

State of California  
**AIR RESOURCES BOARD**

**CALIFORNIA GREENHOUSE GAS EXHAUST EMISSION STANDARDS AND TEST  
PROCEDURES FOR 2014 AND SUBSEQUENT MODEL  
HEAVY-DUTY VEHICLES**

Adopted: October 21, 2014  
Amended: December 19, 2018

NOTE: This document is incorporated by reference in section 95663(d), title 17, California Code of Regulations (CCR). It contains the majority of the requirements necessary for greenhouse gas certification of a heavy-duty vehicle for sale in California. However, reference is made in these test procedures to other ARB documents that contain certification requirements for heavy-duty engines and vehicles. Note that this list of documents is not inclusive of all necessary requirements to complete an application for certification. The following documents are designed to be used in conjunction with this document. They include:

1. "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles," as last amended December 19, 2018 (incorporated by reference in sections 1956.8(b), title 13, CCR)
2. "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles," as last amended December 19, 2018 (incorporated by reference in sections 1956.8(d), title 13, CCR)
3. "California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as last amended December 19, 2018 (incorporated by reference in section 1961.2(d), title 13, CCR)
4. "California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems," as adopted September 1, 2017 (incorporated by reference in section 2208.2(a), title 13, CCR)

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## **CALIFORNIA GREENHOUSE GAS EXHAUST EMISSION STANDARDS AND TEST PROCEDURES FOR 2014 AND SUBSEQUENT MODEL HEAVY-DUTY VEHICLES**

The following provisions of Subpart S, Part 86, Subparts A through I, Part 1037, Subparts A through K, Part 1066, and Subparts A and E, Part 1068, Title 40, Code of Federal Regulations (CFR), as adopted by the U.S. Environmental Protection Agency on September 15, 2011, or amended by the U.S. Environmental Protection Agency on the subsequent date set forth next to the applicable section listed below, and only to the extent they pertain to the greenhouse gas emission testing and compliance of greenhouse gas emissions from medium- and heavy-duty vehicles, are adopted and incorporated herein by this reference as the “California Greenhouse Gas Exhaust Emission Standards and Test Procedures for 2014 and Subsequent Model Heavy-Duty Vehicles,” except as altered or replaced by the provisions set forth below.

References in these test procedures to specific sections of the CFR maintain the same numbering system employed in the CFR. In cases where the entire CFR section is incorporated by reference with no modifications, the notation “[No change.]” is used. In cases where the federal requirements are modified by California requirements, the notation “Amend (or delete) subparagraph (\_\_\_) as follows:” is used. If the federal requirement is not applicable, the notation “[n/a]” is used. In cases where there are California only requirements, the additional California requirements are noted in a separate subsection.

### **PART 86 – CONTROL OF EMISSIONS FROM NEW AND IN-USE HIGHWAY VEHICLES AND ENGINES**

#### **Subpart S – General Compliance Provisions for Control of Air Pollution from New and In-Use Light-Duty Vehicles, Light-Duty Trucks, and Heavy-Duty Vehicles**

86.1819-14 Greenhouse gas emission standards for heavy-duty vehicles. October 25, 2016.

##### **A. Federal Provisions.**

1. Add the following to the introductory paragraph: The test procedures to determine compliance with these emission standards are described in “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.”
2. Subparagraphs (a) through (k)(6). [No change.]
3. Amend subparagraph (k)(7) as follows: Advanced-technology credits.



Provisions for advanced-technology credits apply as described in 40 CFR §1037.615.

(i) If you generate credits from Phase 1 vehicles certified with advanced technology, you may multiply these credits by 1.50.

(ii) If you generate credits from model year 2027 and earlier Phase 2 vehicles certified with advanced technology, you may multiply these credits by 3.5 for plug-in hybrid electric vehicles (PHEV), 4.5 for electric vehicles, and 5.5 for fuel cell vehicles. The Phase 2 ATC multiplier of 3.5 for PHEVs, inclusive of PHEVs with electric power take-off (ePTO), is applicable only if the PHEV complies with both subparagraphs (k)(7)(ii)(A) and (B) of this section:

(A) No increase in oxides of nitrogen (NOx) emissions compared to an equivalent conventional vehicle tested in accordance with 40 CFR §1066.501.B., as modified by these test procedures.

(B) All-electric range (AER) as specified in the table below, tested in accordance with 40 CFR §1066.501.B., as modified by these test procedures.

Phase 2 Plug-in Hybrid Electric Vehicles All-Electric Range Requirements and ATC Multipliers			
Vehicle Model Year	AER (miles)		ATC Multiplier
	Slow-Charge <sup>(1)</sup>	Fast-Charge <sup>(2)</sup>	
2017 - 2020	0	0	1.5 (Phase 1)
2021 - 2023	10+	10+	3.5 <sup>(3)</sup>
2024 - 2026	20+	15+	3.5 <sup>(3)</sup>
2027+	35+	20+	3.5 <sup>(3)</sup>

Notes:

(1) Slow-charge refers to Level 1 and Level 2 chargers with electrical circuit rated up to 240 volts AC, up to 80 amps, and 19.2 kilowatts.

(2) Fast-charge compatible PHEVs must: 1) be capable of charging from 15 percent state-of-charge to 85 percent state-of-charge within one-half hour (0.5hr); and 2) demonstrate that typical operating time is at least 8 times (8x) typical charging time (i.e., a vehicle must be capable of operating for 8 minutes for each minute of charge time).

(3) If the PHEV AER is less than that specified in the AER column for the respective vehicle model year, an ATC multiplier of 1.5 would be applicable if the PHEV complies only with subparagraph (k)(7)(ii)(A) of this section.

(iii) ATC from Phase 1 vehicles may be used to show compliance with any standards of this part or 40 CFR part 1036 or part 1037, subject to the restrictions in 40 CFR §1037.740. Similarly, you may use up to 60,000 Mg per year of advanced-technology credits generated under 40 CFR §§1036.615 or 1037.615 (from Phase 1 vehicles) to demonstrate compliance with the CO<sub>2</sub> standards in this section. Include vehicles generating credits in separate fleet-average calculations (and exclude them from your conventional fleet-average calculation). You must first apply these advanced-technology vehicle credits to any deficits for other vehicles in the averaging set before applying them to other averaging sets.

4. Subparagraphs (k)(8) through (k)(10). [No change.]

## **B. California Provisions.**

1. In the application for certification, the information specified in subparagraphs 1.1 to 1.3 below must be provided to demonstrate compliance with the air conditioning leakage standard in 40 CFR §86.1819-14(h), except when the air conditioning system uses a refrigerant with a global warming potential (GWP) of 150 or less, in which case subsection B.2 applies, or when the projected volume of vehicles that are produced and delivered for sale in California in a given concerned air conditioning platform is less than twenty. For the purpose of this subparagraph B.1, an air conditioning platform is one air conditioning configuration, or a group of air conditioning configurations that can be represented by one “worst-case” scenario air conditioning configuration chosen according to subparagraph B.1.3.

1.1. Cover letter and summary table. The table must include vehicle make, vehicle model, vehicle model year, vehicle family, vehicle subcategory, vehicle weight class, averaging set, manufacturer-assigned air conditioning platform identification number, projected volume of vehicles produced and delivered for sale in California, refrigerant type, refrigerant capacity (rounded to the nearest one gram), refrigerant leak rate (rounded to the nearest one-tenth of a gram), and percent leak rate (rounded to the nearest one-hundredth of one percent) of the air conditioning system.

1.2. Air conditioning system schematic. The schematic must show the topological layout of the air conditioning system components (compressor, heat exchangers, expansion device, hoses, metal pipelines, and joints) with respect to the system. Systems with major variations must be illustrated by separate schematics. The schematic must indicate the air conditioning platform or platforms it represents. For the purpose of this requirement, “major variation” refers to a different topological layout of compressor, heat exchangers, expansion device, hoses, metal pipelines, or joints.

1.2.1. In lieu of the requirements of subparagraph B.1.2., for the 2021 model year you may provide schematics representing a minimum of thirty percent (30%) of the projected volume of vehicles that are produced and delivered for sale in California, and for the 2022 model year you may provide schematics representing a minimum of sixty percent (60%) of the projected volume of vehicles that are produced and delivered for sale in California.

1.3. SAE J2727 spreadsheets. Each spreadsheet must indicate the air conditioning platform or platforms it represents. A “worst-case” scenario air conditioning configuration may be chosen, using a technical assessment or good engineering judgment, to represent all air conditioning configurations in one or more air conditioning platforms, only under one of the following two circumstances:

1.3.1. If such air conditioning configurations have the same specifications in the following aspects: 1) numbers and types of joints, 2) lengths, inner diameters, and permeation rates of flexible hoses, and 3) numbers and types of compressor seals;

1.3.2. If such air conditioning configurations have similar refrigerant capacity, and differ in only one of the following aspects: 1) numbers and/or types of joints, 2) lengths, inner diameters, and/or permeation rates of flexible hoses, or 3) numbers and/or types of compressor seals. Refrigerant capacities are considered to be similar in this subsection if they are within ten grams of each other, except when the air conditioning configurations differ only in the hose lengths, in which case refrigerant capacities are considered to be similar if they are within one hundred grams of each other.

2. A vehicle produced and delivered for sale in California is eligible for low-GWP refrigerant credit if it uses a refrigerant with a GWP of 150 or less in its motor vehicle air conditioning system. The vehicle must comply with the air conditioning leakage standard in subparagraph (h) in the Federal Provisions of this section. Credits may be calculated according to subparagraph (d) in the Federal Provisions of this section, as modified by these test procedures and may only be used to offset emission deficits under this section. You may certify using both the provisions of this section and the off-cycle technology provisions of 40 CFR §86.1819-14(d)(13), provided you do not double-count emission benefits.

3. If you certify vehicles utilizing the provisions of subparagraph (k)(7) of this section, as modified by these test procedures, or of subsection B.2. of this section, as modified by these test procedures, you must use the compliance provisions in subparagraph (d) of this section to show California compliance. You must provide reports for the vehicle family or subfamily to the Executive Officer according to the Federal Provisions of this section, using projected and actual volumes of vehicles produced and delivered for sale in California for the model year. Show your net balance of emission credits for these vehicle families. Federal credits may be used to offset any emission deficits, in which case the federal credits must be retired if used and may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards. Federal credits from vehicles produced and delivered for sale outside of California that do not meet the requirements of subparagraphs (k)(7)(ii), as modified by these test procedures, may not be used to offset the emission deficits. For PHEVs' emission deficits due to the difference between federal and applicable California ATC calculations, as specified in subsection 3.1. of this section, you have the option to retire those federal credits in the amount of that difference or to otherwise offset those deficits. Those retired credits may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards.

3.1. You may generate a 3.5 ATC multiplier for Phase 2 PHEVs, inclusive of PHEVs with ePTO, only if you demonstrate that the PHEVs do not emit increased NOx emissions compared to similar conventional vehicles pursuant to subparagraph (k)(7)(ii)(A) of this section, as modified by these procedures, and that the PHEVs comply with the all-electric range requirement pursuant to subparagraph (k)(7)(ii)(B) of this section, as modified by these procedures. If the PHEVs only comply with the no-NOx increase requirement but not the all-electric range requirement, you may

only generate a 1.5 ATC multiplier. If the PHEVs do not comply with the no-NOx increase requirement, you may not generate an ATC.

If you certify PHEVs federally using the 3.5 multiplier for ATC but these PHEVs do not meet the requirements of subparagraphs (k)(7)(ii)(A) and/or (B) of this section, as modified by these procedures, you will generate an emission deficit based on the difference between federal and applicable California ATC calculations for PHEVs produced and delivered for sale in California, as applicable. You must identify in the reports any ATC generated from PHEVs pursuant to subparagraph (k)(7) of this section and calculate any emission deficits for PHEVs produced and delivered for sale in California, as applicable.

3.2. For every vehicle that is eligible for the low-GWP refrigerant credit according to subparagraph B.2. of this section, modified by these test procedures, calculate the emission credit for each participating family or subfamily as follows, and round it to the nearest one-tenth of a Mg.

$$\text{Low-GWP Refrigerant Credit (Mg)} = \text{Per Year Credit} \times \text{Volume} \times \text{Useful Life}$$

Where:

*Per Year Credit* = amount of credit a vehicle is eligible for every year of its useful life according to the Low-GWP Countdown Schedule of Per Year Credit table.

*Volume* = volume of vehicles produced and delivered for sale in California of the vehicle subfamily.

*Useful Life* = useful life of the vehicles, in years, as described in CCR, title 13, Section 2112.

If the Low-GWP Volume Fraction for the vehicle type and model year to which the credit-eligible vehicle belongs is less than 20%, the Per Year Credit shall be 0.56 Mg per vehicle per year, or 1.28% of the annual tailpipe CO<sub>2</sub> emissions allowed by the CO<sub>2</sub> standards for internal combustion vehicles of the vehicle subcategory and model year to which the credit-eligible vehicle belongs, whichever is less. When the Low-GWP Volume Fraction for the vehicle type and model year to which the credit-eligible vehicle belongs reaches or exceeds 20% for the first time, the above credit levels shall be allowed for that vehicle type for the subsequent four model years. After the subsequent four model years, the Per Year Credit shall be 0.31 Mg per vehicle per year, or 0.71% of the annual tailpipe CO<sub>2</sub> emissions allowed by the internal combustion engine CO<sub>2</sub> standard for the vehicle subcategory and model year to which the credit-eligible vehicle belongs, whichever is less. The countdown of the credit schedule is illustrated in the table below, where MY1 is the first model year for which the Low-GWP Volume Fraction for a particular vehicle type reaches or exceeds 20%, and MY2 through MY6 and beyond are the consecutive model years subsequent to MY1.

Low-GWP Countdown Schedule of Per Year Credit					
MY1	MY2	MY3	MY4	MY5	MY6+
0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.31 Mg/veh./yr.
Or					
1.28%	1.28%	1.28%	1.28%	1.28%	0.71%
of annual tailpipe CO <sub>2</sub> emissions allowed by the internal combustion engine CO <sub>2</sub> standard for the vehicle subcategory and MY, whichever is less					

For the purpose of this subsection, vehicle types are:

- Vocational, classes 2b-5
- Vocational, classes 6 and 7
- Vocational, class 8
- Tractor, class 7
- Tractor, class 8, day cab
- Tractor, class 8, sleeper cab
- Tractor, heavy haul
- HD pickup trucks and vans, classes 2b and 3
- Custom chassis school bus
- Custom chassis motor home
- Custom chassis coach bus
- Custom chassis other bus
- Custom chassis refuse hauler
- Custom chassis concrete mixer
- Custom chassis mixed-use vehicle
- Custom chassis emergency vehicle

Low-GWP Volume Fraction for a particular vehicle type and a particular model year is the ratio of the actual volume of low-GWP refrigerant credit-eligible vehicles of that vehicle type and that model year produced and delivered for sale in California by all manufacturers to the total actual volume of vehicles of that vehicle type and that model year produced and delivered for sale in California by all manufacturers. Low-GWP Volume Fraction is rounded to the nearest one percent.

## **PART 1037 – CONTROL OF EMISSIONS FROM NEW HEAVY-DUTY MOTOR VEHICLES**

### **Subpart A – Overview and Applicability**

1037.1            Applicability. October 25, 2016.

**A. Federal Provisions**

1. Subparagraph (a) [No change.]
2. Delete subparagraph (b) and replace with the following: New alternative fuel conversions must be certified through the same certification procedures as for new vehicles. Aftermarket alternative fuel conversions must be certified according to the “California Certification and Installation Procedures for Alternative Fuel Retrofit Systems for 2004 and Subsequent Model Year On-Road Motor Vehicles and Engines.”

**B. California provisions.**

1. These regulations are applicable to all medium- and heavy-duty vehicles that are subject to the Phase 1 and Phase 2 emission standards as specified in title 17, California Code of Regulations sections 95660 through 95664.
2. Any reference to vehicle or engine sales or vehicle or engine production volume throughout the United States shall mean vehicle or engine sales or vehicle or engine volume in California, except in 40 CFR Part 1037, Subpart H, Averaging, Banking, and Trading for Certification (averaging, banking, and trading compliance calculations will be based on United States-directed sales except where noted in the California Provisions).
3. Regulations concerning U.S. EPA hearings, U.S. EPA inspections, specific language on the Certificate of Conformity, and citations to federal penalty provisions in the Code of Federal regulations or the federal Clean Air Act shall not be applicable to these procedures, except where specifically noted.

1037.2 Who is responsible for compliance? October 25, 2016.

1037.5 Excluded vehicles. October 25, 2016.

1. Subparagraphs (a) through (d). [No change.]
2. Amend subparagraph (e) as follows: Vehicles subject to the heavy-duty greenhouse gas standards of 40 CFR part 86. See 40 CFR §86.1819-14, as modified by these procedures, for greenhouse gas standards that apply for these vehicles. For test procedures applicable to such vehicles, see “California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.” This generally applies for complete heavy-duty vehicles at or below 14,000 pounds GVWR.
3. Subparagraphs (f) through (i). [No change.]

