

for certification and ensure that the emission control information label is consistent with your selection of the test fuel (see § 1039.135(f)). For example, do not test with 15 ppm sulfur fuel if you intend to label your engines to allow 500 ppm sulfur fuel.

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

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

§ 1039.505 Which duty cycles do I use for steady-state testing?

(a) Measure emissions by testing the engine on a dynamometer with one of the following steady-state duty cycles to determine whether it meets the steady-state emission standards in

§ 1039.101(b):

(1) Use the 5-mode duty cycle described in Appendix I of this part for engines that you will certify only for constant-speed operation.

(2) [Reserved]

(3) Use the 6-mode duty cycle described in Appendix III of this part for engines with maximum power below 19 kW whose certification will not be limited to constant-speed applications.

(4) Use the 8-mode duty cycle described in Appendix IV of this part for engines with maximum power at or above 19 kW whose certification will not be limited to constant-speed applications.

(b) During idle mode, operate the engine with the following parameters:

(1) Hold the speed within your specifications.

(2) Set the engine to operate at its minimum fueling rate.

(3) Keep engine torque under 5 percent of maximum test torque.

(c) For full-load operating modes, operate the engine at its maximum fueling rate.

(d) See 40 CFR part 1065 for detailed specifications of tolerances and calculations.

(e) In the normal test sequence described in 40 CFR part 1065, subpart F, steady-state testing generally follows the transient test. For those cases where we do not require transient testing, perform the steady-state test after an appropriate warm-up period, consistent with good engineering judgment.

§ 1039.510 Which duty cycles do I use for transient testing?

(a) Measure emissions by testing the engine on a dynamometer with one of the following transient duty cycles to

determine whether it meets the transient emission standards in § 1039.101(a):

(1) If you certify an engine family for constant-speed operation only, use the transient duty-cycle described in Appendix V of this part.

(2) For all other engines, use the transient duty-cycle described in Appendix VI of this part.

(b) The transient test sequence consists of an initial run through the transient sequence from a cold start, 20 minutes with no engine operation, then a final run through the same transient sequence. Start sampling emissions immediately after you start the engine. Combine the results from these two test runs by applying a weighting factor of 10 percent to the cold-start measurement and 90 percent to the hot-start measurement.

(c) Conduct repeat tests and cool the engine down between tests as described in 40 CFR 86.1335–90 and 86.1336–84(e).

§ 1039.515 What are the test procedures related to not-to-exceed standards?

Use the test procedures described in 40 CFR 86.1370–2007 to determine whether the engine meets the not-to-exceed emission standards in § 1039.101(c).

§ 1039.520 What testing must I perform to establish deterioration factors?

Section 1039.245 describes the method for using test data or engineering analysis to establish deterioration factors for an engine family.

§ 1039.525 How do I adjust emission levels to account for infrequently regenerating aftertreatment devices?

This section describes how to adjust emission results from engines using aftertreatment technology with infrequent regeneration events. For this section, “regeneration” means an intended event during which emission levels change while the system restores aftertreatment performance. For example, exhaust gas temperatures may increase temporarily to remove sulfur from adsorbers or to oxidize accumulated particulate matter in a trap. For this section, “infrequent” refers to regeneration events that are expected to occur less than once over the applicable transient duty cycle.

(a) *Developing adjustment factors.* Develop an upward adjustment factor and a downward adjustment factor for each pollutant based on measured emission data and observed regeneration frequency. Adjustment factors should generally apply to an entire engine family, but you may develop separate adjustment factors for

different engine configurations within an engine family. You may use carryover or carry-across data to establish adjustment factors for an engine family, as described in § 1039.235(d), consistent with good engineering judgment. All adjustment factors for regeneration are additive. You may use either of the following different approaches for engines that use aftertreatment with infrequent regeneration events:

(1) You may disregard this section if regeneration does not significantly effect emission levels for an engine family (or configuration) or if it is not practical to identify when regeneration occurs. If you do not use adjustment factors under this section, your engines must meet emission standards for all testing, without regard to regeneration.

(2) If your engines use aftertreatment technology with extremely infrequent regeneration and you are unable to apply the provisions of this section, you may ask us to approve an alternate methodology to account for regeneration events.

(b) *Calculating average adjustment factors.* Calculate the average adjustment factor (EF_A) based on the following equation:

$$EF_A = (F)(EF_H) + (1 - F)(EF_L)$$

Where:

F = the frequency of the regeneration event in terms of the fraction of tests during which the regeneration occurs.

EF_H = measured emissions from a test in which the regeneration occurs.

EF_L = measured emissions from a test in which the regeneration does not occur.

(c) *Applying adjustment factors.* Apply adjustment factors based on whether regeneration occurs during the test run. You must be able to identify regeneration in a way that is readily apparent during all testing.

(1) If regeneration does not occur during a test run, add an upward adjustment factor to the measured emission rate. Determine the upward adjustment factor (UAF) using the following equation:

$$UAF = EF_A - EF_L$$

(2) If regeneration occurs during a test run, subtract a downward adjustment factor from the measured emission rate. Determine the downward adjustment factor (DAF) using the following equation:

$$DAF = EF_H - EF_A$$

(d) *Sample calculation.* If EF_L is 0.10 g/kW-hr, EF_H is 0.50 g/kW-hr, and F is 0.1 (the regeneration occurs once for each ten tests), then: