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whether or not you are a certificate holder.

(e) Under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq.*), the Office of Management and Budget approves the reporting and recordkeeping specified in the applicable regulations. The following items illustrate the kind of reporting and recordkeeping we require for engines and equipment regulated under this part:

(1) We specify the following requirements related to engine certification in this part 1036:

(i) In §1036.135 we require engine manufacturers to keep certain records related to duplicate labels sent to equipment manufacturers.

(ii) In subpart C of this part we identify a wide range of information required to certify engines.

(iii) In subpart G of this part we identify several reporting and recordkeeping items for making demonstrations and getting approval related to various special compliance provisions.

(iv) In §§1036.725, 1036.730, and 1036.735 we specify certain records related to averaging, banking, and trading.

(2) We specify the following requirements related to testing in 40 CFR part 1066:

(i) In 40 CFR 1066.2 we give an overview of principles for reporting information.

(ii) [Reserved]

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

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APPENDIX III TO PART 1037—EMISSION CONTROL IDENTIFIERS

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### Subpart A—Overview and Applicability

#### § 1037.1 Applicability

This part contains standards and other regulations applicable to the emission of the air pollutant defined as the aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. The regulations in this part 1037 apply for all new heavy-duty vehicles, except as provided in §1037.5.

This includes electric vehicles and vehicles fueled by conventional and alternative fuels.

#### § 1037.5 Excluded vehicles.

Except for the definitions specified in §1037.801, this part does not apply to the following vehicles:

(a) Vehicles not meeting the definition of “motor vehicle”.

(b) Vehicles excluded from the definition of “heavy-duty vehicle” in §1037.801 because of vehicle weight, weight rating, and frontal area (such as light-duty vehicles and light-duty trucks).

(c) Medium-duty passenger vehicles.

(d) Vehicles produced in model years before 2014, unless they are certified under §1037.150.

(e) Vehicles subject to the light-duty greenhouse gas standards of 40 CFR part 86. See 40 CFR 86.1818 for greenhouse gas standards that apply for these vehicles. An example of such a vehicle would be a vehicle meeting the definition of “heavy-duty vehicle” in §1037.801 and 40 CFR 86.1803, but also meeting the definition of “light truck” in 40 CFR 86.1818–12(b)(2).

#### § 1037.10 How is this part organized?

This part 1037 is divided into subparts as described in this section. Note that only subparts A, B, and I of this part apply for vehicles subject to the standards of §1037.104, as described in that section.

(a) Subpart A of this part defines the applicability of part 1037 and gives an overview of regulatory requirements.

(b) Subpart B of this part describes the emission standards and other requirements that must be met to certify vehicles under this part. Note that §1037.150 discusses certain interim requirements and compliance provisions that apply only for a limited time.

(c) Subpart C of this part describes how to apply for a certificate of conformity for vehicles subject to the standards of §1037.105 or §1037.106.

(d) [Reserved]

(e) Subpart E of this part addresses testing of in-use vehicles.

(f) Subpart F of this part describes how to test your vehicles and perform emission modeling (including references to other parts of the Code of

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Federal Regulations) for vehicles subject to the standards of §1037.105 or §1037.106.

(g) Subpart G of this part and 40 CFR part 1068 describe requirements, prohibitions, and other provisions that apply to manufacturers, owners, operators, rebuilders, and all others. Section 1037.601 describes how 40 CFR part 1068 applies for heavy-duty vehicles.

(h) Subpart H of this part describes how you may generate and use emission credits to certify vehicles that are subject to the standards of §1037.105 or §1037.106.

(i) Subpart I of this part contains definitions and other reference information.

### **§ 1037.15 Do any other regulation parts apply to me?**

(a) Parts 1065 and 1066 of this chapter describe procedures and equipment specifications for testing engines and vehicles to measure exhaust emissions. Subpart F of this part 1037 describes how to apply the provisions of part 1065 and part 1066 of this chapter to determine whether vehicles meet the exhaust emission standards in this part.

(b) As described in §1037.601, certain requirements and prohibitions of part 1068 of this chapter apply to everyone, including anyone who manufactures, imports, installs, owns, operates, or rebuilds any of the vehicles subject to this part 1037. Part 1068 of this chapter describes general provisions that apply broadly, but do not necessarily apply for all vehicles or all persons. The issues addressed by these provisions include these seven areas:

- (1) Prohibited acts and penalties for manufacturers and others.
- (2) Rebuilding and other aftermarket changes.
- (3) Exclusions and exemptions for certain vehicles.
- (4) Importing vehicles.
- (5) Selective enforcement audits of your production.
- (6) Recall.
- (7) Procedures for hearings.

(c) Part 86 of this chapter applies for certain vehicles as specified in this part. For example, the test procedures and most of part 86, subpart S, applies for vehicles subject to §1037.104.

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(d) Other parts of this chapter apply if referenced in this part.

### **§ 1037.30 Submission of information.**

Send all reports and requests for approval to the Designated Compliance Officer (see §1037.801). See §1037.825 for additional reporting and recordkeeping provisions.

## **Subpart B—Emission Standards and Related Requirements**

### **§ 1037.101 Overview of emission standards for heavy-duty vehicles.**

(a) This part specifies emission standards for certain vehicles and for certain pollutants. It also summarizes other standards that apply under 40 CFR part 86. This part contains standards and other regulations applicable to the emission of the air pollutant defined as the aggregate group of six greenhouse gases: carbon dioxide, nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

(b) The regulated emissions are addressed in four groups:

(1) Exhaust emissions of NO<sub>x</sub>, HC, PM, and CO. These pollutants are sometimes described collectively as “criteria pollutants” because they are either criteria pollutants under the Clean Air Act or precursors to the criteria pollutant ozone. These pollutants are also sometimes described collectively as “non-greenhouse gas pollutants”, although they do not necessarily have negligible global warming potential. As described in §1037.102, standards for these pollutants are provided in 40 CFR part 86.

(2) Exhaust emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. These pollutants are described collectively in this part as “greenhouse gas pollutants” because they are regulated primarily based on their impact on the climate. These standards are provided in §§1037.104 through 1037.106.

(3) Hydrofluorocarbons. These pollutants are also “greenhouse gas pollutants” but are treated separately from exhaust greenhouse gas pollutants listed in paragraph (b)(2) of this section. These standards are provided in §1037.115.

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(4) Fuel evaporative emissions. These requirements are described in 40 CFR part 86.

(c) The regulated heavy-duty vehicles are addressed in different groups as follows:

(1) For criteria pollutants, vehicles are regulated based on gross vehicle weight rating (GVWR), whether they are considered “spark-ignition” or “compression-ignition,” and whether they are first sold as complete or incomplete vehicles. These groupings apply as described in 40 CFR part 86.

(2) For greenhouse gas pollutants, vehicles are regulated in the following groups:

(i) Complete and certain incomplete vehicles at or below 14,000 pounds GVWR (see §1037.104 for further specification). Certain provisions of 40 CFR part 86 apply for these vehicles; see §1037.104(h) for a list of provisions in this part 1037 that also apply for these vehicles. These provisions may also be optionally applied to certain other vehicles, as described in §1037.104.

(ii) Tractors above 26,000 pounds GVWR.

(iii) All other vehicles subject to standards under this part. These other vehicles are referred to as “vocational” vehicles.

**§ 1037.102 Exhaust emission standards for NO<sub>x</sub>, HC, PM, and CO.**

See 40 CFR part 86 for the exhaust emission standards for NO<sub>x</sub>, HC, PM, and CO that apply for heavy-duty vehicles.

**§ 1037.104 Exhaust emission standards for CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O for heavy-duty vehicles at or below 14,000 pounds GVWR.**

This section applies for heavy-duty vehicles at or below 14,000 pounds GVWR. See paragraph (f) of this section and §1037.150 of this section for

provisions excluding certain vehicles from this section, and allowing other vehicles to be certified under this section.

(a) *Fleet-average CO<sub>2</sub> emission standards.* Fleet-average CO<sub>2</sub> emission standards apply for each manufacturer as follows:

(1) Calculate a work factor, WF, for each vehicle subconfiguration (or group of subconfigurations allowed under paragraph (a)(4) of this section), rounded to the nearest pound, using the following equation:

$$WF = 0.75 \times (GVWR - \text{Curb Weight} + \text{xwd}) + 0.25 \times (GCWR - GVWR)$$

Where:

xwd = 500 pounds if the vehicle has four-wheel drive or all-wheel drive; xwd = 0 pounds for all other vehicles.

(2) Using the appropriate work factor, calculate a target value for each vehicle subconfiguration (or group of subconfigurations allowed under paragraph (a)(4) of this section) you produce using one of the following equations, rounding to the nearest 0.1 g/mile:

(i) For spark-ignition vehicles: CO<sub>2</sub> Target (g/mile) = 0.0440 × WF + 339

(ii) For compression-ignition vehicles and vehicles that operate without engines (such as electric vehicles and fuel cell vehicles): CO<sub>2</sub> Target (g/mile) = 0.0416 × WF + 320

(3) Calculate a production-weighted average of the target values and round it to the nearest 0.1 g/mile. This is your fleet-average standard. All vehicles subject to the standards of this section form a single averaging set. Use the following equation to calculate your fleet-average standard from the target value for each vehicle subconfiguration (Target<sub>*i*</sub>) and U.S.-directed production volume of each vehicle subconfiguration for the given model year (Volume<sub>*i*</sub>):

$$\text{Fleet-Average Standard} = \frac{\sum [\text{Target}_i \times \text{Volume}_i]}{\sum [\text{Volume}_i]}$$

(4) You may group subconfigurations within a configuration together for

purposes of calculating your fleet-average standard as follows:

(i) You may group together sub-configurations that have the same equivalent test weight (ETW), GVWR, and GCWR. Calculate your work factor and target value assuming a curb weight equal to two times ETW minus GVWR.

(ii) You may group together other sub-configurations if you use the lowest target value calculated for any of the sub-configurations.

(b) *Production and in-use CO<sub>2</sub> standards.* Each vehicle you produce that is subject to the standards of this section has an “in-use” CO<sub>2</sub> standard that is calculated from your test result and that applies for selective enforcement audits and in-use testing. This in-use CO<sub>2</sub> standard for each vehicle is equal to the applicable deteriorated emission level multiplied by 1.10 and rounded to the nearest 0.1 g/mile.

(c) *N<sub>2</sub>O and CH<sub>4</sub> standards.* Except as allowed under this paragraph (c), all vehicles subject to the standards of this section must comply with an N<sub>2</sub>O standard of 0.05 g/mile and a CH<sub>4</sub> standard of 0.05 g/mile. You may specify CH<sub>4</sub> and/or N<sub>2</sub>O alternate standards using CO<sub>2</sub> emission credits instead of these otherwise applicable emission standards for one or more test groups, consistent with the provisions of 40 CFR 86.1818. To do this, calculate the CH<sub>4</sub> and/or N<sub>2</sub>O emission credits needed (negative credits) using the equation in this paragraph (c) based on the FEL(s) you specify for your vehicles during certification. You must adjust the calculated emissions by the global warming potential (GWP): GWP equals 25 for CH<sub>4</sub> and 298 for N<sub>2</sub>O. This means you must use 25 Mg of positive CO<sub>2</sub> credits to offset 1 Mg of negative CH<sub>4</sub> credits and 298 Mg of positive CO<sub>2</sub> credits to offset 1 Mg of negative N<sub>2</sub>O credits. Note that 40 CFR 86.1818–12(f) does not apply for vehicles subject to the standards of this section. Calculate credits using the following equation:

$$\text{CO}_2 \text{ Credits Needed (Mg)} = [(\text{FEL} - \text{Std}) \times (\text{U.S.-directed production volume}) \times (\text{Useful Life})] \times (\text{GWP}) \div 1,000,000$$

(d) *Compliance provisions.* Except as specified in this paragraph (d) or elsewhere in this section, the provisions of 40 CFR part 86, describing compliance with the greenhouse gas standards of 40 CFR part 86, subpart S, apply with re-

spect to the standards of paragraphs (a) through (c) of this section.

(1) The CO<sub>2</sub> standards of this section apply with respect to CO<sub>2</sub> emissions, not with respect to carbon-related exhaust emissions (CREE).

(2) Vehicles subject to the standards of this section are included in a single greenhouse gas averaging set separate from any averaging sets otherwise included in 40 CFR part 86.

(3) Special credit and incentive provisions related to flexible fuel vehicles and air conditioning in 40 CFR part 86 do not apply for vehicles subject to the standards of this section.

(4) The CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> standards apply for a weighted average of the city (55%) and highway (45%) test cycle results as specified for light-duty vehicles in 40 CFR part 86, subpart S. Note that this differs from the way the criteria pollutant standards apply for heavy-duty vehicles.

(5) Apply an additive deterioration factor of zero to measured CO<sub>2</sub> emissions unless good engineering judgment indicates that emissions are likely to deteriorate in use. Use good engineering judgment to develop separate deterioration factors for N<sub>2</sub>O and CH<sub>4</sub>.

(6) Credits are calculated using the useful life value (in miles) in place of the “vehicle lifetime miles” specified in 40 CFR part 86, subpart S.

(7) Credits generated from hybrid vehicles with regenerative braking or from vehicles with other advanced technologies may be used to show compliance with any standards of this part or 40 CFR part 1036, subject to the service class restrictions in §1037.740. Include these vehicles in a separate fleet-average calculation (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.

(8) The provisions of 40 CFR 86.1818 do not apply.

(9) Calculate your fleet-average emission rate consistent with good engineering judgment and the provisions of 40 CFR 86.1865. The following additional provisions apply:

(i) Unless we approve a lower number, you must test at least ten subconfigurations. If you produce more than 100 subconfigurations in a given model year, you must test at least ten percent of your subconfigurations. For purposes of this paragraph (d)(9)(i), count carryover tests, but do not include analytically derived CO<sub>2</sub> emission rates, data substitutions, or other untested allowances. We may approve a lower number of tests for manufacturers that have limited product offerings, or low sales volumes. Note that good engineering judgment and other provisions of this part may require you to test more subconfigurations than these minimum values.

(ii) The provisions of paragraph (g) of this section specify how you may use analytically derived CO<sub>2</sub> emission rates.

(iii) At least 90 percent of final production volume at the configuration level must be represented by test data (real, data substituted, or analytical).

(10) For dual fuel, multi-fuel, and flexible fuel vehicles, perform exhaust testing on each fuel type (for example, gasoline and E85).

(i) For your fleet-average calculations, use either the conventional-fueled CO<sub>2</sub> emission rate or a weighted average of your emission results as specified in 40 CFR 600.510–12(k) for light-duty trucks.

(ii) If you certify to an alternate standard for N<sub>2</sub>O or CH<sub>4</sub> emissions, you may not exceed the alternate standard when tested on either fuel.

(11) Test your vehicles with an equivalent test weight based on its Adjusted Loaded Vehicle Weight (ALVW). Determine equivalent test weight from the ALVW as specified in 40 CFR 86.129, except that you may round values to the nearest 500 pound increment for ALVW above 14,000 pounds).

(12) The following definitions apply for purposes of this section:

(i) Configuration means a subclassification within a test group which is based on engine code, transmission type and gear ratios, final drive ratio, and other parameters which we designate. Note that this differs from the definition in 40 CFR 86.1803 because it excludes inertia weight class as a criterion.

(ii) Subconfiguration means a unique combination within a vehicle configuration (as defined in this paragraph (d)(12)) of equivalent test weight, road-load horsepower, and any other operational characteristics or parameters that we determine may significantly affect CO<sub>2</sub> emissions within a vehicle configuration.

(iii) The terms “complete vehicle” and “incomplete vehicle” have the meanings given for “complete heavy-duty vehicle” and “incomplete heavy-duty vehicle” in 40 CFR 86.1803.

(13) This paragraph (d)(13) applies for CO<sub>2</sub> reductions resulting from technologies that were not in common use before 2010 that are not reflected in the specified test procedures. We may allow you to generate emission credits consistent with the provisions of 40 CFR 86.1866–12(d). You do not need to provide justification for not using the 5-cycle methodology option.

(14) You must submit pre-model year reports before you submit your applications for certification for a given model year. Unless we specify otherwise, include the information specified for pre-model year reports in 49 CFR 535.8.

(e) *Useful life.* Your vehicles must meet the exhaust emission standards of this section throughout their full useful life, expressed in service miles or calendar years, whichever comes first. The useful life values for the standards of this section are those that apply for criteria pollutants under 40 CFR part 86.

(f) *Exclusion of vehicles not certified as complete vehicles.* The standards of this section apply for each vehicle that is chassis-certified with respect to criteria pollutants under 40 CFR part 86, subpart S. The standards of this section do not apply for other vehicles, except as noted in §1037.150. Note that vehicles excluded under this paragraph (f) are not considered to be “subject to the standards of this section.” The vehicle standards and requirements of §1037.105 apply for the excluded vehicles. The GHG standards of 40 CFR part 1036 also apply for engines used in these excluded vehicles. If you are not the engine manufacturer, you must notify the engine manufacturer that its engines are subject to 40 CFR part 1036

because you intend to use their engines in your excluded vehicles.

(g) *Analytically derived CO<sub>2</sub> emission rates (ADCs)*. This paragraph (g) describes an allowance to use estimated (*i.e.*, analytically derived) CO<sub>2</sub> emission rates based on baseline test data in-

stead of measured emission rates for calculating fleet-average emissions. Note that these ADCs are similar to ADFEs used for light-duty vehicles. Note also that F terms used in this paragraph (g) represent coefficients from the following road load equation:

$$Force - (mass)(acceleration) = F0 + F1 \cdot (velocity) + F2 \cdot (velocity)^2$$

(1) Except as specified in paragraph (g)(2) of this section, use the following equation to calculate the ADC of a new

vehicle from road load force coefficients (F0, F1, F2), axle ratio, and test weight:

$$ADC = CO_{2base} + 2.18 \cdot \Delta F0 + 37.4 \cdot \Delta F1 + 2257 \cdot \Delta F2 + 189 \cdot \Delta AR + 0.0222 \cdot \Delta ETW$$

Where:

ADC = Analytically derived combined city/highway CO<sub>2</sub> emission rate (g/mile) for a new vehicle.

CO<sub>2base</sub> = Combined city/highway CO<sub>2</sub> emission rate (g/mile) of a baseline vehicle.

ΔF0 = F0 of the new vehicle—F0 of the baseline vehicle.

ΔF1 = F1 of the new vehicle—F1 of the baseline vehicle.

ΔF2 = F2 of the new vehicle—F2 of the baseline vehicle.

ΔAR = Axle ratio of the new vehicle—axle ratio of the baseline vehicle.

ΔETW = ETW of the new vehicle—ETW of the baseline vehicle.

(2) The purpose of this section is to accurately estimate CO<sub>2</sub> emission rates. You must apply the provisions of this section consistent with good engineering judgment. For example, do not use the equation in paragraph (g)(1) of this section where good engineering judgment indicates that it will not accurately estimate emissions. You may ask us to approve alternate equations that allow you to estimate emissions more accurately.

(3) You may select, without our prior approval, baseline test data that meet all the following criteria:

(i) Vehicles considered for selection for the baseline test must comply with all applicable emission standards in the model year associated with the ADC.

(ii) You must include in the pool of tests which will be considered for baseline selection all official tests of the

same or equivalent basic engine, transmission class, engine code, transmission code, engine horsepower, dynamometer drive wheels, and compression ratio as the ADC subconfiguration. Do not include tests in which emissions exceed any applicable standards.

(iii) Where necessary to minimize the CO<sub>2</sub> adjustment, you may supplement the pool with tests associated with worst-case engine or transmission codes and carryover or carry-across engine families. If you do, all the data that qualify for inclusion using the elected worst-case substitution (or carryover or carry-across) must be included in the pool as supplemental data (*i.e.*, individual test vehicles may not be selected for inclusion). You must also include the supplemental data in all subsequent pools, where applicable.

(iv) Tests previously used during the subject model year as baseline tests in ten other ADC subconfigurations must be eliminated from the pool. (v) Select the tested subconfiguration with the smallest absolute difference between the ADC and the test CO<sub>2</sub> emission rate for combined emissions. Use this as the baseline test for the target ADC subconfiguration.

(4) You may ask us to allow you use baseline test data not fully meeting the provisions of paragraph (g)(3) of this section.

(5) Calculate the ADC rounded to the nearest 0.1 g/mile. The downward adjustment of ADC from the baseline is limited to ADC values 20 percent below the baseline emission rate (*i.e.*, baseline emission rate  $\times$  0.80). The upward adjustment is not limited.

(6) You may not submit an ADC if an actual test has been run on the target subconfiguration during the certification process or on a development vehicle that is eligible to be declared as an emission-data vehicle.

(7) No more than 40 percent of the subconfigurations tested in your final CO<sub>2</sub> submission may be represented by ADCs.

(8) You must retain for five years the pool of tests, the vehicle description and tests chosen as the baseline and the basis for its selection, the target ADC subconfiguration, and the calculated emission rates. We may ask to see these records at any time.

(9) We may perform or order a confirmatory test of any subconfiguration covered by an ADC.

(10) Where we determine that you did not fully comply with the provisions of this paragraph (g), we may rescind the use of ADC data, require generation of actual test data, and require recalculation of your fleet-average emission rate.

(h) *Applicability of part 1037 provisions.* Except as specified in this section, the requirements of this part do not apply to vehicles certified to the standards of this section. The following provisions are the only provisions of this part that apply to vehicles certified under this section:

- (1) The provisions of this section.
- (2) [Reserved]
- (3) The air conditioning standards in §1037.115.

(4) The interim provisions of §1037.150(a), (b), (c), (e)–(i), (l), and (m).

(5) The definitions of §1037.801, to the extent such terms are used relative to vehicles subject to standards under this section.

**§ 1037.105 Exhaust emission standards for CO<sub>2</sub> for vocational vehicles.**

(a) The standards of this section apply for the following vehicles:

- (1) Vehicles above 14,000 pounds GVWR and at or below 26,000 pounds

GVWR, but not certified to the vehicle standards §1037.104.

- (2) Vehicles above 26,000 pounds GVWR that are not tractors.

(3) Vocational tractors.

(4) Vehicles at or below 14,000 pounds GVWR that are excluded from the standards in §1037.104 under §1037.104 (f) or use engines certified under §1037.150(m).

(b) The CO<sub>2</sub> standards of this section are given in Table 1 to this section. The provisions of §1037.241 specify how to comply with these standards.

TABLE 1 TO § 1037.105—CO<sub>2</sub> STANDARDS FOR VOCATIONAL VEHICLES

GVWR (pounds)	CO <sub>2</sub> standard (g/ton-mile) for model years 2014–2016	CO <sub>2</sub> standard (g/ton-mile) for model year 2017 and later
GVWR ≤ 19,500 .....	388	373
19,500 < GVWR ≤ 33,000 .....	234	225
33,000 < GVWR .....	226	222

(c) No CH<sub>4</sub> or N<sub>2</sub>O standards apply under this section. See 40 CFR part 1036 for CH<sub>4</sub> or N<sub>2</sub>O standards that apply to engines used in these vehicles.

(d) You may generate or use emission credits under the ABT program as described in subpart H of this part. This requires that you specify a Family Emission Limit (FEL) for CO<sub>2</sub> for each vehicle subfamily. The FEL may not be less than the result of emission modeling from §1037.520. These FELs serve as the emission standards for the vehicle subfamily instead of the standards specified in paragraph (b) of this section.

(e) Your vehicles must meet the exhaust emission standards of this section throughout their full useful life, expressed in service miles or calendar years, whichever comes first. The following useful life values apply for the standards of this section:

- (1) 110,000 miles or 10 years, whichever comes first, for vehicles at or below 19,500 pounds GVWR.
- (2) 185,000 miles or 10 years, whichever comes first, for vehicles above 19,500 pounds GVWR and at or below 33,000 pounds GVWR.
- (3) 435,000 miles or 10 years, whichever comes first, for vehicles above 33,000 pounds GVWR.

(f) See §1037.631 for provisions that exempt certain vehicles used in off-



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road operation from the standards of this section.

(g) You may optionally certify a vocational vehicle to the standards and useful life applicable to a higher vehicle service class (such as medium heavy-duty instead of light heavy-duty), provided you do not generate credits with the vehicle. If you include smaller vehicles in a credit-generating subfamily (with an FEL below the standard), exclude its production volume from the credit calculation.

**§ 1037.106 Exhaust emission standards for CO<sub>2</sub> for tractors above 26,000 pounds GVWR.**

(a) The CO<sub>2</sub> standards of this section apply for tractors above 26,000 pounds GVWR. Note that the standards of this section do not apply for vehicles classified as “vocational tractors” under § 1037.630.

(b) The CO<sub>2</sub> standards for tractors above 26,000 pounds GVWR are given in Table 1 to this section. The provisions of § 1037.241 specify how to comply with these standards.

TABLE 1 TO § 1037.106—CO<sub>2</sub> STANDARDS FOR TRACTORS ABOVE 26,000 POUNDS GVWR

GVWR (pounds)	Sub-category	CO <sub>2</sub> standard (g/ton-mile) for model years 2014–2016	CO <sub>2</sub> standard (g/ton-mile) for model year 2017 and later
26,000 < GVWR ≤ 33,000	Low-Roof (all cab styles)	107	104
	Mid-Roof (all cab styles)	119	115
	High-Roof (all cab styles)	124	120
GVWR > 33,000	Low-Roof Day Cab	81	80
	Low-Roof Sleeper Cab	68	66
	Mid-Roof Day Cab	88	86
	Mid-Roof Sleeper Cab	76	73
	High-Roof Day Cab	92	89
	High-Roof Sleeper Cab	75	72

(c) No CH<sub>4</sub> or N<sub>2</sub>O standards apply under this section. See 40 CFR part 1036 for CH<sub>4</sub> or N<sub>2</sub>O standards that apply to engines used in these vehicles.

(d) You may generate or use emission credits under the ABT program, as described in subpart H of this part. This requires that you specify a Family Emission Limit (FEL) for each pollutant you include in the ABT program for each vehicle subfamily. The FEL may not be less than the result of emission modeling from § 1037.520. These FELs serve as the emission standards for the specific vehicle subfamily instead of the standards specified in paragraph (a) of this section.

(e) Your vehicles must meet the exhaust emission standards of this section throughout their full useful life, expressed in service miles or calendar years, whichever comes first. The following useful life values apply for the standards of this section:

(1) 185,000 miles or 10 years, whichever comes first, for vehicles at or below 33,000 pounds GVWR.

(2) 435,000 miles or 10 years, whichever comes first, for vehicles above 33,000 pounds GVWR.

(f) You may optionally certify a tractor to the standards and useful life applicable to a higher vehicle service class (such as heavy heavy-duty instead of medium heavy-duty), provided you do not generate credits with the vehicle. If you include smaller vehicles in a credit-generating subfamily (with an FEL below the standard), exclude its production volume from the credit calculation.

**§ 1037.115 Other requirements.**

Vehicles required to meet the emission standards of this part must meet the following additional requirements, except as noted elsewhere in this part:

(a) *Adjustable parameters.* Vehicles that have adjustable parameters must meet all the requirements of this part for any adjustment in the physically adjustable range. We may require that you set adjustable parameters to any specification within the adjustable range during any testing. See 40 CFR

part 86 for information related to determining whether or not an operating parameter is considered adjustable. You must ensure safe vehicle operation throughout the physically adjustable range of each adjustable parameter, including consideration of production tolerances. Note that adjustable roof fairings are deemed not to be adjustable parameters.

(b) *Prohibited controls.* You may not design your vehicles with emission control devices, systems, or elements of design that cause or contribute to an unreasonable risk to public health, welfare, or safety while operating. For example, this would apply if the vehicle emits a noxious or toxic substance it would otherwise not emit that contributes to such an unreasonable risk.

(c) *Air conditioning leakage.* Loss of refrigerant from your air conditioning systems may not exceed 1.50 percent per year, except as allowed by paragraphs (c)(2) and (3) of this section. Calculate the total leakage rate in g/year as specified in 40 CFR 86.166. Calculate the percent leakage rate as:  $[\text{total leakage rate (g/yr)}] \div [\text{total refrigerant capacity (g)}] \times 100$ . Round your leakage rate to the nearest one-hundredth of a percent. See §1037.150 for vocational vehicles.

(1) For purpose of this requirement, “refrigerant capacity” is the total mass of refrigerant recommended by the vehicle manufacturer as representing a full charge. Where full charge is specified as a pressure, use good engineering judgment to convert the pressure and system volume to a mass.

(2) If your system uses a refrigerant other than HFC-134a, adjust your leakage rate by multiplying it by the global warming potential of your refrigerant and dividing the product by 1430 (which is the global warming potential of HFC-134a). Apply this adjustment before comparing your leakage rate to the standard. Determine global warming potentials consistent with 40 CFR 86.1866. Note that global warming potentials represent the equivalent grams of CO<sub>2</sub> that would have the same global warming impact (over 100 years) as one gram of the refrigerant.

(3) If your total refrigerant capacity is less than 734 grams, your leakage

rate may exceed 1.50 percent, as long as the total leakage rate does not exceed 11.0 g/yr. If your system uses a refrigerant other than HFC-134a, you may adjust your leakage rate as specified in paragraph (c)(2) of this section.

#### § 1037.120 Emission-related warranty requirements.

(a) *General requirements.* You must warrant to the ultimate purchaser and each subsequent purchaser that the new vehicle, including all parts of its emission control system, meets two conditions:

(1) It is designed, built, and equipped so it conforms at the time of sale to the ultimate purchaser with the requirements of this part.

(2) It is free from defects in materials and workmanship that cause the vehicle to fail to conform to the requirements of this part during the applicable warranty period.

(b) *Warranty period.* (1) Your emission-related warranty must be valid for at least:

(i) 5 years or 50,000 miles for spark-ignition vehicles and light heavy-duty vehicles.

(ii) 5 years or 100,000 miles for medium and heavy heavy-duty vehicles.

(iii) 2 years or 24,000 miles for tires.

(2) You may offer an emission-related warranty more generous than we require. The emission-related warranty for the vehicle may not be shorter than any basic mechanical warranty you provide to that owner without charge for the vehicle. Similarly, the emission-related warranty for any component may not be shorter than any warranty you provide to that owner without charge for that component. This means that your warranty for a given vehicle may not treat emission-related and non-emission-related defects differently for any component. The warranty period begins when the vehicle is placed into service.

(c) *Components covered.* The emission-related warranty covers vehicle speed limiters, idle shutdown systems, fairings, and hybrid system components, to the extent such emission-related components are included in the certified emission controls. The emission-related warranty covers all components whose failure would increase a

vehicle's emissions of air conditioning refrigerants for vehicles subject to air conditioning leakage standards. The emission-related warranty covers tires and all components whose failure would increase a vehicle's evaporative emissions (for vehicles subject to evaporative emission standards). The emission-related warranty covers these components even if another company produces the component. Your emission-related warranty does not need to cover components whose failure would not increase a vehicle's emissions of any regulated pollutant.

(d) *Limited applicability.* You may deny warranty claims under this section if the operator caused the problem through improper maintenance or use, as described in 40 CFR 1068.115.

(e) *Owner's manual.* Describe in the owners manual the emission-related warranty provisions from this section that apply to the vehicle.

**§ 1037.125 Maintenance instructions and allowable maintenance.**

Give the ultimate purchaser of each new vehicle written instructions for properly maintaining and using the vehicle, including the emission control system. The maintenance instructions also apply to service accumulation on any of your emission-data vehicles. See paragraph (i) of this section for requirements related to tire replacement.

(a) *Critical emission-related maintenance.* Critical emission-related maintenance includes any adjustment, cleaning, repair, or replacement of critical emission-related components. This may also include additional emission-related maintenance that you determine is critical if we approve it in advance. You may schedule critical emission-related maintenance on these components if you demonstrate that the maintenance is reasonably likely to be done at the recommended intervals on in-use vehicles. We will accept scheduled maintenance as reasonably likely to occur if you satisfy any of the following conditions:

(1) You present data showing that, if a lack of maintenance increases emissions, it also unacceptably degrades the vehicle's performance.

(2) You present survey data showing that at least 80 percent of vehicles in the field get the maintenance you specify at the recommended intervals.

(3) You provide the maintenance free of charge and clearly say so in your maintenance instructions.

(4) You otherwise show us that the maintenance is reasonably likely to be done at the recommended intervals.

(b) *Recommended additional maintenance.* You may recommend any additional amount of maintenance on the components listed in paragraph (a) of this section, as long as you state clearly that these maintenance steps are not necessary to keep the emission-related warranty valid. If operators do the maintenance specified in paragraph (a) of this section, but not the recommended additional maintenance, this does not allow you to disqualify those vehicles from in-use testing or deny a warranty claim. Do not take these maintenance steps during service accumulation on your emission-data vehicles.

(c) *Special maintenance.* You may specify more frequent maintenance to address problems related to special situations, such as atypical vehicle operation. You must clearly state that this additional maintenance is associated with the special situation you are addressing. We may disapprove your maintenance instructions if we determine that you have specified special maintenance steps to address vehicle operation that is not atypical, or that the maintenance is unlikely to occur in use. If we determine that certain maintenance items do not qualify as special maintenance under this paragraph (c), you may identify this as recommended additional maintenance under paragraph (b) of this section.

(d) *Noncritical emission-related maintenance.* Subject to the provisions of this paragraph (d), you may schedule any amount of emission-related inspection or maintenance that is not covered by paragraph (a) of this section (that is, maintenance that is neither explicitly identified as critical emission-related maintenance, nor that we approve as critical emission-related maintenance). Noncritical emission-related maintenance generally includes maintenance on the components we specify in 40

CFR part 1068, appendix I, that is not covered in paragraph (a) of this section. You must state in the owners manual that these steps are not necessary to keep the emission-related warranty valid. If operators fail to do this maintenance, this does not allow you to disqualify those vehicles from in-use testing or deny a warranty claim. Do not take these inspection or maintenance steps during service accumulation on your emission-data vehicles.

(e) *Maintenance that is not emission-related.* For maintenance unrelated to emission controls, you may schedule any amount of inspection or maintenance. You may also take these inspection or maintenance steps during service accumulation on your emission-data vehicles, as long as they are reasonable and technologically necessary. You may perform this non-emission-related maintenance on emission-data vehicles at the least frequent intervals that you recommend to the ultimate purchaser (but not the intervals recommended for severe service).

(f) *Source of parts and repairs.* State clearly on the first page of your written maintenance instructions that a repair shop or person of the owner's choosing may maintain, replace, or repair emission control devices and systems. Your instructions may not require components or service identified by brand, trade, or corporate name. Also, do not directly or indirectly condition your warranty on a requirement that the vehicle be serviced by your franchised dealers or any other service establishments with which you have a commercial relationship. You may disregard the requirements in this paragraph (f) if you do one of two things:

(1) Provide a component or service without charge under the purchase agreement.

(2) Get us to waive this prohibition in the public's interest by convincing us the vehicle will work properly only with the identified component or service.

(g) [Reserved]

(h) *Owner's manual.* Explain the owner's responsibility for proper maintenance in the owner's manual.

(i) *Tire maintenance and replacement.* Include instructions that will enable

the owner to replace tires so that the vehicle conforms to the original certified vehicle configuration.

#### § 1037.135 Labeling.

(a) Assign each vehicle a unique identification number and permanently affix, engrave, or stamp it on the vehicle in a legible way. The vehicle identification number (VIN) serves this purpose.

(b) At the time of manufacture, affix a permanent and legible label identifying each vehicle. The label must be—

(1) Attached in one piece so it is not removable without being destroyed or defaced.

(2) Secured to a part of the vehicle needed for normal operation and not normally requiring replacement.

(3) Durable and readable for the vehicle's entire life.

(4) Written in English.

(c) The label must—

(1) Include the heading "VEHICLE EMISSION CONTROL INFORMATION".

(2) Include your full corporate name and trademark. You may identify another company and use its trademark instead of yours if you comply with the branding provisions of 40 CFR 1068.45.

(3) Include EPA's standardized designation for the vehicle family.

(4) State the regulatory sub-category that determines the applicable emission standards for the vehicle family (see definition in §1037.801).

(5) State the date of manufacture [DAY (optional), MONTH, and YEAR]. You may omit this from the label if you stamp, engrave, or otherwise permanently identify it elsewhere on the engine, in which case you must also describe in your application for certification where you will identify the date on the engine.

(6) Identify the emission control system. Use terms and abbreviations as described in appendix III to this part or other applicable conventions.

(7) Identify any requirements for fuel and lubricants that do not involve fuel-sulfur levels.

(8) State: "THIS VEHICLE COMPLIES WITH U.S. EPA REGULATIONS FOR [MODEL YEAR] HEAVY-DUTY VEHICLES."

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(9) Include the following statement, if applicable: “THIS VEHICLE IS DESIGNED TO COMPLY WITH EVAPORATIVE EMISSION STANDARDS WITH UP TO x GALLONS OF FUEL TANK CAPACITY.” Complete this statement by identifying the maximum specified fuel tank capacity associated with your certification.

(d) You may add information to the emission control information label to identify other emission standards that the vehicle meets or does not meet (such as European standards). You may also add other information to ensure that the vehicle will be properly maintained and used.

(e) You may ask us to approve modified labeling requirements in this part 1037 if you show that it is necessary or appropriate. We will approve your request if your alternate label is consistent with the requirements of this part.

### § 1037.140 Curb weight and roof height.

(a) Where applicable, a vehicle’s curb weight and roof height are determined from nominal design specifications, as provided in this section. Round the weight to the nearest pound and height to the nearest inch. Base roof height on fully inflated tires having a static loaded radius equal to the arithmetic mean of the largest and smallest static loaded radius of tires you offer or a standard tire we approve.

(b) The nominal design specifications must be within the range of the actual weights and roof heights of production vehicles considering normal production variability. If after production begins it is determined that your nominal design specifications do not represent production vehicles, we may require you to amend your application for certification under § 1037.225.

(c) If your vehicle is equipped with an adjustable roof fairing, measure the roof height with the fairing in its lowest setting.

### § 1037.150 Interim provisions.

The provisions in this section apply instead of other provisions in this part.

(a) *Incentives for early introduction.* The provisions of this paragraph (a) apply with respect to vehicles produced

in model years before 2014. Manufacturers may voluntarily certify in model year 2013 (or earlier model years for electric vehicles) to the greenhouse gas standards of this part.

(1) This paragraph (a)(1) applies for regulatory sub-categories subject to the standards of § 1037.105 or § 1037.106. Except as specified in paragraph (a)(3) of this section, to generate early credits under this paragraph for any vehicles other than electric vehicles, you must certify your entire U.S.-directed production volume within the regulatory sub-category to these standards. Except as specified in paragraph (a)(4) of this section, if some vehicle families within a regulatory sub-category are certified after the start of the model year, you may generate credits only for production that occurs after all families are certified. For example, if you produce three vehicle families in an averaging set and you receive your certificates for those families on January 4, 2013, March 15, 2013, and April 24, 2013, you may not generate credits for model year 2013 production in any of the families that occurs before April 24, 2013. Calculate credits relative to the standard that would apply in model year 2014 using the equations in subpart H of this part. You may bank credits equal to the surplus credits you generate under this paragraph (a) multiplied by 1.50. For example, if you have 1.0 Mg of surplus credits for model year 2013, you may bank 1.5 Mg of credits. Credit deficits for an averaging set prior to model year 2014 do not carry over to model year 2014. These credits may be used to show compliance with the standards of this part for 2014 and later model years. We recommend that you notify EPA of your intent to use this provision before submitting your applications.

(2) This paragraph (a)(2) applies for regulatory sub-categories subject to the standards of § 1037.104. To generate early credits under this paragraph (a)(2) for any vehicles other than electric vehicles, you must certify your entire U.S.-directed production volume within the regulatory sub-category to these standards. If you calculate a separate fleet average for advanced-technology vehicles under § 1037.104(c)(7),

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you must certify your entire U.S.-directed production volume of both advanced and conventional vehicles within the regulatory sub-category. Except as specified in paragraph (a)(4) of this section, if some test groups are certified after the start of the model year, you may generate credits only for production that occurs after all test groups are certified. For example, if you produce three test groups in an averaging set and you receive your certificates for those test groups on January 4, 2013, March 15, 2013, and April 24, 2013, you may not generate credits for model year 2013 production in any of the test groups that occurs before April 24, 2013. Calculate credits relative to the standard that would apply in model year 2014 using the applicable equations in 40 CFR part 86 and your model year 2013 U.S.-directed production volumes. These credits may be used to show compliance with the standards of this part for 2014 and later model years. We recommend that you notify EPA of your intent to use this provision before submitting your applications.

(3) You may generate emission credits for the number of additional SmartWay designated tractors (relative to your 2012 production), provided you do not generate credits for those vehicles under paragraph (a)(1) of this

section. Calculate credits for each regulatory sub-category relative to the standard that would apply in model year 2014 using the equations in subpart H of this part. Use a production volume equal to the number of designated model year 2013 SmartWay tractors minus the number of designated model year 2012 SmartWay tractors. You may bank credits equal to the surplus credits you generate under this paragraph (a)(3) multiplied by 1.50. Your 2012 and 2013 model years must be equivalent in length.

(4) This paragraph (a)(4) applies where you do not receive your final certificate in a regulatory sub-category within 30 days of submitting your final application for that sub-category. Calculate your credits for all production that occurs 30 days or more after you submit your final application for the sub-category.

(b) *Phase-in provisions.* Each manufacturer must choose one of the following options for phasing in the standards of §1037.104:

(1) To implement the phase-in under this paragraph (b)(1), the standards in §1037.104 apply as specified for model year 2018, with compliance for vehicles in model years 2014 through 2017 based on the CO<sub>2</sub> target values specified in the following table:

TABLE 1 TO § 1037.150

Model year and engine cycle	Alternate CO <sub>2</sub> target (g/mile)
2014 Spark-Ignition .....	$[0.0482 \times (WF)] + 371$
2015 Spark-Ignition .....	$[0.0479 \times (WF)] + 369$
2016 Spark-Ignition .....	$[0.0469 \times (WF)] + 362$
2017 Spark-Ignition .....	$[0.0460 \times (WF)] + 354$
2014 Compression-Ignition .....	$[0.0478 \times (WF)] + 368$
2015 Compression-Ignition .....	$[0.0474 \times (WF)] + 366$
2016 Compression-Ignition .....	$[0.0460 \times (WF)] + 354$
2017 Compression-Ignition .....	$[0.0445 \times (WF)] + 343$

(2) To implement the phase-in under this paragraph (b)(2), the standards in §1037.104 apply as specified for model year 2019, with compliance for vehicles

in model years 2014 through 2018 based on the CO<sub>2</sub> target values specified in the following table:

TABLE 2 TO § 1037.150

Model year and engine cycle	Alternate CO <sub>2</sub> target (g/mile)
2014 Spark-Ignition .....	$[0.0482 \times (WF)] + 371$
2015 Spark-Ignition .....	$[0.0479 \times (WF)] + 369$
2016–2018 Spark-Ignition .....	$[0.0456 \times (WF)] + 352$
2014 Compression-Ignition .....	$[0.0478 \times (WF)] + 368$
2015 Compression-Ignition .....	$[0.0474 \times (WF)] + 366$

TABLE 2 TO § 1037.150—Continued

Model year and engine cycle	Alternate CO <sub>2</sub> target (g/mile)
2016–2018 Compression-Ignition .....	$[0.0440 \times (WF)] + 339$

(c) *Provisions for small manufacturers.* Manufacturers meeting the small business criteria specified in 13 CFR 121.201 for “Heavy Duty Truck Manufacturing” are not subject to the greenhouse gas standards of §§1037.104 through 1037.106, as specified in this paragraph (c). Qualifying manufacturers must notify the Designated Compliance Officer each model year before introducing these excluded vehicles into U.S. commerce. This notification must include a description of the manufacturer’s qualification as a small business under 13 CFR 121.201. You must label your excluded vehicles with the following statement: “THIS VEHICLE IS EXCLUDED UNDER 40 CFR 1037.150(c).”.

(d) *Air conditioning leakage for vocational vehicles.* The air conditioning leakage standard of §1037.115 does not apply for vocational vehicles.

(e) *Model year 2014 N<sub>2</sub>O standards.* In model year 2014 and earlier, manufacturers may show compliance with the N<sub>2</sub>O standards using an engineering analysis. This allowance also applies for later test groups families carried over from model 2014 consistent with the provisions of 40 CFR 86.1839. You may not certify to an N<sub>2</sub>O FEL different than the standard without measuring N<sub>2</sub>O emissions.

(f) *Electric vehicles.* All electric vehicles are deemed to have zero emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. No emission testing is required for electric vehicles.

(g) *Compliance date.* Compliance with the standards of this part is optional prior to January 1, 2014. This means that if your 2014 model year begins before January 1, 2014, you may certify for a partial model year that begins on January 1, 2014 and ends on the day your model year would normally end. You must label model year 2014 vehicles excluded under this paragraph (g) with the following statement: “THIS VEHICLE IS EXCLUDED UNDER 40 CFR 1037.150(g).”

(h) *Off-road vehicle exemption.* In unusual circumstances, vehicle manufac-

urers may ask us to exempt vehicles under §1037.631 based on other criteria that are equivalent to those specified in §1037.631(a). For example, we would normally not grant relief in cases where the vehicle manufacturer had credits or other compliant tires were available.

(i) *Credit multiplier for advanced technology.* If you generate credits from 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.

(j) *Limited prohibition related to early model year engines.* The prohibition in §1037.601 against introducing into U.S. commerce a vehicle containing an engine not certified to the standards of this part does not apply for vehicles using model year 2014 or 2015 spark-ignition engines, or any model year 2013 or earlier engines.

(k) *Verifying drag areas from in-use vehicles.* We may measure the drag area of your vehicles after they have been placed into service. Your vehicle conforms to the regulations of this part with respect to aerodynamic performance if we measure its drag area to be at or below the maximum drag area allowed for the bin to which that configuration was certified. To account for measurement variability, your vehicle is also deemed to conform to the regulations of this part with respect to aerodynamic performance if we measure its drag area to at or below the maximum drag area allowed for the bin above the bin to which you certified (for example, Bin II if you certified the vehicle to Bin III), unless we determine that you knowingly produced the vehicle to have a higher drag area than is allowed for the bin to which it was certified.

(l) *Optional certification under §1037.104.* You may certify certain complete or cab-complete vehicles to the standards of §1037.104. All vehicles optionally certified under this paragraph

(1) are deemed to be subject to the standards of §1037.104. Note that certification under this paragraph (1) does not affect how you may or may not certify with respect to criteria pollutants. For example, certifying a Class 4 vehicle under this paragraph does not allow you to chassis-certify these vehicles with respect to criteria emissions.

(1) You may certify complete or cab-complete spark-ignition vehicles to the standards of §1037.104.

(2) You may apply the provisions of §1037.104 to cab-complete vehicles based on a complete sister vehicle. In unusual circumstances, you may ask us to apply these provisions to Class 2b or 3 incomplete vehicles that do not meet the definition of cab-complete. Except as specified in paragraph (1)(3) of this section, for purposes of §1037.104, a complete sister vehicle is a complete vehicle of the same vehicle configuration (as defined in §1037.104) as the cab-complete vehicle. Calculate the target value under §1037.104(a) based on the same work factor value that applies for the complete sister vehicle. Test these cab-complete vehicles using the same equivalent test weight and other dynamometer settings that apply for the complete vehicle from which you used the work factor value. For certification, you may submit the test data from that complete sister vehicle instead of performing the test on the cab-complete vehicle. You are not required to produce the complete sister vehicle for sale to use the provisions of this paragraph (1)(2). This means the complete sister vehicle may be a carry-over vehicle from a prior model year or a vehicle created solely for the purpose of testing.

(3) You may use as complete sister vehicle a complete vehicle that is not of the same vehicle configuration as the cab-complete vehicle as specified in this paragraph (1)(3). This allowance applies where the complete vehicle is not of the same vehicle configuration as the cab-complete vehicle only because of factors unrelated to coastdown performance. If your complete sister vehicle is covered by this paragraph (1)(3), you may not submit the test data from that complete sister vehicle and must perform the test on the cab-complete vehicle.

(m) *Loose engine sales.* This paragraph (m) applies for spark-ignition engines identical to engines used in vehicles certified to the standards of §1037.104, where you sell such engines as loose engines or as engines installed in incomplete vehicles that are not cab-complete vehicles. For purposes of this paragraph (m), engines would not be considered to be identical if they used different engine hardware. You may include such engines in a test group certified to the standards of §1037.104, subject to the following provisions:

(1) Engines certified under this paragraph (m) are deemed to be certified to the standards of 40 CFR 1036.108 as specified in 40 CFR 1036.108(a)(4).

(2) The U.S.-directed production volume of engines you sell as loose engines or installed in incomplete heavy-duty vehicles that are not cab-complete vehicles in any given model year may not exceed ten percent of the total U.S.-directed production volume of engines of that design that you produce for heavy-duty applications for that model year, including engines you produce for complete vehicles, cab-complete vehicles, and other incomplete vehicles. The total number of engines you may certify under this paragraph (m), of all engine designs, may not exceed 15,000 in any model year. Engines produced in excess of either of these limits are not covered by your certificate. For example, if you produce 80,000 complete model year 2017 Class 2b pickup trucks with a certain engine and 10,000 incomplete model year 2017 Class 3 vehicles with that same engine, and you do not apply the provisions of this paragraph (m) to any other engine designs, you may produce up to 10,000 engines of that design for sale as loose engines under this paragraph (m). If you produced 11,000 engines of that design for sale as loose engines, the last 1,000 of them that you produced in that model year 2017 would be considered uncertified.

(3) This paragraph (m) does not apply for engines certified to the standards of 40 CFR 1036.108(a)(1).

(4) Label the engines as specified in 40 CFR 1036.135 including the following compliance statement: "THIS ENGINE WAS CERTIFIED TO THE ALTERNATE GREENHOUSE GAS EMISSION



STANDARDS OF 40 CFR 1036.108(a)(4).” List the test group name instead of an engine family name.

(5) Vehicles using engines certified under this paragraph (m) are subject to the emission standards of §1037.105.

(6) For certification purposes, your engines are deemed to have a CO<sub>2</sub> target value and test result equal to the CO<sub>2</sub> target value and test result for the complete vehicle in the applicable test group with the highest equivalent test weight, except as specified in paragraph (m)(6)(ii) of this section. Use these values to calculate your target value, fleet-average emission rate, and in-use emission standard. Where there are multiple complete vehicles with the same highest equivalent test weight, select the CO<sub>2</sub> target value and test result as specified in paragraphs (m)(6)(i) and (ii) of this section:

(i) If one or more of the CO<sub>2</sub> test results exceed the applicable target value, use the CO<sub>2</sub> target value and test result of the vehicle that exceeds its target value by the greatest amount.

(ii) If none of the CO<sub>2</sub> test results exceed the applicable target value, select the highest target value and set the test result equal to it. This means that you may not generate emission credits from vehicles certified under this paragraph (m).

(7) State in your applications for certification that your test group and engine family will include engines certified under this paragraph (m). This applies for your greenhouse gas vehicle test group and your criteria pollutant engine family. List in each application the name of the corresponding test group/engine family.

**Subpart C—Certifying Vehicle families**

**§ 1037.201 General requirements for obtaining a certificate of conformity.**

(a) You must send us a separate application for a certificate of conformity for each vehicle family. A certificate of conformity is valid from the indicated effective date until the end of the model year for which it is issued, which may not extend beyond December 31 of that year. You must renew

your certification annually for any vehicles you continue to produce.

(b) The application must contain all the information required by this part and must not include false or incomplete statements or information (see §1037.255).

(c) We may ask you to include less information than we specify in this subpart, as long as you maintain all the information required by §1037.250.

(d) You must use good engineering judgment for all decisions related to your application (see 40 CFR 1068.5).

(e) An authorized representative of your company must approve and sign the application.

(f) See §1037.255 for provisions describing how we will process your application.

(g) We may perform confirmatory testing on your vehicles; for example, we may test vehicles to verify drag areas or other GEM inputs. We may require you to deliver your test vehicles to a facility we designate for our testing. Alternatively, you may choose to deliver another vehicle that is identical in all material respects to the test vehicle. Where certification is based on testing components such as tires, we may require you to deliver test components to a facility we designate for our testing.

**§ 1037.205 What must I include in my application?**

This section specifies the information that must be in your application, unless we ask you to include less information under §1037.201(c). We may require you to provide additional information to evaluate your application. Note that references to testing and emission-data vehicles refer to testing vehicles to measure aerodynamic drag, assess hybrid vehicle performance, and/or measure evaporative emissions.

(a) Describe the vehicle family’s specifications and other basic parameters of the vehicle’s design and emission controls. List the fuel type on which your vehicles are designed to operate (for example, ultra low-sulfur diesel fuel).

(b) Explain how the emission control system operates. As applicable, describe in detail all system components for controlling greenhouse gas and

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evaporative emissions, including all auxiliary emission control devices (AECDs) and all fuel-system components you will install on any production vehicle. Identify the part number of each component you describe. For this paragraph (b), treat as separate AECDs any devices that modulate or activate differently from each other.

(c) For vehicles subject to air conditioning standards, include:

(1) The refrigerant leakage rates (leak scores).

(2) The refrigerant capacity of the air conditioning systems.

(3) The corporate name of the final installer of the air conditioning system.

(d) Describe any vehicles you selected for testing and the reasons for selecting them.

(e) Describe any test equipment and procedures that you used, including any special or alternate test procedures you used (see §1037.501).

(f) Describe how you operated any emission-data vehicle before testing, including the duty cycle and the number of vehicle operating miles used to stabilize emission levels. Explain why you selected the method of service accumulation. Describe any scheduled maintenance you did.

(g) List the specifications of any test fuel to show that it falls within the required ranges we specify in 40 CFR part 1065.

(h) Identify the vehicle family's useful life.

(i) Include the maintenance instructions and warranty statement you will give to the ultimate purchaser of each new vehicle (see §§1037.120 and 1037.125).

(j) Describe your emission control information label (see §1037.135).

(k) Identify the emission standards or FELs to which you are certifying vehicles in the vehicle family. For families containing multiple subfamilies, this means that you must identify multiple CO<sub>2</sub> FELs. For example, you may identify the highest and lowest FELs to which any of your subfamilies will be certified and also list all possible FELs in between (which will be in 1 g/ton-mile increments).

(l) Where applicable, identify the vehicle family's deterioration factors and describe how you developed them.

Present any emission test data you used for this (see §1037.241(c)).

(m) Where applicable, state that you operated your emission-data vehicles as described in the application (including the test procedures, test parameters, and test fuels) to show you meet the requirements of this part.

(n) Present evaporative test data to show your vehicles meet the evaporative emission standards we specify in subpart B of this part, if applicable. Report all valid test results from emission-data vehicles and indicate whether there are test results from invalid tests or from any other tests of the emission-data vehicle, whether or not they were conducted according to the test procedures of subpart F of this part. We may require you to report these additional test results. We may ask you to send other information to confirm that your tests were valid under the requirements of this part and 40 CFR part 86.

(o) Report modeling results for ten configurations. Include modeling inputs and detailed descriptions of how they were derived. Unless we specify otherwise, include the configuration with the highest modeling result, the lowest modeling result, and the configurations with the highest projected sales.

(p) Describe all adjustable operating parameters (see §1037.115), including production tolerances. You do not need to include parameters that do not affect emissions covered by your application. Include the following in your description of each parameter:

(1) The nominal or recommended setting.

(2) The intended physically adjustable range.

(3) The limits or stops used to establish adjustable ranges.

(4) Information showing why the limits, stops, or other means of inhibiting adjustment are effective in preventing adjustment of parameters on in-use vehicles to settings outside your intended physically adjustable ranges.

(q) [Reserved]

(r) Unconditionally certify that all the vehicles in the vehicle family comply with the requirements of this part, other referenced parts of the CFR, and the Clean Air Act.

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(s) Include good-faith estimates of U.S.-directed production volumes by subfamily. We may require you to describe the basis of your estimates.

(t) Include the information required by other subparts of this part. For example, include the information required by §1037.725 if you participate in the ABT program.

(u) Include other applicable information, such as information specified in this part or 40 CFR part 1068 related to requests for exemptions.

(v) Name an agent for service located in the United States. Service on this agent constitutes service on you or any of your officers or employees for any action by EPA or otherwise by the United States related to the requirements of this part.

### **§ 1037.210 Preliminary approval before certification.**

If you send us information before you finish the application, we may review it and make any appropriate determinations. Decisions made under this section are considered to be preliminary approval, subject to final review and approval. We will generally not reverse a decision where we have given you preliminary approval, unless we find new information supporting a different decision. If you request preliminary approval related to the upcoming model year or the model year after that, we will make best-efforts to make the appropriate determinations as soon as practicable. We will generally not provide preliminary approval related to a future model year more than two years ahead of time.

### **§ 1037.220 Amending maintenance instructions.**

You may amend your emission-related maintenance instructions after you submit your application for certification as long as the amended instructions remain consistent with the provisions of §1037.125. You must send the Designated Compliance Officer a written request to amend your application for certification for a vehicle family if you want to change the emission-related maintenance instructions in a way that could affect emissions. In your request, describe the proposed changes to the maintenance instruc-

tions. If operators follow the original maintenance instructions rather than the newly specified maintenance, this does not allow you to disqualify those vehicles from in-use testing or deny a warranty claim.

(a) If you are decreasing or eliminating any specified maintenance, you may distribute the new maintenance instructions to your customers 30 days after we receive your request, unless we disapprove your request. This would generally include replacing one maintenance step with another. We may approve a shorter time or waive this requirement.

(b) If your requested change would not decrease the specified maintenance, you may distribute the new maintenance instructions anytime after you send your request. For example, this paragraph (b) would cover adding instructions to increase the frequency of filter changes for vehicles in severe-duty applications.

(c) You need not request approval if you are making only minor corrections (such as correcting typographical mistakes), clarifying your maintenance instructions, or changing instructions for maintenance unrelated to emission control. We may ask you to send us copies of maintenance instructions revised under this paragraph (c).

### **§ 1037.225 Amending applications for certification.**

Before we issue you a certificate of conformity, you may amend your application to include new or modified vehicle configurations, subject to the provisions of this section. After we have issued your certificate of conformity, you may send us an amended application requesting that we include new or modified vehicle configurations within the scope of the certificate, subject to the provisions of this section. You must amend your application if any changes occur with respect to any information that is included or should be included in your application.

(a) You must amend your application before you take any of the following actions:

(1) Add a vehicle configuration to a vehicle family. In this case, the vehicle configuration added must be consistent with other vehicle configurations in

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the vehicle family with respect to the criteria listed in §1037.230.

(2) Change a vehicle configuration already included in a vehicle family in a way that may affect emissions, or change any of the components you described in your application for certification. This includes production and design changes that may affect emissions any time during the vehicle's lifetime.

(3) Modify an FEL for a vehicle family as described in paragraph (f) of this section.

(b) To amend your application for certification, send the relevant information to the Designated Compliance Officer.

(1) Describe in detail the addition or change in the vehicle model or configuration you intend to make.

(2) Include engineering evaluations or data showing that the amended vehicle family complies with all applicable requirements. You may do this by showing that the original emission-data vehicle is still appropriate for showing that the amended family complies with all applicable requirements.

(3) If the original emission-data vehicle or emission modeling for the vehicle family is not appropriate to show compliance for the new or modified vehicle configuration, include new test data or emission modeling showing that the new or modified vehicle configuration meets the requirements of this part.

(c) We may ask for more test data or engineering evaluations. You must give us these within 30 days after we request them.

(d) For vehicle families already covered by a certificate of conformity, we will determine whether the existing certificate of conformity covers your newly added or modified vehicle. You may ask for a hearing if we deny your request (see §1037.820).

(e) For vehicle families already covered by a certificate of conformity, you may start producing the new or modified vehicle configuration anytime after you send us your amended application and before we make a decision under paragraph (d) of this section. However, if we determine that the affected vehicles do not meet applicable requirements, we will notify you to

cease production of the vehicles and may require you to recall the vehicles at no expense to the owner. Choosing to produce vehicles under this paragraph (e) is deemed to be consent to recall all vehicles that we determine do not meet applicable emission standards or other requirements and to remedy the nonconformity at no expense to the owner. If you do not provide information required under paragraph (c) of this section within 30 days after we request it, you must stop producing the new or modified vehicles.

(f) You may ask us to approve a change to your FEL in certain cases after the start of production. The changed FEL may not apply to vehicles you have already introduced into U.S. commerce, except as described in this paragraph (f). You may ask us to approve a change to your FEL in the following cases:

(1) You may ask to raise your FEL for your vehicle subfamily at any time. In your request, you must show that you will still be able to meet the emission standards as specified in subparts B and H of this part. Use the appropriate FELs with corresponding production volumes to calculate emission credits for the model year, as described in subpart H of this part.

(2) Where testing applies, you may ask to lower the FEL for your vehicle subfamily only if you have test data from production vehicles showing that emissions are below the proposed lower FEL. Otherwise, you may ask to lower your FEL for your vehicle subfamily at any time. The lower FEL applies only to vehicles you produce after we approve the new FEL. Use the appropriate FELs with corresponding production volumes to calculate emission credits for the model year, as described in subpart H of this part.

(3) You may ask to add an FEL for your vehicle family at any time.

### **§ 1037.230 Vehicle families, sub-families, and configurations.**

(a) For purposes of certifying your vehicles to greenhouse gas standards, divide your product line into families of vehicles as specified in this section. Your vehicle family is limited to a single model year. Group vehicles in the

same vehicle family if they are the same in all the following aspects:

(1) The regulatory sub-category (or equivalent in the case of vocational tractors), as follows:

(i) Vocational vehicles at or below 19,500 pounds GVWR.

(ii) Vocational vehicles (other than vocational tractors) above 19,500 pounds GVWR and at or below 33,000 pounds GVWR.

(iii) Vocational vehicles (other than vocational tractors) above 33,000 pounds GVWR.

(iv) Low-roof tractors above 26,000 pounds GVWR and at or below 33,000 pounds GVWR.

(v) Mid-roof tractors above 26,000 pounds GVWR and at or below 33,000 pounds GVWR.

(vi) High-roof tractors above 26,000 pounds GVWR and at or below 33,000 pounds GVWR.

(vii) Low-roof day cab tractors above 33,000 pounds GVWR.

(viii) Low-roof sleeper cab tractors above 33,000 pounds GVWR.

(ix) Mid-roof day cab tractors above 33,000 pounds GVWR.

(x) Mid-roof sleeper cab tractors above 33,000 pounds GVWR.

(xi) High-roof day cab tractors above 33,000 pounds GVWR.

(xii) High-roof sleeper cab tractors above 33,000 pounds GVWR.

(xiii) Vocational tractors.

(2) Vehicle technology as follows:

(i) Group together vehicles that do not contain advanced or innovative technologies.

(ii) Group together vehicles that contain the same advanced/innovative technologies.

(b) If the vehicles in your family are being certified to more than one FEL, subdivide your greenhouse gas vehicle families into subfamilies that include vehicles with identical FELs. Note that you may add subfamilies at any time during the model year.

(c) Group vehicles into configurations consistent with the definition of “vehicle configuration” in §1037.801. Note that vehicles with hardware or software differences that are related to measured or modeled emissions are considered to be different vehicle configurations even if they have the same GEM inputs and FEL. Note also, that

you are not required to separately identify all configurations for certification. See paragraph (g) of this section for provisions allowing you to group certain hardware differences into the same configuration. Note that you are not required to identify all possible configurations for certification; also, you are required to include in your end-of year report only those configurations you produced.

(d) For a vehicle model that straddles a roof-height, cab type, or GVWR division, you may include all the vehicles in the same vehicle family if you certify the vehicle family to the more stringent standards. For roof height, this means you must certify to the taller roof standards. For cab-type and GVWR, this means you must certify to the numerically lower standards.

(e) [Reserved]

(f) You may divide your families into more families than specified in this section.

(g) You may ask us to allow you to group into the same configuration vehicles that have very small body hardware differences that do not significantly affect drag areas. Note that this allowance does not apply for substantial differences, even if the vehicles have the same measured drag areas.

**§ 1037.241 Demonstrating compliance with exhaust emission standards for greenhouse gas pollutants.**

(a) For purposes of certification, your vehicle family is considered in compliance with the emission standards in §1037.105 or §1037.106 if all vehicle configurations in that family have modeled CO<sub>2</sub> emission rates (as specified in subpart F of this part) at or below the applicable standards. See 40 CFR part 86, subpart S, for showing compliance with the standards of §1037.104. Note that your FELs are considered to be the applicable emission standards with which you must comply if you participate in the ABT program in subpart H of this part.

(b) Your vehicle family is deemed not to comply if any vehicle configuration in that family has a modeled CO<sub>2</sub> emission rate that is above its FEL.

(c) We may require you to provide an engineering analysis showing that the performance of your emission controls

will not deteriorate during the useful life with proper maintenance. If we determine that your emission controls are likely to deteriorate during the useful life, we may require you to develop and apply deterioration factors consistent with good engineering judgment. For example, you may need to apply a deterioration factor to address deterioration of battery performance for an electric hybrid vehicle. Where the highest useful life emissions occur between the end of useful life and at the low-hour test point, base deterioration factors for the vehicles on the difference between (or ratio of) the point at which the highest emissions occur and the low-hour test point.

**§ 1037.250 Reporting and record-keeping.**

(a) Within 90 days after the end of the model year, send the Designated Compliance Officer a report including the total U.S.-directed production volume of vehicles you produced in each vehicle family during the model year (based on information available at the time of the report). Report by vehicle identification number and vehicle configuration and identify the subfamily identifier. Report uncertified vehicles sold to secondary vehicle manufacturers. Small manufacturers may omit the reporting requirements of this paragraph (a).

(b) Organize and maintain the following records:

(1) A copy of all applications and any summary information you send us.

(2) Any of the information we specify in § 1037.205 that you were not required to include in your application.

(3) A detailed history of each emission-data vehicle, if applicable.

(4) Production figures for each vehicle family divided by assembly plant.

(5) Keep a list of vehicle identification numbers for all the vehicles you produce under each certificate of conformity.

(c) Keep routine data from emission tests required by this part (such as test cell temperatures and relative humidity readings) for one year after we issue the associated certificate of conformity. Keep all other information specified in this section for eight years after we issue your certificate.

(d) Store these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them. You must keep these records readily available. We may review them at any time.

**§ 1037.255 What decisions may EPA make regarding my certificate of conformity?**

(a) If we determine your application is complete and shows that the vehicle family meets all the requirements of this part and the Act, we will issue a certificate of conformity for your vehicle family for that model year. We may make the approval subject to additional conditions.

(b) We may deny your application for certification if we determine that your vehicle family fails to comply with emission standards or other requirements of this part or the Clean Air Act. We will base our decision on all available information. If we deny your application, we will explain why in writing.

(c) In addition, we may deny your application or suspend or revoke your certificate if you do any of the following:

(1) Refuse to comply with any testing or reporting requirements.

(2) Submit false or incomplete information (paragraph (e) of this section applies if this is fraudulent). This includes doing anything after submission of your application to render any of the submitted information false or incomplete.

(3) Render any test data inaccurate.

(4) Deny us from completing authorized activities despite our presenting a warrant or court order (see 40 CFR 1068.20). This includes a failure to provide reasonable assistance.

(5) Produce vehicles for importation into the United States at a location where local law prohibits us from carrying out authorized activities.

(6) Fail to supply requested information or amend your application to include all vehicles being produced.

(7) Take any action that otherwise circumvents the intent of the Act or this part, with respect to your engine family.

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(d) We may void the certificate of conformity for a vehicle family if you fail to keep records, send reports, or give us information as required under this part or the Act. Note that these are also violations of 40 CFR 1068.101(a)(2).

(e) We may void your certificate if we find that you intentionally submitted false or incomplete information. This includes rendering submitted information false or incomplete after submission.

(f) If we deny your application or suspend, revoke, or void your certificate, you may ask for a hearing (see § 1037.820).

### Subpart D [Reserved]

### Subpart E—In-Use Testing

#### § 1037.401 General provisions.

We may perform in-use testing of any vehicle subject to the standards of this part. For example, we may test vehicles to verify drag areas or other GEM inputs.

### Subpart F—Test and Modeling Procedures

#### § 1037.501 General testing and modeling provisions.

This subpart specifies how to perform emission testing and emission modeling required elsewhere in this part.

(a) [Reserved]

(b) Where exhaust emission testing is required, use the equipment and procedures in 40 CFR part 1066 to determine whether your vehicles meet the duty-cycle emission standards in subpart B of this part. Measure the emissions of all the exhaust constituents subject to emission standards as specified in 40 CFR part 1066. Use the applicable duty cycles specified in § 1037.510.

(c) [Reserved]

(d) Use the applicable fuels specified 40 CFR part 1065 to perform valid tests.

(1) For service accumulation, use the test fuel or any commercially available fuel that is representative of the fuel that in-use vehicles will use.

(2) For diesel-fueled vehicles, use the appropriate diesel fuel specified for emission testing. Unless we specify

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otherwise, the appropriate diesel test fuel is ultra low-sulfur diesel fuel.

(3) For gasoline-fueled vehicles, use the gasoline specified for “General Testing”.

(e) You may use special or alternate procedures as specified in 40 CFR 1065.10.

(f) This subpart is addressed to you as a manufacturer, but it applies equally to anyone who does testing for you, and to us when we perform testing to determine if your vehicles meet emission standards.

(g) Apply this paragraph (g) whenever we specify use of standard trailers. Unless otherwise specified, a tolerance of  $\pm 2$  inches applies for all nominal trailer dimensions.

(1) The standard trailer for high-roof tractors must meet the following criteria:

(i) It is an unloaded two-axle dry van box trailer 53.0 feet long, 102 inches wide, and 162 inches high (measured from the ground with the trailer level).

(ii) It has a king pin located with its center  $36\pm 0.5$  inches from the front of the trailer and a minimized trailer gap (no greater than 45 inches).

(iii) It has a smooth surface with nominally flush rivets and does not include any aerodynamic features such as side fairings, boat tails, or gap reducers. It may have a scuff band of no more than 0.13 inches in thickness.

(iv) It includes dual 22.5 inch wheels, standard mudflaps, and standard landing gear. The centerline of the rear-most axle must be 146 inches from the rear of the trailer.

(2) The standard trailer for mid-roof tractors is an empty two-axle tanker trailer  $42\pm 1$  feet long by 140 inches high.

(i) It has a  $40\pm 1$  feet long cylindrical tank with a  $7000\pm 7$  gallon capacity, smooth surface, and rounded ends.

(ii) The standard tanker trailer does not include any aerodynamic features such as side fairings, but does include a centered 20 inch manhole, side-centered ladder, and lengthwise walkway. It includes dual 24.5 inch wheels.

(3) The standard trailer for low-roof tractors is an unloaded two-axle flat bed trailer  $53\pm 1$  feet long and 102 inches wide.

(i) The deck height is  $60.0\pm 0.5$  inches in the front and  $55.0\pm 0.5$  inches in the

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rear. The standard trailer does not include any aerodynamic features such as side fairings.

(ii) It includes an air suspension and dual 22.5 inch wheels on tandem axles spread up to 122 inches apart between axle centerlines, measured along the length of the trailer.

**§ 1037.510 Duty-cycle exhaust testing.**

This section applies where exhaust emission testing is required, such as when applying the provisions of §1037.615. Note that for most vehicles, testing under this section is not required.

(a) Where applicable, measure emissions by testing the vehicle on a chassis dynamometer with the applicable

test cycles. Each test cycle consists of a series of speed commands over time: variable speeds for the transient test and constant speeds for the cruise tests. None of these cycles include vehicle starting or warmup; each test cycle begins with a running, warmed-up vehicle. Start sampling emissions at the start of each cycle. The transient cycle is specified in appendix I to this part. For the 55 mph and 65 mph cruise cycles, sample emissions for 300 second cycles with constant vehicle speeds of 55.0 mph and 65.0 mph, respectively. The tolerance around these speed set-points is ±1.0 mph.

(b) Calculate the official emission result from the following equation:

$$Emissions \left( \frac{g}{ton-mile} \right) = \frac{1}{payload (tons)} \cdot \left( \frac{w_{transient} \cdot m_{transient}}{D_{transient}} + \frac{w_{55} \cdot m_{55}}{D_{55}} + \frac{w_{65} \cdot m_{65}}{D_{65}} \right)$$

Where:

*payload* = the standard payload, in tons, as specified in §1037.705.

*w* = weighting factor for the appropriate test cycle, as described in paragraph (c) of this section.

*m* = grams of CO<sub>2</sub> emitted over the appropriate test cycle.

*D* = miles driven over the appropriate test cycle.

(c) Apply weighting factors specific to each type of vehicle and for each duty cycle as described in the following table:

TABLE 1 TO § 1037.510—WEIGHTING FACTORS FOR DUTY CYCLES

	Transient (%)	55 mph cruise (%)	65 mph cruise (%)
Vocational .....	42	21	37
Vocational Hybrid Vehicles .....	75	9	16
Day Cabs .....	19	17	64
Sleeper Cabs .....	5	9	86

(d) For transient testing, compare actual second-by-second vehicle speed with the speed specified in the test cycle and ensure any differences are consistent with the criteria as specified in 40 CFR part 1066. If the speeds do not conform to these criteria, the test is not valid and must be repeated.

(e) Run test cycles as specified in 40 CFR part 86. For cruise cycle testing of vehicles equipped with cruise control, use the vehicle's cruise control to control the vehicle speed. For vehicles equipped with adjustable VSLs, test

the vehicle with the VSL at its highest setting.

(f) Test the vehicle using its adjusted loaded vehicle weight, unless we determine this would be unrepresentative of in-use operation as specified in 40 CFR 1065.10(c)(1).

(g) For hybrid vehicles, correct for the net energy change of the energy storage device as described in 40 CFR 1066.501.



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§ 1037.520 Modeling CO<sub>2</sub> emissions to show compliance.

This section describes how to use the GEM simulation tool (incorporated by reference in §1037.810) to show compliance with the CO<sub>2</sub> standards of §§1037.105 and 1037.106. Use good engineering judgment when demonstrating compliance using the GEM.

(a) *General modeling provisions.* To run the GEM, enter all applicable inputs as specified by the model. All seven of the following inputs apply for sleeper cab tractors, while some do not apply for other regulatory subcategories:

- (1) Regulatory subcategory (such as “Class 8 Combination—Sleeper Cab—High Roof”).
- (2) Coefficient of aerodynamic drag, as described in paragraph (b) of this section. Leave this field blank for vocational vehicles.
- (3) Steer tire rolling resistance, as described in paragraph (c) of this section.
- (4) Drive tire rolling resistance, as described in paragraph (c) of this section.

(5) Vehicle speed limit, as described in paragraph (d) of this section. Leave this field blank for vocational vehicles.

(6) Vehicle weight reduction, as described in paragraph (e) of this section. Leave this field blank for vocational vehicles.

(7) Extended idle reduction credit, as described in paragraph (f) of this section. Leave this field blank for vehicles other than Class 8 sleeper cabs.

(b) *Coefficient of aerodynamic drag and drag area.* Determine the appropriate drag area as follows:

(1) Use the recommended method or an alternate method to establish a value for the vehicle’s drag area, expressed in m<sup>2</sup> and rounded to two decimal places. Where we allow you to group multiple configurations together, measure the drag area of the worst-case configuration. Measure drag areas specified in §1037.521.

(2) Determine the bin level for your vehicle based on the drag area from paragraph (b)(1) of this section as shown in the following tables:

TABLE 1 TO § 1037.520—HIGH-ROOF DAY AND SLEEPER CABS

Bin level	If your measured C <sub>D</sub> A (m <sup>2</sup> ) is . . .	Then your C <sub>D</sub> input is . . .
High-Roof Day Cabs		
Bin I	≥ 8.0	0.79
Bin II	7.1–7.9	0.72
Bin III	6.2–7.0	0.63
Bin IV	5.6–6.1	0.56
Bin V	≤ 5.5	0.51
High-Roof Sleeper Cabs		
Bin I	≥ 7.6	0.75
Bin II	6.7–7.5	0.68
Bin III	5.8–6.6	0.60
Bin IV	5.2–5.7	0.52
Bin V	≤ 5.1	0.47

TABLE 2 TO § 1037.520— LOW-ROOF DAY AND SLEEPER CABS

Bin level	If your measured C <sub>D</sub> A (m <sup>2</sup> ) is . . .	Then your C <sub>D</sub> input is . . .
Low-Roof Day and Sleeper Cabs		
Bin I	≥ 5.1	0.77
Bin II	≤ 5.0	0.71
Mid-Roof Day and Sleeper Cabs		
Bin I	≥ 5.6	0.87
Bin II	≤ 5.5	0.82

(3) For low- and mid-roof tractors, you may determine your drag area bin based on the drag area bin of an equivalent high-roof tractor. If the high-roof tractor is in Bin I or Bin II, then you may assume your equivalent low- and mid-roof tractors are in Bin I. If the high-roof tractor is in Bin III, Bin IV, or Bin V, then you may assume your equivalent low- and mid-roof tractors are in Bin II.

(c) *Steer and drive tire rolling resistance.* You must have a tire rolling resistance level (TRRL) for each tire configuration. For purposes of this section, you may consider tires with the same SKU number to be the same configuration.

(1) Measure tire rolling resistance in kg per metric ton as specified in ISO 28580 (incorporated by reference in §1037.810), except as specified in this paragraph (c). Use good engineering judgment to ensure that your test results are not biased low. You may ask us to identify a reference test laboratory to which you may correlate your test results. Prior to beginning the test procedure in Section 7 of ISO 28580 for a new bias-ply tire, perform a break-in procedure by running the tire at the specified test speed, load, and pressure for 60±2 minutes.