1037.10 How is this part organized? October 25, 2016.

1037.15 Do any other regulation parts apply to me? October 25, 2016.

1037.30 Submission of information. October 25, 2016.

## Subpart B – Emission Standards and Related Requirements

1037.101 Overview of emission standards for heavy-duty vehicles. October 25, 2016.

1. Subparagraphs (a) through (b) introductory paragraph. [No change.]
2. Subparagraph (b)(1). [n/a; see “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles” and “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles” for California criteria exhaust emission standards.]
3. Amend subparagraph (b)(2) by adding the following: For the 2014 through 2020 model years, a manufacturer may elect to demonstrate compliance with sections 40 CFR §1037.104 through §1037.115 for its entire applicable vehicle fleet by demonstrating compliance with the Phase 1 program, if it meets the criteria identified below.
  - (1) A manufacturer that selects compliance with this option must notify the Executive Officer of that selection, in writing, prior to the start of the applicable model year or December 1, 2014, whichever is later;
  - (2) The manufacturer must submit to ARB all data that the manufacturer submitted to U.S. Environmental Protection Agency in accordance with the reporting requirements as required under 40 CFR §1037.205, §1037.250 and §1037.730, for demonstrating compliance with Phase 1 and the U.S. Environmental Protection Agency determination of compliance. With the exception of the 2014 model year, all such data must be submitted within 30 days of receipt of the U.S. Environmental Protection Agency Certificate of Conformity or of the date of submission to the U.S. Environmental Protection Agency, whichever is later, for each model year that a manufacturer selects compliance with this option;
  - (3) The manufacturer must provide to the Executive Officer separate numbers for each subfamily of heavy-duty vehicles produced and delivered for sale in California each model year and all values used in calculating positive or negative emission credits in 40 CFR §1037.730.
4. Subparagraph (b)(3). [No change.]
5. Subparagraph (b)(4). [n/a; see “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” for California fuel evaporative emission standards.]
6. Subparagraph (c). [No change.]

1037.102 Exhaust emission standards for NO<sub>x</sub>, HC, PM, and CO. October 25, 2016.

1. Amend the introductory paragraph as follows: See the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles,” and the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles,” for the exhaust emission standards for NO<sub>x</sub>, HC, PM, and CO that apply for

heavy-duty vehicles.

1037.103 Evaporative and refueling emission standards. [n/a; see “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” for California fuel evaporative emission standards, and see “California Refueling Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” for California refueling emission standards.]

1037.104 Exhaust emission standards for chassis-certified heavy-duty vehicles at or below 14,000 pounds GVWR. October 25, 2016.

1037.105 CO<sub>2</sub> emission standards for vocational vehicles. October 25, 2016.

1. Subparagraphs (a) through (h) introductory paragraph. [No change.]

2. Amend subparagraph (h)(1) as follows:

(1) The following alternative emission standards apply by vehicle type and model year as follows:

**TABLE 5 OF 40 CFR §1037.105—PHASE 2 CUSTOM CHASSIS STANDARDS [g/ton-mile]**

<b>Vehicle Type<sup>1</sup></b>	<b>Assigned Vehicle Service Class</b>	<b>MY 2021-2026</b>	<b>MY 2027+</b>
School bus	Medium HDV	291	271
Motor home	Medium HDV	228	226
Coach bus	Heavy HDV	210	205
Other bus <sup>2</sup>	Heavy HDV	300	286
Refuse hauler	Heavy HDV	313	298
Concrete mixer	Heavy HDV	319	316
Mixed-use vehicle	Heavy HDV	319	316
Emergency vehicle	Heavy HDV	324	319

<sup>1</sup> Vehicle types are generally defined in 40 CFR §1037.801. “Other bus” includes any bus that is not a school bus or a coach bus. A “mixed-use vehicle” is one that meets at least one of the criteria specified in 40 CFR §1037.631(a)(1) and at least one of the criteria in 40 CFR §1037.631(a)(2), but not both.

<sup>2</sup> You may not use the Other bus standard to certify a GHG urban bus unless additional requirements in the California Provisions of 40 CFR §§1037.241 and 1037.701, as modified by these procedures, are met.

3. Subparagraphs (h)(2) through (h)(8). [No change.]



1037.106 Exhaust emission standards for tractors above 26,000 pounds GVWR. October 25, 2016.

1037.107 Emission standards for trailers. October 25, 2016.

1037.115 Other requirements. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

1. In the application for certification, the information specified in subparagraphs 1.1 to 1.3 below must be provided to demonstrate compliance with the air conditioning leakage standard in 40 CFR §1037.115(e), except when the air conditioning system uses a refrigerant with a global warming potential (GWP) of 150 or less, in which case subsection B.2 applies, or when the projected volume of vehicles that are produced and delivered for sale in California in a given air conditioning platform is less than twenty, or when the air conditioning system has a capacity above 3000 grams and is designed such that a compliance demonstration using SAE J2727 standard is impossible or impractical, in which case subparagraph B.1.4 applies. For the purpose of this subparagraph B.1, an air conditioning platform is one air conditioning configuration, or a group of air conditioning configurations that can be represented by one “worst-case” scenario air conditioning configuration chosen according to subparagraph B.1.3.

1.1. Cover letter and summary table. The table must include vehicle make, vehicle model, vehicle model year, vehicle family, vehicle subcategory, vehicle weight class, averaging set, manufacturer-assigned air conditioning platform identification number, projected volume of vehicles produced and delivered for sale in California, refrigerant type, refrigerant capacity (rounded to the nearest one gram), refrigerant leak rate (rounded to the nearest one-tenth of a gram), and percent leak rate (rounded to the nearest one-hundredth of one percent) of the air conditioning system.

1.2. Air conditioning system schematic. The schematic must show the topological layout of the air conditioning system components (compressor, heat exchangers, expansion device, hoses, metal pipelines, and joints) with respect to the system. Systems with major variations must be illustrated by separate schematics. The schematic must indicate the air conditioning platform or platforms it represents. For the purpose of this requirement, “major variation” refers to a different topological layout of compressor, heat exchangers, expansion device, hoses, metal pipelines, or joints.

1.2.1. In lieu of the requirements of subparagraph B.1.2., for the 2021 model year you may provide schematics representing a minimum of thirty percent (30%) of the projected volume of vehicles that are produced and delivered for sale in California, and for the 2022 model year you may provide schematics representing a minimum of sixty percent (60%) of the projected volume of vehicles that are produced and delivered for sale in California.

1.3. SAE J2727 spreadsheets. Each spreadsheet must indicate the air conditioning platform or platforms it represents. A “worst-case” scenario air conditioning configuration may be chosen, using a technical assessment or good engineering judgment, to represent all air conditioning configurations in one or more air conditioning platforms, only under one of the following two circumstances:

1.3.1. If such air conditioning configurations have the same specifications in the following aspects: 1) numbers and types of joints, 2) lengths, inner diameters, and permeation rates of flexible hoses, and 3) numbers and types of compressor seals;

1.3.2. If such air conditioning configurations have similar refrigerant capacity, and differ in only one of the following aspects: 1) numbers and/or types of joints, 2) lengths, inner diameters, and/or permeation rates of flexible hoses, or 3) numbers and/or types of compressor seals. Refrigerant capacities are considered to be similar in this subsection if they are within ten grams of each other, except when the air conditioning configurations differ only in the hose lengths, in which case refrigerant capacities are considered to be similar if they are within one hundred grams of each other.

1.4. If the air conditioning system has a capacity above 3,000 grams and is designed such that a compliance demonstration using SAE J2727 standard is impossible or impractical, you must use alternative means to demonstrate, via an engineering evaluation, that your air conditioning system achieves an equivalent level of refrigerant leakage control. The engineering evaluation must quantify or estimate the refrigerant leak rate for new-production air conditioning systems, and must take into account the probability of incorrect assembly for various fitting technologies for joints. The Executive Officer will review the evaluation and determine the validity of the alternative demonstration means and the leakage compliance of the system. In making such a determination, the Executive Officer will rely on information submitted by the applicant and good engineering judgment.

2. A vehicle produced and delivered for sale in California is eligible for low-GWP refrigerant credit if it uses a refrigerant with a GWP of 150 or less in its motor vehicle air conditioning system. The vehicle must comply with the air conditioning leakage standard in subparagraph (e) in the Federal Provisions of this section. Credits may be calculated according to part 1037, subpart H, as modified by these test procedures. You may certify using both the provisions of this section and the off-cycle technology provisions of 40 CFR 1037.610, provided you do not double-count emission benefits.

1037.120 Emission-related warranty requirements. October 25, 2016.

1. Subparagraphs (a) through (b)(1)(i). [No change.]
2. Amend subparagraph (b)(1)(ii) as follows: 5 years or 100,000 miles for Medium and Heavy HDV (except tires).

