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Title 40 —Protection of Environment
Chapter I —Environmental Protection Agency
Subchapter U —Air Pollution Controls

Part 1033 Control of Emissions from Locomotives

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Original Standards for Tier 0, Tier 1 and Tier 2 Locomotives

PART 1033—CONTROL OF EMISSIONS FROM LOCOMOTIVES

Authority: 42 U.S.C. 7401-7671q.

Source: 73 FR 37197, June 30, 2008, unless otherwise noted.

Subpart A—Overview and Applicability

§ 1033.1 Applicability.

The regulations in this part 1033 apply for all new locomotives and all locomotives containing a new locomotive engine, except as provided in § 1033.5.

- (a) Standards begin to apply each time a locomotive or locomotive engine is originally manufactured or otherwise becomes new (defined in § 1033.901). The requirements of this part continue to apply as specified after locomotives cease to be new.
- (b) Standards apply to the locomotive. However, in certain cases, the manufacturer/remanufacturer is allowed to test a locomotive engine instead of a complete locomotive, such as for certification. Also, you are not required to complete assembly of a locomotive to obtain a certificate of conformity for it, provided you meet the definition of “manufacturer” or “remanufacturer” (as applicable) in § 1033.901. For example, an engine manufacturer may obtain a certificate for locomotives which it does not manufacture, if the locomotives use its engines.
- (c) Standards apply based on the year in which the locomotive was originally manufactured. The date of original manufacture is generally the date on which assembly is completed for the first time. For example, all locomotives originally manufactured in calendar years 2002, 2003, and 2004 are subject to the Tier 1 emission standards for their entire service lives.
- (d) The following provisions apply when there are multiple persons meeting the definition of manufacturer or remanufacturer in § 1033.901:
 - (1) Each person meeting the definition of manufacturer must comply with the requirements of this part that apply to manufacturers; and each person meeting the definition of remanufacturer must comply with the requirements of this part that apply to remanufacturers. However, if one person complies with a specific requirement for a given locomotive, then all manufacturers/remanufacturers are deemed to have complied with that specific requirement.
 - (2) We will apply the requirements of subparts C, D, and E of this part to the manufacturer/remanufacturer that obtains the certificate of conformity for the locomotive. Other manufacturers and remanufacturers are required to comply with the requirements of subparts C, D, and E of this part only when notified by us. In our notification, we will specify a reasonable time period in which you need to comply with the requirements identified in the notice. See § 1033.601 for the applicability of 40 CFR part 1068 to these other manufacturers and remanufacturers.
 - (3) For example, we may require a railroad that installs certified kits but does not hold the certificate to perform production line auditing of the locomotives that it remanufactures. However, if we did, we would allow the railroad a reasonable amount of time to develop the ability to perform such auditing.
- (e) This part applies for locomotives that were certified as freshly manufactured or remanufactured locomotives under 40 CFR part 92.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74004, Oct. 25, 2016; 88 FR 4484, Jan. 24, 2023]

§ 1033.5 Exemptions and exclusions.

- (a) Subpart G of this part exempts certain locomotives from the standards of this part.
- (b) The definition of “locomotive” in § 1033.901 excludes certain vehicles. In general, the engines used in such excluded equipment are subject to standards under other regulatory parts. For example, see 40 CFR part 1039 for requirements that apply to diesel engines used in equipment excluded from the definition of “locomotive” in § 1033.901. The following locomotives are also excluded from the provisions of this part 1033:

- (1) Historic locomotives powered by steam engines. For a locomotive that was originally manufactured after January 1, 1973 to be excluded under this paragraph (b)(1), it may not use any internal combustion engines and must be used only for historical purposes such as at a museum or similar public attraction.
- (2) Locomotives powered only by an external source of electricity.
- (c) [Reserved]
- (d) The provisions of this part do not apply for any auxiliary engine that only provides hotel power. In general, these engines are subject to the provisions of 40 CFR part 1039. However, depending on the engine cycle, model year and power rating, the engines may be subject to other regulatory parts instead.
- (e) Manufacturers and owners of locomotives that operate only on non-standard gauge rails may ask us to exclude such locomotives from this part by excluding them from the definition of “locomotive”.

[73 FR 37197, June 30, 2008, as amended at 88 FR 4484, Jan. 24, 2023]

§ 1033.10 Organization of this part.

The regulations in this part 1033 contain provisions that affect locomotive manufacturers, remanufacturers, and others. However, the requirements of this part are generally addressed to the locomotive manufacturer/remanufacturer. The term “you” generally means the manufacturer/remanufacturer, as defined in § 1033.901. This part 1033 is divided into the following subparts:

- (a) Subpart A of this part defines the applicability of part 1033 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 locomotives under this part. Note that § 1033.150 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.
- (d) Subpart D of this part describes general provisions for testing and auditing production locomotives.
- (e) Subpart E of this part describes general provisions for testing in-use locomotives.
- (f) Subpart F of this part and 40 CFR part 1065 describe how to test locomotives and engines.
- (g) Subpart G of this part and 40 CFR part 1068 describe requirements, prohibitions, exemptions, and other provisions that apply to locomotive manufacturer/remanufacturers, owners, operators, and all others.
- (h) Subpart H of this part describes how you may generate and use emission credits to certify your locomotives.
- (i) Subpart I of this part describes provisions for locomotive owners and operators.
- (j) Subpart J of this part contains definitions and other reference information.

§ 1033.15 Other regulation parts that apply for locomotives.

- (a) Part 1065 of this chapter describes procedures and equipment specifications for testing engines to measure exhaust emissions. Subpart F of this part 1033 describes how to apply the provisions of part 1065 of this chapter to test locomotives to determine whether they meet the exhaust emission standards in this part.
- (b) The requirements and prohibitions of part 1068 of this chapter apply to everyone, including anyone who manufactures, remanufactures, imports, maintains, owns, or operates any of the locomotives subject to this part 1033. See § 1033.601 to determine how to apply the part 1068 regulations for locomotives. Part 1068 of this chapter describes general provisions, including the following areas:
 - (1) Prohibited acts and penalties for locomotive manufacturer/remanufacturers and others.
 - (2) Exclusions and exemptions for certain locomotives.
 - (3) Importing locomotives.
 - (4) Selective enforcement audits of your production.
 - (5) Defect reporting and recall.
 - (6) Procedures for hearings.
- (c) Other parts of this chapter apply if referenced in this part.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22982, Apr. 30, 2010]

§ 1033.30 Submission of information.

Unless we specify otherwise, send all reports and requests for approval to the Designated Compliance Officer (see § 1033.901). See § 1033.925 for additional reporting and recordkeeping provisions.

[81 FR 74004, Oct. 25, 2016]

Subpart B—Emission Standards and Related Requirements

§ 1033.101 Exhaust emission standards.

See appendix A of this part to determine how emission standards apply before 2023.

- (a) **Emission standards for line-haul locomotives.** Exhaust emissions from your new locomotives may not exceed the applicable emission standards in Table 1 to this section during the useful life of the locomotive. (NOTE: § 1033.901 defines locomotives to be “new” when originally manufactured and when remanufactured.) Measure emissions using the applicable test procedures described in subpart F of this part.

TABLE 1 TO § 1033.101—LINE-HAUL LOCOMOTIVE EMISSION STANDARDS

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO _x	PM	HC	CO
1973-1992 ^a	Tier 0 ^b	8.0	0.22	1.00	5.0
1993 ^a -2004	Tier 1 ^b	7.4	0.22	0.55	2.2
2005-2011	Tier 2 ^b	5.5	^e 0.10	0.30	1.5
2012-2014	Tier 3 ^c	5.5	0.10	0.30	1.5

^a Locomotive models that were originally manufactured in model years 1993 through 2001, but that were not originally equipped with a separate coolant system for intake air are subject to the Tier 0 rather than the Tier 1 standards.

^b Line-haul locomotives subject to the Tier 0 through Tier 2 emission standards must also meet switch standards of the same tier.

^c Tier 3 line-haul locomotives must also meet Tier 2 switch standards.

^d Manufacturers may elect to meet a combined NO_x + HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_x and HC standards, as described in paragraph (j) of this section.

^e The PM standard for newly remanufactured Tier 2 line-haul locomotives is 0.20 g/bhp-hr until January 1, 2013, except as specified in § 1033.150(a).

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO _x	PM	HC	CO
2015 or later	Tier 4 ^d	1.3	0.03	0.14	1.5

^a Locomotive models that were originally manufactured in model years 1993 through 2001, but that were not originally equipped with a separate coolant system for intake air are subject to the Tier 0 rather than the Tier 1 standards.

^b Line-haul locomotives subject to the Tier 0 through Tier 2 emission standards must also meet switch standards of the same tier.

^c Tier 3 line-haul locomotives must also meet Tier 2 switch standards.

^d Manufacturers may elect to meet a combined NO_x + HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_x and HC standards, as described in paragraph (j) of this section.

^e The PM standard for newly remanufactured Tier 2 line-haul locomotives is 0.20 g/bhp-hr until January 1, 2013, except as specified in § 1033.150(a).

- (b) **Emission standards for switch locomotives.** Exhaust emissions from your new locomotives may not exceed the applicable emission standards in Table 2 to this section during the useful life of the locomotive. (Note: § 1033.901 defines locomotives to be “new” when originally manufactured and when remanufactured.) Measure emissions using the applicable test procedures described in subpart F of this part.

TABLE 2 TO § 1033.101—SWITCH LOCOMOTIVE EMISSION STANDARDS

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO _x	PM	HC	CO
1973-2001	Tier 0	11.8	0.26	2.10	8.0
2002-2004	Tier 1 ^a	11.0	0.26	1.20	2.5
2005-2010	Tier 2 ^a	8.1	^b 0.13	0.60	2.4
2011-2014	Tier 3	5.0	0.10	0.60	2.4

^a Switch locomotives subject to the Tier 1 through Tier 2 emission standards must also meet line-haul standards of the same tier.

^b The PM standard for new Tier 2 switch locomotives is 0.24 g/bhp-hr until January 1, 2013.

^c Manufacturers may elect to meet a combined NO_x + HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_x and HC standards, as described in paragraph (j) of this section.

Year of original manufacture	Tier of standards	Standards (g/bhp-hr)			
		NO _x	PM	HC	CO
2015 or later	Tier 4	^c 1.3	0.03	^c 0.14	2.4

^a Switch locomotives subject to the Tier 1 through Tier 2 emission standards must also meet line-haul standards of the same tier.

^b The PM standard for new Tier 2 switch locomotives is 0.24 g/bhp-hr until January 1, 2013.

^c Manufacturers may elect to meet a combined NO_x + HC standard of 1.4 g/bhp-hr instead of the otherwise applicable Tier 4 NO_x and HC standards, as described in paragraph (j) of this section.

- (c) **Smoke standards.** The smoke opacity standards specified in Table 3 to this section apply only for locomotives certified to one or more PM standards or FELs greater than 0.05 g/bhp-hr. Smoke emissions, when measured in accordance with the provisions of Subpart F of this part, shall not exceed these standards.

TABLE 3 TO § 1033.101—SMOKE STANDARDS FOR LOCOMOTIVES (PERCENT OPACITY)

	Steady-state	30-sec peak	3-sec peak
Tier 0	30	40	50
Tier 1	25	40	50
Tier 2 and later	20	40	50

- (d) **Averaging, banking, and trading.** You may generate or use emission credits under the averaging, banking, and trading (ABT) program as described in subpart H of this part to comply with the NO_x and/or PM standards of this part. You may also use ABT to comply with the Tier 4 HC standards of this part as described in paragraph (j) of this section. Generating or using emission credits requires that you specify a family emission limit (FEL) for each pollutant you include in the ABT program for each engine family. These FELs serve as the emission standards for the engine family with respect to all required testing instead of the standards specified in paragraphs (a) and (b) of this section. FELs may not be higher than the following limits:
- (1) FELs for Tier 0 and Tier 1 locomotives originally manufactured before 2002 may have any value.
 - (2) FELs for Tier 1 locomotives originally manufactured 2002 through 2004 may not exceed 9.5 g/bhp-hr for NO_x emissions or 0.60 g/bhp-hr for PM emissions measured over the line-haul duty cycle. FELs for these locomotives may not exceed 14.4 g/bhp-hr for NO_x emissions or 0.72 g/bhp-hr for PM emissions measured over the switch duty cycle.
 - (3) FELs for Tier 2 and Tier 3 locomotives may not exceed the Tier 1 standards of this section.
 - (4) FELs for Tier 4 locomotives may not exceed the Tier 3 standards of this section.

(e) **Notch standards.**

- (1) Exhaust emissions from locomotives may not exceed the notch standards specified in paragraph (e)(2) of this section, except as allowed in paragraph (e)(3) of this section, when measured using any test procedures under any test conditions.
- (2) Except as specified in paragraph (e)(5) of this section, calculate the applicable notch standards for each pollutant for each notch from the certified notch emission rate as follows:

$$\text{Notch standard} = (E_i) \times (1.1 + (1 - \text{ELH}_i / \text{std}))$$

Where:

E_i = The deteriorated brake-specific emission rate (for pollutant i) for the notch (i.e., the brake-specific emission rate calculated under subpart F of this part, adjusted by the deterioration factor in the application for certification); where i is NO_x , HC, CO or PM.

ELH_i = The deteriorated line-haul duty-cycle weighted brake-specific emission rate for pollutant i , as reported in the application for certification, except as specified in paragraph (e)(6) of this section.

std = The applicable line-haul duty-cycle standard/FEL, except as specified in paragraph (e)(6) of this section.

- (3) Exhaust emissions that exceed the notch standards specified in paragraph (e)(2) of this section are allowed only if one of the following is true:
 - (i) The same emission controls are applied during the test conditions causing the noncompliance as were applied during certification test conditions (and to the same degree).
 - (ii) The exceedance result from a design feature that was described (including its effect on emissions) in the approved application for certification, and is:
 - (A) Necessary for safety;
 - (B) Addresses infrequent regeneration of an aftertreatment device; or
 - (C) Otherwise allowed by this part.
 - (4) Since you are only required to test your locomotive at the highest emitting dynamic brake point, the notch caps that you calculate for the dynamic brake point that you test also apply for other dynamic brake points.
 - (5) No PM notch caps apply for locomotives certified to a PM standard or FEL of 0.05 g/bhp-hr or lower.
 - (6) For switch locomotives that are not subject to line-haul standards, ELH_i equals the deteriorated switch duty-cycle weighted brake-specific emission rate for pollutant i and std is the applicable switch cycle standard/FEL.
- (f) **Fuels.** The exhaust emission standards in this section apply for locomotives using the fuel type on which the locomotives in the engine family are designed to operate.
- (1) You must meet the numerical emission standards for HC in this section based on the following types of hydrocarbon emissions for locomotives powered by the following fuels:

- (i) Alcohol-fueled locomotives: THCE emissions for Tier 3 and earlier locomotives and NMHCE for Tier 4.
 - (ii) Gaseous-fueled locomotives: Nonmethane-nonethane emissions (NMNEHC). This includes dual-fuel and flexible-fuel locomotives that use a combination of a gaseous fuel and a nongaseous fuel.
 - (iii) Diesel-fueled and other locomotives: THC emissions for Tier 3 and earlier locomotives and NMHC for Tier 4. Note that manufacturers/remanufacturers may choose to not measure NMHC and assume that NMHC is equal to THC multiplied by 0.98 for diesel-fueled locomotives.
- (2) You must certify your diesel-fueled locomotives to use the applicable grades of diesel fuel as follows:
- (i) Certify your Tier 4 and later diesel-fueled locomotives for operation with only Ultra Low Sulfur Diesel (ULSD) fuel. Use ULSD as the test fuel for these locomotives. You may alternatively certify Tier 4 and later locomotives using Low Sulfur Diesel Fuel (LSD).
 - (ii) Certify your Tier 3 and earlier diesel-fueled locomotives for operation with only ULSD fuel if they include sulfur-sensitive technology and you demonstrate compliance using a ULSD test fuel.
 - (iii) Certify your Tier 3 and earlier diesel-fueled locomotives for operation with either ULSD fuel or LSD fuel if they do not include sulfur-sensitive technology or if you demonstrate compliance using an LSD test fuel (including commercial LSD fuel).
 - (iv) For Tier 1 and earlier diesel-fueled locomotives, if you demonstrate compliance using a ULSD test fuel, you must adjust the measured PM emissions upward by 0.01 g/bhp-hr to make them equivalent to tests with LSD. We will not apply this adjustment for our testing.
- (g) **Useful life.** The emission standards and requirements in this subpart apply to the emissions from new locomotives for their useful life. The useful life is generally specified as MW-hrs and years, and ends when either of the values (MW-hrs or years) is exceeded or the locomotive is remanufactured.
- (1) The minimum useful life in terms of MW-hrs is equal to the product of the rated horsepower multiplied by 7.50. The minimum useful life in terms of years is ten years. For locomotives originally manufactured before January 1, 2000 and not equipped with MW-hr meters, the minimum useful life is equal to 750,000 miles or ten years, whichever is reached first. See § 1033.140 for provisions related to rated power.
 - (2) You must specify a longer useful life if the locomotive or locomotive engine is designed to last longer than the applicable minimum useful life. Recommending a time to remanufacture that is longer than the minimum useful life is one indicator of a longer design life.
 - (3) Manufacturers/remanufacturers of locomotives with non-locomotive-specific engines (as defined in § 1033.901) may ask us (before certification) to allow a shorter useful life for an engine family containing only non-locomotive-specific engines. We may approve a shorter useful life, in MW-hrs of locomotive operation but not in years, if we determine that these locomotives will rarely operate longer than the shorter useful life. If engines identical to those in the engine family have already been produced and are in use, your demonstration must include documentation from such in-use engines. In other cases, your demonstration must include an engineering analysis of information equivalent to such in-use data, such as data from research engines or similar engine models that are

already in production. Your demonstration must also include any overhaul interval that you recommend, any mechanical warranty that you offer for the engine or its components, and any relevant customer design specifications. Your demonstration may include any other relevant information.

(4) Remanufacturers of locomotive or locomotive engine configurations that have been previously certified under paragraph (g)(3) of this section to a useful life that is shorter than the value specified in paragraph (g)(1) of this section may certify to that same shorter useful life value without request.

(5) In unusual circumstances, you may ask us to allow you to certify some locomotives in your engine family to a partial useful life. This allowance is limited to cases in which some or all of the locomotive's power assemblies have been operated previously such that the locomotive will need to be remanufactured prior to the end of the otherwise applicable useful life. Unless we specify otherwise, define the partial useful life based on the total MW-hrs since the last remanufacture to be consistent with other locomotives in the family. For example, this may apply for a previously uncertified locomotive that becomes "new" when it is imported, but that was remanufactured two years earlier (representing 25 percent of the normal useful life period). If such a locomotive could be brought into compliance with the applicable standards without being remanufactured, you may ask to include it in your engine family for the remaining 75 percent of its useful life period.

(h) **Applicability for testing.** The emission standards in this subpart apply to all testing, including certification testing, production-line testing, and in-use testing.

(i) **Alternate CO standards.** Manufacturers/remanufacturers may certify locomotives to an alternate CO emission standard of 10.0 g/bhp-hr instead of the otherwise applicable CO standard if they also certify those locomotives to alternate PM standards as follows:

(1) The alternate PM standard for Tier 0, Tier 1, and Tier 2 locomotives is one-half of the otherwise applicable PM standard. For example, a manufacturer certifying Tier 2 switch locomotives to a 0.065 g/bhp-hr PM standard may certify those locomotives to the alternate CO standard of 10.0 g/bhp-hr.

(2) The alternate PM standard for Tier 3 and Tier 4 locomotives is 0.01 g/bhp-hr.

(j) **Alternate NO_x + HC standards for Tier 4.** Manufacturers/remanufacturers may use credits accumulated through the ABT program to certify Tier 4 locomotives to an alternate NO_x + HC emission standard of 1.4 g/bhp-hr (instead of the otherwise applicable NO_x and NMHC standards). You may use NO_x credits to show compliance with this standard by certifying your family to a NO_x + HC FEL. Calculate the NO_x credits needed as specified in subpart H of this part using the NO_x + HC emission standard and FEL in the calculation instead of the otherwise applicable NO_x standard and FEL. You may not generate credits relative to the alternate standard or certify to the standard without using credits.

(k) **Upgrading.** Upgraded locomotives that were originally manufactured prior to January 1, 1973 are subject to the Tier 0 standards. (See the definition of upgrade in § 1033.901.)

(l) **Other optional standard provisions.** Locomotives may be certified to a higher tier of standards than would otherwise be required. Tier 0 switch locomotives may be certified to both the line-haul and switch cycle standards. In both cases, once the locomotives become subject to the additional standards, they remain subject to those standards for the remainder of their service lives.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59188, Oct. 8, 2008; 75 FR 22982, Apr. 30, 2010; 81 FR 74004, Oct. 25, 2016; 88 FR 4484, Jan. 24, 2023]

§ 1033.110 Emission diagnostics—general requirements.

The provisions of this section apply if you equip your locomotives with a diagnostic system that will detect significant malfunctions in their emission-control systems and you choose to base your emission-related maintenance instructions on such diagnostics. See § 1033.420 for information about how to select and maintain diagnostic-equipped locomotives for in-use testing. Notify the owner/operator that the presence of this diagnostic system affects their maintenance obligations under § 1033.815. Except as specified in § 1033.112, this section does not apply for diagnostics that you do not include in your emission-related maintenance instructions. The provisions of this section address diagnostic systems based on malfunction-indicator lights (MILs). You may ask to use other indicators instead of MILs.