(2) For each tire design tested, measure rolling resistance of at least three different tires of that specific design and size. Perform the test at least once for each tire. Use the arithmetic mean of these results as your test result. You may use this value as your GEM input or select a higher TRRL. You must test at least one tire size for each tire model, and may use engineering analysis to determine the rolling resistance of other tire sizes of that model. Note that for tire sizes that you do not test, we will treat your analytically derived rolling resistances the same as test results, and we may perform our own testing to verify your values. We may require you to test a small sub-sample of untested tire sizes that we select.

(3) If you obtain your test results from the tire manufacturer or another third party, you must obtain a signed statement from them verifying the

tests were conducted according to the requirements of this part. Such statements are deemed to be submissions to EPA.

(4) For tires marketed as light truck tires and that have load ranges C, D, or E, use as the GEM input TRRL at or above the measured rolling resistance multiplied by 0.87.

(d) *Vehicle speed limit.* If the vehicles will be equipped with a vehicle speed limiter, input the maximum vehicle speed to which the vehicle will be limited (in miles per hour rounded to the nearest 0.1 mile per hour) as specified in §1037.640. Otherwise leave this field blank. Use good engineering judgment to ensure the limiter is tamper resistant. We may require you to obtain preliminary approval for your designs.

(e) *Vehicle weight reduction.* For purposes of this paragraph (e), high-strength steel is steel with tensile strength at or above 350 MPa.

(1) Vehicle weight reduction inputs for wheels are specified relative to dual-wide tires with conventional steel wheels. For purposes of this paragraph (e)(1), a light-weight aluminum wheel is one that weighs at least 21 lb less than a comparable conventional steel wheel. The inputs are listed in Table 4 to this section. For example, a tractor with aluminum steel wheels and eight (4×2) dual-wide aluminum drive wheels would have an input of 210 lb (2×21 + 8×21).

TABLE 3 TO § 1037.520—WHEEL-RELATED WEIGHT REDUCTIONS

Weight reduction technology	Weight reduction (lb per tire or wheel)
Single-Wide Drive Tire with	
Steel Wheel .....	84
Aluminum Wheel .....	139
Light-Weight Aluminum Wheel .....	147
Steer Tire or Dual-wide Drive Tire with . . .	
High-Strength Steel Wheel .....	8
Aluminum Wheel .....	21
Light-Weight Aluminum Wheel .....	30

(2) Vehicle weight reduction inputs for components other than wheels are specified relative to mild steel components as specified in the following table:

TABLE 4 TO § 1037.520—NONWHEEL-RELATED WEIGHT REDUCTIONS

Weight reduction technologies	Aluminum weight reduction (lb)	High-strength steel weight reduction (lb)
Door .....	20	6
Roof .....	60	18
Cab rear wall .....	49	16
Cab floor .....	56	18
Hood Support Structure System .....	15	3
Fairing Support Structure System .....	35	6
Instrument Panel Support Structure .....	5	1
Brake Drums—Drive (4) .....	140	11
Brake Drums—Non Drive (2) .....	60	8
Frame Rails .....	440	87
Crossmember—Cab .....	15	5
Crossmember—Suspension .....	25	6
Crossmember—Non Suspension (3) .....	15	5
Fifth Wheel .....	100	25
Radiator Support .....	20	6
Fuel Tank Support Structure .....	40	12
Steps .....	35	6
Bumper .....	33	10
Shackles .....	10	3
Front Axle .....	60	15
Suspension Brackets, Hangers .....	100	30
Transmission Case .....	50	12
Clutch Housing .....	40	10
Drive Axle Hubs (8) .....	160	4
Non Drive Front Hubs (2) .....	40	5
Driveshaft .....	20	5
Transmission/Clutch Shift Levers .....	20	4

(3) You may ask to apply the innovative technology provisions of §1037.610 for weight reductions not covered by this paragraph (e).

(f) *Extended idle reduction credit.* If your tractor is equipped with idle reduction technology meeting the requirements of §1037.660 that will automatically shut off the main engine after 300 seconds or less, use 5.0 g/ton-mile as the input (or a lesser value specified in §1037.660). Otherwise leave this field blank.

**§ 1037.521 Aerodynamic measurements.**

This section describes how to determine the aerodynamic drag area ( $C_D A$ ) of your vehicle using the coastdown procedure in 40 CFR part 1066 or an alternative method correlated to it.

(a) *General.* The primary method for measuring the aerodynamic drag area of vehicles is specified in paragraph (b) of this section. You may determine the drag area using an alternate method, consistent with the provisions of this section and good engineering judgment, based on wind tunnel testing, computational fluid dynamic modeling, or constant-speed road load testing.

See 40 CFR 1068.5 for provisions describing how we may evaluate your engineering judgment. All drag areas measured using an alternative method ( $C_{DA_{alt}}$ ) must be adjusted to be equivalent to the corresponding drag areas that would have been measured using the coastdown procedure as follows:

(1) Unless good engineering judgment requires otherwise, assume that coastdown drag areas are proportional to drag areas measured using alternative methods. This means you may apply a single constant adjustment factor ( $F_{alt-aero}$ ) for a given alternate drag area method using the following equation:

$$C_{DA} = C_{DA_{alt}} \times F_{alt-aero}$$

(2) Determine  $F_{alt-aero}$  by performing coastdown testing and applying your alternate method on the same vehicle. Unless we approve another vehicle, the vehicle must be a Class 8, high-roof, sleeper cab with a full aerodynamics package, pulling a standards trailer. Where you have more than one model meeting these criteria, use the model with the highest projected sales. If you do not have such a model you may use your most comparable model with

prior approval. If good engineering judgment allows the use of a single, constant value of  $F_{\text{alt-aero}}$ , calculate it from this coastdown drag area ( $C_{D A_{\text{coast}}}$ ) divided by alternative drag area ( $C_{D A_{\text{alt}}}$ ):

$$F_{\text{alt-aero}} = C_{D A_{\text{coast}}} \div C_{D A_{\text{alt}}}$$

(3) Calculate  $F_{\text{alt-aero}}$  to at least three decimal places. For example, if your coastdown testing results in a drag area of 6.430, but your wind tunnel method results in a drag area of 6.200,  $F_{\text{alt-aero}}$  would be 1.037.

(b) *Recommended method.* Perform coastdown testing as described in 40 CFR part 1066, subpart D, subject to the following additional provisions:

(1) The specifications of this paragraph (b)(1) apply when measuring drag areas for tractors. Test high-roof tractors with a standard box trailer. Test low- and mid-roof tractors without a trailer (sometimes referred to as in a “bobtail configuration”). You may test low- and mid-roof tractors with a trailer to evaluate innovative technologies.

(2) The specifications of this paragraph (b)(2) apply for tractors and standard trailers. Use tires mounted on steel rims in a dual configuration (except for steer tires). The tires must—

(i) Be SmartWay-Verified tires or have a rolling resistance below 5.1 kg/ton.

(ii) Have accumulated at least 2,175 miles of prior use but have no less than 50 percent of their original tread depth (as specified for truck cabs in SAE J1263).

(iii) Not be retreads or have any apparent signs of chunking or uneven wear.

(iv) Be size 295/75R22.5 or 275/80R22.5.

(3) Calculate the drag area ( $C_{D A}$ ) in  $\text{m}^2$  from the coastdown procedure specified in 40 CFR part 1066.

(c) *Approval.* You must obtain preliminary approval before using any methods other than coastdown testing to determine drag coefficients. Send your request for approval to the Designated Compliance Officer. Keep records of the information specified in this paragraph (c). Unless we specify otherwise, include this information with your request. You must provide any information we require to evaluate whether you are apply the provisions of

this section consistent with good engineering judgment.

(1) Include all of the following for your coastdown results:

(i) The name, location, and description of your test facilities, including background/history, equipment and capability, and track and facility elevation, along with the grade and size/length of the track.

(ii) Test conditions for each test result, including date and time, wind speed and direction, ambient temperature and humidity, vehicle speed, driving distance, manufacturer name, test vehicle/model type, model year, applicable model engine family, tire type and rolling resistance, weight of tractor-trailer (as tested), and driver identifier(s).

(iii) Average drag area result as calculated in 40 CFR 1066, subpart D) and all of the individual run results (including voided or invalid runs).

(2) Identify the name and location of the test facilities for your wind tunnel method (if applicable). Also include the following things to describe the test facility:

(i) Background/history.

(ii) The layout (with diagram), type, and construction (structural and material) of the wind tunnel.

(iii) Wind tunnel design details: corner turning vane type and material, air settling, mesh screen specification, air straightening method, tunnel volume, surface area, average duct area, and circuit length.

(iv) Wind tunnel flow quality: temperature control and uniformity, airflow quality, minimum airflow velocity, flow uniformity, angularity and stability, static pressure variation, turbulence intensity, airflow acceleration and deceleration times, test duration flow quality, and overall airflow quality achievement.

(v) Test/working section information: test section type (*e.g.*, open, closed, adaptive wall) and shape (*e.g.*, circular, square, oval), length, contraction ratio, maximum air velocity, maximum dynamic pressure, nozzle width and height, plenum dimensions and net volume, maximum allowed model scale, maximum model height above road, strut movement rate (if applicable), model support, primary boundary layer

slot, boundary layer elimination method, and photos and diagrams of the test section.

(vi) Fan section description: fan type, diameter, power, maximum rotational speed, maximum top speed, support type, mechanical drive, and sectional total weight.

(vii) Data acquisition and control (where applicable): acquisition type, motor control, tunnel control, model balance, model pressure measurement, wheel drag balances, wing/body panel balances, and model exhaust simulation.

(viii) Moving ground plane or rolling road (if applicable): construction and material, yaw table and range, moving ground length and width, belt type, maximum belt speed, belt suction mechanism, platen instrumentation, temperature control, and steering.

(ix) Facility correction factors and purpose.

(3) Include all of the following for your computational fluid dynamics (CFD) method (if applicable):

(i) Official name/title of the software product.

(ii) Date and version number for the software product.

(iii) Manufacturer/company name, address, phone number and Web address for software product.

(iv) Identify if the software code is Navier-Stokes or Lattice-Boltzmann based.

(4) Include all of the following for any other method (if applicable):

(i) Official name/title of the procedure(s).

(ii) Description of the procedure.

(iii) Cited sources for any standardized procedures that the method is based on.

(iv) Modifications/deviations from the standardized procedures for the method and rationale for modifications/deviations.

(v) Data comparing this requested procedure to the coastdown reference procedure.

(vi) Information above from the other methods as applicable to this method (*e.g.*, source location/address, background/history).

(d) *Wind tunnel methods.* (1) You may measure drag areas consistent with the modified SAE procedures described in

this paragraph (d) using any wind tunnel recognized by the Subsonic Aerodynamic Testing Association. If your wind tunnel is not capable of testing in accordance with these modified SAE procedures, you may ask us to approve your alternate test procedures if you demonstrate that your procedures produce equivalent data. For purposes of this paragraph (d), data are equivalent if they are the same or better with respect to repeatability and unbiased correlation with coastdown testing. Note that, for wind tunnels not capable of these modified SAE procedures, good engineering judgment may require you to base your alternate method adjustment factor on more than one vehicle. You may not develop your correction factor until we have approved your alternate method. The applicable SAE procedures are SAE J1252, SAE J1594, and SAE J2071 (incorporated by reference in §1037.810). The following modifications apply for SAE J1252:

(i) The minimum Reynold's number ( $Re_{min}$ ) is  $1.0 \times 10^6$  instead of the value specified in section 5.2 of the SAE procedure. Your model frontal area at zero yaw angle may exceed the recommended 5 percent of the active test section area, provided it does not exceed 25 percent.

(ii) For full-scale wind tunnel testing, use good engineering judgment to select a test article (tractor and trailer) that is a reasonable representation of the test article used for the reference method testing. For example, where your wind tunnel is not long enough to test the tractor with a standard 53 foot trailer, it may be appropriate to use shorter box trailer. In such a case, the correlation developed using the shorter trailer would only be valid for testing with the shorter trailer.

(iii) For reduced-scale wind tunnel testing, a one-eighth (1/8th) or larger scale model of a heavy-duty tractor and trailer must be used, and the model must be of sufficient design to simulate airflow through the radiator inlet grill and across an engine geometry representative of those commonly used in your test vehicle.

(2) You must perform wind tunnel testing and the coastdown procedure on the same tractor model and provide

the results for both methods. Conduct the wind tunnel tests at a zero yaw angle and, if so equipped, utilizing the moving/rolling floor (*i.e.*, the moving/rolling floor should be on during the test, as opposed to static) for comparison to the coastdown procedure, which corrects to a zero yaw angle for the oncoming wind.

(e) *Computational fluid dynamics (CFD)*. You may determine drag areas using a CFD method, consistent with good engineering judgment and the requirements of this paragraph (e) using commercially available CFD software code. Conduct the analysis assuming zero yaw angle, and ambient conditions consistent with coastdown procedures. For simulating a wind tunnel test, the analysis should accurately model the particular wind tunnel and assume a wind tunnel blockage ratio consistent with SAE J1252 (incorporated by reference in § 1037.810) or one that matches the selected wind tunnel, whichever is lower. For simulation of open road conditions similar to that experienced during coastdown test procedures, the CFD analysis should assume a blockage ratio at or below 0.2 percent.

(1) Take the following steps for CFD code with a Navier-Stokes formula solver:

(i) Perform an unstructured, time-accurate, analysis using a mesh grid size with total volume element count of at least 50 million cells of hexahedral and/or polyhedral mesh cell shape, surface elements representing the geometry consisting of no less than 6 million elements, and a near-wall cell size corresponding to a  $y^+$  value of less than 300, with the smallest cell sizes applied to local regions of the tractor and trailer in areas of high flow gradients and smaller geometry features.

(ii) Perform the analysis with a turbulence model and mesh deformation enabled (if applicable) with boundary layer resolution of  $\pm 95$  percent. Once result convergence is achieved, demonstrate the convergence by supplying multiple, successive convergence values for the analysis. The turbulence model may use  $k$ -epsilon ( $k$ - $\epsilon$ ), shear stress transport  $k$ -omega (SST  $k$ - $\omega$ ), or other commercially accepted methods.

(2) For Lattice-Boltzman based CFD code, perform an unstructured, time-

accurate analysis using a mesh grid size with total surface elements of at least 50 million cells using cubic volume elements and triangular and/or quadrilateral surface elements with a near wall cell size of no greater than 6 mm on local regions of the tractor and trailer in areas of high flow gradients and smaller geometry features, with cell sizes in other areas of the mesh grid starting at twelve millimeters and increasing in size from this value as the distance from the tractor-trailer model increases.

(3) All CFD analysis should be conducted using the following conditions:

(i) A tractor-trailer combination using the manufacturer's tractor and the standard trailer, as applicable.

(ii) An environment with a blockage ratio at or below 0.2 percent to simulate open road conditions, a zero degree yaw angle between the oncoming wind and the tractor-trailer combination.

(iii) Ambient conditions consistent with the coastdown test procedures specified in this part.

(iv) Open grill with representative back pressures based on data from the tractor model,

(v) Turbulence model and mesh deformation enabled (if applicable).

(vi) Tires and ground plane in motion consistent with and simulating a vehicle moving in the forward direction of travel.

(vii) The smallest cell size should be applied to local regions on the tractor and trailer in areas of high flow gradients and smaller geometry features (*e.g.*, the a-pillar, mirror, visor, grille and accessories, trailer leading and trailing edges, rear bogey, tires, and tractor-trailer gap).

(viii) Simulate a speed of 55 mph.

(4) You may ask us to allow you to perform CFD analysis using parameters and criteria other than those specified in this paragraph (e), consistent with good engineering judgment, if you can demonstrate that the specified conditions are not feasible (*e.g.*, insufficient computing power to conduct such analysis, inordinate length of time to conduct analysis, equivalent flow characteristics with more feasible criteria/parameters) or improved criteria may yield better results (*e.g.*, different mesh cell shape

and size). To support this request, we may require that you supply data demonstrating that your selected parameters/criteria will provide a sufficient level of detail to yield an accurate analysis, including comparison of key characteristics between your criteria/parameters and the criteria specified in paragraphs (e)(1) and (2) of this section (*e.g.*, pressure profiles, drag build-up, and/or turbulent/laminar flow at key points on the front of the tractor and/or over the length of the tractor-trailer combination).

(f) *Yaw sweep corrections.* You may optionally apply this paragraph (f) for vehicles with aerodynamic features that are more effective at reducing wind-averaged drag than is predicted

by zero-yaw drag. You may correct your zero-yaw drag area as follows if the ratio of the zero-yaw drag area divided by yaw sweep drag area for your vehicle is greater than 0.8065 (which represents the ratio expected for a typical aerodynamic Class 8 high-roof sleeper cab tractor):

(1) Determine the zero-yaw drag area and the yaw sweep drag area for your vehicle using the same alternate method as specified in this subpart. Measure drag area for 0°, -6°, and +6°. Use the arithmetic mean of the -6° and +6° drag areas as the ±6° drag area.

(2) Calculate your yaw sweep correction factor (CF<sub>ys</sub>) using the following equation:

$$CF_{ys} = \frac{(\pm 6^\circ \text{ Drag Area}) \times 0.8065}{(\text{Zero Yaw Drag Area})}$$

(3) Calculate your corrected drag area for determining the aerodynamic bin by multiplying the measured zero-yaw drag area by CF<sub>ys</sub>. The correction factor may be applied to drag areas measured using other procedures. For example, we would apply CF<sub>ys</sub> to drag areas measured using the recommended coastdown method. If you use an alternative method, you would also need to apply an alternative correction (F<sub>alt-aero</sub>) and calculate the final drag area using the following equation:

$$C_{DA} = F_{\text{alt-aero}} \cdot CF_{ys} \cdot (C_{DA})_{\text{zero-alt}}$$

(4) You may ask us to apply CF<sub>ys</sub> to similar vehicles incorporating the same design features.

(5) As an alternative, you may choose to calculate the wind-averaged drag area according to SAE J1252 (incorporated by reference in §1037.810) and substitute this value into the equation in paragraph (f)(2) of this section for the ±6° yaw-averaged drag area.

**§ 1037.525 Special procedures for testing hybrid vehicles with power take-off.**

This section describes the procedure for quantifying the reduction in greenhouse gas emissions as a result of running power take-off (PTO) devices with

a hybrid powertrain. The procedures are written to test the PTO so that all the energy is produced with the engine. The full test for the hybrid vehicle is from a fully charged renewable energy storage system (RESS) to a depleted RESS and then back to a fully charged RESS. These procedures may be used for whole vehicles or with a post-transmission hybrid system. When testing just the post-transmission hybrid system, you must include all hardware for the PTO system. You may ask us to modify the provisions of this section to allow testing hybrid vehicles other than electric-battery hybrids, consistent with good engineering judgment.

(a) Select two vehicles for testing as follows:

(1) Select a vehicle with a hybrid powertrain to represent the vehicle family. If your vehicle family includes more than one vehicle model, use good engineering judgment to select the vehicle type with the maximum number of PTO circuits that has the smallest potential reduction in greenhouse gas emissions.

(2) Select an equivalent conventional vehicle as specified in §1037.615.

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(b) Measure PTO emissions from the fully warmed-up conventional vehicle as follows:

(1) Without adding any additional restrictions, instrument the vehicle with pressure transducers at the outlet of the hydraulic pump for each circuit.

(2) Operate the PTO system with no load for at least 15 seconds. Measure the pressure and record the average value over the last 10 seconds ( $p_{min}$ ). Apply maximum operator demand to the PTO system until the pressure relief valve opens and pressure stabilizes; measure the pressure and record the average value over the last 10 seconds ( $p_{max}$ ).

(3) Denormalize the PTO duty cycle in appendix II of this part using the following equation:

$$p_{refi} = NP_i \cdot (p_{max} - p_{min}) + p_{min}$$

Where:

$p_{refi}$  = the reference pressure at each point  $i$  in the PTO cycle.

$NP_i$  = the normalized pressure at each point  $i$  in the PTO cycle.

$p_{max}$  = the maximum pressure measured in paragraph (b)(2) of this section.

$p_{min}$  = the minimum pressure measured in paragraph (b)(2) of this section.

(4) If the PTO system has two circuits, repeat paragraph (b)(2) and (3) of this section for the second PTO circuit.

(5) Install a system to control pressures in the PTO system during the cycle.

(6) Start the engine.

(7) Operate the vehicle over one or both of the denormalized PTO duty cycles, as applicable. Collect CO<sub>2</sub> emissions during operation over each duty cycle.

(8) Use the provisions of 40 CFR part 1066 to collect and measure emissions. Calculate emission rates in grams per test without rounding.

(9) For each test, validate the pressure in each circuit with the pressure specified from the cycle according to 40 CFR 1065.514. Measured pressures must meet the specifications in the following table for a valid test:

TABLE 1 OF § 1037.525—STATISTICAL CRITERIA FOR VALIDATING DUTY CYCLES

Parameter	Pressure
Slope, $ a_1 $ .....	$0.950 \leq a_1 \leq 1.030$ .
Absolute value of intercept, $ a_0 $ .....	$\leq 2.0\%$ of maximum mapped pressure.
Standard error of estimate, $SEE$ .....	$\leq 10\%$ of maximum mapped pressure.
Coefficient of determination, $r^2$ .....	$\geq 0.970$ .

(10) Continue testing over the three vehicle drive cycles, as otherwise required by this part.

(11) Calculate combined cycle-weighted emissions of the four cycles as specified in paragraph (d) of this section.

(c) Measure PTO emissions from the fully warmed-up hybrid vehicle as follows:

(1) Perform the steps in paragraphs (b)(1) through (5) of this section.

(2) Prepare the vehicle for testing by operating it as needed to stabilize the battery at a full state of charge. For electric hybrid vehicles, we recommend running back-to-back PTO tests until engine operation is initiated to charge the battery. The battery should be fully charged once engine operation stops. The ignition should remain in the “on” position.

(3) Turn the vehicle and PTO system off while the sampling system is being prepared.

(4) Turn the vehicle and PTO system on such that the PTO system is functional, whether it draws power from the engine or a battery.

(5) Operate the vehicle over the PTO cycle(s) without turning the vehicle off, until the engine starts and then shuts down. The test cycle is completed once the engine shuts down. Measure emissions as described in paragraphs (b)(2) and (3) of this section. Use good engineering judgment to minimize the variability in testing between the two types of vehicles.

(6) Refer to paragraph (b)(9) of this section for cycle validation.

(7) Continue testing over the three vehicle drive cycles, as otherwise required by this part.



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(8) Calculate combined cycle-weighted emissions of the four cycles as specified in paragraph (d) of this section.

(d) Calculate combined cycle-weighted emissions of the four cycles for vocational vehicles as follows:

(1) Calculate the g/ton-mile emission rate for the driving portion of the test specified in §1037.510.

(2) Calculate the g/hr emission rate for the PTO portion of the test by dividing the total mass emitted over the cycle (grams) by the time of the test

(hours). For testing where fractions of a cycle were run (for example, where three cycles are completed and the halfway point of a fourth PTO cycle is reached before the engine starts and shuts down again), use the following procedures to calculate the time of the test:

(i) Add up the time run for all complete tests.

(ii) For fractions of a test, use the following equation to calculate the time:

$$t_{test} = \frac{\sum_{i=1}^N (NP_{circuit\_1,i} \cdot NP_{circuit\_2,i}) \cdot \Delta t}{\sum_{i=1}^N (NP_{circuit\_1,i} \cdot NP_{circuit\_2,i}) \cdot \Delta t} \cdot t_{cycle}$$

Where:

$t_{test}$  = time of the incomplete test.

$i$  = the number of each measurement interval.

$N$  = the total number of measurement intervals.

$NP_{circuit-1}$  = Normalized pressure command from circuit 1 of the PTO cycle.

$NP_{circuit-2}$  = Normalized pressure command from circuit 2 of the PTO cycle. Let  $NP_{circuit-2} = 1$  if there is only one circuit.

$t_{cycle}$  = time of a complete cycle.

(iii) Sum the time from complete cycles (paragraph (d)(2)(i) of this section) and from partial cycles (paragraph (d)(2)(ii) of this section).

(3) Convert the g/hr PTO result to an equivalent g/mi value based on the assumed fraction of engine operating time during which the PTO is operating (28 percent) and an assumed average vehicle speed while driving (27.1 mph). The conversion factor is: Factor =  $(0.280)/(1.000 - 0.280)/(27.1 \text{ mph}) = 0.0144 \text{ hr/mi}$ . Multiply the g/hr emission rate by 0.0144 hr/mi.

(4) Divide the g/mi PTO emission rate by the standard payload and add this value to the g/ton-mile emission rate for the driving portion of the test.

(e) Follow the provisions of §1037.615 to calculate improvement factors and benefits for advanced technologies.

§ 1037.550 Special procedures for testing post-transmission hybrid systems.

This section describes the procedure for simulating a chassis test with a post-transmission hybrid system for A to B testing. The hardware that must be included in these tests is the engine, the transmission, the hybrid electric motor, the power electronics between the hybrid electric motor and the RESS, and the RESS. You may ask us to modify the provisions of this section to allow testing non-electric hybrid vehicles, consistent with good engineering judgment.

(a) Set up the engine according to 40 CFR 1065.110 to account for work inputs and outputs and accessory work.

(b) Collect CO<sub>2</sub> emissions while operating the system over the test cycles specified in §1037.510.

(c) Collect and measure emissions as described in 40 CFR part 1066. Calculate emission rates in grams per ton-mile without rounding. Determine values for  $A$ ,  $B$ ,  $C$ , and  $M$  for the vehicle being simulated as specified in 40 CFR part 1066. If you will apply an improvement factor or test results to multiple vehicle configurations, use values of  $A$ ,  $B$ ,  $C$ ,  $M$ ,  $k_a$ , and  $r$  that represent the vehicle configuration with the smallest potential reduction in greenhouse gas

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emissions as a result of the hybrid capability.

(d) Calculate the transmission output shaft's angular speed target for the

driver model,  $f_{nref,driver}$ , from the linear speed associated with the vehicle cycle using the following equation:

$$f_{nref,driver} = \frac{S_{i,cycle} \cdot k_d}{2 \cdot \pi \cdot r}$$

Where:

$S_{cyclei}$  = vehicle speed of the test cycle for each point  $i$ .

$k_d$  = final drive ratio (the angular speed of the transmission output shaft divided by the angular speed of the drive axle), as declared by the manufacturer.

$r$  = radius of the loaded tires, as declared by the manufacturer.

(e) Use either speed control or torque control to program the dynamometer to follow the test cycle, as follows:

(1) *Speed control.* Program dynamometers using speed control as described in this paragraph (e)(1). We recommend speed control for automated manual transmissions or other designs where there is a power interrupt during shifts. Calculate the transmission output shaft's angular speed target for the dynamometer,  $f_{nref,dyno}$ , from the measured linear speed at the dynamometer rolls using the following equation:

$$f_{nref,dyno} = \frac{S_{i,ref} \cdot k_d}{2 \cdot \pi \cdot r}$$

Where:

$$S_{i,ref} = \left( FR_{meas,i} - (A + B \cdot S_i + C \cdot S_i^2) \right) \frac{t_i - t_{i-1}}{M} + S_{i,ref-1}$$

$t$  = elapsed time in the driving schedule as measured by the dynamometer, in seconds. Let  $t_{i-1} = 0$ .

$$FR_{meas,i} = \frac{k_d \cdot T_i}{r}$$

$$S_i = \frac{2 \cdot \pi \cdot r \cdot f_{n,i}}{k_d}$$

Where:

$T_i$  = instantaneous measured torque at the transmission output shaft.

$f_{n,i}$  = instantaneous measured angular speed of the transmission output shaft.

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(2) *Torque control.* Program dynamometers using torque control as described in this paragraph (e)(2).

(i) Calculate the transmission output shaft's torque target,  $T_{ref,i}$ , using the following equation:

$$T_{ref,i} = \frac{r \cdot FR_i}{k_d}$$

Where:

$FR_i$  = total road load force at the surface of the roll, calculated using the equation in 40 CFR 1066.210(d)(4), as specified in paragraph (e)(2)(ii) of this section.

(ii) Calculate the total road load force based on instantaneous speed values,  $S_i$ , calculated from the equation in paragraph (e)(1) of this section.

(3) For each test, validate the measured transmission output shaft's speed or torque with the corresponding reference values according to 40 CFR

1065.514(e). You may delete points when the vehicle is braking or stopped. Perform the validation based on speed and torque values at the transmission output shaft. For steady-state tests (55 mph and 65 mph cruise), apply cycle-validation criteria by treating the sampling periods from the two tests as a continuous sampling period. Perform this validation based on the following parameters for either speed-control or torque-control, as applicable:

TABLE 1 OF § 1037.550—STATISTICAL CRITERIA FOR VALIDATING DUTY CYCLES

Parameter	Speed control	Torque control
Slope, $a_1$ .....	$0.950 \leq a_1 \leq 1.030$ .....	$0.950 \leq a_1 \leq 1.030$ .
Absolute value of intercept, $a_0$ .....	$\leq 2.0\%$ of maximum test speed .....	$\leq 2.0\%$ of maximum torque.
Standard error of estimate, <i>SEE</i> .....	$\leq 5\%$ of maximum test speed .....	$\leq 10\%$ of maximum torque.
Coefficient of determination, $r^2$ .....	$\geq 0.970$ .....	$\geq 0.850$ .

(f) Send a brake signal when throttle position is equal to zero and vehicle speed is greater than the reference vehicle speed from the test cycle. The brake signal should be turned off when the torque measured at the transmission output shaft is less than the reference torque. Set a delay before changing the brake state using good engineering judgment to prevent the brake signal from dithering.

(g) The driver model should be designed to follow the cycle as closely as possible and must meet the requirements of 40 CFR 1066.430(e) for transient testing and §1037.510 for steady-state testing.

(h) Correct for the net energy change of the energy storage device as described in 40 CFR 1066.501.

(i) Follow the provisions of §1037.510 to weight the cycle results and §1037.615 to calculate improvement factors and benefits for advanced technologies.

**Subpart G—Special Compliance Provisions**

**§ 1037.601 What compliance provisions apply to these vehicles?**

(a) Engine and vehicle manufacturers, as well as owners and operators of vehicles subject to the requirements of this part, and all other persons, must observe the provisions of this part, the provisions of the Clean Air Act, and the following provisions of 40 CFR part 1068:

(1) The exemption and importation provisions of 40 CFR part 1068, subparts C and D, apply for vehicles subject to this part 1037, except that the hardship exemption provisions of 40 CFR 1068.245, 1068.250, and 1068.255 do not apply for motor vehicles.

(2) Manufacturers may comply with the defect reporting requirements of 40 CFR 1068.501 instead of the defect reporting requirements of 40 CFR part 85.

(b) Vehicles exempted from the applicable standards of 40 CFR part 86 are exempt from the standards of this part without request. Similarly, vehicles are exempt without request if the installed engine is exempted from the applicable standards in 40 CFR part 86.

(c) The prohibitions of 40 CFR 86.1854 apply for vehicles subject to the requirements of this part. The actions prohibited under this provision include the introduction into U.S. commerce of a complete or incomplete vehicle subject to the standards of this part where the vehicle is not covered by a valid certificate of conformity or exemption.

(d) Except as specifically allowed by this part, it is a violation of section 203(a)(1) of the Clean Air Act (42 U.S.C. 7522(a)(1)) to introduce into U.S. commerce a tractor containing an engine not certified for use in tractors; or to introduce into U.S. commerce a vocational vehicle containing a light heavy-duty or medium heavy-duty engine not certified for use in vocational vehicles. This prohibition applies especially to the vehicle manufacturer.

(e) A vehicle manufacturer that completes assembly of a vehicle at two or more facilities may ask to use as the date of manufacture for that vehicle the date on which manufacturing is completed at the place of main assembly, consistent with provisions of 49 CFR 567.4. Note that such staged assembly is subject to the provisions of 40 CFR 1068.260(c). Include your request in your application for certification, along with a summary of your staged-assembly process. You may ask to apply this allowance to some or all of the vehicles in your vehicle family. Our approval is effective when we grant your certificate. We will not approve your request if we determine that you intend to use this allowance to circumvent the intent of this part.

**§ 1037.610 Vehicles with innovative technologies.**

(a) You may ask us to apply the provisions of this section for CO<sub>2</sub> emission reductions resulting from vehicle technologies that were not in common use with heavy-duty vehicles before model year 2010 that are not reflected in the GEM simulation tool. These provisions may be applied for CO<sub>2</sub> emission reduc-

tions reflected using the specified test procedures, provided they are not reflected in the GEM. We will apply these provisions only for technologies that will result in measurable, demonstrable, and verifiable real-world CO<sub>2</sub> emission reductions.

(b) The provisions of this section may be applied as either an improvement factor or as a separate credit, consistent with good engineering judgment. We recommend that you base your credit/adjustment on A to B testing of pairs of vehicles differing only with respect to the technology in question.

(1) Calculate improvement factors as the ratio of in-use emissions with the technology divided by the in-use emissions without the technology. Use the improvement-factor approach where good engineering judgment indicates that the actual benefit will be proportional to emissions measured over the test procedures specified in this part.

(2) Calculate separate credits (g/ton-mile) based on the difference between the in-use emission rate with the technology and the in-use emission rate without the technology. Multiply this difference by the number of vehicles, standard payload, and useful life. Use the separate-credit approach where good engineering judgment indicates that the actual benefit will be not be proportional to emissions measured over the test procedures specified in this part.

(3) We may require you to discount or otherwise adjust your improvement factor or credit to account for uncertainty or other relevant factors.

(c) You may perform A to B testing by measuring emissions from the vehicles during chassis testing or from in-use on-road testing. We recommend that you perform on-road testing according to SAE J1321 Joint TMC/SAE Fuel Consumption Test Procedure Type II Reaffirmed 1986-10 or SAE J1526 Joint TMC/SAE Fuel Consumption In-Service Test Procedure Type III Issued 1987-06 (see § 1037.810 for information availability of SAE standards), subject to the following provisions:

(1) The minimum route distance is 100 miles.

(2) The route selected must be representative in terms of grade. We will

take into account published and relevant research in determining whether the grade is representative.

(3) The vehicle speed over the route must be representative of the drive-cycle weighting adopted for each regulatory subcategory. For example, if the route selected for an evaluation of a combination tractor with a sleeper cab contains only interstate driving, the improvement factor would apply only to 86 percent of the weighted result.

(4) The ambient air temperature must be between 5 and 35 °C, unless the technology requires other temperatures for demonstration.

(5) We may allow you to use a Portable Emissions Measurement System (PEMS) device for measuring CO<sub>2</sub> emissions during the on-road testing.

(d) Send your request to the Designated Compliance Officer. Include a detailed description of the technology and a recommended test plan. Also state whether you recommend applying these provisions using the improvement-factor method or the separate-credit method. We recommend that you do not begin collecting test data (for submission to EPA) before contacting us. For technologies for which the engine manufacturer could also claim credits (such as transmissions in certain circumstances), we may require you to include a letter from the engine manufacturer stating that it will not seek credits for the same technology.

(e) We may seek public comment on your request, consistent with the provisions of 40 CFR 86.1866. 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.

**§ 1037.615 Hybrid vehicles and other advanced technologies.**

(a) This section applies for hybrid vehicles with regenerative braking, vehicles equipped with Rankine-cycle engines, electric vehicles, and fuel cell vehicles. You may not generate credits for engine features for which the engines generate credits under 40 CFR part 1036.

(b) Generate advanced technology emission credits for hybrid vehicles that include regenerative braking (or the equivalent) and energy storage systems, fuel cell vehicles, and vehicles equipped with Rankine-cycle engines as follows:

(1) Measure the effectiveness of the advanced system by chassis testing a vehicle equipped with the advanced system and an equivalent conventional vehicle. Test the vehicles as specified in subpart F of this part. For purposes of this paragraph (b), a conventional vehicle is considered to be equivalent if it has the same footprint (as defined in 40 CFR 86.1803), vehicle service class, aerodynamic drag, and other relevant factors not directly related to the hybrid powertrain. If you use § 1037.525 to quantify the benefits of a hybrid system for PTO operation, the conventional vehicle must have same number of PTO circuits and have equivalent PTO power. If you do not produce an equivalent vehicle, you may create and test a prototype equivalent vehicle. The conventional vehicle is considered Vehicle A and the advanced vehicle is considered Vehicle B. We may specify an alternate cycle if your vehicle includes a power take-off.

(2) Calculate an improvement factor and g/ton-mile benefit using the following equations and parameters:

(i) Improvement Factor = [(Emission Rate A) – (Emission Rate B)] / (Emission Rate A)

(ii) g/ton-mile benefit = Improvement Factor × (GEM Result B)

(iii) Emission Rates A and B are the g/ton-mile CO<sub>2</sub> emission rates of the conventional and advanced vehicles, respectively, as measured under the test procedures specified in this section. GEM Result B is the g/ton-mile CO<sub>2</sub> emission rate resulting from emission modeling of the advanced vehicle as specified in § 1037.520.

(3) Use the equations of § 1037.705 to convert the g/ton-mile benefit to emission credits (in Mg). Use the g/ton-mile benefit in place of the (Std-FEL) term.

(c) See § 1037.525 for special testing provisions related to hybrid vehicles equipped with power take-off units.

(d) You may use an engineering analysis to calculate an improvement factor for fuel cell vehicles based on measured emissions from the fuel cell vehicle.

(e) For electric vehicles, calculate CO<sub>2</sub> credits using an FEL of 0 g/ton-mile.

(f) As specified in subpart H of this part, credits generated under this section may be used under this part 1037 outside of the averaging set in which they were generated or used under 40 CFR part 1036.

(g) You may certify using both provisions of this section and the innovative technology provisions of §1037.610, provided you do not double count emission benefits.

**§ 1037.620 Shipment of incomplete vehicles to secondary vehicle manufacturers.**

This section specifies how manufacturers may introduce partially complete vehicles into U.S. commerce.

(a) The provisions of this section allow manufacturers to ship partially complete vehicles to secondary vehicle manufacturers or otherwise introduce them into U.S. commerce in the following circumstances:

(1) *Tractors.* Manufacturers may introduce partially complete tractors into U.S. commerce if they are covered by a certificate of conformity for tractors and will be in their certified tractor configuration before they reach the ultimate purchasers. For example, this would apply for sleepers initially shipped without the sleeper compartments attached. Note that delegated assembly provisions may apply (see 40 CFR 1068.261).

(2) *Vocational vehicles.* Manufacturers may introduce partially complete vocational vehicles into U.S. commerce if they are covered by a certificate of conformity for vocational vehicles and will be in their certified vocational configuration before they reach the ultimate purchasers. Note that delegated assembly provisions may apply (see 40 CFR 1068.261).

(3) *Uncertified vehicles that will be certified by secondary vehicle manufacturers.* Manufacturers may introduce into U.S. commerce partially complete vehicles for which they do not hold a certificate

of conformity only as allowed by paragraph (b) of this section.

(b) The provisions of this paragraph (b) generally apply where the secondary vehicle manufacturer has substantial control over the design and assembly of emission controls. In determining whether a manufacturer has substantial control over the design and assembly of emission controls, we would consider the degree to which the secondary manufacturer would be able to ensure that the engine and vehicle will conform to the regulations in their final configurations.

(1) A secondary manufacturer may finish assembly of partially complete vehicles in the following cases:

(i) It obtains a vehicle that is not fully assembled with the intent to manufacture a complete vehicle in a certified configuration.

(ii) It obtains a vehicle with the intent to modify it to a certified configuration before it reaches the ultimate purchaser. For example, this may apply for converting a gasoline-fueled vehicle to operate on natural gas under the terms of a valid certificate.

(2) Manufacturers may introduce partially complete vehicles into U.S. commerce as described in this paragraph (b) if they have a written request for such vehicles from a secondary vehicle manufacturer that will finish the vehicle assembly and has certified the vehicle (or the vehicle has been exempted or excluded from the requirements of this part). The written request must include a statement that the secondary manufacturer has a certificate of conformity (or exemption/exclusion) for the vehicle and identify a valid vehicle family name associated with each vehicle model ordered (or the basis for an exemption/exclusion). The original vehicle manufacturer must apply a removable label meeting the requirements of 40 CFR 1068.45 that identifies the corporate name of the original manufacturer and states that the vehicle is exempt under the provisions of §1037.620. The name of the certifying manufacturer must also be on the label or, alternatively, on the bill of lading that accompanies the vehicles during shipment. The original manufacturer may not apply a permanent emission control information label identifying

the vehicle's eventual status as a certified vehicle.

(3) If you are the secondary manufacturer and you will hold the certificate, you must include the following information in your application for certification:

(i) Identify the original manufacturer of the partially complete vehicle or of the complete vehicle you will modify.

(ii) Describe briefly how and where final assembly will be completed. Specify how you have the ability to ensure that the vehicles will conform to the regulations in their final configuration. (Note: This section prohibits using the provisions of this paragraph (b) unless you have substantial control over the design and assembly of emission controls.)

(iii) State unconditionally that you will not distribute the vehicles without conforming to all applicable regulations.

(4) If you are a secondary manufacturer and you are already a certificate holder for other families, you may receive shipment of partially complete vehicles after you apply for a certificate of conformity but before the certificate's effective date. This exemption allows the original manufacturer to ship vehicles after you have applied for a certificate of conformity. Manufacturers may introduce partially complete vehicles into U.S. commerce as described in this paragraph (b)(4) if they have a written request for such vehicles from a secondary manufacturer stating that the application for certification has been submitted (instead of the information we specify in paragraph (b)(2) of this section). We may set additional conditions under this paragraph (b)(4) to prevent circumvention of regulatory requirements.

(5) Both original and secondary manufacturers must keep the records described in this section for at least five years, including the written request for exempted vehicles and the bill of lading for each shipment (if applicable). The written request is deemed to be a submission to EPA.

(6) These provisions are intended only to allow secondary manufacturers to obtain or transport vehicles in the specific circumstances identified in

this section so any exemption under this section expires when the vehicle reaches the point of final assembly identified in paragraph (b)(3)(ii) of this section.

(7) For purposes of this section, an allowance to introduce partially complete vehicles into U.S. commerce includes a conditional allowance to sell, introduce, or deliver such vehicles into commerce in the United States or import them into the United States. It does not include a general allowance to offer such vehicles for sale because this exemption is intended to apply only for cases in which the certificate holder already has an arrangement to purchase the vehicles from the original manufacturer. This exemption does not allow the original manufacturer to subsequently offer the vehicles for sale to a different manufacturer who will hold the certificate unless that second manufacturer has also complied with the requirements of this part. The exemption does not apply for any individual vehicles that are not labeled as specified in this section or which are shipped to someone who is not a certificate holder.

(8) We may suspend, revoke, or void an exemption under this section, as follows:

(i) We may suspend or revoke your exemption if you fail to meet the requirements of this section. We may suspend or revoke an exemption related to a specific secondary manufacturer if that manufacturer sells vehicles that are in not in a certified configuration in violation of the regulations. We may disallow this exemption for future shipments to the affected secondary manufacturer or set additional conditions to ensure that vehicles will be assembled in the certified configuration.

(ii) We may void an exemption for all the affected vehicles if you intentionally submit false or incomplete information or fail to keep and provide to EPA the records required by this section.

(iii) The exemption is void for a vehicle that is shipped to a company that is not a certificate holder or for a vehicle that is shipped to a secondary manufacturer that is not in compliance with the requirements of this section.

(iv) The secondary manufacturer may be liable for penalties for causing a prohibited act where the exemption is voided due to actions on the part of the secondary manufacturer.

(c) Provide instructions along with partially complete vehicles including all information necessary to ensure that an engine will be installed in its certified configuration.

**§ 1037.630 Special purpose tractors.**

(a) *General provisions.* This section allows a vehicle manufacturer to reclassify certain tractors as vocational tractors. Vocational tractors are treated as vocational vehicles and are exempt from the standards of §1037.106. Note that references to “tractors” outside of this section mean non-vocational tractors.

(1) This allowance is intended only for vehicles that do not typically operate at highway speeds, or would otherwise not benefit from efficiency improvements designed for line-haul tractors. This allowance is limited to the following vehicle and application types:

(i) Low-roof tractors intended for intra-city pickup and delivery, such as those that deliver bottled beverages to retail stores.

(ii) Tractors intended for off-road operation (including mixed service operation), such as those with reinforced frames and increased ground clearance.

(iii) Tractors with a GCWR over 120,000 pounds.

(2) Where we determine that a manufacturer is not applying this allowance in good faith, we may require the manufacturer to obtain preliminary approval before using this allowance.

(b) *Requirements.* The following requirements apply with respect to tractors reclassified under this section:

(1) The vehicle must fully conform to all requirements applicable to vocational vehicles under this part.

(2) Vehicles reclassified under this section must be certified as a separate vehicle family. However, they remain part of the vocational regulatory subcategory and averaging set that applies for their weight class.

(3) You must include the following additional statement on the vehicle’s emission control information label

under §1037.135: “THIS VEHICLE WAS CERTIFIED AS A VOCATIONAL TRACTOR UNDER 40 CFR 1037.630.”.

(4) You must keep records for three years to document your basis for believing the vehicles will be used as described in paragraph (a)(1) of this section. Include in your application for certification a brief description of your basis.

(c) *Production limit.* No manufacturer may produce more than 21,000 vehicles under this section in any consecutive three model year period. This means you may not exceed 6,000 in a given model year if the combined total for the previous two years was 15,000. The production limit applies with respect to all Class 7 and Class 8 tractors certified or exempted as vocational tractors. Note that in most cases, the provisions of paragraph (a) of this section will limit the allowable number of vehicles to be a number lower than the production limit of this paragraph (c).

(d) *Off-road exemption.* All the provisions of this section apply for vocational tractors exempted under §1037.631, except as follows:

(1) The vehicles are required to comply with the requirements of §1037.631 instead of the requirements that would otherwise apply to vocational vehicles. Vehicles complying with the requirements of §1037.631 and using an engine certified to the standards of 40 CFR part 1036 are deemed to fully conform to all requirements applicable to vocational vehicles under this part.

(2) The vehicles must be labeled as specified under §1037.631 instead of as specified in paragraph (b)(3) of this section.

**§ 1037.631 Exemption for vocational vehicles intended for off-road use.**

This section provides an exemption from the greenhouse gas standards of this part for certain vocational vehicles intended to be used extensively in off-road environments such as forests, oil fields, and construction sites. This section does not exempt the engine used in the vehicle from the standards of 40 CFR part 86 or part 1036. Note that you may not include these exempted vehicles in any credit calculations under this part.



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(a) *Qualifying criteria.* Vocational vehicles intended for off-road use meeting either the criteria of paragraph (a)(1) or (a)(2) of this section are exempt without request, subject to the provisions of this section.

(1) Vehicles are exempt if the tires installed on the vehicle have a maximum speed rating at or below 55 mph.

(2) Vehicles are exempt if they were primarily designed to perform work off-road (such as in oil fields, forests, or construction sites), and they meet at least one of the criteria of paragraph (a)(2)(i) of this section and at least one of the criteria of paragraph (a)(2)(ii) of this section.

(i) The vehicle must have affixed components designed to work in an off-road environment (*i.e.*, hazardous material equipment or off-road drill equipment) or be designed to operate at low speeds such that it is unsuitable for normal highway operation.

(ii) The vehicle must meet one of the following criteria:

(A) Have an axle that has a gross axle weight rating (GAWR) of 29,000 pounds.

(B) Have a speed attainable in 2 miles of not more than 33 mph.

(C) Have a speed attainable in 2 miles of not more than 45 mph, an unloaded vehicle weight that is not less than 95 percent of its gross vehicle weight rating (GVWR), and no capacity to carry occupants other than the driver and operating crew.

(b) *Tractors.* The provisions of this section may apply for tractors only if each tractor qualifies as a vocational tractor under § 1037.630.

(c) *Recordkeeping and reporting.* (1) You must keep records to document that your exempted vehicle configurations meet all applicable requirements of this section. Keep these records for at least eight years after you stop producing the exempted vehicle model. We may review these records at any time.

(2) You must also keep records of the individual exempted vehicles you produce, including the vehicle identification number and a description of the vehicle configuration.

(3) Within 90 days after the end of each model year, you must send to the Designated Compliance Officer a report with the following information:

(i) A description of each exempted vehicle configuration, including an explanation of why it qualifies for this exemption.

(ii) The number of vehicles exempted for each vehicle configuration.

(d) *Labeling.* You must include the following additional statement on the vehicle's emission control information label under § 1037.135: "THIS VEHICLE WAS EXEMPTED UNDER 40 CFR 1037.631."

### § 1037.640 Variable vehicle speed limiters.

This section specifies provisions that apply for vehicle speed limiters (VSLs) that you model under § 1037.520. This does not apply for VSLs that you do not model under § 1037.520.

(a) *General.* The regulations of this part do not constrain how you may design VSLs for your vehicles. For example, you may design your VSL to have a single fixed speed limit or a soft-top speed limit. You may also design your VSL to expire after accumulation of a predetermined number of miles. However, designs with soft tops or expiration features are subject to proration provisions under this section that do not apply to fixed VSLs that do not expire.

(b) *Definitions.* The following definitions apply for purposes of this section:

(1) Default speed limit means the speed limit that normally applies for the vehicle, except as follows:

(i) The default speed limit for adjustable VSLs must represent the speed limit that applies when the VSL is adjusted to its highest setting under paragraph (c) of this section.

(ii) For VSLs with soft tops, the default speed does not include speeds possible only during soft-top operation.

(iii) For expiring VSLs, the default does not include speeds that are possible only after expiration.

(2) Soft-top speed limit means the highest speed limit that applies during soft-top operation.

(3) Maximum soft-top duration means the maximum amount of time that a vehicle could operate above the default speed limit.

(4) Certified VSL means a VSL configuration that applies when a vehicle is new and until it expires.

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(5) Expiration point means the mileage at which a vehicle's certified VSL expires (or the point at which tamper protections expire).

(6) Effective speed limit has the meaning given in paragraph (d) of this section.

(c) *Adjustments.* You may design your VSL to be adjustable; however, this may affect the value you use in the GEM.

(1) Except as specified in paragraph (c)(2) of this section, any adjustments that can be made to the engine, vehicle, or their controls that change the VSL's actual speed limit are considered to be adjustable operating parameters. Compliance is based on the vehicle being adjusted to the highest speed limit within this range.

(2) The following adjustments are not adjustable parameters:

(i) Adjustments made only to account for changing tire size or final drive ratio.

(ii) Adjustments protected by encrypted controls or passwords.

(iii) Adjustments possible only after the VSL's expiration point.

(d) *Effective speed limit.* (1) For VSLs without soft tops or expiration points that expire before 1,259,000 miles, the effective speed limit is the highest speed limit that results by adjusting the VSL or other vehicle parameters consistent with the provisions of paragraph (c) of this section.

(2) For VSLs with soft tops and/or expiration points, the effective speed limit is calculated as specified in this paragraph (d)(2), which is based on 10 hours of operation per day (394 miles per day for day cabs and 551 miles per day for sleeper cabs). Note that this calculation assumes that a fraction of this operation is speed limited (3.9 hours and 252 miles for day cabs, and 7.3 hours and 474 miles for sleeper cabs). Use the following equation to calculate the effective speed limit, rounded to the nearest 0.1 mph:

$$\text{Effective speed} = \text{ExF} * [\text{STF} * \text{STSL} + (1 - \text{STF}) * \text{DSL}] + (1 - \text{ExF}) * 65 \text{ mph}$$

Where:

ExF = expiration point miles/1,259,000 miles  
STF = maximum number of allowable soft top operation hours per day/3.9 hours for day cabs (or maximum miles per day/252)

STF = maximum number of allowable soft top operation hours per day/7.3 hours for sleeper cabs (or maximum miles per day/474)

STSL = the soft top speed limit  
DSL = the default speed limit

### § 1037.645 In-use compliance with family emission limits (FELs).

You may ask us to apply a higher in-use FEL for certain in-use vehicles, subject to the provisions of this section. Note that §1037.225 contains provisions related to changing FELs during a model year.