3. Subparagraphs (b)(1)(iii) through (e). [No change.]

1037.125 Maintenance instructions and allowable maintenance. October 25, 2016.

1037.130 Assembly instructions for secondary vehicle manufacturers. October 25, 2016.

1037.135 Labeling. October 25, 2016.

1. Subparagraphs (a) through (c)(5). [No change.]

2. Amend subparagraph (c)(6) as follows: Identify the emission control system. Use terms and abbreviations as described in Appendix III to this part or other applicable conventions.

(i) Phase 2 tractors are only required to have the following emission control systems identified, although additional emission control system abbreviations may be included on the label. The minimum required Phase 2 tractor emission control identifiers are:

IRT – Engine shutoff system

LRRA – Low rolling resistance tires (all) (If LRRA is identified on the label, LRRD and LRRS are not required.)

LRRD – Low rolling resistance tires (drive)

LRRS – Low rolling resistance tires (steer)

TPMS – Tire pressure monitoring system

ATI – Automatic tire inflation system

ATS – Aerodynamic side skirt and/or fuel tank fairing

ARF – Aerodynamic roof fairing

ARFR – Adjustable height aerodynamic roof fairing

TGR – Gap reducing tractor fairing

(ii) Phase 2 vocational vehicles are only required to have the following emission control systems identified, although additional emission control system abbreviations may be included on the label. The minimum required Phase 2 vocational vehicle emission control identifiers are:

IRT – Engine shutoff system

LRRA – Low rolling resistance tires (all) (If LRRA is identified on the label, LRRD and LRRS are not required.)

LRRD – Low rolling resistance tires (drive)

LRRS – Low rolling resistance tires (steer)

TPMS – Tire pressure monitoring system

ATI – Automatic tire inflation system

ATS – Aerodynamic side skirt and/or fuel tank fairing

ARF – Aerodynamic roof fairing

ARFR – Adjustable height aerodynamic roof fairing

AFF – Aerodynamic front fairing

AREF – Aerodynamic rear fairing

3. Subparagraph (c)(7). [No change.]

4. Amend subparagraph (c)(8) as follows: Beginning January 1, 2015, state:

“THIS VEHICLE COMPLIES WITH CALIFORNIA REGULATIONS FOR [MODEL YEAR] HEAVY-DUTY VEHICLES.” It may also state that the vehicle conforms to any other applicable federal or Canadian emission standards for heavy-duty vehicles.

5. Subparagraphs (c)(9) through (e). [No change.]

1037.140 Classifying vehicles and determining vehicle parameters. October 25, 2016.

1037.150 Interim provisions. October 25, 2016.

1. Amend subparagraph (a) as follows: *Credit provisions for 2013 and earlier model year compliance.* The provisions of this paragraph (a) apply to vehicles produced in the 2013 and earlier model years that have generated early credits with U.S. Environmental Protection Agency. For 2013 model year heavy-duty vehicles (or earlier model years for electric vehicles) that are certified to the greenhouse gas standards of this 40 CFR Part 1037, an equal amount of credit as given by the U.S. Environmental Protection Agency will be granted in the California ABT Program. The manufacturer must notify ARB of its intent to use this provision before submitting its application and must submit to ARB all data that it submitted to U.S. Environmental Protection Agency in accordance with the reporting requirements as required under 40 CFR §§1037.205, 1037.250, and 1037.730.

2. Subparagraphs (a)(1) through (o). [No change.]

3. Amend subparagraph (p) as follows: Credit multiplier for advanced technology.

(1) If you generate credits from Phase 1 vehicles certified with advanced technology, you may multiply these credits by 1.50, except that you may not apply this multiplier in addition to the early-credit multiplier of paragraph (a) of this section.

(2) If you generate credits from model year 2027 and earlier Phase 2 vehicles certified with advanced technology, you may multiply these credits by 3.5 for PHEVs, 4.5 for electric vehicles, and 5.5 for fuel cell vehicles. The Phase 2 ATC multiplier of 3.5 for PHEVs, inclusive of PHEVs with ePTO, is applicable only if the PHEV complies with both subparagraphs (p)(2)(i) and (ii) of this section:

(i) No increase in NOx emissions compared to an equivalent conventional vehicle tested in accordance with 40 CFR §1066.501.B, as modified by these test procedures.

(ii) All-electric range (AER) as specified in the table below, tested in accordance with 40 CFR §1066.501.B, as modified by these test procedures.

Phase 2 Plug-in Hybrid Electric Vehicles All-Electric Range Requirements and ATC Multipliers			
Vehicle Model Year	AER (miles)		ATC Multiplier
	Slow-Charge <sup>(1)</sup>	Fast-Charge <sup>(2)</sup>	
2017 - 2020	0	0	1.5 (Phase 1)
2021 - 2023	10+	10+	3.5 <sup>(3)</sup>
2024 - 2026	20+	15+	3.5 <sup>(3)</sup>
2027+	35+	20+	3.5 <sup>(3)</sup>

Notes:

(1) Slow-charge refers to Level 1 and Level 2 chargers with electrical circuit rated up to 240 volts AC, up to 80 amps, and 19.2 kilowatts.

(2) Fast-charge compatible PHEVs must: 1) be capable of charging from 15 percent state-of-charge to 85 percent state-of-charge within one-half hour (0.5hr); and 2) demonstrate that typical operating time is at least 8 times (8x) typical charging time (i.e., a vehicle must be capable of operating for 8 minutes for each minute of charge time).

(3) If the PHEV AER is less than that specified in the AER column for the respective vehicle model year, an ATC multiplier of 1.5 would be applicable if the PHEV complies only with subparagraph (p)(2)(i) of this section.

4. Subparagraphs (q) through (s). [No change.]

5. Amend subparagraph (t)(1) as follows: Glider kits and glider vehicles.

(1) Glider vehicles conforming to the requirements in this paragraph (t)(1) are exempt from the Phase 1 emission standards of this part 1037 prior to January 1, 2021. Engines in such vehicles (including vehicles produced after January 1, 2021) remain subject to the requirements of 40 CFR part 86 as it existed on October 25, 2016, which is incorporated by reference herein, applicable for the engines' original model year, but not subject to the Phase 1 or Phase 2 standards of 40 CFR part 1036 as it existed on October 25, 2016, which is incorporated by reference herein, unless they were originally manufactured in model year 2014 or later. Only engines that are certified to the 2010 and newer model-year emission standards of title 13, CCR, section 1956.8 shall be used in such vehicles that qualify for the interim provision in this paragraph (t)(1).

6. Subparagraphs (t)(1)(i) through (t)(2). [No change.]

7. Delete subparagraph (t)(3).

8. Subparagraph (u) through (aa). [No change.]

### Subpart C – Certifying Vehicle Families

1037.201 General requirements for obtaining a certificate of conformity. October 25, 2016

1037.205 What must I include in my application? October 25, 2016.

#### A. Federal Provisions.

1. Subparagraphs (a) through (q). [No change.]

2. Amend subparagraph (r) as follows: Unconditionally certify that all the vehicles in the vehicle family are built as described and comply with the requirements of this part, other referenced parts of the CFR, and title 17, CCR, sections 95660 through 95664.

3. Subparagraphs (s) through (v). [No change.]

**B. California Provisions.**

1. In your application, identify the engine families that will be used in the vehicle family, for vehicles produced and delivered for sale in California.

- 1037.210 Preliminary approval before certification. October 25, 2016.
- 1037.211 Preliminary approval for manufacturers of aerodynamic devices. October 25, 2016.
- 1037.220 Amending maintenance instructions. October 25, 2016.
- 1037.225 Amending applications for certification. October 25, 2016.
- 1037.230 Vehicle families, sub-families, and configurations. October 25, 2016.
- 1037.231 Powertrain families. October 25, 2016.
- 1037.232 Axle and transmission families. October 25, 2016.
- 1037.235 Testing requirements for certification. October 25, 2016.
  
- 1037.241 Demonstrating compliance with exhaust emission standards for greenhouse gas pollutants. October 25, 2016.

**A. Federal Provisions.** [No change]

**B. California Provisions.**

1. If you certify a GHG urban bus to the Other bus CO<sub>2</sub> emission standard specified in 40 CFR §1037.105(h)(1), in order to demonstrate compliance in California you must do one of the following:

1.1. Perform emission modeling using the Greenhouse gas Emissions Model (GEM), as described in 40 CFR §1037.520, to demonstrate that the GHG urban bus can meet the applicable CO<sub>2</sub> emission standard specified in 40 CFR §1037.105(b). Simplified versions of GEM, as defined in 40 CFR §1037.520(a)(2)(ii), may not be used for this demonstration. If you wish to use emission credits to demonstrate that the GHG urban bus can meet the applicable CO<sub>2</sub> emission standard specified in 40 CFR §1037.105(b), the emission credits must be from the applicable averaging set, either 40 CFR §1037.740(a)(1), (2) or (3). You may not use emission credits generated from vehicles that are certified to the CO<sub>2</sub> emission standards in 40 CFR §1037.105(h) for this demonstration. Or

1.2. Produce and deliver the percentage of zero-emission GHG urban buses of the same averaging set, either 40 CFR §1037.740(a)(1), (2) or (3), for sale in California, as specified in the table below:

Vehicle Model Year	2021	2022	2023	2024	2025	2026	2027	2028+
Zero-Emission GHG Urban Bus Production for each Vehicle Model Year*	0.49%	0.49%	0.49%	2.33%	2.33%	2.33%	1.64%	6.98%

\* The computed number of zero-emission GHG urban buses shall be rounded to the next whole

number.

1037.243 Demonstrating compliance with evaporative emission standards. [n/a; see “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” for California fuel evaporative emission standards.]

1037.250 Reporting and recordkeeping. October 25, 2016.

1. Amend subparagraph (a) as follows: (a) Within 90 days after the end of the model year, send the Executive Officer a report including the total U.S.-directed production volume (the total U.S.-directed production volume is its intended meaning in this subparagraph (a), and not the California-directed production volume as referenced in subsection 2. in the California Provisions of 40 CFR §1037.1) of vehicles you produced in each vehicle family during the model year (based on information available at the time of the report). For each vehicle, report vehicle identification number, vehicle configuration, and engine family, and identify the vehicle subfamily identifier. Report uncertified vehicles sold to secondary vehicle manufacturers. We may waive the reporting requirements of this paragraph (a) for small manufacturers.

2. Subparagraphs (b) through (e). [No change.]

1037.255 What decisions may ARB make regarding my certificate of conformity? October 25, 2016.

#### **Subpart D – Testing Production Vehicles and Engines**

1037.301 Overview of measurements related to GEM inputs in a selective enforcement audit. October 25, 2016.

1037.305 Audit procedures for tractors-aerodynamic testing. October 25, 2016.

1037.310 Audit procedures for trailers. October 25, 2016.

1037.315 Audit procedures related to powertrain testing. October 25, 2016.

1037.320 Audit procedures for axles and transmissions. October 25, 2016.

#### **Subpart E – In-use Testing**

1037.401 General provisions. October 25, 2016.

#### **Subpart F – Test and Modeling Procedures**

1037.501 General testing and modeling provisions. October 25, 2016.

1. Subparagraphs (a) through (c). [No change.]

2. Amend subparagraph (d) as follows: Use the applicable fuels specified in 40 CFR part 1065, as amended by the “California Exhaust Emission Standards and

Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles,” and “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles,” to perform valid tests.

3. Subparagraphs (d)(1) through (h). [No change.]

- 1037.510 Duty-cycle exhaust testing. October 25, 2016.
- 1037.515 Determining CO<sub>2</sub> emissions to show compliance for trailers. October 25, 2016
- 1037.520 Modeling CO<sub>2</sub> emissions to show compliance for vocational vehicles and tractors. October 25, 2016.
- 1037.525 Aerodynamic measurements for tractors. October 25, 2016.
- 1037.526 Aerodynamic measurements for trailers. October 25, 2016.
- 1037.527 Aerodynamic measurements for vocational vehicles. October 25, 2016.
- 1037.528 Coastdown procedures for calculating drag area (C<sub>d</sub>A). October 25, 2016.
- 1037.530 Wind-tunnel procedures for calculating drag area (C<sub>d</sub>A). October 25, 2016.
- 1037.532 Using computational fluid dynamics to calculate drag area (C<sub>d</sub>A). October 25, 2016.
- 1037.534 Constant-speed procedure for calculating drag area (C<sub>d</sub>A). October 25, 2016.
- 1037.540 Special procedures for testing vehicles with hybrid power take-off. October 25, 2016.
- 1037.550 Powertrain testing. June 30, 2017.
  - 1. Subparagraph (a). [No change.]
  - 2. Amend subparagraph (b) as follows: Perform powertrain testing to establish measured fuel-consumption rates and exhaust emissions over applicable duty cycles pursuant to “California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems,” as adopted on September 1, 2017, which is incorporated by reference herein, for hybrid and conventional vehicle configurations. The following general provisions apply:
    - 3. Subparagraph (b)(1) through (q). [No change.]
- 1037.551 Engine-based simulation of powertrain testing. October 25, 2016.
- 1037.555 Special procedures for testing Phase 1 hybrid systems. October 25, 2016.
- 1037.560 Axle efficiency test. October 25, 2016.
- 1037.565 Transmission efficiency test. October 25, 2016.

## **Subpart G – Special Compliance Provisions**

- 1037.601 General compliance provisions. October 25, 2016.
  - 1. Subparagraph (a). [No change.]
  - 2. Amend subparagraph (a)(1) as follows: Except as specifically allowed by this part or 40 CFR part 1068, it is a violation of 40 CFR §1068.101(a)(1) to introduce into



commerce in California a tractor or vocational vehicle containing an engine not certified to the applicable requirements of this part and 40 CFR part 86. Further, it is a violation to introduce into commerce in California a Phase 1 tractor containing an engine not certified for use in tractors; or to introduce into commerce in California a vocational vehicle containing a light heavy-duty or medium heavy-duty engine not certified for use in vocational vehicles, subject to the penalty provisions set forth in Article 3 (commencing with section 42400) of Chapter 4 of Part 4 of, and Chapter 1.5 (commencing with Section 43025) of Part 5 of, Division 26 of the California Health and Safety Code. These prohibitions apply especially to the vehicle manufacturer. Note that this paragraph (a)(1) allows the use of heavy heavy-duty tractor engines in vocational vehicles.

3. Subparagraphs (a)(2) through (a)(4). [No change.]

4. Amend subparagraph (a)(5) as follows: The warranty-related prohibitions in title 13, CCR, sections 2035, 2036, 2037, 2039, 2040, 2041, and 2042, apply to manufacturers of new heavy-duty highway vehicles in addition to the prohibitions described in 40 CFR §1068.101(b)(6).

5. Subparagraphs (a)(6) through (b). [No change.]

6. Amend subparagraph (c) as follows: The prohibitions of 40 CFR §1068.101 apply for vehicles subject to the requirements of this part. The actions prohibited under this provision include the introduction into commerce in California of a complete or incomplete vehicle subject to the standards of this part where the vehicle is not covered by a valid Executive Order or exemption.

7. Subparagraphs (d) through (f). [No change.]

1037.605 Installing engines certified to alternate standards for specialty vehicles. October 25, 2016.

1037.610 Vehicles with off-cycle technologies. October 25, 2016.

1. Subparagraphs (a) through (d). [No change.]

2. Amend subparagraph (e) as follows: We may seek public comment on your request. However, we will generally not seek public comment on credits or adjustments based on A to B chassis testing performed according to the duty-cycle testing requirements of this part or in-use testing performed according to paragraph (c) of this section.

3. Subparagraphs (f) through (g). [No change.]

1037.615 Advanced technologies. October 25, 2016.

1037.620 Responsibilities for multiple manufacturers. October 25, 2016.

1. Subparagraphs (a) through (d). [No change.]

2. Amend subparagraph (d)(1) as follows: Such test results are deemed under 40 CFR §1037.825 to be submissions to ARB.

3. Subparagraphs (d)(2) through (e). [No change.]

4. Amend subparagraph (f) as follows: ARB may require component manufacturers to provide information or take other actions. For example, ARB may require component manufacturers to test components they produce.

1037.621 Delegated assembly. October 25, 2016.

1037.622 Shipment of partially complete vehicles to secondary vehicle manufacturers. October 25, 2016.

1037.630 Special purpose tractors. October 25, 2016.

1037.631 Exemption for vocational vehicles intended for off-road use. October 25, 2016.

1037.635 Glider kits and glider vehicles. October 25, 2016.

1. Amend the introductory sentence as follows: Except as specified in 40 CFR §1037.150, the requirements of this section apply beginning [Insert effective date of amendment for this rulemaking].

2. Subparagraphs (a) through (b). [No change.]

3. Amend subparagraph (c) as follows: The engine standards identified in paragraph (b) of this section do not apply for certain engines when used in glider kits. These engines remain subject to the standards to which they were previously certified. In order to qualify for the allowances in this paragraph (c), engines must be certified to the 2010 and newer model-year emission standards of title 13, CCR, section 1956.8.

4. Subparagraphs (c)(1) through (e). [No change.]

\* \* \* \*

1037.640 Variable vehicle speed limiters. October 25, 2016.

1037.645 In-use compliance with family emission limits (FELs). October 25, 2016.

1037.655 Post-useful life vehicle modifications. October 25, 2016.

1. Amend subparagraph (a) as follows: *General*. Vehicle modifications during and after the useful life violate California Vehicle Code 27156 and title 13, CCR, 2220 et seq.

2. Subparagraphs (b) through (d). [No change.]

1037.660 Idle reduction technologies. October 25, 2016.

**A. Federal Provisions**

1. Subparagraphs (a) and (b). [No change.]

2. Delete subparagraph (c).

3. Subparagraph (d) through (e). [No change.]

**B. California Provisions**

1. Additional provisions apply for automatic engine shutdown systems to comply with California's Heavy-Duty Diesel Engine Idling Requirements, as contained in section 11.B.6. of the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles." However, a manufacturer may choose to comply with California's Heavy-Duty Diesel Engine Idling Requirements via the Optional NOx Idling Emission Standard, as

described in subsection 11.B.6.3, in which case the aforementioned additional California provisions for the automatic engine shutdown system would not be necessary for compliance.

- 1037.665 Production and in-use tractor testing. October 25, 2016.
- 1037.670 Optional CO2 emission standards for tractors at or above 120,000 pounds GCWR. October 25, 2016.

## **Subpart H – Averaging, Banking, and Trading for Certification**

1037.701 General provisions. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

1. You are required to retire any emission credits that are used to demonstrate that the GHG urban buses produced and delivered for sale in California can meet the applicable standard specified in 40 CFR §1037.105(b), as specified in the California Provisions of 40 CFR §1037.241.1.1 (if applicable). You may not generate emission credits from zero-emission GHG urban buses produced and delivered for sale in California that are used to demonstrate compliance in California, as specified in the California Provisions of 40 CFR §1037.241.1.2 (if applicable). You are required to retire any emission credits from such zero-emission GHG urban buses if you generate them in the federal provisions. Identify any retired credits for GHG urban buses and for zero-emission GHG urban buses in the reports described in 40 CFR §§1037.725 and 1037.730. These credits may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards.

2. You may generate low-GWP credit for a vehicle that uses a qualifying low-GWP air conditioning refrigerant and that is produced and delivered for sale in California, if it meets the requirements in 40 CFR §1037.115 B.2., as modified by these test procedures. You may use this credit only within its vehicle averaging set.

3. You may generate with a 3.5 ATC multiplier for Phase 2 PHEVs, inclusive of PHEVs with ePTO, only if you demonstrate that the PHEVs do not emit increased NOx emissions compared to similar conventional vehicles pursuant to 40 CFR §1037.150(p)(2)(i), as modified by these procedures, and that the PHEVs comply with the all-electric range requirement pursuant to 40 CFR §1037.150(p)(2)(ii), as modified by these procedures. If the PHEVs only comply with the no-NOx increase requirement but not the all-electric range requirement, you may only generate with a 1.5 ATC multiplier. If the PHEVs do not comply with the no-NOx increase requirement, you may not generate an ATC.

If you certify PHEVs federally using the 3.5 multiplier for ATC but these PHEVs do not meet the requirements of 40 CFR §1037.150(p)(2)(i) and/or (ii), as modified by these procedures, you will generate an emission deficit based on the difference between federal and applicable California ATC calculations for PHEVs produced and

delivered for sale in California, as applicable. You must identify in the reports, described in 40 CFR §§1037.725 and 1037.730, any ATC generated from PHEVs pursuant to 40 CFR §1037.150(p) and calculate any emission deficits for PHEVs produced and delivered for sale in California, as applicable.

1037.705 Generating and calculating emission credits. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

1. For every vehicle that is eligible for the low-GWP refrigerant credit according to 40 CFR 1037.115.B.2., modified by these test procedures, calculate the emission credit for each participating family or subfamily as follows, and round it to the nearest one-tenth of a Mg.

Low-GWP Refrigerant Credit (Mg) = Per Year Credit × Volume × Useful Life

Where:

*Per Year Credit* = amount of credit a vehicle is eligible for every year of its useful life according to the Low-GWP Countdown Schedule of Per Year Credit table.

*Volume* = volume of vehicles produced and delivered for sale in California of the vehicle subfamily.

*Useful Life* = useful life of the vehicles, in years, as described in CCR, title 13, Section 2112.

If the Low-GWP Volume Fraction for the vehicle type and model year to which the credit-eligible vehicle belongs is less than 20%, the Per Year Credit shall be 0.56 Mg per vehicle per year, or 1.28% of the annual tailpipe CO<sub>2</sub> emissions allowed by the CO<sub>2</sub> standards for internal combustion vehicles of the vehicle subcategory and model year to which the credit-eligible vehicle belongs, whichever is less. When the Low-GWP Volume Fraction for the vehicle type and model year to which the credit-eligible vehicle belongs reaches or exceeds 20% for the first time, the above credit levels shall be allowed for that vehicle type for the subsequent four model years. After the subsequent four model years, the Per Year Credit shall be 0.31 Mg per vehicle per year, or 0.71% of the annual tailpipe CO<sub>2</sub> emissions allowed by the internal combustion engine CO<sub>2</sub> standard for the vehicle subcategory and model year to which the credit-eligible vehicle belongs, whichever is less. The countdown of the credit schedule is illustrated in the table below, where MY1 is the first model year for which the Low-GWP Volume Fraction for a particular vehicle type reaches or exceeds 20%, and MY2 through MY6 and beyond are the consecutive model years subsequent to MY1.

Low-GWP Countdown Schedule of Per Year Credit					
MY1	MY2	MY3	MY4	MY5	MY6+
0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.56 Mg/veh./yr.	0.31 Mg/veh./yr.
Or					
1.28%	1.28%	1.28%	1.28%	1.28%	0.71%
of annual tailpipe CO <sub>2</sub> emissions allowed by the internal combustion engine CO <sub>2</sub> standard for the vehicle subcategory and MY, whichever is less					

For the purpose of this subsection, vehicle types are:

- Vocational, classes 2b-5
- Vocational, classes 6 and 7
- Vocational, class 8
- Tractor, class 7
- Tractor, class 8, day cab
- Tractor, class 8, sleeper cab
- Tractor, heavy haul
- HD pickup trucks and vans, classes 2b and 3
- Custom chassis school bus
- Custom chassis motor home
- Custom chassis coach bus
- Custom chassis other bus
- Custom chassis refuse hauler
- Custom chassis concrete mixer
- Custom chassis mixed-use vehicle
- Custom chassis emergency vehicle

Low-GWP Volume Fraction for a particular vehicle type and a particular model year is the ratio of the actual volume of low-GWP refrigerant credit-eligible vehicles of that vehicle type and that model year produced and delivered for sale in California by all manufacturers to the total actual volume of vehicles of that vehicle type and that model year produced and delivered for sale in California by all manufacturers. Low-GWP Volume Fraction is rounded to the nearest one percent.

1037.710 Averaging. October 25, 2016.

1037.715 Banking. October 25, 2016.

1037.720 Trading. October 25, 2016.

1037.725 What must I include in my application for certification? October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

1. If any of your vehicles are included in the California Provisions in 40 CFR §1037.701.B., as modified by these test procedures, you must provide information for the vehicle family or subfamily to the Executive Officer according to the Federal Provisions of this section, using projected volumes of vehicles produced and delivered for sale in California for the model year. If you project emission deficits for a family or subfamily, you may use either California credit and/or federal credit to offset the emission deficits, in which case the federal credit must be retired if used and may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards. Federal credits from vehicles produced and delivered for sale outside of California that do not meet either requirements of 40 CFR §§1037.241.B and 1037.150(p)(2)(i) and (ii), as modified by these test procedures, may not be used to offset the emission deficits. For PHEVs' emission deficits due to the difference between federal and applicable California ATC calculations, as specified in 40 CFR §1037.701.B(3), you have the option to retire those federal credits in the amount of that difference or to otherwise offset those deficits. Those retired credits may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards.

1037.730 ABT reports. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

1. If any of your vehicles are included in the California Provisions in 40 CFR §1037.701.B., as modified by these test procedures, you must provide reports for the vehicle family or subfamily to the Executive Officer according to the Federal Provisions of this section, using projected and actual volumes of vehicles produced and delivered for sale in California for the model year. Show your net balance of emission credits for these vehicle families. Federal credit may be used to offset any emission deficits, in which case the federal credit must be retired if used and may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards. Federal credits from vehicles produced and delivered for sale outside of California that do not meet either requirements of 40 CFR §§1037.241.B. and 1037.150(p)(2)(i) and (ii), as modified by these test procedures, may not be used to offset the emission deficits. For PHEVs' emission deficits due to the difference between federal and applicable California ATC calculations, as specified in 40 CFR §1037.701.B(3), you have the option to retire those federal credits in the amount of that difference or to otherwise offset those deficits. Those retired credits may no longer be used by anyone to demonstrate compliance with any ARB/U.S. Environmental Protection Agency emission standards.

1037.735 Recordkeeping. October 25, 2016.

1037.740 Restrictions for using emission credits. October 25, 2016.

1037.745 End-of-year CO2 credit deficits. October 25, 2016.

1037.750 What can happen if I do not comply with the provisions of this subpart?  
October 25, 2016.

1. Subparagraphs (a) through (b). [No change.]
2. Amend subparagraph (c) as follows: ARB may void the Executive Order for a vehicle family if you fail to keep records, send reports, or give us information we request.
3. Subparagraph (d). [No change.]

1037.755 Information provided to the Department of Transportation. [n/a]

## **Subpart I – Definitions and Other Reference Information**

1037.801 Definitions. October 25, 2016.

**A. Federal Provisions.** [All federal definitions apply, except as otherwise noted below.]

**B. California Provisions.**

“Certificate of Conformity” means an Executive Order certifying vehicles for sale in California.

“Certification” means relating to the process of obtaining an Executive Order for a vehicle family that complies with the emission standards and requirements in this part.

“Designated Compliance Officer” means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

“Designated Enforcement Officer” means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

“EPA” shall also mean Air Resources Board or Executive Officer of the Air Resources Board.

“GHG Urban Bus” means a passenger-carrying vehicle with a load capacity of fifteen or more passengers and intended primarily for intracity operation, i.e., within the confines of a city or greater metropolitan area. GHG urban bus operation is characterized by short rides and frequent stops. To facilitate this type of operation, more than one set of quick-operating entrance and exit doors would normally be installed. Since fares are usually paid in cash or tokens, rather than purchased in advance in the form of tickets, GHG urban buses would normally have equipment installed for collection of fares. GHG urban buses are also typically characterized by the absence of equipment and facilities for long distance travel, e.g., rest rooms, large luggage compartments, and facilities for stowing carry-on luggage.

“Manufacturer” means any person who manufactures or assembles a vehicle (including a trailer or another incomplete vehicle) for sale in California or otherwise introduces a new vehicle into commerce in California. This includes importers who import vehicles for resale, entities that manufacture gliders kits, and entities that assemble glider vehicles.

“Medium-duty engine” means any heavy-duty engine that is used to propel a medium-duty vehicle.

“Medium-duty vehicle” means any heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle certified to the standards in title 13, CCR sections 1961(a)(1), 1961.2, 1962, 1962.1, except medium-duty passenger vehicles, having a manufacturer’s gross vehicle weight rating between 8,501 and 14,000 pounds.

“U.S. Environmental Protection Agency” means the United States Environmental Protection Agency.

“We (us, our)” means the Executive Officer and any authorized representatives.

1037.805 Symbols, abbreviations, and acronyms. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

ARB means Air Resources Board.

1037.810 Incorporation by reference. October 25, 2016.

1037.815 Confidential information. October 25, 2016.

1. Delete and replace as follows: The provisions of title 17, CCR section 91000 through 91022 apply for information you consider confidential. Note that according to section 91011, emissions data shall not be identified as confidential.

1037.820 Requesting a hearing. October 25, 2016.

1. Delete subparagraph (a) and replace as follows: You may request a hearing under certain circumstances, as described elsewhere in this part.

2. Subparagraph (b). [No change.]

3. Amend subparagraph (c) as follows: If we agree to hold a hearing, we will use the procedures specified in 17 CCR sections 60055.1 through 6055.43.

1037.825 Reporting and recordkeeping requirements. October 25, 2016.

1. Subparagraphs (a) through (d). [No change.]

2. Delete subparagraph (e).

## **Appendix I to Part 1037—Heavy-duty Transient Test Cycle**

## **Appendix II to Part 1037—Power Take-Off Test Cycle**

## **Appendix III to Part 1037—Emission Control Identifiers**

## **Appendix IV to Part 1037—Heavy-Duty Grade Profile for Phase 2 Steady-State Test Cycles**

## **Appendix V to Part 1037—Power Take-Off Utility Factors**



## **PART 1066 – VEHICLE TESTING PROCEDURES**

### **Subpart A – Applicability and General Provisions**

- 1066.1 Applicability. April 28, 2014.
- 1066.2 Submitting information to ARB under this part. April 28, 2014.
1. Subparagraph (a). [No change.]
  2. Delete subparagraph (b) and replace as follows: In the standard-setting part and in 40 CFR 1068.101, we describe your obligation to report truthful and complete information and the consequences of failing to meet this obligation. This obligation applies whether you submit this information directly to ARB or through someone else.
  3. Subparagraphs (c) through (d). [No change.]
  4. Amend subparagraph (e) as follows: See the provisions of title 17, CCR sections 91000 through 91022 for provisions related to confidential information. Note however that emission data is generally not eligible for confidential treatment.
  5. Amend subparagraph (f) as follows: Nothing in this part should be interpreted to limit our ability to verify that vehicles conform to the regulations.
- 1066.5 Overview of this part 1066 and its relationship to the standard-setting part. April 28, 2014.
- 1066.10 Other procedures. February 19, 2015.
- 1066.15 Overview of test procedures. April 28, 2014.
- 1066.20 Units of measure and overview of calculations. April 28, 2014.
- 1066.25 Recordkeeping. April 28, 2014.

### **Subpart B – Equipment, Measurement Instruments, Fuel, and Analytical Gas Specifications**

- 1066.101 Overview. April 28, 2014.
1. Subparagraph (a). [No change.]
  2. Amend subparagraph (b) as follows: The provisions of 40 CFR part 1065 specify engine-based procedures for measuring emissions. Except as specified otherwise in this part, the provisions of 40 CFR part 1065, as modified by the “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles,” and “California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles,” apply for testing required by this part as follows:
    3. Subparagraphs (b)(1) through (c). [No change.]
- 1066.105 Ambient controls and vehicle cooling fans. October 25, 2016.
- 1066.110 Equipment specifications for emission sampling systems. October 25, 2016.

- 1066.120 Measurement instruments. April 28, 2014.
- 1066.125 Data updating, recording, and control. February 19, 2015.
- 1066.130 Measurement instrument calibrations and verifications. April 28, 2014.
- 1066.135 Linearity verification. October 25, 2016.
- 1066.140 Diluted exhaust flow calibration. October 25, 2016.
- 1066.145 Test fuel, engine fluids, analytical gases, and other calibration standards. April 28, 2014.
- 1066.150 Analyzer interference and quench verification limit. April 28, 2014.

**Subpart C – Dynamometer Specifications**

- 1066.201 Dynamometer overview. April 28, 2014.
- 1066.210 Dynamometers. October 22, 2016.
- 1066.215 Summary of verification procedures for chassis dynamometers. April 28, 2014.
- 1066.220 Linearity verification for chassis dynamometer systems. April 28, 2014.
- 1066.225 Roll runout and diameter verification procedure. April 28, 2014.
- 1066.230 Time verification procedure. April 28, 2014.
- 1066.235 Speed verification procedure. October 25, 2016.
- 1066.240 Torque transducer verification. April 28, 2014.
- 1066.245 Response time verification. October 25, 2016.
- 1066.250 Base inertia verification. October 25, 2016.
- 1066.255 Parasitic loss verification. February 19, 2015.
- 1066.260 Parasitic friction compensation evaluation. October 25, 2016.
- 1066.265 Acceleration and deceleration verification. October 25, 2016.
- 1066.270 Unloaded coastdown verification. October 25, 2016.
- 1066.275 Daily dynamometer readiness verification. October 25, 2016.
- 1066.290 Verification of speed accuracy for the driver's aid. April 28, 2014.

**Subpart D – Coastdown**

- 1066.301 Overview of road-load determination procedures. October 25, 2016.
- 1066.305 Procedures for specifying road-load forces for motor vehicles at or below 14,000 pounds GVWR. October 25, 2016.
- 1066.310 Coastdown procedures for vehicles above 14,000 pounds GVWR. October 25, 2016.
- 1066.315 Dynamometer road-load setting. April 28, 2014.

## **Subpart E – Preparing Vehicles and Running an Exhaust Emission Test**

- 1066.401 Overview. April 28, 2014.
- 1066.405 Vehicle preparation and preconditioning. April 28, 2014.
- 1066.410 Dynamometer test procedure. October 25, 2016.
- 1066.415 Vehicle operation. October 25, 2016.
- 1066.420 Test preparation. February 19, 2015.
- 1066.425 Performing emission tests. October 25, 2016.

## **Subpart F – Electric Vehicles and Hybrid Electric Vehicles**

- 1066.501 Overview. February 19, 2015.

### **A. Federal Provisions.** [No change.]

### **B. California provisions.**

1. A manufacturer may use the test procedures described in this subsection to test hybrid vehicles to demonstrate no increase in NO<sub>x</sub> emissions compared to a similar conventional vehicle pursuant to 40 CFR §1037.150(p)(2)(i), as modified by these procedures.

1.1. Chassis Dynamometer. A manufacturer may use the test procedures pursuant to “California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems,” as adopted on September 1, 2017, which is incorporated by reference herein.

1.2. Chassis Dynamometer – Hybrid with ePTO. A manufacturer may use the test procedures pursuant to the hybrid-PTO test procedures as specified in Title 40 Code of Federal Regulations, Part 1037.525. Additional requirements are as specified in “California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems,” as adopted on September 1, 2017, which is incorporated by reference herein.

1.3. Portable Emission Measurement System (PEMS). A manufacturer may use the test procedures pursuant to “California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems,” as adopted on September 1, 2017, which is incorporated by reference herein.

1.4. Powertrain testing. A manufacturer may use powertrain testing to test for NO<sub>x</sub> emissions and all electric range pursuant to 40 CFR §1037.550, as modified by these procedures.

1.5. Alternate Duty Cycles. A manufacturer may propose, as part of its Hybrid Technology Emission Test Plan, an alternate duty cycle in lieu of the duty cycles referenced in subsections 1.1, 1.2, and 1.3 of this section, as described in “California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems,” as adopted on September 1, 2017, which is incorporated by reference herein. The Executive Officer may approve an alternate duty cycle if he determines, based upon his engineering judgment and data provided by the applicant, that the proposed alternate test cycle more

accurately represents the hybrid vehicle's anticipated in-use activity by California fleets.

1.6. Hybrid Technology Emission Test Plan: The manufacturer must submit a Hybrid Technology Emission Test Plan as described in "California Certification and Installation Procedures for Medium and Heavy-Duty Vehicle Hybrid Conversion Systems," as adopted on September 1, 2017, which is incorporated by reference herein.

### **Subpart G – Calculations**

- 1066.601 Overview. April 28, 2014.
- 1066.605 Mass-based and molar-based exhaust emission calculations. October 25, 2016.
- 1066.610 Dilution air background correction. April 28, 2014.
- 1066.615 NO<sub>x</sub> intake-air humidity correction. October 25, 2016.
- 1066.620 Removed water correction. April 28, 2014.
- 1066.625 Flow meter calibration calculations. October 25, 2016.
- 1066.630 PDP, SSV, and CFV flow rate calculations. October 25, 2016.
- 1066.635 NMOG determination. October 25, 2016.
- 1066.695 Data requirements. October 25, 2016.

### **Subpart H – Cold Temperature Test Procedures [n/a]**

### **Subpart I – Exhaust Emission Test Procedures for Motor Vehicles**

- 1066.801 Applicability and general provisions. October 25, 2016.
- 1066.805 Road-load power, test weight, and inertia weight class determination. October 25, 2016.
- 1066.810 Vehicle preparation. April 28, 2014.
- 1066.815 Exhaust emission test procedures for FTP testing. October 25, 2016.
- 1066.816 Vehicle preconditioning for FTP testing. April 28, 2014.
- 1066.820 Composite calculations for FTP exhaust emissions. October 25, 2016.
- 1066.830 Supplemental Federal Test Procedures; overview. [n/a]
- 1066.831 Exhaust emission test procedures for aggressive driving. [n/a]
- 1066.835 Exhaust emission test procedure for SC03 emissions. [n/a]
- 1066.840 Highway fuel economy test procedure. April 28, 2014.
- 1066.845 AC17 air conditioning efficiency test procedure. [n/a]

### **Subpart J – Evaporative Emission Test Procedures [n/a]**

## **Subpart K – Definitions and Other Reference Material**

1066.1001 Definitions. February 19, 2015.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

“EPA” shall also mean Air Resources Board or Executive Officer of the Air Resources Board.

1066.1005 Symbols, abbreviations, acronyms, and units of measure. October 25, 2016.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

ARB means Air Resources Board.

1066.1010 Incorporation by reference. October 25, 2016.

## **PART 1068 – GENERAL COMPLIANCE PROVISIONS FOR HIGHWAY, STATIONARY, AND NONROAD PROGRAMS**

### **Subpart A – Applicability and Miscellaneous Provisions**

1068.1.1 Does this part apply to me? October 25, 2016.

1. Subparagraph (a) to (a)(1). [No change.]
2. Amend subparagraph (a)(2) as follows: This part 1068 applies to heavy-duty motor vehicles, including trailers, and motor vehicle engines used in such vehicles, that are subject to the emission standards in title 17, CCR, sections 95660, 95661, 95662, 95663, and 95664.
3. Delete subparagraphs (a)(3) to (d).

1068.20 May ARB enter my facilities for inspections? October 25, 2016.

1. Delete subparagraph (a) and replace with: We may inspect your testing, manufacturing processes, storage facilities (including port facilities for imported engines and equipment or other relevant facilities), or records, as authorized by the California Health and Safety Code, to enforce the provisions of this chapter. Inspectors will have authorizing credentials and will usually limit inspections to normal operating hours.
2. Subparagraph (b). [No change.]
3. Delete subparagraph (c) and replace with: Any ARB Enforcement Officer must be furnished by those in charge of a facility being inspected with such reasonable assistance as may be necessary to discharge any function listed in this paragraph. Each applicant for or recipient of certification is required to cause those in charge of a facility operated for its benefit to furnish such reasonable assistance without charge to the ARB irrespective of whether or not the applicant controls the facility.
4. Delete subparagraph (d) and replace with: The duty to admit or cause to be admitted any ARB Enforcement Officer applies whether or not the applicant owns or controls the facility in question and applies both to domestic and foreign engine and vehicle manufacturers and facilities. The ARB will not attempt to make any inspections that it has been informed that local law forbids. However, if local law makes it impossible to insure the accuracy of data generated at a facility, no informed judgment that an engine or vehicle is certifiable or is covered by an Executive Order can properly be based on the data. It is the responsibility of the engine manufacturer or vehicle manufacturer to locate its testing and manufacturing facilities in jurisdictions where this situation will not arise.

1068.30 Definitions. October 25, 2016.

**A. Federal Provisions.** [All federal definitions apply, except as otherwise noted below.]

Date of manufacture: Delete and replace with:

*Date of manufacture* means one of the following:

(1) For engines, the date on which the crankshaft is installed in an engine block, with the following exception:

(i) Manufacturers may assign a date of manufacture at a point in the assembly process later than the date otherwise specified under this definition. For example, a manufacturer may use the build date printed on the label or stamped on the engine as the date of manufacture.

Engine: Delete

**B. California Provisions.**

“Administrator” means the Executive Officer of the Air Resources Board, or a designee of the Executive Officer.

“Certificate of Conformity” means an Executive Order certifying vehicles for sale in California.

“Certification” means relating to the process of obtaining an Executive Order for a vehicle family that complies with the emission standards and requirements in this part.

“Designated Compliance Officer” means the Executive Officer of the Air Resources Board or a designee of the Executive Officer.

“EPA” shall also mean Air Resources Board or Executive Officer of the Air Resources Board.

“Standard-setting part” means the articles of the California Code of Regulations that define emission standards for a particular vehicle.

“United States” in reference to vehicle sales or vehicles introduced into commerce means the vehicle sales or vehicles introduced into commerce in California.

“We (us, our)” means the Executive Officer and any authorized representatives.

1068.35 Symbols, acronyms, and abbreviations. October 8, 2008.

**A. Federal Provisions.** [No change.]

**B. California Provisions.**

ARB means Air Resources Board.

1068.45 General labeling provisions. October 25, 2016.

## **Subpart E – Selective Enforcement Auditing**

- 1068.401 What is a selective enforcement audit? October 25, 2016.
- 1068.405 What is in a test order? October 25, 2016.
- 1068.410 How must I select and prepare my engines/equipment? April 30, 2010.
- 1068.415 How do I test my engines/equipment? October 25, 2016.
- 1068.420 How do I know when my engine family fails an SEA? October 25, 2016.
- 1068.425 What happens if one of my production-line engines/equipment exceeds the emission standards? October 25, 2016.
- 1068.430 What happens if a family fails an SEA? October 25, 2016.
- 1068.435 May I sell engines/equipment from a family with a suspended certificate of conformity? October 8, 2008.
- 1068.440 How do I ask ARB to reinstate my suspended certificate? April 30, 2010.
- 1068.445 When may ARB revoke my certificate under this subpart and how may I sell these engines/equipment again? October 8, 2008.
- 1068.450 What records must I send to ARB? October 25, 2016.
- 1068.455 What records must I keep? October 8, 2008.