
40 C.F.R. § 1037.520

Modeling CO₂ emissions to show compliance for vocational vehicles and tractors.

This section describes how to use the Greenhouse gas Emissions Model (GEM) (incorporated by reference in § 1037.810) to show compliance with the CO₂ standards of §§ 1037.105 and 1037.106 for vocational vehicles and tractors. Use GEM version 2.0.1 to demonstrate compliance with Phase 1 standards; use GEM Phase 2, Version 4.0 to demonstrate compliance with Phase 2 standards. Use good engineering judgment when demonstrating compliance using GEM. See § 1037.515 for calculation procedures for demonstrating compliance with trailer standards.

(a) *General modeling provisions.* To run GEM, enter all applicable inputs as specified by the model.

(1) GEM inputs apply for Phase 1 standards as follows:

(i) Model year and regulatory subcategory (see § 1037.230).

(ii) Coefficient of aerodynamic drag or drag area, as described in paragraph (b) of this section (tractors only).

(iii) Steer and drive tire rolling resistance, as described in paragraph (c) of this section.

(iv) Vehicle speed limit, as described in paragraph (d) of this section (tractors only).

(v) Vehicle weight reduction, as described in paragraph (e) of this section (tractors only for Phase 1).

(vi) Automatic engine shutdown systems, as described in § 1037.660 (only for Class 8 sleeper cabs). Enter a GEM input value of 5.0 g/ton-mile, or an adjusted value as specified in § 1037.660.

(2) For Phase 2 vehicles, the GEM inputs described in paragraphs (a)(1)(i) through (v) of this section continue to apply. Note that the provisions in this part related to vehicle speed limiters and automatic engine shutdown systems are available for vocational vehicles in Phase 2. The rest of this section describes additional GEM inputs for demonstrating compliance with Phase 2 standards. Simplified versions of GEM apply for limited circumstances as follows:

(i) You may use default engine fuel maps for glider kits as described in § 1037.635.

(ii) If you certify vehicles to the custom-chassis standards specified in § 1037.105(h), run GEM by identifying the vehicle type and entering “NA” instead of what would otherwise apply for, tire revolutions per mile, engine information, transmission information, drive axle ratio, axle efficiency, and aerodynamic improvement as specified in paragraphs (c)(1), (f), (g)(1) and (3), (i), and (m) of this section, respectively. Incorporate other GEM inputs as specified in this section.

(b) *Coefficient of aerodynamic drag and drag area for tractors.* Determine the appropriate drag area, C_dA , for tractors as described in this paragraph (b). Use the recommended method or an alternate method to

establish a value for C_dA , expressed in m to one decimal place, as specified in § 1037.525. Where we allow you to group multiple configurations together, measure C_dA of the worst-case configuration.

(1) Except as specified in paragraph (b)(2) of this section, determine the Phase 1 bin level for your vehicle based on measured C_dA values as shown in the following tables:

Table 1 to § 1037.520—Cd Inputs for Phase 1 High-Roof Tractors

Tractor type	Bin level	If your measured CDA (M2) is . . .	Then your CD 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	6.8-7.5	0.68
	Bin III	6.3-6.7	0.60
	Bin IV	5.6-6.2	0.52
	Bin V	≤ 5.5	0.47

Table 2 to § 1037.520—Cd Inputs for Phase 1 Low-Roof and Mid-Roof Tractors

Tractor type	Bin level	If your measured CDA (M2) is . . .	Then your CD 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

(2) For Phase 1 low- and mid-roof tractors, you may instead 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.

(3) For Phase 2 tractors other than heavy-haul tractors, determine bin levels and C_dA inputs as follows:

(i) Determine bin levels for high-roof tractors based on aerodynamic test results as specified in § 1037.525 and summarized in the following table:

Table 3 to § 1037.520—Bin Determinations for Phase 2 High-Roof Tractors Based on Aerodynamic Test Results

[CdA in m²]

Tractor type	Bin I	Bin II	Bin III	Bin IV	Bin V	Bin VI	Bin VII
Day Cabs	≥7.2	6.6-7.1	6.0-6.5	5.5-5.9	5.0-5.4	4.5-4.9	≤4.4
Sleeper Cabs	≥6.9	6.3-6.8	5.7-6.2	5.2-5.6	4.7-5.1	4.2-4.6	≤4.1

(ii) For low- and mid-roof tractors, you may either use the same bin level that applies for an equivalent high-roof tractor as shown in Table 3 of this section, or you may determine your bin level based on aerodynamic test results as described in Table 4 of this section.

Table 4 to § 1037.520—Bin Determinations for Phase 2 Low-Roof and Mid-Roof Tractors Based on Aerodynamic Test Results

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