(a) *Purpose.* This section is intended to address circumstances in which it is in the public interest to apply a higher in-use FEL based on forfeiting an appropriate number of emission credits.

(b) *FELs.* We may apply higher in-use FELs to your vehicles as follows:

(1) Where your vehicle family includes more than one sub-family with different FELs, we may apply a higher FEL within the family than was applied to the vehicle's configuration in your final ABT report. For example, if your vehicle family included three sub-families with FELs of 200 g/ton-mile, 210 g/ton-mile, and 220 g/ton-mile, we may apply a 220 g/ton-mile in-use FEL to vehicles that were originally designated as part of the 200 g/ton-mile or 210 g/ton-mile sub-families.

(2) Without regard to the number of sub-families in your certified vehicle family, we may specify new sub-families with higher FELs than were included in your final ABT report. We may apply these higher FELs as in-use FELs for your vehicles. For example, if your vehicle family included three sub-families with FELs of 200 g/ton-mile, 210 g/ton-mile, and 220 g/ton-mile, we may specify a new 230 g/ton-mile sub-family.

(3) In specifying sub-families and in-use FELs, we would intend to accurately reflect the actual in-use performance of your vehicles, consistent with the specified testing and modeling provisions of this part.

(c) *Equivalent families.* We may apply the higher FELs to other families in other model years if they used equivalent emission controls.

(d) *Credit forfeiture.* Where we specify higher in-use FELs under this section, you must forfeit CO<sub>2</sub> emission credits

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based on the difference between the in-use FEL and the otherwise applicable FEL. Calculate the amount of credits to be forfeited using the applicable equation in §1037.705, by substituting the otherwise applicable FEL for the standard and the in-use FEL for the otherwise applicable FEL.

(e) *Requests.* Submit your request to the Designated Compliance Officer. Include the following in your request:

(1) The vehicle family name, model year, and name/description of the configuration(s) affected.

(2) A list of other vehicle families/configurations/model years that may be affected.

(3) The otherwise applicable FEL for each configuration along with your recommendations for higher in-use FELs.

(4) Your source of credits for forfeiture.

(f) *Relation to recall.* You may not request higher in-use FELs for any vehicle families for which we have made a determination of nonconformance and ordered a recall. You may, however, make such requests for vehicle families for which you are performing a voluntary emission recall.

(g) *Approval.* We may approve your request if we determine that you meet the requirements of this section and such approval is in the public interest. We may include appropriate conditions with our approval or we may approve your request with modifications.

### § 1037.650 Tire manufacturers.

This section describes how the requirements of this part apply with respect to tire manufacturers that choose to provide test data or emission warranties for purposes of this part.

(a) *Testing.* You are responsible as follows for test tires and emission test results that you provide to vehicle manufacturers for the purpose of the manufacturer submitting them to EPA for certification under this part:

(1) Such test results are deemed under §1037.825 to be submissions to EPA. This means that you may be subject to criminal penalties under 18 U.S.C. 1001 if you knowingly submit false test results to the manufacturer.

(2) You may not cause a vehicle manufacturer to violate the regulations by

rendering inaccurate emission test results you provide (or emission test results from testing of test tires you provide) to the vehicle manufacturer.

(3) Your provision of test tires and emission test results to vehicle manufacturers for the purpose of certifying under this part is deemed to be an agreement to provide tires to EPA for confirmatory testing under §1037.201.

(b) *Warranty.* You may contractually agree to process emission warranty claims on behalf of the manufacturer certifying the vehicle with respect to tires you produce.

(1) Your fulfillment of the warranty requirements of this part is deemed to fulfill the vehicle manufacturer's warranty obligations under this part with respect to tires you warrant.

(2) You may not cause a vehicle manufacturer to violate the regulations by failing to fulfill the emission warranty requirements that you contractually agreed to fulfill.

### § 1037.655 Post-useful life vehicle modifications.

This section specifies vehicle modifications that may occur after a vehicle reaches the end of its regulatory useful life. It does not apply with respect to modifications that occur within the useful life period. It also does not apply with respect to engine modifications or recalibrations. Note that many such modifications to the vehicle during the useful life and to the engine at any time are presumed to violate 42 U.S.C. 7522(a)(3)(A).

(a) *General.* Except as allowed by this section, it is prohibited for any person to remove or render inoperative any emission control device installed to comply with the requirements of this part 1037.

(b) *Allowable modifications.* You may modify a vehicle for the purpose of reducing emissions, provided you have a reasonable technical basis for knowing that such modification will not increase emissions of any other pollutant. Reasonable technical basis has the meaning given in 40 CFR 1068.30. This generally requires you to have information that would lead an engineer or other person familiar with engine and vehicle design and function to reasonably believe that the modifications will

not increase emissions of any regulated pollutant.

(c) *Examples of allowable modifications.* The following are examples of allowable modifications:

(1) It is generally allowable to remove tractor roof fairings after the end of the vehicle's useful life if the vehicle will no longer be used primarily to pull box trailers.

(2) Other fairings may be removed after the end of the vehicle's useful life if the vehicle will no longer be used significantly on highways with vehicle speed of 55 miles per hour or higher.

(d) *Examples of prohibited modifications.* The following are examples of modifications that are not allowable:

(1) No person may disable a vehicle speed limiter prior to its expiration point.

(2) No person may remove aerodynamic fairings from tractors that are used primarily to pull box trailers on highways.

**§ 1037.660 Automatic engine shutdown systems.**

This section specifies requirements that apply for certified automatic engine shutdown systems (AES) that are modeled under § 1037.520. It does not apply for AES systems that you do not model under § 1037.520.

(a) *Minimum requirements.* Your AES system must meet all of the requirements of this paragraph (a) to be modeled under § 1037.520. The system must shut down the engine within 300 seconds when all the following conditions are met:

(1) The transmission is set in neutral with the parking brake engaged (or the transmission is set to park if so equipped).

(2) The operator has not reset the system timer within the 300 seconds by changing the position of the accelerator, brake, or clutch pedal; or by some other mechanism we approve.

(3) None of the override conditions of paragraph (b) of this section are met.

(b) *Override conditions.* The system may delay shutting the engine down while any of the conditions of this paragraph (b) apply. Engines equipped with auto restart may restart during override conditions. Note that these conditions allow the system to delay

shutdown or restart, but do not allow it to reset the timer. The system may delay shutdown—

(1) While an exhaust emission control device is regenerating. The period considered to be regeneration for purposes of this allowance must be consistent with good engineering judgment and may differ in length from the period considered to be regeneration for other purposes. For example, in some cases it may be appropriate to include a cool down period for this purpose but not for infrequent regeneration adjustment factors.

(2) If necessary while servicing the vehicle, provided the deactivation of the AES system is accomplished using a diagnostic scan tool. The system must be automatically reactivated when the engine is shutdown for more than 60 minutes.

(3) If the vehicle's main battery state-of-charge is not sufficient to allow the main engine to be restarted.

(4) If the external ambient temperature reaches a level below which or above which the cabin temperature cannot be maintained within reasonable heat or cold exposure threshold limit values for the health and safety of the operator (not merely comfort).

(5) If the vehicle's engine coolant temperature is too low according to the manufacturer's engine protection guidance. This may also apply for fuel or oil temperatures. This allows the engine to continue operating until it reaches a predefined temperature at which the shutdown sequence of paragraph (a) of this section would resume.

(6) The system may delay shutdown while the vehicle's main engine is operating in power take-off (PTO) mode. For purposes of this paragraph (b)(6), an engine is considered to be in PTO mode when a switch or setting designating PTO mode is enabled.

(c) *Expiration of AES systems.* The AES system may include an expiration point (in miles) after which the AES system may be disabled. If your vehicle is equipped with an expiring AES system that expires before 1,259,000 miles adjust the model input as follows:

Input = 5 g CO<sub>2</sub>/ton-mile × (miles at expiration/1,259,000 miles)

(d) *Adjustable parameters.* Provisions that apply generally with respect to

adjustable parameters also apply to the AES system operating parameters, except the following are not considered to be adjustable parameters:

(1) Accelerator, brake, and clutch pedals, with respect to resetting the idle timer. Parameters associated with other timer reset mechanisms we approve are also not adjustable parameters.

(2) Bypass parameters allowed for vehicle service under paragraph (b)(2) of this section.

(3) Parameters that are adjustable only after the expiration point.

**Subpart H—Averaging, Banking, and Trading for Certification**

**§ 1037.701 General provisions.**

(a) You may average, bank, and trade (ABT) emission credits for purposes of certification as described in this subpart and in subpart B of this part to show compliance with the standards of §§ 1037.105 and 1037.106. Participation in this program is voluntary.

(b) The definitions of Subpart I of this part apply to this subpart. The following definitions also apply:

(1) *Actual emission credits* means emission credits you have generated that we have verified by reviewing your final report.

(2) *Averaging set* means a set of vehicles in which emission credits may be exchanged. Credits generated by one vehicle may only be used by other vehicles in the same averaging set. Note that an averaging set may comprise more than one regulatory subcategory. See § 1037.740.

(3) *Broker* means any entity that facilitates a trade of emission credits between a buyer and seller.

(4) *Buyer* means the entity that receives emission credits as a result of a trade.

(5) *Reserved emission credits* means emission credits you have generated that we have not yet verified by reviewing your final report.

(6) *Seller* means the entity that provides emission credits during a trade.

(7) *Standard* means the emission standard that applies under subpart B of this part for vehicles not participating in the ABT program of this subpart.

(8) *Trade* means to exchange emission credits, either as a buyer or seller.

(c) Emission credits may be exchanged only within an averaging set as specified in § 1037.740.

(d) You may not use emission credits generated under this subpart to offset any emissions that exceed an FEL or standard, except as allowed by § 1037.645.

(e) You may trade emission credits generated from any number of your vehicles to the vehicle purchasers or other parties to retire the credits. Identify any such credits in the reports described in § 1037.730. Vehicles must comply with the applicable FELs even if you donate or sell the corresponding emission credits under this paragraph (e). Those credits may no longer be used by anyone to demonstrate compliance with any EPA emission standards.

(f) Emission credits may be used in the model year they are generated. Surplus emission credits may be banked for future model years. Surplus emission credits may sometimes be used for past model years, as described in § 1037.745.

(g) You may increase or decrease an FEL during the model year by amending your application for certification under § 1037.225. The new FEL may apply only to vehicles you have not already introduced into commerce.

(h) See § 1037.740 for special credit provisions that apply for credits generated under § 1037.104(d)(7), § 1037.615 or 40 CFR 1036.615.

(i) Unless the regulations explicitly allow it, you may not calculate credits more than once for any emission reduction. For example, if you generate CO<sub>2</sub> emission credits for a given hybrid vehicle under this part, no one may generate CO<sub>2</sub> emission credits for the hybrid engine under 40 CFR part 1036. However, credits could be generated for identical engine used in vehicles that did not generate credits under this part.

**§ 1037.705 Generating and calculating emission credits.**

(a) The provisions of this section apply separately for calculating emission credits for each pollutant.

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(b) For each participating family or subfamily, calculate positive or negative emission credits relative to the otherwise applicable emission standard. Calculate positive emission credits for a family or subfamily that has an FEL below the standard. Calculate negative emission credits for a family or subfamily that has an FEL above the standard. Sum your positive and negative credits for the model year before rounding. Round the sum of emission credits to the nearest megagram (Mg), using consistent units throughout the following equations:

(1) For vocational vehicles:

$$\text{Emission credits (Mg)} = (\text{Std-FEL}) \times (\text{Payload Tons}) \times (\text{Volume}) \times (\text{UL}) \times (10^{-6})$$

Where:

Std = the emission standard associated with the specific tractor regulatory subcategory (g/ton-mile).

FEL = the family emission limit for the vehicle subfamily (g/ton-mile).

Payload tons = the prescribed payload for each class in tons (2.85 tons for light heavy-duty vehicles, 5.6 tons for medium heavy-duty vehicles, and 7.5 tons for heavy heavy-duty vehicles).

Volume = U.S.-directed production volume of the vehicle subfamily. For example, if you produce three configurations with the same FEL, the subfamily production volume would be the sum of the production volumes for these three configurations.

UL = useful life of the vehicle (110,000 miles for light heavy-duty vehicles, 185,000 miles for medium heavy-duty vehicles, and 435,000 miles for heavy heavy-duty vehicles).

(2) For tractors:

$$\text{Emission credits (Mg)} = (\text{Std-FEL}) \times (\text{Payload tons}) \times (\text{Volume}) \times (\text{UL}) \times (10^{-6})$$

Where:

Std = the emission standard associated with the specific tractor regulatory subcategory (g/ton-mile).

FEL = the family emission limit for the vehicle subfamily (g/ton-mile).

Payload tons = the prescribed payload for each class in tons (12.5 tons for Class 7 and 19 tons for Class 8).

Volume = U.S.-directed production volume of the vehicle subfamily.

UL = useful life of the tractor (435,000 miles for Class 8 and 185,000 miles for Class 7).

(c) As described in §1037.730, compliance with the requirements of this subpart is determined at the end of the model year based on actual U.S.-directed production volumes. Keep appropriate records to document these production volumes. Do not include any of the following vehicles to calculate emission credits:

(1) Vehicles that you do not certify to the CO<sub>2</sub> standards of this part because they are permanently exempted under subpart G of this part or under 40 CFR part 1068.

(2) Exported vehicles.

(3) Vehicles not subject to the requirements of this part, such as those excluded under §1037.5.

(4) Any other vehicles, where we indicate elsewhere in this part 1037 that they are not to be included in the calculations of this subpart.

### § 1037.710 Averaging.

(a) Averaging is the exchange of emission credits among your vehicle families. You may average emission credits only within the same averaging set.

(b) You may certify one or more vehicle families (or subfamilies) to an FEL above the applicable standard, subject to any applicable FEL caps and other provisions in subpart B of this part, if you show in your application for certification that your projected balance of all emission-credit transactions in that model year is greater than or equal to zero or that a negative balance is allowed under §1037.745.

(c) If you certify a vehicle family to an FEL that exceeds the otherwise applicable standard, you must obtain enough emission credits to offset the vehicle family's deficit by the due date for the final report required in §1037.730. The emission credits used to address the deficit may come from your other vehicle families that generate emission credits in the same model year (or from later model years as specified in §1037.745), from emission credits you have banked, or from emission credits you obtain through trading.

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### § 1037.715 Banking.

(a) Banking is the retention of surplus emission credits by the manufacturer generating the emission credits for use in future model years for averaging or trading.

(b) You may designate any emission credits you plan to bank in the reports you submit under § 1037.730 as reserved credits. During the model year and before the due date for the final report, you may designate your reserved emission credits for averaging or trading.

(c) Reserved credits become actual emission credits when you submit your final report. However, we may revoke these emission credits if we are unable to verify them after reviewing your reports or auditing your records.

(d) Banked credits retain the designation of the averaging set in which they were generated.

### § 1037.720 Trading.

(a) Trading is the exchange of emission credits between manufacturers, or the transfer of credits to another party to retire them. You may use traded emission credits for averaging, banking, or further trading transactions. Traded emission credits remain subject to the averaging-set restrictions based on the averaging set in which they were generated.

(b) You may trade actual emission credits as described in this subpart. You may also trade reserved emission credits, but we may revoke these emission credits based on our review of your records or reports or those of the company with which you traded emission credits. You may trade banked credits within an averaging set to any certifying manufacturer.

(c) If a negative emission credit balance results from a transaction, both the buyer and seller are liable, except in cases we deem to involve fraud. See § 1037.255(e) for cases involving fraud. We may void the certificates of all vehicle families participating in a trade that results in a manufacturer having a negative balance of emission credits. See § 1037.745.

### § 1037.725 What must I include in my application for certification?

(a) You must declare in your application for certification your intent to use

the provisions of this subpart for each vehicle family that will be certified using the ABT program. You must also declare the FELs you select for the vehicle family or subfamily for each pollutant for which you are using the ABT program. Your FELs must comply with the specifications of subpart B of this part, including the FEL caps. FELs must be expressed to the same number of decimal places as the applicable standards.

(b) Include the following in your application for certification:

(1) A statement that, to the best of your belief, you will not have a negative balance of emission credits for any averaging set when all emission credits are calculated at the end of the year; or a statement that you will have a negative balance of emission credits for one or more averaging sets but that it is allowed under § 1037.745.

(2) Calculations of projected emission credits (positive or negative) based on projected U.S.-directed production volumes. We may require you to include similar calculations from your other vehicle families to project your net credit balances for the model year. If you project negative emission credits for a family or subfamily, state the source of positive emission credits you expect to use to offset the negative emission credits.

### § 1037.730 ABT reports.

(a) If any of your vehicle families are certified using the ABT provisions of this subpart, you must send an end-of-year report within 90 days after the end of the model year and a final report within 270 days after the end of the model year.

(b) Your end-of-year and final reports must include the following information for each vehicle family participating in the ABT program:

(1) Vehicle-family and subfamily designations.

(2) The regulatory subcategory and emission standards that would otherwise apply to the vehicle family.

(3) The FEL for each pollutant. If you change the FEL after the start of production, identify the date that you started using the new FEL and/or give the vehicle identification number for the first vehicle covered by the new

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FEL. In this case, identify each applicable FEL and calculate the positive or negative emission credits as specified in § 1037.225.

(4) The projected and actual U.S.-directed production volumes for the model year. If you changed an FEL during the model year, identify the actual production volume associated with each FEL.

(5) Useful life.

(6) Calculated positive or negative emission credits for the whole vehicle family. Identify any emission credits that you traded, as described in paragraph (d)(1) of this section.

(7) If you have a negative credit balance for the averaging set in the given model year, specify whether the vehicle family (or certain subfamilies with the vehicle family) have a credit deficit for the year. Consider for example, a manufacturer with three vehicle families ("A", "B", and "C") in a given averaging set. If family A generates enough credits to offset the negative credits of family B but not enough to also offset the negative credits of family C (and the manufacturer has no banked credits in the averaging set), the manufacturer may designate families A and B as having no deficit for the model year, provided it designates family C as having a deficit for the model year.

(c) Your end-of-year and final reports must include the following additional information:

(1) Show that your net balance of emission credits from all your participating vehicle families in each averaging set in the applicable model year is not negative, except as allowed under § 1037.745.

(2) State whether you will reserve any emission credits for banking.

(3) State that the report's contents are accurate.

(d) If you trade emission credits, you must send us a report within 90 days after the transaction, as follows:

(1) As the seller, you must include the following information in your report:

(i) The corporate names of the buyer and any brokers.

(ii) A copy of any contracts related to the trade.

(iii) The vehicle families that generated emission credits for the trade, including the number of emission credits from each family.

(2) As the buyer, you must include the following information in your report:

(i) The corporate names of the seller and any brokers.

(ii) A copy of any contracts related to the trade.

(iii) How you intend to use the emission credits, including the number of emission credits you intend to apply to each vehicle family (if known).

(e) Send your reports electronically to the Designated Compliance Officer using an approved information format. If you want to use a different format, send us a written request with justification for a waiver.

(f) Correct errors in your end-of-year report or final report as follows:

(1) You may correct any errors in your end-of-year report when you prepare the final report, as long as you send us the final report by the time it is due.

(2) If you or we determine within 270 days after the end of the model year that errors mistakenly decreased your balance of emission credits, you may correct the errors and recalculate the balance of emission credits. You may not make these corrections for errors that are determined more than 270 days after the end of the model year. If you report a negative balance of emission credits, we may disallow corrections under this paragraph (f)(2).

(3) If you or we determine anytime that errors mistakenly increased your balance of emission credits, you must correct the errors and recalculate the balance of emission credits.

### § 1037.735 Recordkeeping.

(a) You must organize and maintain your records as described in this section. We may review your records at any time.

(b) Keep the records required by this section for at least eight years after the due date for the end-of-year report. You may not use emission credits for any vehicles if you do not keep all the records required under this section. You must therefore keep these records to continue to bank valid credits. Store



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these records in any format and on any media, as long as you can promptly send us organized, written records in English if we ask for them. You must keep these records readily available. We may review them at any time.

(c) Keep a copy of the reports we require in §§ 1037.725 and 1037.730.

(d) Keep records of the vehicle identification number for each vehicle you produce that generates or uses emission credits under the ABT program. You may identify these numbers as a range. If you change the FEL after the start of production, identify the date you started using each FEL and the range of vehicle identification numbers associated with each FEL. You must also identify the purchaser and destination for each vehicle you produce to the extent this information is available.

(e) We may require you to keep additional records or to send us relevant information not required by this section in accordance with the Clean Air Act.

### § 1037.740 Restrictions for using emission credits.

The following restrictions apply for using emission credits:

(a) *Averaging sets.* Except as specified in paragraph (b) of this section, emission credits may be exchanged only within an averaging set. There are three principal averaging sets for vehicles subject to this subpart.

(1) Vehicles at or below 19,500 pounds GVWR that are subject to the standards of § 1037.105.

(2) Vehicles above 19,500 pounds GVWR but at or below 33,000 pounds GVWR.

(3) Vehicles over 33,000 pounds GVWR.

(4) Note that other separate averaging sets also apply for emission credits not related to this subpart. For example, under § 1037.104, an additional averaging set comprises all vehicles subject to the standards of that section. Separate averaging sets also apply for engines under 40 CFR part 1036, including engines used in vehicles subject to this subpart.

(b) *Credits from hybrid vehicles and other advanced technologies.* The averaging set restrictions of paragraph (a) of this section do not apply for credits

generated under § 1037.104(d)(7), § 1037.615 or 40 CFR 1036.615 from hybrid vehicles with regenerative braking, or from other advanced technologies.

(1) The maximum amount of credits you may bring into the following service class groups is 60,000 Mg per model year:

(i) Spark-ignition engines, light heavy-duty compression-ignition engines, and light heavy-duty vehicles. This group comprises the averaging set listed in paragraphs (a)(1) of this section and the averaging set listed in 40 CFR 1036.740(a)(1) and (2).

(ii) Medium heavy-duty compression-ignition engines and medium heavy-duty vehicles. This group comprises the averaging sets listed in paragraph (a)(2) of this section and 40 CFR 1036.740(a)(3).

(iii) Heavy heavy-duty compression-ignition engines and heavy heavy-duty vehicles. This group comprises the averaging sets listed in paragraph (a)(3) of this section and 40 CFR 1036.740(a)(4).

(2) The limit specified in paragraph (b)(1) of this section does not limit the amount of advanced technology credits that can be used within a service class group if they were generated in that same service class group.

(c) *Credit life.* Credits expire after five years.

(d) *Other restrictions.* Other sections of this part specify additional restrictions for using emission credits under certain special provisions.

### § 1037.745 End-of-year CO<sub>2</sub> credit deficits.

Except as allowed by this section, we may void the certificate of any vehicle family certified to an FEL above the applicable standard for which you do not have sufficient credits by the deadline for submitting the final report.

(a) Your certificate for a vehicle family for which you do not have sufficient CO<sub>2</sub> credits will not be void if you remedy the deficit with surplus credits within three model years. For example, if you have a credit deficit of 500 Mg for a vehicle family at the end of model year 2015, you must generate (or otherwise obtain) a surplus of at least 500 Mg in that same averaging set by the end of model year 2018.

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(b) You may apply only surplus credits to your deficit. You may not apply credits to a deficit from an earlier model year if they were generated in a model year for which any of your vehicle families for that averaging set had an end-of-year credit deficit.

(c) If you do not remedy the deficit with surplus credits within three model years, we may void your certificate for that vehicle family. Note that voiding a certificate applies *ab initio*. Where the net deficit is less than the total amount of negative credits originally generated by the family, we will void the certificate only with respect to the number of vehicles needed to reach the amount of the net deficit. For example, if the original vehicle family generated 500 Mg of negative credits, and the manufacturer's net deficit after three years was 250 Mg, we would void the certificate with respect to half of the vehicles in the family.

### § 1037.750 What can happen if I do not comply with the provisions of this subpart?

(a) For each vehicle family participating in the ABT program, the certificate of conformity is conditioned upon full compliance with the provisions of this subpart during and after the model year. You are responsible to establish to our satisfaction that you fully comply with applicable requirements. We may void the certificate of conformity for a vehicle family if you fail to comply with any provisions of this subpart.

(b) You may certify your vehicle family or subfamily to an FEL above an applicable standard based on a projection that you will have enough emission credits to offset the deficit for the vehicle family. See § 1037.745 for provisions specifying what happens if you cannot show in your final report that you have enough actual emission credits to offset a deficit for any pollutant in a vehicle family.

(c) We may void the certificate of conformity for a vehicle family if you fail to keep records, send reports, or give us information we request. Note that failing to keep records, send reports, or give us information we request is also a violation of 42 U.S.C. 7522(a)(2).

(d) You may ask for a hearing if we void your certificate under this section (see § 1037.820).

### § 1037.755 Information provided to the Department of Transportation.

After receipt of each manufacturer's final report as specified in § 1037.730 and completion of any verification testing required to validate the manufacturer's submitted final data, we will issue a report to the Department of Transportation with CO<sub>2</sub> emission information and will verify the accuracy of each manufacturer's equivalent fuel consumption data required by NHTSA under 49 CFR 535.8. We will send a report to DOT for each vehicle manufacturer based on each regulatory category and subcategory, including sufficient information for NHTSA to determine fuel consumption and associated credit values. See 49 CFR 535.8 to determine if NHTSA deems submission of this information to EPA to also be a submission to NHTSA.

## Subpart I—Definitions and Other Reference Information

### § 1037.801 Definitions.

The following definitions apply to this part. The definitions apply to all subparts unless we note otherwise. All undefined terms have the meaning the Act gives to them. The definitions follow:

*A to B testing* means testing performed in pairs to allow comparison of vehicle A to vehicle B.

*Act* means the Clean Air Act, as amended, 42 U.S.C. 7401-7671q.

*Adjustable parameter* means any device, system, or element of design that someone can adjust (including those which are difficult to access) and that, if adjusted, may affect measured or modeled emissions (as applicable). You may ask us to exclude a parameter that is difficult to access if it cannot be adjusted to affect emissions without significantly degrading vehicle performance, or if you otherwise show us that it will not be adjusted in a way that affects emissions during in-use operation.

*Adjusted Loaded Vehicle Weight* means the numerical average of vehicle curb weight and GVWR.

*Advanced technology* means vehicle technology certified under §1037.615, §1037.104(d)(7), or 40 CFR 1036.615.

*Aftertreatment* means relating to a catalytic converter, particulate filter, or any other system, component, or technology mounted downstream of the exhaust valve (or exhaust port) whose design function is to decrease emissions in the vehicle exhaust before it is exhausted to the environment. Exhaust-gas recirculation (EGR) and turbochargers are not aftertreatment.

*Alcohol-fueled vehicle* means a vehicle that is designed to run using an alcohol fuel. For purposes of this definition, alcohol fuels do not include fuels with a nominal alcohol content below 25 percent by volume.

*Auxiliary emission control device* means any element of design that senses temperature, motive speed, engine RPM, transmission gear, or any other parameter for the purpose of activating, modulating, delaying, or deactivating the operation of any part of the emission control system.

*Averaging set* has the meaning given in §1037.701.

*Cab-complete vehicle* means a vehicle that is first sold as an incomplete vehicle that substantially includes its cab. Vehicles known commercially as chassis-cabs, cab-chassis, box-deletes, bed-deletes, cut-away vans are considered cab-complete vehicles. For purposes of this definition, a cab includes a steering column and passenger compartment. Note a vehicle lacking some components of the cab is a cab-complete vehicle if it substantially includes the cab.

*Calibration* means the set of specifications and tolerances specific to a particular design, version, or application of a component or assembly capable of functionally describing its operation over its working range.

*Carbon-related exhaust emissions (CREE)* has the meaning given in 40 CFR 600.002. Note that CREE represents the combined mass of carbon emitted as HC, CO, and CO<sub>2</sub>, expressed as having a molecular weight equal to that of CO<sub>2</sub>.

*Carryover* means relating to certification based on emission data generated from an earlier model year.

*Certification* means relating to the process of obtaining a certificate of conformity for a vehicle family that complies with the emission standards and requirements in this part.

*Certified emission level* means the highest deteriorated emission level in a vehicle family for a given pollutant from either transient or steady-state testing.

*Class* means relating to GVWR classes, as follows:

(1) *Class 2b* means heavy-duty motor vehicles at or below 10,000 pounds GVWR.

(2) *Class 3* means heavy-duty motor vehicles above 10,000 pounds GVWR but at or below 14,000 pounds GVWR.

(3) *Class 4* means heavy-duty motor vehicles above 14,000 pounds GVWR but at or below 16,000 pounds GVWR.

(4) *Class 5* means heavy-duty motor vehicles above 16,000 pounds GVWR but at or below 19,500 pounds GVWR.

(5) *Class 6* means heavy-duty motor vehicles above 19,500 pounds GVWR but at or below 26,000 pounds GVWR.

(6) *Class 7* means heavy-duty motor vehicles above 26,000 pounds GVWR but at or below 33,000 pounds GVWR.

(7) *Class 8* means heavy-duty motor vehicles above 33,000 pounds GVWR.

*Complete vehicle* has the meaning given in the definition of *vehicle* in this section.

*Compression-ignition* means relating to a type of reciprocating, internal-combustion engine that is not a spark-ignition engine.

*Curb weight* has the meaning given in 40 CFR 86.1803, consistent with the provisions of §1037.140.

*Date of manufacture* means the date on which the certifying vehicle manufacturer completes its manufacturing operations, except as follows:

(1) Where the certificate holder is an engine manufacturer that does not manufacture the chassis, the date of manufacture of the vehicle is based on the date assembly of the vehicle is completed.

(2) We may approve an alternate date of manufacture based on the date on which the certifying (or primary) manufacturer completes assembly at the place of main assembly, consistent with the provisions of §1037.601 and 49 CFR 567.4.

*Day cab* means a type of tractor cab that is not a sleeper cab.

*Designated Compliance Officer* means the Manager, Heavy-Duty and Nonroad Engine Group (6405-J), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

*Designated Enforcement Officer* means the Director, Air Enforcement Division (2242A), U.S. Environmental Protection Agency, 1200 Pennsylvania Ave., NW., Washington, DC 20460.

*Deteriorated emission level* means the emission level that results from applying the appropriate deterioration factor to the official emission result of the emission-data vehicle. Note that where no deterioration factor applies, references in this part to the *deteriorated emission level* mean the official emission result.

*Deterioration factor* means the relationship between emissions at the end of useful life and emissions at the low-hour test point, expressed in one of the following ways:

(1) For multiplicative deterioration factors, the ratio of emissions at the end of useful life to emissions at the low-hour test point.

(2) For additive deterioration factors, the difference between emissions at the end of useful life and emissions at the low-hour test point.

*Driver model* means an automated controller that simulates a person driving a vehicle.

*Electric vehicle* means a vehicle that does not include an engine, and is powered solely by an external source of electricity and/or solar power. Note that this does not include electric hybrid or fuel-cell vehicles that use a chemical fuel such as gasoline, diesel fuel, or hydrogen. Electric vehicles may also be referred to as all-electric vehicles to distinguish them from hybrid vehicles.

*Emission control system* means any device, system, or element of design that controls or reduces the emissions of regulated pollutants from a vehicle.

*Emission-data vehicle* means a vehicle that is tested for certification. This includes vehicle tested to establish deterioration factors.

*Emission-related maintenance* means maintenance that substantially affects

emissions or is likely to substantially affect emission deterioration.

*Excluded* means relating to vehicles that are not subject to some or all of the requirements of this part as follows:

(1) A vehicle that has been determined not to be a motor vehicle is excluded from this part.

(2) Certain vehicles are excluded from the requirements of this part under § 1037.5.

(3) Specific regulatory provisions of this part may exclude a vehicle generally subject to this part from one or more specific standards or requirements of this part.

*Exempted* has the meaning given in 40 CFR 1068.30.

*Family emission limit (FEL)* means an emission level declared by the manufacturer to serve in place of an otherwise applicable emission standard under the ABT program in subpart H of this part. The family emission limit must be expressed to the same number of decimal places as the emission standard it replaces. Note that an FEL may apply as a “subfamily” emission limit.

*Fuel system* means all components involved in transporting, metering, and mixing the fuel from the fuel tank to the combustion chamber(s), including the fuel tank, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents. It also includes components for controlling evaporative emissions, such as fuel caps, purge valves, and carbon canisters.

*Fuel type* means a general category of fuels such as diesel fuel or natural gas. There can be multiple grades within a single fuel type, such as high-sulfur or low-sulfur diesel fuel.

*Good engineering judgment* has the meaning given in 40 CFR 1068.30. See 40 CFR 1068.5 for the administrative process we use to evaluate good engineering judgment.

*Gross combination weight rating (GCWR)* means the value specified by the vehicle manufacturer as the maximum weight of a loaded vehicle and trailer, consistent with good engineering judgment. For example, compliance with SAE J2807 is generally considered to be consistent with good engineering

judgment, especially for Class 3 and smaller vehicles.

*Gross vehicle weight rating (GVWR)* means the value specified by the vehicle manufacturer as the maximum design loaded weight of a single vehicle, consistent with good engineering judgment.

*Heavy-duty engine* means any engine used for (or for which the engine manufacturer could reasonably expect to be used for) motive power in a heavy-duty vehicle.

*Heavy-duty vehicle* means any motor vehicle above 8,500 pounds GVWR or that has a vehicle curb weight above 6,000 pounds or that has a basic vehicle frontal area greater than 45 square feet.

*Hybrid engine* or *hybrid powertrain* means an engine or powertrain that includes energy storage features other than a conventional battery system or conventional flywheel. Supplemental electrical batteries and hydraulic accumulators are examples of hybrid energy storage systems. Note that certain provisions in this part treat hybrid engines and powertrains intended for vehicles that include regenerative braking different than those intended for vehicles that do not include regenerative braking.

*Hybrid vehicle* means a vehicle that includes energy storage features (other than a conventional battery system or conventional flywheel) in addition to an internal combustion engine or other engine using consumable chemical fuel. Supplemental electrical batteries and hydraulic accumulators are examples of hybrid energy storage systems. Note that certain provisions in this part treat hybrid vehicles that include regenerative braking different than those that do not include regenerative braking.

*Hydrocarbon (HC)* means the hydrocarbon group on which the emission standards are based for each fuel type. For alcohol-fueled vehicles, HC means nonmethane hydrocarbon equivalent (NMHCE) for exhaust emissions and total hydrocarbon equivalent (THCE) for evaporative emissions. For all other vehicles, HC means nonmethane hydrocarbon (NMHC) for exhaust emissions and total hydrocarbon (THC) for evaporative emissions.

*Identification number* means a unique specification (for example, a model number/serial number combination) that allows someone to distinguish a particular vehicle from other similar vehicles.

*Incomplete vehicle* has the meaning given in the definition of *vehicle* in this section.

*Innovative technology* means technology certified under §1037.610.

*Light-duty truck* means any motor vehicle rated at or below 8,500 pounds GVWR with a curb weight at or below 6,000 pounds and basic vehicle frontal area at or below 45 square feet, which is:

(1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle; or

(2) Designed primarily for transportation of persons and has a capacity of more than 12 persons; or

(3) Available with special features enabling off-street or off-highway operation and use.

*Light-duty vehicle* means a passenger car or passenger car derivative capable of seating 12 or fewer passengers.

*Low-mileage* means relating to a vehicle with stabilized emissions and represents the undeteriorated emission level. This would generally involve approximately 4000 miles of operation.

*Low rolling resistance tire* means a tire on a vocational vehicle with a TRRL at or below of 7.7 kg/metric ton, a steer tire on a tractor with a TRRL at or below 7.7 kg/metric ton, or a drive tire on a tractor with a TRRL at or below 8.1 kg/metric ton.

*Manufacture* means the physical and engineering process of designing, constructing, and/or assembling a vehicle.

*Manufacturer* has the meaning given in section 216(1) of the Act. In general, this term includes any person who manufactures a vehicle or vehicle for sale in the United States or otherwise introduces a new motor vehicle into commerce in the United States. This includes importers who import vehicles or vehicles for resale.

*Medium-duty passenger vehicle (MDPV)* has the meaning given in 40 CFR 86.1803.

*Model year* means the manufacturer's annual new model production period,

except as restricted under this definition and 40 CFR part 85, subpart X. It must include January 1 of the calendar year for which the model year is named, may not begin before January 2 of the previous calendar year, and it must end by December 31 of the named calendar year.

(1) The manufacturer who holds the certificate of conformity for the vehicle must assign the model year based on the date when its manufacturing operations are completed relative to its annual model year period. In unusual circumstances where completion of your assembly is delayed, we may allow you to assign a model year one year earlier, provided it does not affect which regulatory requirements will apply.

(2) Unless a vehicle is being shipped to a secondary manufacturer that will hold the certificate of conformity, the model year must be assigned prior to introduction of the vehicle into U.S. commerce. The certifying manufacturer must redesignate the model year if it does not complete its manufacturing operations within the originally identified model year. A vehicle introduced into U.S. commerce without a model year is deemed to have a model year equal to the calendar year of its introduction into U.S. commerce unless the certifying manufacturer assigns a later date.

*Motor vehicle* has the meaning given in 40 CFR 85.1703.

*New motor vehicle* means a motor vehicle meeting the criteria of either paragraph (1) or (2) of this definition. New motor vehicles may be complete or incomplete.

(1) A motor vehicle for which the ultimate purchaser has never received the equitable or legal title is a *new motor vehicle*. This kind of vehicle might commonly be thought of as "brand new" although a *new motor vehicle* may include previously used parts. Under this definition, the vehicle is new from the time it is produced until the ultimate purchaser receives the title or places it into service, whichever comes first.

(2) An imported heavy-duty motor vehicle originally produced after the 1969 model year is a *new motor vehicle*.

*Noncompliant vehicle* means a vehicle that was originally covered by a certificate of conformity, but is not in the certified configuration or otherwise does not comply with the conditions of the certificate.

*Nonconforming vehicle* means a vehicle not covered by a certificate of conformity that would otherwise be subject to emission standards.

*Nonmethane hydrocarbons (NMHC)* means the sum of all hydrocarbon species except methane, as measured according to 40 CFR part 1065.

*Official emission result* means the measured emission rate for an emission-data vehicle on a given duty cycle before the application of any required deterioration factor, but after the applicability of regeneration adjustment factors.

*Owners manual* means a document or collection of documents prepared by the vehicle manufacturer for the owners or operators to describe appropriate vehicle maintenance, applicable warranties, and any other information related to operating or keeping the vehicle. The owners manual is typically provided to the ultimate purchaser at the time of sale.

*Oxides of nitrogen* has the meaning given in 40 CFR 1065.1001.

*Particulate trap* means a filtering device that is designed to physically trap all particulate matter above a certain size.

*Percent* has the meaning given in 40 CFR 1065.1001. Note that this means percentages identified in this part are assumed to be infinitely precise without regard to the number of significant figures. For example, one percent of 1,493 is 14.93.

*Placed into service* means put into initial use for its intended purpose.

*Power take-off (PTO)* means a secondary engine shaft (or equivalent) that provides substantial auxiliary power for purposes unrelated to vehicle propulsion or normal vehicle accessories such as air conditioning, power steering, and basic electrical accessories. A typical PTO uses a secondary shaft on the engine to transmit power to a hydraulic pump that powers auxiliary equipment, such as a boom on a bucket truck. You may ask us to consider other equivalent auxiliary power

configurations (such as those with hybrid vehicles) as power take-off systems.

*Rechargeable Energy Storage System (RESS)* means the component(s) of a hybrid engine or vehicle that store recovered energy for later use, such as the battery system in an electric hybrid vehicle.

*Regulatory sub-category* means one of following groups:

(1) Spark-ignition vehicles subject to the standards of §1037.104. Note that this category includes most gasoline-fueled heavy-duty pickup trucks and vans.

(2) All other vehicles subject to the standards of §1037.104. Note that this category includes most diesel-fueled heavy-duty pickup trucks and van.

(3) Vocational vehicles at or below 19,500 pounds GVWR.

(4) Vocational vehicles at or above 19,500 pounds GVWR but below 33,000 pounds GVWR.

(5) Vocational vehicles over 33,000 pounds GVWR.

(6) Low-roof tractors at or above 26,000 pounds GVWR but below 33,000 pounds GVWR.

(7) Mid-roof tractors at or above 26,000 pounds GVWR but below 33,000 pounds GVWR.

(8) High-roof tractors at or above 26,000 pounds GVWR but below 33,000 pounds GVWR.

(9) Low-roof day cab tractors at or above 33,000 pounds GVWR.

(10) Low-roof sleeper cab tractors at or above 33,000 pounds GVWR.

(11) Mid-roof day cab tractors at or above 33,000 pounds GVWR.

(12) Mid-roof sleeper cab tractors at or above 33,000 pounds GVWR.

(13) High-roof day cab tractors at or above 33,000 pounds GVWR.

(14) High-roof sleeper cab tractors at or above 33,000 pounds GVWR.

*Relating to* as used in this section means relating to something in a specific, direct manner. This expression is used in this section only to define terms as adjectives and not to broaden the meaning of the terms.

*Revoke* has the meaning given in 40 CFR 1068.30.

*Roof height* means the maximum height of a vehicle (rounded to the nearest inch), excluding narrow acces-

sories such as exhaust pipes and antennas, but including any wide accessories such as roof fairings. Measure roof height of the vehicle configured to have its maximum height that will occur during actual use, with properly inflated tires and no driver, passengers, or cargo onboard. *Roof height* may also refer to the following categories:

(1) Low-roof means relating to a vehicle with a roof height of 120 inches or less.

(2) Mid-roof means relating to a vehicle with a roof height of 121 to 147 inches.

(3) High-roof means relating to a vehicle with a roof height of 148 inches or more.

*Round* has the meaning given in 40 CFR 1065.1001.

*Scheduled maintenance* means adjusting, repairing, removing, disassembling, cleaning, or replacing components or systems periodically to keep a part or system from failing, malfunctioning, or wearing prematurely. It also may mean actions you expect are necessary to correct an overt indication of failure or malfunction for which periodic maintenance is not appropriate.

*Sleeper cab* means a type of tractor cab that has a compartment behind the driver's seat intended to be used by the driver for sleeping. This includes cabs accessible from the driver's compartment and those accessible from outside the vehicle.

*Small manufacturer* means a manufacturer meeting the criteria specified in 13 CFR 121.201. For manufacturers owned by a parent company, the employee and revenue limits apply to the total number employees and total revenue of the parent company and all its subsidiaries.

*Spark-ignition* means relating to a gasoline-fueled engine or any other type of engine with a spark plug (or other sparking device) and with operating characteristics significantly similar to the theoretical Otto combustion cycle. Spark-ignition engines usually use a throttle to regulate intake air flow to control power during normal operation.

*Standard payload* means the vehicle payload assumed for each class in tons for modeling and calculating emission

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credits. There are three standard payloads:

(1) 2.85 tons for light heavy-duty vehicles.

(2) 5.6 tons for medium heavy-duty vehicles.

(3) 7.5 tons for heavy heavy-duty vehicles.

*Standard trailer* has the meaning given in §1037.501.

*Suspend* has the meaning given in 40 CFR 1068.30.

*Test sample* means the collection of vehicles selected from the population of a vehicle family for emission testing. This may include testing for certification, production-line testing, or in-use testing.

*Test vehicle* means a vehicle in a test sample.

*Test weight* means the vehicle weight used or represented during testing.

*Tire rolling resistance level (TRRL)* means a value with units of kg/metric ton that represents that rolling resistance of a tire configuration. TRRLs are used as inputs to the GEM model under §1037.520. Note that a manufacturer may assign a value higher than the measured rolling resistance of a tire configuration.

*Total hydrocarbon* has the meaning given in 40 CFR 1065.1001. This generally means the combined mass of organic compounds measured by the specified procedure for measuring total hydrocarbon, expressed as a hydrocarbon with an atomic hydrogen-to-carbon ratio of 1.85:1.

*Total hydrocarbon equivalent* has the meaning given in 40 CFR 1065.1001. This generally means the sum of the carbon mass contributions of non-oxygenated hydrocarbons, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as exhaust hydrocarbon from petroleum-fueled vehicles. The atomic hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

*Tractor* has the meaning given for "truck tractor" in 49 CFR 571.3. This includes most heavy-duty vehicles specifically designed for the primary purpose of pulling trailers, but does not include vehicles designed to carry other loads. For purposes of this definition "other loads" would not include loads

carried in the cab, sleeper compartment, or toolboxes. Examples of vehicles that are similar to tractors but that are not *tractors* under this part include dromedary tractors, automobile haulers, straight trucks with trailers hitches, and tow trucks. Note that the provisions of this part that apply for tractors do not apply for tractors that are classified as vocational tractors under §1037.630.

*Ultimate purchaser* means, with respect to any new vehicle, the first person who in good faith purchases such new vehicle for purposes other than resale.

*United States* has the meaning given in 40 CFR 1068.30.

*Upcoming model year* means for a vehicle family the model year after the one currently in production.

*U.S.-directed production volume* means the number of vehicle units, subject to the requirements of this part, produced by a manufacturer for which the manufacturer has a reasonable assurance that sale was or will be made to ultimate purchasers in the United States. This does not include vehicles certified to state emission standards that are different than the emission standards in this part.

*Useful life* means the period during which a vehicle is required to comply with all applicable emission standards.

*Vehicle* means equipment intended for use on highways that meets the criteria of paragraph (1)(i) or (1)(ii) of this definition, as follows:

(1) The following equipment are vehicles:

(i) A piece of equipment that is intended for self-propelled use on highways becomes a vehicle when it includes at least an engine, a transmission, and a frame. (Note: For purposes of this definition, any electrical, mechanical, and/or hydraulic devices attached to engines for the purpose of powering wheels are considered to be transmissions.)

(ii) A piece of equipment that is intended for self-propelled use on highways becomes a vehicle when it includes a passenger compartment attached to a frame with axles.

(2) Vehicles may be complete or incomplete vehicles as follows:



(i) A *complete vehicle* is a functioning vehicle that has the primary load carrying device or container (or equivalent equipment) attached. Examples of equivalent equipment would include fifth wheel trailer hitches, firefighting equipment, and utility booms.

(ii) An *incomplete vehicle* is a vehicle that is not a complete vehicle. Incomplete vehicles may also be cab-complete vehicles. This may include vehicles sold to secondary vehicle manufacturers.

(iii) The primary use of the terms “complete vehicle” and “incomplete vehicle” are to distinguish whether a vehicle is complete when it is first sold as a vehicle.

(iv) You may ask us to allow you to certify a vehicle as incomplete if you manufacture the engines and sell the unassembled chassis components, as long as you do not produce and sell the body components necessary to complete the vehicle.

(3) Equipment such as trailers that are not self-propelled are not “vehicles” under this part 1037.

*Vehicle configuration* means a unique combination of vehicle hardware and calibration (related to measured or modeled emissions) within a vehicle family. Vehicles with hardware or software differences, but that have no hardware or software differences related to measured or modeled emissions may be included in the same vehicle configuration. Note that vehicles with hardware or software differences related to measured or modeled emissions are considered to be different configurations even if they have the same GEM inputs and FEL. Vehicles within a vehicle configuration differ only with respect to normal production variability or factors unrelated to measured or modeled emissions.

*Vehicle family* has the meaning given in § 1037.230.

*Vehicle service class* means a vehicle’s weight class as specified in this definition. Note that, while *vehicle service class* is similar to primary intended service class for engines, they are not necessarily the same. For example, a medium heavy-duty vehicle may include a light heavy-duty engine. Note also that while spark-ignition engines do not have a primary intended service

class, vehicles using spark-ignition engines have a vehicle service class.

(1) Light heavy-duty vehicles are those vehicles with GVWR below 19,500 pounds.

Vehicles in this class include heavy-duty pickup trucks and vans, motor homes and other recreational vehicles, and some straight trucks with a single rear axle. Typical applications would include personal transportation, light-load commercial delivery, passenger service, agriculture, and construction.

(2) Medium heavy-duty vehicles are those vehicles with GVWR from 19,500 to 33,000 pounds. Vehicles in this class include school buses, straight trucks with a single rear axle, city tractors, and a variety of special purpose vehicles such as small dump trucks, and refuse trucks. Typical applications would include commercial short haul and intra-city delivery and pickup.

(3) Heavy heavy-duty vehicles are those vehicles with GVWR above 33,000 pounds. Vehicles in this class include tractors, urban buses, and other heavy trucks.

*Vehicle subfamily* or *subfamily* means a subset of a vehicle family including vehicles subject to the same FEL(s).

*Vocational tractor* means a vehicle classified as a vocational tractor under § 1037.630.

*Vocational vehicle* means relating to a vehicle subject to the standards of § 1037.105 (including vocational tractors).

*Void* has the meaning given in 40 CFR 1068.30.

*Volatile liquid fuel* means any fuel other than diesel or biodiesel that is a liquid at atmospheric pressure and has a Reid Vapor Pressure higher than 2.0 pounds per square inch.

*We (us, our)* means the Administrator of the Environmental Protection Agency and any authorized representatives.

**§ 1037.805 Symbols, acronyms, and abbreviations.**

The following symbols, acronyms, and abbreviations apply to this part:

- ABT Averaging, banking, and trading.
- AECD auxiliary emission control device.
- C<sub>D</sub> drag coefficient.
- C<sub>D</sub>A drag area.
- CFD computational fluid dynamics.
- CFR Code of Federal Regulations.
- CH<sub>4</sub> methane.

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CO carbon monoxide.  
CO<sub>2</sub> carbon dioxide.  
CREE carbon-related exhaust emissions.  
DOT Department of Transportation.  
EPA Environmental Protection Agency.  
ETW equivalent test weight.  
FEL Family Emission Limit.  
g grams.  
GAWR gross axle weight rating.  
GCWR gross combination weight rating.  
GVWR gross vehicle weight rating.  
GWP global-warming potential.  
HC hydrocarbon.  
ISO International Organization for Standardization.  
kg kilograms.  
m meter.  
mm millimeter.  
mph miles per hour.  
N<sub>2</sub>O nitrous oxide.  
NARA National Archives and Records Administration.  
NHTSA National Highway Transportation Safety Administration.  
NO<sub>x</sub> oxides of nitrogen (NO and NO<sub>2</sub>).  
PM particulate matter.  
PTO power take-off.  
RESS rechargeable energy storage system.  
RPM revolutions per minute.  
SAE Society of Automotive Engineers.  
SKU Stock-keeping unit.  
TRRL Tire rolling resistance level.  
U.S.C. United States Code.  
VSL vehicle speed limiter.  
WF work factor.

### § 1037.810 Incorporation by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the Environmental Protection Agency must publish a notice of the change in the FEDERAL REGISTER and the material must be available to the public. All approved material is available for inspection at U.S. EPA, Air and Radiation Docket and Information Center, 1301 Constitution Ave., NW., Room B102, EPA West Building, Washington, DC 20460, (202) 202-1744, and is available from the sources listed below. It is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to [http://www.archives.gov/federal\\_register/code\\_of\\_federal\\_regulations/ibr\\_locations.html](http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html).

(b) International Organization for Standardization, Case Postale 56, CH-1211 Geneva 20, Switzerland, (41) 22749 0111, <http://www.iso.org>, or [central@iso.org](mailto:central@iso.org).

(1) ISO 28580:2009(E) "Passenger car, truck and bus tyres—Methods of measuring rolling resistance—Single point test and correlation of measurement results", First Edition, July 1, 2009; IBR approved for § 1037.520(c).

(2) [Reserved]

(c) U.S. EPA, Office of Air and Radiation, 2565 Plymouth Road, Ann Arbor, MI 48105, <http://www.epa.gov>:

(1) GEM simulation tool, Version 2.0, August 2011; IBR approved for § 1037.520. The computer code for this model is available as noted in paragraph (a) of this section. A working version of this software is also available for download at <http://www.epa.gov/otaq/climate/gem.htm>.

(2) [Reserved]

(d) Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA 15096-0001, (877) 606-7323 (U.S. and Canada) or (724) 776-4970 (outside the U.S. and Canada), <http://www.sae.org>.

(1) SAE J1252, SAE Wind Tunnel Test Procedure for Trucks and Buses, Revised July 1981, IBR approved for § 1037.521(d), (e), and (f).

(2) SAE J1594, Vehicle Aerodynamics Terminology, Revised July 2010, IBR approved for § 1037.521(d).

(3) SAE J2071, Aerodynamic Testing of Road Vehicles—Open Throat Wind Tunnel Adjustment, Revised June 1994, IBR approved for § 1037.521(d).

### § 1037.815 Confidential information.

The provisions of 40 CFR 1068.10 apply for information you consider confidential.

### § 1037.820 Requesting a hearing.

(a) You may request a hearing under certain circumstances, as described elsewhere in this part. To do this, you must file a written request, including a description of your objection and any supporting data, within 30 days after we make a decision.

(b) For a hearing you request under the provisions of this part, we will approve your request if we find that your request raises a substantial factual issue.

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(c) If we agree to hold a hearing, we will use the procedures specified in 40 CFR part 1068, subpart G.

**§ 1037.825 Reporting and record-keeping requirements.**

(a) This part includes various requirements to submit and record data or other information. Unless we specify otherwise, store required records in any format and on any media and keep them readily available for eight years after you send an associated application for certification, or eight years after you generate the data if they do not support an application for certification. You may not rely on anyone else to meet recordkeeping requirements on your behalf unless we specifically authorize it. We may review these records at any time. You must promptly send us organized, written records in English if we ask for them. We may require you to submit written records in an electronic format.

(b) The regulations in §1037.255 and 40 CFR 1068.25 and 1068.101 describe your obligation to report truthful and complete information. This includes information not related to certification. Failing to properly report information and keep the records we specify violates 40 CFR 1068.101(a)(2), which may involve civil or criminal penalties.

(c) Send all reports and requests for approval to the Designated Compliance Officer (see §1037.801).

(d) Any written information we require you to send to or receive from another company is deemed to be a required record under this section. Such records are also deemed to be submissions to EPA. Keep these records for eight years unless the regulations specify a different period. We may require you to send us these records whether or not you are a certificate holder.

(e) Under the Paperwork Reduction Act (44 U.S.C. 3501 *et seq*), the Office of Management and Budget approves the reporting and recordkeeping specified in the applicable regulations. The following items illustrate the kind of reporting and recordkeeping we require for vehicles regulated under this part:

(1) We specify the following requirements related to vehicle certification in this part 1037:

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(i) In subpart C of this part we identify a wide range of information required to certify vehicles.

(ii) In subpart G of this part we identify several reporting and recordkeeping items for making demonstrations and getting approval related to various special compliance provisions.

(iii) In §1037.725, 1037.730, and 1037.735 we specify certain records related to averaging, banking, and trading.

(2) We specify the following requirements related to testing in 40 CFR part 1066:

(i) In 40 CFR 1065.2 we give an overview of principles for reporting information.

(ii) In 40 CFR 1065.10 and 1065.12 we specify information needs for establishing various changes to published test procedures.

(iii) In 40 CFR 1065.25 we establish basic guidelines for storing test information.

(iv) In 40 CFR 1065.695 we identify data that may be appropriate for collecting during testing of in-use vehicles using portable analyzers.

**APPENDIX I TO PART 1037—HEAVY-DUTY TRANSIENT CHASSIS TEST CYCLE**

	Time sec.	Speed mph	Speed m/s
1 .....	0.00	0.00	0.00
2 .....	0.00	0.00	0.00
3 .....	0.00	0.00	0.00
4 .....	0.00	0.00	0.00
5 .....	0.00	0.00	0.00
6 .....	0.00	0.00	0.00
7 .....	0.41	0.18	0.18
8 .....	1.18	0.53	0.53
9 .....	2.26	1.01	1.01
10 .....	3.19	1.43	1.43
11 .....	3.97	1.77	1.77
12 .....	4.66	2.08	2.08
13 .....	5.32	2.38	2.38
14 .....	5.94	2.66	2.66
15 .....	6.48	2.90	2.90
16 .....	6.91	3.09	3.09
17 .....	7.28	3.25	3.25
18 .....	7.64	3.42	3.42
19 .....	8.02	3.59	3.59
20 .....	8.36	3.74	3.74
21 .....	8.60	3.84	3.84
22 .....	8.74	3.91	3.91
23 .....	8.82	3.94	3.94
24 .....	8.82	3.94	3.94
25 .....	8.76	3.92	3.92
26 .....	8.66	3.87	3.87
27 .....	8.58	3.84	3.84
28 .....	8.52	3.81	3.81
29 .....	8.46	3.78	3.78
30 .....	8.38	3.75	3.75
31 .....	8.31	3.71	3.71
32 .....	8.21	3.67	3.67
33 .....	8.11	3.63	3.63

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Time sec.	Speed mph	Speed m/s	Time sec.	Speed mph	Speed m/s
34	8.00	3.58	107	7.42	3.32
35	7.94	3.55	108	7.43	3.32
36	7.94	3.55	109	7.40	3.31
37	7.80	3.49	110	7.39	3.30
38	7.43	3.32	111	7.42	3.32
39	6.79	3.04	112	7.50	3.35
40	5.81	2.60	113	7.57	3.38
41	4.65	2.08	114	7.60	3.40
42	3.03	1.35	115	7.60	3.40
43	1.88	0.84	116	7.61	3.40
44	1.15	0.51	117	7.64	3.42
45	1.14	0.51	118	7.68	3.43
46	1.12	0.50	119	7.74	3.46
47	1.11	0.50	120	7.82	3.50
48	1.19	0.53	121	7.90	3.53
49	1.57	0.70	122	7.96	3.56
50	2.31	1.03	123	7.99	3.57
51	3.37	1.51	124	8.02	3.59
52	4.51	2.02	125	8.01	3.58
53	5.56	2.49	126	7.87	3.52
54	6.41	2.87	127	7.59	3.39
55	7.09	3.17	128	7.20	3.22
56	7.59	3.39	129	6.52	2.91
57	7.99	3.57	130	5.53	2.47
58	8.32	3.72	131	4.36	1.95
59	8.64	3.86	132	3.30	1.48
60	8.91	3.98	133	2.50	1.12
61	9.13	4.08	134	1.94	0.87
62	9.29	4.15	135	1.56	0.70
63	9.40	4.20	136	0.95	0.42
64	9.39	4.20	137	0.42	0.19
65	9.20	4.11	138	0.00	0.00
66	8.84	3.95	139	0.00	0.00
67	8.35	3.73	140	0.00	0.00
68	7.81	3.49	141	0.00	0.00
69	7.22	3.23	142	0.00	0.00
70	6.65	2.97	143	0.00	0.00
71	6.13	2.74	144	0.00	0.00
72	5.75	2.57	145	0.00	0.00
73	5.61	2.51	146	0.00	0.00
74	5.65	2.53	147	0.00	0.00
75	5.80	2.59	148	0.00	0.00
76	5.95	2.66	149	0.00	0.00
77	6.09	2.72	150	0.00	0.00
78	6.21	2.78	151	0.00	0.00
79	6.31	2.82	152	0.00	0.00
80	6.34	2.83	153	0.00	0.00
81	6.47	2.89	154	0.00	0.00
82	6.65	2.97	155	0.00	0.00
83	6.88	3.08	156	0.00	0.00
84	7.04	3.15	157	0.00	0.00
85	7.05	3.15	158	0.00	0.00
86	7.01	3.13	159	0.00	0.00
87	6.90	3.08	160	0.00	0.00
88	6.88	3.08	161	0.00	0.00
89	6.89	3.08	162	0.00	0.00
90	6.96	3.11	163	0.00	0.00
91	7.04	3.15	164	0.00	0.00
92	7.17	3.21	165	0.00	0.00
93	7.29	3.26	166	0.00	0.00
94	7.39	3.30	167	0.00	0.00
95	7.48	3.34	168	0.00	0.00
96	7.57	3.38	169	0.00	0.00
97	7.61	3.40	170	0.00	0.00
98	7.59	3.39	171	0.00	0.00
99	7.53	3.37	172	1.11	0.50
100	7.46	3.33	173	2.65	1.18
101	7.40	3.31	174	4.45	1.99
102	7.39	3.30	175	5.68	2.54
103	7.38	3.30	176	6.75	3.02
104	7.37	3.29	177	7.59	3.39
105	7.37	3.29	178	7.75	3.46
106	7.39	3.30	179	7.63	3.41

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Time sec.	Speed mph	Speed m/s	Time sec.	Speed mph	Speed m/s
180	7.67	3.43	253	0.00	0.00
181	8.70	3.89	254	0.00	0.00
182	10.20	4.56	255	0.00	0.00
183	11.92	5.33	256	0.00	0.00
184	12.84	5.74	257	0.00	0.00
185	13.27	5.93	258	0.00	0.00
186	13.38	5.98	259	0.50	0.22
187	13.61	6.08	260	1.57	0.70
188	14.15	6.33	261	3.07	1.37
189	14.84	6.63	262	4.57	2.04
190	16.49	7.37	263	5.65	2.53
191	18.33	8.19	264	6.95	3.11
192	20.36	9.10	265	8.05	3.60
193	21.47	9.60	266	9.13	4.08
194	22.35	9.99	267	10.05	4.49
195	22.96	10.26	268	11.62	5.19
196	23.46	10.49	269	12.92	5.78
197	23.92	10.69	270	13.84	6.19
198	24.42	10.92	271	14.38	6.43
199	24.99	11.17	272	15.64	6.99
200	25.91	11.58	273	17.14	7.66
201	26.26	11.74	274	18.21	8.14
202	26.38	11.79	275	18.90	8.45
203	26.26	11.74	276	19.44	8.69
204	26.49	11.84	277	20.09	8.98
205	26.76	11.96	278	21.89	9.79
206	27.07	12.10	279	24.15	10.80
207	26.64	11.91	280	26.26	11.74
208	25.99	11.62	281	26.95	12.05
209	24.77	11.07	282	27.03	12.08
210	24.04	10.75	283	27.30	12.20
211	23.39	10.46	284	28.10	12.56
212	22.73	10.16	285	29.44	13.16
213	22.16	9.91	286	30.78	13.76
214	21.66	9.68	287	32.09	14.35
215	21.39	9.56	288	33.24	14.86
216	21.43	9.58	289	34.46	15.40
217	20.67	9.24	290	35.42	15.83
218	17.98	8.04	291	35.88	16.04
219	13.15	5.88	292	36.03	16.11
220	7.71	3.45	293	35.84	16.02
221	3.30	1.48	294	35.65	15.94
222	0.88	0.39	295	35.31	15.78
223	0.00	0.00	296	35.19	15.73
224	0.00	0.00	297	35.12	15.70
225	0.00	0.00	298	35.12	15.70
226	0.00	0.00	299	35.04	15.66
227	0.00	0.00	300	35.08	15.68
228	0.00	0.00	301	35.04	15.66
229	0.00	0.00	302	35.34	15.80
230	0.00	0.00	303	35.50	15.87
231	0.00	0.00	304	35.77	15.99
232	0.00	0.00	305	35.81	16.01
233	0.00	0.00	306	35.92	16.06
234	0.00	0.00	307	36.23	16.20
235	0.00	0.00	308	36.42	16.28
236	0.00	0.00	309	36.65	16.38
237	0.00	0.00	310	36.26	16.21
238	0.00	0.00	311	36.07	16.12
239	0.00	0.00	312	35.84	16.02
240	0.00	0.00	313	35.96	16.08
241	0.00	0.00	314	36.00	16.09
242	0.00	0.00	315	35.57	15.90
243	0.00	0.00	316	35.00	15.65
244	0.00	0.00	317	34.08	15.24
245	0.00	0.00	318	33.39	14.93
246	0.00	0.00	319	32.20	14.39
247	0.00	0.00	320	30.32	13.55
248	0.00	0.00	321	28.48	12.73
249	0.00	0.00	322	26.95	12.05
250	0.00	0.00	323	26.18	11.70
251	0.00	0.00	324	25.38	11.35
252	0.00	0.00	325	24.77	11.07

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Time sec.	Speed mph	Speed m/s	Time sec.	Speed mph	Speed m/s
326	23.46	10.49	399	19.90	8.90
327	22.39	10.01	400	18.86	8.43
328	20.97	9.37	401	17.79	7.95
329	20.09	8.98	402	17.25	7.71
330	18.90	8.45	403	16.91	7.56
331	18.17	8.12	404	16.75	7.49
332	16.48	7.37	405	16.75	7.49
333	15.07	6.74	406	16.87	7.54
334	12.23	5.47	407	16.37	7.32
335	10.08	4.51	408	16.37	7.32
336	7.71	3.45	409	16.49	7.37
337	7.32	3.27	410	17.21	7.69
338	8.63	3.86	411	17.41	7.78
339	10.77	4.81	412	17.37	7.77
340	12.65	5.66	413	16.87	7.54
341	13.88	6.20	414	16.72	7.47
342	15.03	6.72	415	16.22	7.25
343	15.64	6.99	416	15.76	7.05
344	16.99	7.60	417	14.72	6.58
345	17.98	8.04	418	13.69	6.12
346	19.13	8.55	419	12.00	5.36
347	18.67	8.35	420	10.43	4.66
348	18.25	8.16	421	8.71	3.89
349	18.17	8.12	422	7.44	3.33
350	18.40	8.23	423	5.71	2.55
351	19.63	8.78	424	4.22	1.89
352	20.32	9.08	425	2.30	1.03
353	21.43	9.58	426	1.00	0.45
354	21.47	9.60	427	0.00	0.00
355	21.97	9.82	428	0.61	0.27
356	22.27	9.96	429	1.19	0.53
357	22.69	10.14	430	1.61	0.72
358	23.15	10.35	431	1.53	0.68
359	23.69	10.59	432	2.34	1.05
360	23.96	10.71	433	4.29	1.92
361	24.27	10.85	434	7.25	3.24
362	24.34	10.88	435	10.20	4.56
363	24.50	10.95	436	12.46	5.57
364	24.42	10.92	437	14.53	6.50
365	24.38	10.90	438	16.22	7.25
366	24.31	10.87	439	17.87	7.99
367	24.23	10.83	440	19.74	8.82
368	24.69	11.04	441	21.01	9.39
369	25.11	11.23	442	22.23	9.94
370	25.53	11.41	443	22.62	10.11
371	25.38	11.35	444	23.61	10.55
372	24.58	10.99	445	24.88	11.12
373	23.77	10.63	446	26.15	11.69
374	23.54	10.52	447	26.99	12.07
375	23.50	10.51	448	27.56	12.32
376	24.15	10.80	449	28.18	12.60
377	24.30	10.86	450	28.94	12.94
378	24.15	10.80	451	29.83	13.34
379	23.19	10.37	452	30.78	13.76
380	22.50	10.06	453	31.82	14.22
381	21.93	9.80	454	32.78	14.65
382	21.85	9.77	455	33.24	14.86
383	21.55	9.63	456	33.47	14.96
384	21.89	9.79	457	33.31	14.89
385	21.97	9.82	458	33.08	14.79
386	21.97	9.82	459	32.78	14.65
387	22.01	9.84	460	32.39	14.48
388	21.85	9.77	461	32.13	14.36
389	21.62	9.67	462	31.82	14.22
390	21.62	9.67	463	31.55	14.10
391	22.01	9.84	464	31.25	13.97
392	22.81	10.20	465	30.94	13.83
393	23.54	10.52	466	30.71	13.73
394	24.38	10.90	467	30.56	13.66
395	24.80	11.09	468	30.79	13.76
396	24.61	11.00	469	31.13	13.92
397	23.12	10.34	470	31.55	14.10
398	21.62	9.67	471	31.51	14.09

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Time sec.	Speed mph	Speed m/s	Time sec.	Speed mph	Speed m/s
472	31.47	14.07	545	7.59	3.39
473	31.44	14.05	546	7.63	3.41
474	31.51	14.09	547	7.67	3.43
475	31.59	14.12	548	7.67	3.43
476	31.67	14.16	549	7.48	3.34
477	32.01	14.31	550	7.29	3.26
478	32.63	14.59	551	7.29	3.26
479	33.39	14.93	552	7.40	3.31
480	34.31	15.34	553	7.48	3.34
481	34.81	15.56	554	7.52	3.36
482	34.20	15.29	555	7.52	3.36
483	32.39	14.48	556	7.48	3.34
484	30.29	13.54	557	7.44	3.33
485	28.56	12.77	558	7.28	3.25
486	26.45	11.82	559	7.21	3.22
487	24.79	11.08	560	7.09	3.17
488	23.12	10.34	561	7.06	3.16
489	20.73	9.27	562	7.29	3.26
490	18.33	8.19	563	7.75	3.46
491	15.72	7.03	564	8.55	3.82
492	13.11	5.86	565	9.09	4.06
493	10.47	4.68	566	10.04	4.49
494	7.82	3.50	567	11.12	4.97
495	5.70	2.55	568	12.46	5.57
496	3.57	1.60	569	13.00	5.81
497	0.92	0.41	570	14.26	6.37
498	0.00	0.00	571	15.37	6.87
499	0.00	0.00	572	17.02	7.61
500	0.00	0.00	573	18.17	8.12
501	0.00	0.00	574	19.21	8.59
502	0.00	0.00	575	20.17	9.02
503	0.00	0.00	576	20.66	9.24
504	0.00	0.00	577	21.12	9.44
505	0.00	0.00	578	21.43	9.58
506	0.00	0.00	579	22.66	10.13
507	0.00	0.00	580	23.92	10.69
508	0.00	0.00	581	25.42	11.36
509	0.00	0.00	582	25.53	11.41
510	0.00	0.00	583	26.68	11.93
511	0.00	0.00	584	28.14	12.58
512	0.00	0.00	585	30.06	13.44
513	0.00	0.00	586	30.94	13.83
514	0.00	0.00	587	31.63	14.14
515	0.00	0.00	588	32.36	14.47
516	0.00	0.00	589	33.24	14.86
517	0.00	0.00	590	33.66	15.05
518	0.00	0.00	591	34.12	15.25
519	0.00	0.00	592	35.92	16.06
520	0.00	0.00	593	37.72	16.86
521	0.00	0.00	594	39.26	17.55
522	0.50	0.22	595	39.45	17.64
523	1.50	0.67	596	39.83	17.81
524	3.00	1.34	597	40.18	17.96
525	4.50	2.01	598	40.48	18.10
526	5.80	2.59	599	40.75	18.22
527	6.52	2.91	600	41.02	18.34
528	6.75	3.02	601	41.36	18.49
529	6.44	2.88	602	41.79	18.68
530	6.17	2.76	603	42.40	18.95
531	6.33	2.83	604	42.82	19.14
532	6.71	3.00	605	43.05	19.25
533	7.40	3.31	606	43.09	19.26
534	7.67	3.43	607	43.24	19.33
535	7.33	3.28	608	43.59	19.49
536	6.71	3.00	609	44.01	19.67
537	6.41	2.87	610	44.35	19.83
538	6.60	2.95	611	44.55	19.92
539	6.56	2.93	612	44.82	20.04
540	5.94	2.66	613	45.05	20.14
541	5.45	2.44	614	45.31	20.26
542	5.87	2.62	615	45.58	20.38
543	6.71	3.00	616	46.00	20.56
544	7.56	3.38	617	46.31	20.70

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Time sec.	Speed mph	Speed m/s	Time sec.	Speed mph	Speed m/s
618	46.54	20.81	646	17.04	7.62
619	46.61	20.84	647	14.26	6.37
620	46.92	20.98	648	11.52	5.15
621	47.19	21.10	649	8.78	3.93
622	47.46	21.22	650	7.17	3.21
623	47.54	21.25	651	5.56	2.49
624	47.54	21.25	652	3.72	1.66
625	47.54	21.25	653	3.38	1.51
626	47.50	21.23	654	3.11	1.39
627	47.50	21.23	655	2.58	1.15
628	47.50	21.23	656	1.66	0.74
629	47.31	21.15	657	0.67	0.30
630	47.04	21.03	658	0.00	0.00
631	46.77	20.91	659	0.00	0.00
632	45.54	20.36	660	0.00	0.00
633	43.24	19.33	661	0.00	0.00
634	41.52	18.56	662	0.00	0.00
635	39.79	17.79	663	0.00	0.00
636	38.07	17.02	664	0.00	0.00
637	36.34	16.25	665	0.00	0.00
638	34.04	15.22	666	0.00	0.00
639	32.45	14.51	667	0.00	0.00
640	30.86	13.80	668	0.00	0.00
641	28.83	12.89			
642	26.45	11.82			
643	24.27	10.85			
644	22.04	9.85			
645	19.82	8.86			

APPENDIX II TO PART 1037—POWER TAKE-OFF TEST CYCLE

Cycle simulation	Mode	Start time of mode	Normalized pressure, circuit 1 (%)	Normalized pressure, circuit 2 (%)
Utility	0	0	0.0	0.0
Utility	1	33	80.5	0.0
Utility	2	40	0.0	0.0
Utility	3	145	83.5	0.0
Utility	4	289	0.0	0.0
Refuse	5	361	0.0	13.0
Refuse	6	363	0.0	38.0
Refuse	7	373	0.0	53.0
Refuse	8	384	0.0	73.0
Refuse	9	388	0.0	0.0
Refuse	10	401	0.0	13.0
Refuse	11	403	0.0	38.0
Refuse	12	413	0.0	53.0
Refuse	13	424	0.0	73.0
Refuse	14	442	11.2	0.0
Refuse	15	468	29.3	0.0
Refuse	16	473	0.0	0.0
Refuse	17	486	11.2	0.0
Refuse	18	512	29.3	0.0
Refuse	19	517	0.0	0.0
Refuse	20	530	12.8	11.1
Refuse	21	532	12.8	38.2
Refuse	22	541	12.8	53.4
Refuse	23	550	12.8	73.5
Refuse	24	553	0.0	0.0
Refuse	25	566	12.8	11.1
Refuse	26	568	12.8	38.2
Refuse	27	577	12.8	53.4
Refuse	28	586	12.8	73.5
Refuse	29	589	0.0	0.0
Refuse	30	600	0.0	0.0



## APPENDIX III TO PART 1037—EMISSION CONTROL IDENTIFIERS

This appendix identifies abbreviations for emission control information labels, as required under § 1037.135.

## VEHICLE SPEED LIMITERS

- VSL—Vehicle speed limiter
- VSLS—“Soft-top” vehicle speed limiter
- VSLE—Expiring vehicle speed limiter
- VSLD—Vehicle speed limiter with both “soft-top” and expiration

## IDLE REDUCTION TECHNOLOGY

- IRT5—Engine shutoff after 5 minutes or less of idling
- IRTE—Expiring engine shutoff

## TIRES

- LRRR—Low rolling resistance tires (all)
- LRRD—Low rolling resistance tires (drive)
- LRRS—Low rolling resistance tires (steer)

## AERODYNAMIC COMPONENTS

- ATS—Aerodynamic side skirt and/or fuel tank fairing
- ARF—Aerodynamic roof fairing
- ARFR—Adjustable height aerodynamic roof fairing
- TGR—Gap reducing fairing (tractor to trailer gap)

## OTHER COMPONENTS

- ADVH—Vehicle includes advanced hybrid technology components
- ADVO—Vehicle includes other advanced technology components (*i.e.*, non-hybrid system)
- INV—Vehicle includes innovative technology components

**PART 1039—CONTROL OF EMISSIONS FROM NEW AND IN-USE NONROAD COMPRESSION-IGNITION ENGINES****Subpart A—Overview and Applicability**

Sec.

- 1039.1 Does this part apply for my engines?
- 1039.2 Who is responsible for compliance?
- 1039.5 Which engines are excluded from this part’s requirements?
- 1039.10 How is this part organized?
- 1039.15 Do any other regulation parts apply to me?
- 1039.20 What requirements from this part apply to excluded stationary engines?
- 1039.30 Submission of information.

**Subpart B—Emission Standards and Related Requirements**

- 1039.101 What exhaust emission standards must my engines meet after the 2014 model year?
- 1039.102 What exhaust emission standards and phase-in allowances apply for my engines in model year 2014 and earlier?
- 1039.104 Are there interim provisions that apply only for a limited time?
- 1039.105 What smoke standards must my engines meet?
- 1039.107 What evaporative emission standards and requirements apply?
- 1039.110 [Reserved]
- 1039.115 What other requirements apply?
- 1039.120 What emission-related warranty requirements apply to me?
- 1039.125 What maintenance instructions must I give to buyers?
- 1039.130 What installation instructions must I give to equipment manufacturers?
- 1039.135 How must I label and identify the engines I produce?
- 1039.140 What is my engine’s maximum engine power?

**Subpart C—Certifying Engine Families**

- 1039.201 What are the general requirements for obtaining a certificate of conformity?
- 1039.205 What must I include in my application?
- 1039.210 May I get preliminary approval before I complete my application?
- 1039.220 How do I amend the maintenance instructions in my application?
- 1039.225 How do I amend my application for certification?
- 1039.230 How do I select engine families?
- 1039.235 What testing requirements apply for certification?
- 1039.240 How do I demonstrate that my engine family complies with exhaust emission standards?
- 1039.245 How do I determine deterioration factors from exhaust durability testing?
- 1039.250 What records must I keep and what reports must I send to EPA?
- 1039.255 What decisions may EPA make regarding my certificate of conformity?

**Subpart D [Reserved]****Subpart E—In-use Testing**

- 1039.401 General provisions.

**Subpart F—Test Procedures**

- 1039.501 How do I run a valid emission test?
- 1039.505 How do I test engines using steady-state duty cycles, including ramped-modal testing?
- 1039.510 Which duty cycles do I use for transient testing?