(c) For engines that use aftertreatment technology with infrequent regeneration events, apply infrequent regeneration adjustment factors for each duty cycle as described in §1036.580.

(d) If your engine is intended for installation in a vehicle equipped with stop-start technology meeting the specifications of 40 CFR 1037.660 to qualify as tamper-resistant under 40 CFR 1037.520(j)(4), you may shut the engine down during idle portions of the duty cycle to represent in-use operation. We recommend installing a production engine starter motor and letting the engine's ECM manipulate the starter motor to control the engine stop and start events. Use good engineering judgment to address the effects of dynamometer inertia on restarting the engine by, for example, using a larger starter motor or declutching the engine from the dynamometer during restart.

(e) You may disable any AECDs that have been approved solely for emergency equipment applications under §1036.115(h)(4). Note that the emission standards do not apply when any of these AECDs are active.

(f) You may use special or alternate procedures to the extent we allow them under 40 CFR 1065.10.

(g) 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 engines meet emission standards.

(h) For testing engines that use regenerative braking through the crankshaft only to power an electric heater for aftertreatment devices, you may use the nonhybrid engine testing procedures in §§1036.510, 1036.512, and 1036.514 and you may also or instead use the fuel mapping procedure in §1036.505(b)(1) or (2). You may use this allowance only if the recovered energy is less than 10 percent of the total positive work for each applicable test interval. Otherwise, use powertrain testing procedures specified for hybrid powertrains to measure emissions and create fuel maps. For engines that power an electric heater with a battery, you must meet the requirements related to charge-sustaining operation as described in 40 CFR 1066.501(a)(3).

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§1036.505 Engine data and information to support vehicle certification.

You must give vehicle manufacturers information as follows so they can certify their vehicles to greenhouse gas emission standards under 40 CFR part 1037:

(a) Identify engine make, model, fuel type, combustion type, engine family name, calibration identification, and engine displacement. Also identify whether the engines meet CO_2 standards for tractors, vocational vehicles, or both. When certifying vehicles with GEM, for any fuel type not identified in table 1 to paragraph (b)(4) of §1036.550, identify the fuel type as diesel fuel for engines subject to compression-ignition standards, and as gasoline for engines subject to spark-ignition standards.

(b) This paragraph (b) describes four different methods to generate engine fuel maps. For engines without hybrid components and for mild hybrid engines where you do not include hybrid components in the test, generate fuel maps using either paragraph (b)(1) or (2) of this section. For other hybrid engines, generate fuel maps using paragraph (b)(3) of this section. For hybrid powertrains and nonhybrid powertrains and for vehicles where the transmission is not automatic, automated manual, manual, or dual-clutch, generate fuel maps using paragraph (b)(4) of this section.

(1) Determine steady-state engine fuel maps as described in §1036.535(b). Determine fuel consumption at idle as described in §1036.535(c). Determine cycle-average engine fuel maps as described in §1036.540, excluding cycle-average fuel maps for highway cruise cycles.

(2) Determine steady-state fuel maps as described in either §1036.535(b) or (d). Determine fuel consumption at idle as described in §1036.535(c). Determine cycle-average engine fuel maps as described in §1036.540, including cycle-average engine fuel maps for highway cruise cycles. We may do confirmatory testing by creating cycle-average fuel

maps from steady-state fuel maps created in paragraph (b)(1) of this section for highway cruise cycles. In §1036.540 we define the vehicle configurations for testing; we may add more vehicle configurations to better represent your engine's operation for the range of vehicles in which your engines will be installed (see 40 CFR 1065.10(c)(1)).

(3) Determine fuel consumption at idle as described in §1036.535(c) and (d) and determine cycle-average engine fuel maps as described in §1036.545, including cycle-average engine fuel maps for highway cruise cycles. Set up the test to apply accessory load for all operation by primary intended service class as described in the following table:

TABLE 1 TO PARAGRAPH (b)(3) OF §1036.505—ACCESSORY LOAD

Primary intended service class	Power representing accessory load (kW)
Light HDV	1.5
Medium HDV	2.5
Heavy HDV	3.5

(4) Generate powertrain fuel maps as described in §1036.545 instead of fuel mapping under §1036.535 or §1036.540. Note that the option in §1036.545(b)(2) is allowed only for hybrid engine testing. Disable stop-start systems and automatic engine shutdown systems when conducting powertrain fuel map testing using §1036.545.

(c) Provide the following information if you generate engine fuel maps using either paragraph (b)(1), (2), or (3) of this section:

(1) Full-load torque curve for installed engines and the full-load torque curve of the engine (parent engine) with the highest fueling rate that shares the same engine hardware, including the turbocharger, as described in 40 CFR 1065.510. You may use 40 CFR 1065.510(b)(5)(i) for Spark-ignition HDE. Measure the torque curve for hybrid engines that have an RESS as described in 40 CFR 1065.510(g)(2) with the hybrid system active. Test hybrid engines with no RESS as described in 40 CFR 1065.510(b)(5)(ii).

(2) Motoring torque curve as described in 40 CFR 1065.510(c)(2) and (5) for nonhybrid and hybrid engines, respectively. For engines with a low-speed governor, remove data points where the low-speed governor is active. If you don't know when the low-speed governor is active, we recommend removing all points below 40 r/min above the warm low-idle speed.

(3) Declared engine idle speed. For vehicles with manual transmissions, this is the engine speed with the transmission in neutral. For all other vehicles, this is the engine's idle speed when the transmission is in drive.

(4) The engine idle speed during the transient cycle-average fuel map.

(5) The engine idle torque during the transient cycle-average fuel map.

(d) If you generate powertrain fuel maps using paragraph (b)(4) of this section, determine the system continuous rated power according to §1036.520.

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§1036.510 Supplemental Emission Test.

(a) Measure emissions using the steady-state SET duty cycle as described in this section. Note that the SET duty cycle is operated as a ramped-modal cycle rather than discrete steady-state test points.

(b) Procedures apply differently for testing certain kinds of engines and powertrains as follows:

(1) For testing nonhybrid engines, the SET duty cycle is based on normalized speed and torque values relative to certain maximum values. Denormalize speed as described in 40 CFR 1065.512. Denormalize torque as described in 40 CFR 1065.610(d). Note that idle points are to be run at conditions simulating neutral or park on the transmission.

(2) Test hybrid powertrains as described in §1036.545, except as specified in this paragraph (b)(2). Do not compensate the duty cycle for the distance driven as described in §1036.545(g)(4). For hybrid engines, select the transmission from §1036.540(c)(2), substituting ''engine'' for ''vehicle'' and ''highway cruise cycle'' for ''SET''. Disregard duty cycles in §1036.545(j). For cycles that begin with idle, leave the transmission in neutral or park for the full initial idle segment. Place the transmission into drive no earlier than 5 seconds before the first nonzero vehicle speed setpoint. For SET testing