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(1) For vehicles that use aftertreatment technology, such as catalytic converters, use a multiplicative deterioration factor for exhaust emissions. A multiplicative deterioration factor for a pollutant is the ratio of exhaust emissions at the end of the useful life and exhaust emissions at the low-hour test point. In these cases, adjust the official emission results for each tested vehicle or engine at the selected test point by multiplying the measured emissions by the deterioration factor. If the factor is less than one, use one. Multiplicative deterioration factors must be specified to three significant figures.

(2) For vehicles that do not use aftertreatment technology, use an additive deterioration factor for exhaust emissions. An additive deterioration factor for a pollutant is the difference between exhaust emissions at the end of the useful life and exhaust emissions at the low-hour test point. In these cases, adjust the official emission results for each tested vehicle or engine at the selected test point by adding the factor to the measured emissions. If the factor is less than zero, use zero. Additive deterioration factors must be specified to one more decimal place than the applicable standard.

(d) Collect emission data using measurements to one more decimal place than the applicable standard. Apply the deterioration factor to the official emission result, as described in paragraph (c) of this section, then round the adjusted figure to the same number of decimal places as the emission standard. Compare the rounded emission levels to the emission standard for each emission-data vehicle. In the case of HC+NO_x standards, add the emission results and apply the deterioration factor to the sum of the pollutants before rounding. However, if your deterioration factors are based on emission measurements that do not cover the vehicle's full useful life, apply the deterioration factor to each pollutant and then add the results before rounding.

[70 FR 40496, July 13, 2005]

40 CFR Ch. I (7-1-06 Edition)

§ 1051.243 How do I determine deterioration factors from exhaust durability testing?

Establish deterioration factors to determine whether your engines will meet emission standards for each pollutant throughout the useful life, as described in subpart B of this part and § 1051.240. This section describes how to determine deterioration factors, either with pre-existing test data or with new emission measurements.

(a) You may ask us to approve deterioration factors for an engine family based on emission measurements from similar vehicles or engines if you have already given us these data for certifying other vehicles in the same or earlier model years. Use good engineering judgment to decide whether the two vehicles or engines are similar. We will approve your request if you show us that the emission measurements from other vehicles or engines reasonably represent in-use deterioration for the engine family for which you have not yet determined deterioration factors.

(b) If you are unable to determine deterioration factors for an engine family under paragraph (a) of this section, select vehicles, engines, subsystems, or components for testing. Determine deterioration factors based on service accumulation and related testing to represent the deterioration expected from in-use vehicles over the full useful life, as follows:

(1) You must measure emissions from the emission-data vehicle at a low-hour test point and the end of the useful life. You may also test at evenly spaced intermediate points.

(2) Operate the vehicle or engine over a representative duty cycle for a period at least as long as the useful life (in hours or kilometers). You may operate the vehicle or engine continuously.

(3) You may perform maintenance on emission-data vehicles as described in § 1051.125 and 40 CFR part 1065, subpart E.

(4) If you measure emissions at only two points to calculate your deterioration factor, base your calculations on a linear relationship connecting these two data points for each pollutant. If you measure emissions at three or more points, use a linear least-squares

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fit of your test data for each pollutant to calculate your deterioration factor.

(5) Use good engineering judgment for all aspects of the effort to establish deterioration factors under this paragraph (b).

(6) You may to use other testing methods to determine deterioration factors, consistent with good engineering judgment.

(c) Include the following information in your application for certification:

(1) If you use test data from a different engine family, explain why this is appropriate and include all the emission measurements on which you base the deterioration factor.

(2) If you do testing to determine deterioration factors, describe the form and extent of service accumulation, including a rationale for selecting the service-accumulation period and the method you use to accumulate hours.

[70 FR 40496, July 13, 2005]

§ 1051.245 How do I demonstrate that my engine family complies with evaporative emission standards?

(a) For purposes of certification, your engine family is considered in compliance with the evaporative emission standards in subpart B of this part if you do either of the following:

(1) You have test results showing permeation emission levels from the fuel tanks and fuel lines in the family are at or below the standards in § 1051.110 throughout the useful life.

(2) You comply with the design specifications in paragraph (e) of this section.

(b) Your engine family is deemed not to comply if any fuel tank or fuel line representing that family has test results showing a deteriorated emission level above the standard.

(c) To compare emission levels with the emission standards, apply deterioration factors to the measured emission levels. For permeation emissions, use the following procedures to establish an additive deterioration factor, as described in § 1051.240(c)(2):

(1) Section 1051.515 specifies how to test your fuel tanks to develop deterioration factors. Small-volume manufacturers may use assigned deterioration factors that we establish. Apply the deterioration factors as follows:

(i) Calculate the deterioration factor from emission tests performed before and after the durability tests as described in § 1051.515(c) and (d), using good engineering judgment. The durability tests described in § 1051.515(d) represent the minimum requirements for determining a deterioration factor. You may not use a deterioration factor that is less than the difference between evaporative emissions before and after the durability tests as described in § 1051.515(c) and (d).

(ii) Do not apply the deterioration factor to test results for tanks that have already undergone these durability tests.

(2) Determine the deterioration factor for fuel lines using good engineering judgment.

(d) Collect emission data using measurements to one more decimal place than the applicable standard. Apply the deterioration factor to the official emission result, as described in paragraph (c) of this section, then round the adjusted figure to the same number of decimal places as the emission standard. Compare the rounded emission levels to the emission standard for each emission-data vehicle.

(e) You may demonstrate for certification that your engine family complies with the evaporative emission standards by demonstrating that you use the following control technologies:

(1) For certification to the standards specified in § 1051.110(a) with the control technologies shown in the following table:

TABLE 1 OF § 1051.245—DESIGN-CERTIFICATION TECHNOLOGIES FOR CONTROLLING TANK PERMEATION

If the tank permeability control technology is . . .	Then you may design-certify with a tank emission level of . . .
(i) A metal fuel tank with no non-metal gaskets or with gaskets made from a low-permeability material ¹ .	1.5 g/m ² /day.
(ii) A metal fuel tank with non-metal gaskets with an exposed surface area of 1000 mm ² or less.	1.5 g/m ² /day.

¹Permeability of 10 g/m²/day or less according to ASTM D 814-95 (incorporated by reference in § 1051.810).

(2) For certification to the standards specified in § 1051.110(b) with the control technologies shown in the following table: