466	178	525	526	576	576	626	626
89	7	278	24	346	92	396	132	467	179	525	526	577	577	627	627
90	19	279	13	347	93	397	133	468	180	527	527	578	578	628	628
111	8	280	25	348	94	398	134	469	181	528	528	579	579	629	629
112	20	281	14	349	95	399	136	470	182	529	529	580	580	630	630
121	9	282	26	350	96	400	135	471	183	530	530	581	581	632	632
122	40	289	15	351	39	407	203	472	184	531	531	582	582	634	634
130	206	290	27	352	47	408	200	473	185	532	532	583	583	636	636
155	48	291	35	353	97	410	201	474	186	533	533	584	584	637	637
156	60	297	32	354	98	411	202	475	187	534	534	585	585	900	FT5
157	161	298	45	360	104	412	138	476	188	535	535	586	586	901	HW5
158	162	299	38	361	105	413	139	477	189	536	536	589	589		
177	49	300	46	362	106	414	140	478	190	537	537	590	590		
178	61	301	54	363	107	414 *2	428	479	191	538	538	591	591		
185	10	302	63	364	108	415	141	480	192	539	539	592	592		
187	11	303	55	365	109	417	147	481	193	540	540	593	593		
188	21	304	61	366	110	419	207	482	194	541	541	594	594		
193	12	308	28	367	111	419 1*	219	489	213	542	542	595	595		
194	22	310	60	368	112	420	216	490	214	543	543	596	596		
205	198	311	56	369	113	423	218	491	221	544	544	597	597		
208	199	312	61	370	114	424	220	492	222	545	545	598	598		
209	209	314	195	371	115	426	231	493	223	546	546	599	599		
212	205	317	57	372	116	437	151	494	224	547	547	600	600		
213	204	318	64	373	59	438	147	495	227	548	548	601	601		
214	210	319	58	374	66	439	148	496	228	549	549	602	602		
215	235	320	65	375	16	440	149	497	230	550	550	603	603		
216	208	321	83	376	29	441	150	498	498	551	551	604	604		
218	211	322	84	377	17	443	152	499	499	552	552	605	605		
220	215	323	85	378	30	445	154	502	502	554	554	606	606		
221	225	324	86	379	117	446	153	503	503	555	555	607	607		
222	226	329	69	380	118	447	155	507	507	556	556	608	608		
223	229	330	70	381	119	448	156	508	508	557	557	609	609		
227	50	331	71	382	120	449	157	509	509	558	558	610	610		
228	62	332	72	383	18	450	158	510	510	559	559	611	611		
229	50	333	73	384	31	451	159	511	511	561	561	612	612		
230	61	334	74	385	121	452	160	512	512	562	562	613	613		
241	170	335	75	386	122	453	165	513	513	563	563	614	614		
245	77	336	76	387	123	455	166	514	514	564	564	615	615		
246	78	337	79			456	167	515	515	565	565	616	616		
251	67					457	168	516	516	566	566	617	617		
252	68					458	169	517	517	567	567	618	618		

\*1 Resubmitted

\*2 This 414 is a US06. The old one is a HWFE.