- (a) The MIL must be readily visible to the operator. When the MIL goes on, it must display “Check Emission Controls” or a similar message that we approve. You may use sound in addition to the light signal.
- (b) To ensure that owner/operators consider MIL illumination seriously, you may not illuminate it for malfunctions that would not otherwise require maintenance. This section does not limit your ability to display other indicator lights or messages, as long as they are clearly distinguishable from MILs affecting the owner/operator's maintenance obligations under § 1033.815.
- (c) Control when the MIL can go out. If the MIL goes on to show a malfunction, it must remain on during all later engine operation until servicing corrects the malfunction. If the engine is not serviced, but the malfunction does not recur during the next 24 hours, the MIL may stay off during later engine operation.
- (d) Record and store in computer memory any diagnostic trouble codes showing a malfunction that should illuminate the MIL. The stored codes must identify the malfunctioning system or component as uniquely as possible. Make these codes available through the data link connector as described in paragraph (e) of this section. You may store codes for conditions that do not turn on the MIL. The system must store a separate code to show when the diagnostic system is disabled (from malfunction or tampering). Provide instructions to the owner/operator regarding how to interpret malfunction codes.
- (e) Make data, access codes, and devices accessible. Make all required data accessible to us without any access codes or devices that only you can supply. Ensure that anyone servicing your locomotive can read and understand the diagnostic trouble codes stored in the onboard computer with generic tools and information.
- (f) Follow standard references for formats, codes, and connections.

§ 1033.112 Emission diagnostics for SCR systems.

Engines equipped with SCR systems using separate reductant tanks must also meet the requirements of this section in addition to the requirements of § 1033.110. This section does not apply for SCR systems using the engine's fuel as the reductant.

- (a) The diagnostic system must monitor reductant quality and tank levels and alert operators to the need to refill the reductant tank before it is empty, or to replace the reductant if it does not meet your concentration specifications. Unless we approve other alerts, use a malfunction-indicator light (MIL) as specified in § 1033.110 and an audible alarm. You do not need to separately monitor reductant quality if you include an exhaust NO_x sensor (or other sensor) that allows you to determine inadequate reductant quality. However, tank level must be monitored in all cases.

- (b) Your onboard computer must record in nonvolatile computer memory all incidents of engine operation with inadequate reductant injection or reductant quality. It must record the total amount of operation without adequate reductant. It may total the operation by hours, work, or excess NO_x emissions.

§ 1033.115 Other requirements.

Locomotives that are required to meet the emission standards of this part must meet the requirements of this section. These requirements apply when the locomotive is new (for freshly manufactured or remanufactured locomotives) and continue to apply throughout the useful life.

- (a) **Crankcase emissions.** Crankcase emissions may not be discharged directly into the ambient atmosphere from any locomotive, except as follows:
 - (1) Locomotives may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during all emission testing. If you take advantage of this exception, you must do both of the following things:
 - (i) Manufacture the locomotives so that all crankcase emissions can be routed into the applicable sampling systems specified in 40 CFR part 1065, consistent with good engineering judgment.
 - (ii) Account for deterioration in crankcase emissions when determining exhaust deterioration factors.
 - (2) For purposes of this paragraph (a), crankcase emissions that are routed to the exhaust upstream of exhaust aftertreatment during all operation are not considered to be discharged directly into the ambient atmosphere.
- (b) **Adjustable parameters.** Locomotives that have adjustable parameters must meet all the requirements of this part for any adjustment in the approved adjustable range. General provisions for adjustable parameters apply as specified in 40 CFR 1068.50. You must specify in your application for certification the adjustable range of each adjustable parameter on a new locomotive or new locomotive engine to—
 - (1) Ensure that safe locomotive operating characteristics are available within that range, as required by section 202(a)(4) of the Clean Air Act (42 U.S.C. 7521(a)(4)), taking into consideration the production tolerances.
 - (2) Limit the physical range of adjustability to the maximum extent practicable to the range that is necessary for proper operation of the locomotive or locomotive engine.
- (c) **Prohibited controls.**
 - (1) **General provisions.** You may not design or produce your locomotives 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, a locomotive may not emit a noxious or toxic substance it would otherwise not emit that contributes to such an unreasonable risk.
 - (2) **Vanadium sublimation in SCR catalysts.** For engines equipped with vanadium-based SCR catalysts, you must design the engine and its emission controls to prevent vanadium sublimation and protect the catalyst from high temperatures. We will evaluate your engine design based on the following information that you must include in your application for certification:
 - (i) Identify the threshold temperature for vanadium sublimation for your specified SCR catalyst formulation as described in 40 CFR 1065.1113 through 1065.1121.

- (ii) Describe how you designed your engine to prevent catalyst inlet temperatures from exceeding the temperature you identify in paragraph (c)(2)(i) of this section, including consideration of engine wear through the useful life. Also describe your design for catalyst protection in case catalyst temperatures exceed the specified temperature. In your description, include how you considered elevated catalyst temperature resulting from sustained high-load engine operation, catalyst exotherms, particulate filter regeneration, and component failure resulting in unburned fuel in the exhaust stream.
- (d) **Evaporative and refueling controls.** For locomotives fueled with a volatile fuel you must design and produce them to minimize evaporative emissions during normal operation, including periods when the engine is shut down. You must also design and produce them to minimize the escape of fuel vapors during refueling. Hoses used to refuel gaseous-fueled locomotives may not be designed to be bled or vented to the atmosphere under normal operating conditions. No valves or pressure relief vents may be used on gaseous-fueled locomotives except as emergency safety devices that do not operate at normal system operating flows and pressures.
- (e) **Altitude requirements.** All locomotives must be designed to include features that compensate for changes in altitude so that the locomotives will comply with the applicable emission standards when operated at any altitude less than:
 - (1) 7000 feet above sea level for line-haul locomotives.
 - (2) 5500 feet above sea level for switch locomotives.
- (f) **Defeat devices.** You may not equip your locomotives with a defeat device. A defeat device is an auxiliary emission control device (AECD) that reduces the effectiveness of emission controls under conditions that the locomotive may reasonably be expected to encounter during normal operation and use.
 - (1) This does not apply to AECDs you identify in your application for certification if any of the following is true:
 - (i) The conditions of concern were substantially included in the applicable duty cycle test procedures described in subpart F of this part.
 - (ii) You show your design is necessary to prevent locomotive damage or accidents.
 - (iii) The reduced effectiveness applies only to starting the locomotive.
 - (iv) The locomotive emissions when the AECD is functioning are at or below the notch caps of § 1033.101.
 - (2) This does not apply to AECDs related to hotel mode that conform to the specifications of this paragraph (f)(2). This provision is intended for AECDs that have the primary function of operating the engine at a different speed than would be done to generate the same propulsive power when not operating in hotel mode. Identify and describe these AECDs in your application for certification. We may allow the AECDs to modify engine calibrations where we determine that such modifications are environmentally beneficial or needed for proper engine function. You must obtain preliminary approval under § 1033.210 before incorporating such modifications. Otherwise, you must apply the same injection timing and intake air cooling strategies in hotel mode and non-hotel mode.

- (g) **Idle controls.** All new locomotives must be equipped with automatic engine stop/start as described in this paragraph (g). All new locomotives must be designed to allow the engine(s) to be restarted at least six times per day without causing engine damage that would affect the expected interval between remanufacturing. Note that it is a violation of 40 CFR 1068.101(b)(1) to circumvent the provisions of this paragraph (g).
- (1) Except as allowed by paragraph (g)(2) of this section, the stop/start systems must shut off the main locomotive engine(s) after 30 minutes of idling (or less).
 - (2) Stop/start systems may restart or continue idling for the following reasons:
 - (i) To prevent engine damage such as to prevent the engine coolant from freezing.
 - (ii) To maintain air pressure for brakes or starter system, or to recharge the locomotive battery.
 - (iii) To perform necessary maintenance.
 - (iv) To otherwise comply with federal regulations.
 - (3) You may ask to use alternate stop/start systems that will achieve equivalent idle control.
 - (4) See § 1033.201 for provisions that allow you to obtain a separate certificate for idle controls.
 - (5) It is not considered circumvention to allow a locomotive to idle to heat or cool the cab, provided such heating or cooling is necessary.
- (h) **Power meters.** Tier 1 and later locomotives must be equipped with MW-hr meters (or the equivalent) consistent with the specifications of § 1033.140.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59189, Oct. 8, 2008; 75 FR 22982, Apr. 30, 2010; 88 FR 4484, Jan. 24, 2023]

§ 1033.120 Emission-related warranty requirements.

- (a) **General requirements.** Manufacturers/remanufacturers must warrant to the ultimate purchaser and each subsequent purchaser that the new locomotive, 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 may keep it from meeting these requirements.
- (b) **Warranty period.** Except as specified in this paragraph, the minimum warranty period is one-third of the useful life. Your emission-related warranty must be valid for at least as long as the minimum warranty periods listed in this paragraph (b) in MW-hrs of operation (or miles for Tier 0 locomotives not equipped with MW-hr meters) and years, whichever comes first. You may offer an emission-related warranty more generous than we require. The emission-related warranty for the locomotive may not be shorter than any basic mechanical warranty you provide without charge for the locomotive. Similarly, the emission-related warranty for any component may not be shorter than any warranty you provide without charge for that component. This means that your warranty may not treat emission-related and nonemission-related defects differently for any component. If you provide an extended warranty to individual owners for any components covered in paragraph (c) of this section for an additional charge, your emission-related

warranty must cover those components for those owners to the same degree. If the locomotive does not record MW-hrs, we base the warranty periods in this paragraph (b) only on years. The warranty period begins when the locomotive is placed into service, or back into service after remanufacture.

- (c) **Components covered.** The emission-related warranty covers all components whose failure would increase a locomotive's emissions of any regulated pollutant. This includes components listed in 40 CFR part 1068, appendix A, and components from any other system you develop to control emissions. The emission-related warranty covers the components you sell even if another company produces the component. Your emission-related warranty does not need to cover components whose failure would not increase a locomotive's emissions of any regulated pollutant. For remanufactured locomotives, your emission-related warranty is required to cover only those parts that you supply or those parts for which you specify allowable part manufacturers. It does not need to cover used parts that are not replaced during the remanufacture.
- (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) **Owners manual.** Describe in the owners manual the emission-related warranty provisions from this section that apply to the locomotive.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59189, Oct. 8, 2008; 75 FR 22983, Apr. 30, 2010; 81 FR 74004, Oct. 25, 2016; 88 FR 4485, Jan. 24, 2023]

§ 1033.125 Maintenance instructions.

Give the owner of each new locomotive written instructions for properly maintaining and using the locomotive, including the emission-control system. Include in the instructions a notification that owners and operators must comply with the requirements of subpart I of this part 1033. The emission-related maintenance instructions also apply to any service accumulation on your emission-data locomotives, as described in § 1033.245 and in 40 CFR part 1065. If you equip your locomotives with a diagnostic system that will detect significant malfunctions in their emission-control systems, specify the extent to which your emission-related maintenance instructions include such diagnostics.

§ 1033.130 Instructions for engine remanufacturing or engine installation.

- (a) If you do not complete assembly of the new locomotive (such as selling a kit that allows someone else to remanufacture a locomotive under your certificate), give the assembler instructions for completing assembly consistent with the requirements of this part. Include all information necessary to ensure that the locomotive will be assembled in its certified configuration.
- (b) Make sure these instructions have the following information:
 - (1) Include the heading: "Emission-related assembly instructions"
 - (2) Describe any instructions necessary to make sure the assembled locomotive will operate according to design specifications in your application for certification.
 - (3) Describe how to properly label the locomotive. This will generally include instructions to remove and destroy the previous Engine Emission Control Information label.
 - (4) State one of the following as applicable:

- (i) "Failing to follow these instructions when remanufacturing a locomotive or locomotive engine violates federal law (40 CFR 1068.105(b)), and may subject you to fines or other penalties as described in the Clean Air Act."
 - (ii) "Failing to follow these instructions when installing this locomotive engine violates federal law (40 CFR 1068.105(b)), and may subject you to fines or other penalties as described in the Clean Air Act."
- (c) You do not need installation instructions for locomotives you assemble.
- (d) Provide instructions in writing or in an equivalent format. For example, you may post instructions on a publicly available Web site for downloading or printing. If you do not provide the instructions in writing, explain in your application for certification how you will ensure that each assembler is informed of the assembly requirements.
- (e) Your emission-related assembly instructions may not include specifications for parts unrelated to emissions. For the basic mechanical parts listed in this paragraph (e), you may not specify a part manufacturer unless we determine that such a specification is necessary. You may include design specifications for such parts addressing the dimensions and material constraints as necessary. You may also specify a part number, as long you make it clear that alternate part suppliers may be used. This paragraph (e) covers the following parts or other parts we determine qualify as basic mechanical parts:
 - (1) Intake and exhaust valves.
 - (2) Intake and exhaust valve retainers.
 - (3) Intake and exhaust valve springs.
 - (4) Intake and exhaust valve rotators.
 - (5) Oil coolers.

§ 1033.135 Labeling.

As described in this section, each locomotive must have a label on the locomotive and a separate label on the engine. The label on the locomotive stays on the locomotive throughout its service life. It generally identifies the original certification of the locomotive, which is when it was originally manufactured for Tier 1 and later locomotives. The label on the engine is replaced each time the locomotive is remanufactured and identifies the most recent certification.

- (a) **Serial numbers.** At the point of original manufacture, assign each locomotive and each locomotive engine a serial number or other unique identification number and permanently affix, engrave, or stamp the number on the locomotive and engine in a legible way.
- (b) **Locomotive labels.**
 - (1) Locomotive labels meeting the specifications of paragraph (b)(2) of this section must be applied as follows:
 - (i) The manufacturer must apply a locomotive label at the point of original manufacture.
 - (ii) The remanufacturer must apply a locomotive label at the point of original remanufacture, unless the locomotive was labeled by the original manufacturer.

- (iii) Any remanufacturer certifying a locomotive to an FEL or standard different from the previous FEL or standard to which the locomotive was previously certified must apply a locomotive label.

(2) The locomotive label must meet all of the following criteria:

- (i) The label must be permanent and legible and affixed to the locomotive in a position in which it will remain readily visible. Attach it to a locomotive chassis part necessary for normal operation and not normally requiring replacement during the service life of the locomotive. You may not attach this label to the engine or to any equipment that is easily detached from the locomotive. Attach the label so that it cannot be removed without destroying or defacing the label. For Tier 0 and Tier 1 locomotives, the label may be made up of more than one piece, as long as all pieces are permanently attached to the locomotive.
- (ii) The label must be lettered in the English language using a color that contrasts with the background of the label.
- (iii) The label must include all the following information:
 - (A) The label heading: "ORIGINAL LOCOMOTIVE EMISSION CONTROL INFORMATION." Manufacturers/remanufacturers may add a subheading to distinguish this label from the engine label described in paragraph (c) of this section.
 - (B) Full corporate name and trademark of the manufacturer (or remanufacturer).
 - (C) The applicable engine family and configuration identification. In the case of locomotive labels applied by the manufacturer at the point of original manufacture, this will be the engine family and configuration identification of the certificate applicable to the freshly manufactured locomotive. In the case of locomotive labels applied by a remanufacturer during remanufacture, this will be the engine family and configuration identification of the certificate under which the remanufacture is being performed.
 - (D) Date of original manufacture of the locomotive, as defined in § 1033.901.
 - (E) The standards/FELs to which the locomotive was certified and the following statement: "THIS LOCOMOTIVE MUST COMPLY WITH THESE EMISSION LEVELS EACH TIME THAT IT IS REMANUFACTURED, EXCEPT AS ALLOWED BY 40 CFR 1033.750."

- (3) Label diesel-fueled locomotives near the fuel inlet to identify the allowable fuels, consistent with § 1033.101. For example, Tier 4 locomotives with sulfur-sensitive technology (or that otherwise require ULSD for compliance) should be labeled "ULTRA LOW SULFUR DIESEL FUEL ONLY". You do not need to label Tier 3 and earlier locomotives certified for use with both LSD and ULSD.

(c) **Engine labels.**

- (1) For engines not requiring aftertreatment devices, apply engine labels meeting the specifications of paragraph (c)(2) of this section once an engine has been assembled in its certified configuration. For engines that require aftertreatment devices, apply the label after the engine has been fully assembled, which may occur before installing the aftertreatment devices. These labels must be applied by:
 - (i) The manufacturer at the point of original manufacture; and

- (ii) The remanufacturer at the point of each remanufacture (including the original remanufacture and subsequent remanufactures).
- (2) The engine label must meet all of the following criteria:
- (i) The label must be durable throughout the useful life of the engine, be legible and affixed to the engine in a position in which it will be readily visible after installation of the engine in the locomotive. Attach it to an engine part necessary for normal operation and not normally requiring replacement during the useful life of the locomotive. You may not attach this label to any equipment that is easily detached from the engine. Attach the label so it cannot be removed without destroying or defacing the label. The label may be made up of more than one piece, as long as all pieces are permanently attached to the same engine part.
 - (ii) The label must be lettered in the English language using a color that contrasts with the background of the label.
 - (iii) The label must include all the following information:
 - (A) The label heading: "ENGINE EMISSION CONTROL INFORMATION." Manufacturers/ remanufacturers may add a subheading to distinguish this label from the locomotive label described in paragraph (b) of this section.
 - (B) Full corporate name and trademark of the manufacturer/remanufacturer.
 - (C) Engine family and configuration identification as specified in the certificate under which the locomotive is being manufactured or remanufactured.
 - (D) A prominent unconditional statement of compliance with U.S. Environmental Protection Agency regulations which apply to locomotives, as applicable:
 - (1) "This locomotive conforms to U.S. EPA regulations applicable to Tier 0 + switch locomotives."
 - (2) "This locomotive conforms to U.S. EPA regulations applicable to Tier 0 + line-haul locomotives."
 - (3) "This locomotive conforms to U.S. EPA regulations applicable to Tier 1 + locomotives."
 - (4) "This locomotive conforms to U.S. EPA regulations applicable to Tier 2 + locomotives."
 - (5) "This locomotive conforms to U.S. EPA regulations applicable to Tier 3 switch locomotives."
 - (6) "This locomotive conforms to U.S. EPA regulations applicable to Tier 3 line-haul locomotives."
 - (7) "This locomotive conforms to U.S. EPA regulations applicable to Tier 4 switch locomotives."
 - (8) "This locomotive conforms to U.S. EPA regulations applicable to Tier 4 line-haul locomotives."
 - (E) The useful life of the locomotive.

- (F) The standards/FELS to which the locomotive was certified.
- (iv) You may include other critical operating instructions such as specifications for adjustments or reductant use for SCR systems.
- (d) You may add information to the emission control information label as follows:
 - (1) You may identify other emission standards that the engine/locomotive meets or does not meet (such as international standards). You may include this information by adding it to the statement we specify or by including a separate statement.
 - (2) You may add other information to ensure that the locomotive will be properly maintained and used.
 - (3) You may add appropriate features to prevent counterfeit labels. For example, you may include the engine's unique identification number on the label.
- (e) You may ask us to approve modified labeling requirements in this part 1033 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.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59189, Oct. 8, 2008; 81 FR 74004, Oct. 25, 2016]

§ 1033.140 Rated power.

This section describes how to determine the rated power of a locomotive for the purposes of this part.

- (a) A locomotive configuration's rated power is the maximum brake power point on the nominal power curve for the locomotive configuration, as defined in this section. See § 1033.901 for the definition of brake power. Round the power value to the nearest whole horsepower. Generally, this will be the brake power of the engine in notch 8.
- (b) The nominal power curve of a locomotive configuration is its maximum available brake power at each possible operator demand setpoint or "notch". See 40 CFR 1065.1001 for the definition of operator demand. The maximum available power at each operator demand setpoint is based on your design and production specifications for that locomotive. The nominal power curve does not include any operator demand setpoints that are not achievable during in-use operation. For example, for a locomotive with only eight discrete operator demand setpoints, or notches, the nominal power curve would be a series of eight power points versus notch, rather than a continuous curve.
- (c) The nominal power curve must be within the range of the actual power curves of production locomotives considering normal production variability. If after production begins it is determined that your nominal power curve does not represent production locomotives, we may require you to amend your application for certification under § 1033.225.
- (d) For the purpose of determining useful life, you may need to use a rated power based on power other than brake power according to the provisions of this paragraph (d). The useful life must be based on the power measured by the locomotive's megawatt-hour meter. For example, if your megawatt-hour meter reads and records the electrical work output of the alternator/generator rather than the brake power of the engine, and the power output of the alternator/generator at notch 8 is 4000 horsepower, calculate your useful life as 30,000MW-hrs (7.5×4000).

§ 1033.150 Interim provisions.

The provisions of this section apply instead of other provisions of this part for a limited time. This section describes when these provisions apply.

- (a) [Reserved]
- (b) **Idle controls.** A locomotive equipped with an automatic engine stop/start system that was originally installed before January 1, 2009 and that conforms to the requirements of § 1033.115(g) is deemed to be covered by a certificate of conformity with respect to the requirements of § 1033.115(g). Note that the provisions of subpart C of this part also allow you to apply for a conventional certificate of conformity for such systems.
- (c) **Locomotive labels for transition to new standards.** This paragraph (c) applies when you remanufacture a locomotive that was previously certified under 40 CFR part 92. You must remove the old locomotive label and replace it with the locomotive label specified in § 1033.135.
- (d) [Reserved]
- (e) **Producing switch locomotives using certified nonroad engines.** You may use the provisions of this paragraph (e) to produce any number of freshly manufactured or refurbished switch locomotives in model years 2008 through 2017. Locomotives produced under this paragraph (e) are exempt from the standards and requirements of this part subject to the following provisions:
 - (1) All of the engines on the switch locomotive must be covered by a certificate of conformity issued under 40 CFR part 89 or 1039 for model year 2008 or later (or earlier model years if the same standards applied as in 2008). Engines over 750 hp certified to the Tier 4 standards for non-generator set engines are not eligible for this allowance after 2014.
 - (2) You must reasonably project that more of the engines will be sold and used for non-locomotive use than for use in locomotives.
 - (3) You may not generate or use locomotive credits under this part for these locomotives.
 - (4) Include the following statement on a permanent locomotive label: "THIS LOCOMOTIVE WAS CERTIFIED UNDER 40 CFR 1033.150(e). THE ENGINES USED IN THIS LOCOMOTIVE ARE SUBJECT TO REQUIREMENTS OF 40 CFR PARTS 1039 (or 89) AND 1068."
 - (5) The rebuilding requirements of 40 CFR part 1068 apply when remanufacturing engines used in these locomotives.
- (f) **In-use compliance limits.** For purposes of determining compliance other than for certification or production-line testing, calculate the applicable in-use compliance limits by adjusting the applicable standards/FELs. The PM adjustment applies only for model year 2017 and earlier locomotives and does not apply for locomotives with a PM FEL higher than 0.03 g/bhp-hr. The NO_x adjustment applies only for model year 2017 and earlier locomotives and does not apply for locomotives with a NO_x FEL higher than

2.0 g/bhp-hr. Add the applicable adjustments in Tables 1 or 2 of this section (which follow) to the otherwise applicable standards (or FELs) and notch caps. You must specify during certification which add-ons, if any, will apply for your locomotives.

TABLE 1 TO § 1033.150—IN-USE ADJUSTMENTS FOR TIER 4 LOCOMOTIVES

Fraction of useful life already used	In-use adjustments (g/bhp-hr)	
	For model year 2017 and earlier Tier 4 NO _x standards	For model year 2017 and earlier Tier 4 PM standards
0 < MW-hrs ≤ 50% of UL	0.7	0.01
50 < MW-hrs ≤ 75% of UL	1.0	0.01
MW-hrs > 75% of UL	1.3	0.01

TABLE 2 TO § 1033.150—OPTIONAL IN-USE ADJUSTMENTS FOR TIER 4 LOCOMOTIVES

Fraction of useful life already used	In-use adjustments (g/bhp-hr)	
	For model year 2017 and earlier Tier 4 NO _x standards	For model year 2017 and earlier Tier 4 PM standards
0 < MW-hrs ≤ 50% of UL	0.2	0.03
50 < MW-hrs ≤ 75% of UL	0.3	0.03
MW-hrs > 75% of UL	0.4	0.03

(g) **Optional interim Tier 4 compliance provisions for NO_x emissions.** For model years 2015 through 2022, manufacturers may choose to certify some or all of their Tier 4 line-haul engine families according to the optional compliance provisions of this paragraph (g). The following provisions apply to all locomotives in those families:

- (1) The provisions of this paragraph (g) apply instead of the deterioration factor requirements of §§ 1033.240 and 1033.245 for NO_x emissions. You must certify that the locomotives in the engine family will conform to the requirements of this paragraph (g) for their full useful lives.
- (2) The applicable NO_x emission standard for locomotives certified under this paragraph (g) is:
 - (i) 1.3 g/bhp-hr for locomotives that have accumulated less than 50 hours of operation.
 - (ii) 1.3 plus 0.6 g/bhp-hr for locomotives that have accumulated 50 hours or more of operation.

- (3) The engine family may not generate NO_x emission credits.
- (4) The design certification provisions of § 1033.240(c) do not apply for these locomotives for the next remanufacture.
- (5) Manufacturers must comply with the production-line testing program in subpart D of this part for these engine families or the following optional program:
 - (i) You are not required to test locomotives in the family under subpart D of this part if you comply with the requirements of this paragraph (g)(5).
 - (ii) Test the locomotives as specified in subpart E of this part, with the following exceptions:
 - (A) The minimum test sample size is one percent of the number of locomotives in the family or five, whichever is less.
 - (B) The locomotives must be tested after they have accumulated 50 hours or more of operation but before they have reached 50 percent of their useful life.
 - (iii) The standards in this part for pollutants other than NO_x apply as specified for testing conducted under this optional program.
- (6) The engine family may use NO_x emission credits to comply with this paragraph (g). However, a 1.5 g/bhp-hr NO_x FEL cap applies for engine families certified under this paragraph (g). The applicable standard for locomotives that have accumulated 50 hours or more of operation is the FEL plus 0.6 g/bhp-hr.
- (7) The in-use NO_x add-ons specified in paragraph (f) of this section do not apply for these locomotives.
- (8) All other provisions of this part apply to such locomotives, except as specified otherwise in this paragraph (g).
- (h)-(j) [Reserved]
- (k) **Test fuels.** Testing performed during calendar years 2008 and 2009 may be performed using test fuels that meet the specifications of 40 CFR 92.113. If you do, adjust PM emissions downward by 0.04 g/bhp-hr to account for the difference in sulfur content of the fuel.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59189, Oct. 8, 2008; 74 FR 8423, Feb. 24, 2009; 75 FR 22983, Apr. 30, 2010; 75 FR 68460, Nov. 8, 2010; 81 FR 74004, Oct. 25, 2016; 86 FR 34375, June 29, 2021]

Subpart C—Certifying Engine Families

§ 1033.201 General requirements for obtaining a certificate of conformity.

Certification is the process by which you demonstrate to us that your freshly manufactured or remanufactured locomotives will meet the applicable emission standards throughout their useful lives (explaining to us how you plan to manufacture or remanufacture locomotives, and providing test data showing that such locomotives will comply with all applicable emission standards). Anyone meeting the definition of manufacturer in § 1033.901 may apply for a certificate of conformity for freshly manufactured locomotives. Anyone meeting the definition of remanufacturer in § 1033.901 may apply for a certificate of conformity for remanufactured locomotives.

- (a) You must send us a separate application for a certificate of conformity for each engine family. A certificate of conformity is valid for new production 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. No certificate will be issued after December 31 of the model year. You may amend your application for certification after the end of the model year in certain circumstances as described in §§ 1033.220 and 1033.225. You must renew your certification annually for any locomotives 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 § 1033.255).
- (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 § 1033.250.
- (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 § 1033.255 for provisions describing how we will process your application.
- (g) We may require you to deliver your test locomotives (including test engines, as applicable) to a facility we designate for our testing (see § 1033.235(c)). Alternatively, you may choose to deliver another engine/locomotive that is identical in all material respects to the test locomotive, or another engine/locomotive that we determine can appropriately serve as an emission-data locomotive for the engine family.
- (h) By applying for a certificate of conformity, you are accepting responsibility for the in-use emission performance of all properly maintained and used locomotives covered by your certificate. This responsibility applies without regard to whether you physically manufacture or remanufacture the entire locomotive. If you do not physically manufacture or remanufacture the entire locomotive, you must take reasonable steps (including those specified by this part) to ensure that the locomotives produced under your certificate conform to the specifications of your application for certification. Note that this paragraph does not limit any liability under this part or the Clean Air Act for entities that do not obtain certificates. This paragraph also does not prohibit you from making contractual arrangements with noncertifiers related to recovering damages for noncompliance.
- (i) The provisions of this subpart describe how to obtain a certificate that covers all standards and requirements. Manufacturer/remanufacturers may ask to obtain a certificate of conformity that does not cover the idle control requirements of § 1033.115 or one that only covers the idle control requirements of § 1033.115. Remanufacturers obtaining such partial certificates must include a statement in their installation instructions that two certificates and labels are required for a locomotive to be in a fully certified configuration. We may modify the certification requirements for certificates that will only cover idle control systems.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74005, Oct. 25, 2016]

§ 1033.205 Applying for a certificate of conformity.

- (a) Send the Designated Compliance Officer a complete application for each engine family for which you are requesting a certificate of conformity.
- (b) [Reserved]

- (c) You must update and correct your application to accurately reflect your production, as described in § 1033.225.
- (d) Include the following information in your application:
 - (1) A description of the basic engine design including, but not limited to, the engine family specifications listed in § 1033.230. For freshly manufactured locomotives, a description of the basic locomotive design. For remanufactured locomotives, a description of the basic locomotive designs to which the remanufacture system will be applied. Include in your description, a list of distinguishable configurations to be included in the engine family. Note whether you are requesting a certificate that will or will not cover idle controls.
 - (2) An explanation of how the emission control system operates, including detailed descriptions of:
 - (i) All emission control system components.
 - (ii) Injection or ignition timing for each notch (i.e., degrees before or after top-dead-center), and any functional dependence of such timing on other operational parameters (e.g., engine coolant temperature).
 - (iii) Each auxiliary emission control device (AECD).
 - (iv) All fuel system components to be installed on any production or test locomotives.
 - (v) Diagnostics.
 - (3) A description of the test locomotive.
 - (4) A description of the test equipment and fuel used. Identify any special or alternate test procedures you used.
 - (5) A description of the operating cycle and the period of operation necessary to accumulate service hours on the test locomotive and stabilize emission levels. You may also include a Green Engine Factor that would adjust emissions from zero-hour engines to be equivalent to stabilized engines.
 - (6) A description of injection timing, fuel rate, and all other adjustable operating parameters, including production tolerances. For any operating parameters that do not qualify as adjustable parameters, include a description supporting your conclusion (see 40 CFR 1068.50(c)). Include the following in your description of each adjustable parameter:
 - (i) For practically adjustable operating parameters, include the nominal or recommended setting, the intended practically adjustable range, the limits or stops used to limit adjustable ranges, and production tolerances of the limits or stops used to establish each practically adjustable range. State that the physical limits, stops or other means of limiting adjustment, are effective in preventing adjustment of parameters on in-use engines to settings outside your intended practically adjustable ranges and provide information to support this statement.
 - (ii) For programmable operating parameters, state that you have restricted access to electronic controls to prevent parameter adjustments on in-use engines that would allow operation outside the practically adjustable range. Describe how your engines are designed to prevent unauthorized adjustments.
 - (7) Projected U.S. production information for each configuration. If you are projecting substantially different sales of a configuration than you had previously, we may require you to explain why you are projecting the change.

(8)

(i) All test data you obtained for each test engine or locomotive. As described in § 1033.235, we may allow you to demonstrate compliance based on results from previous emission tests, development tests, or other testing information. Include data for NO_x, PM, HC, CO, and CO₂.

(ii) Report measured CO₂, N₂O, and CH₄ as described in § 1033.235. Small manufacturers/remanufacturers may omit reporting N₂O and CH₄.

(9) The intended deterioration factors for the engine family, in accordance with § 1033.245. If the deterioration factors for the engine family were developed using procedures that we have not previously approved, you should request preliminary approval under § 1033.210.

(10) The intended useful life period for the engine family, in accordance with § 1033.101(g). If the useful life for the engine family was determined using procedures that we have not previously approved, you should request preliminary approval under § 1033.210.

(11) Copies of your proposed emission control label(s), maintenance instructions, and installation instructions (where applicable).

(12) An unconditional statement declaring that all locomotives included in the engine family comply with all requirements of this part and the Clean Air Act.

(e) If we request it, you must supply such additional information as may be required to evaluate the application.

(f) Provide the information to read, record, and interpret all the information broadcast by a locomotive's onboard computers and electronic control units. State that, upon request, you will give us any hardware, software, or tools we would need to do this. You may reference any appropriate publicly released standards that define conventions for these messages and parameters. Format your information consistent with publicly released standards.

(g) Include the information required by other subparts of this part. For example, include the information required by § 1033.725 if you participate in the ABT program.

(h) Include other applicable information, such as information specified in this part or part 1068 of this chapter related to requests for exemptions.

(i) 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.

(j) For imported locomotives, we may require you to describe your expected importation process.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 74 FR 56508, Oct. 30, 2009; 88 FR 4485, Jan. 24, 2023]

§ 1033.210 Preliminary approval.

(a) If you send us information before you finish the application, we will review it and make any appropriate determinations for questions related to engine family definitions, auxiliary emission-control devices, deterioration factors, testing for service accumulation, maintenance, and useful lives.

- (b) 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.
- (c) 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 three years ahead of time.
- (d) You must obtain preliminary approval for your plan to develop deterioration factors prior to the start of any service accumulation to be used to develop the factors.

§ 1033.220 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 § 1033.125. You must send the Designated Compliance Officer a request to amend your application for certification for an engine 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 instructions. If owners/operators follow the original maintenance instructions rather than the newly specified maintenance, this does not allow you to disqualify those locomotives from in-use testing or deny a warranty claim.

- (a) If you are decreasing or eliminating any of the 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 locomotives in severe-duty applications.
- (c) You do not need to 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).

[73 FR 37197, June 30, 2008, as amended at 75 FR 22983, Apr. 30, 2010]

§ 1033.225 Amending applications for certification.

Before we issue you a certificate of conformity, you may amend your application to include new or modified locomotive 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 locomotive configurations within the scope of the certificate, subject to the provisions of this section. You must also amend your application if any changes occur with respect to any information that is included or should be included in your application. For example, you must amend your application if you determine that your actual production variation for an adjustable parameter exceeds the tolerances specified in your application.

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

- (1) Add a locomotive configuration to an engine family. In this case, the locomotive added must be consistent with other locomotives in the engine family with respect to the criteria listed in § 1033.230. For example, you must amend your application if you want to produce 12-cylinder versions of the 16-cylinder locomotives you described in your application.
 - (2) Change a locomotive already included in an engine 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 locomotive's lifetime. For example, you must amend your application if you want to change a part supplier if the part was described in your original application and is different in any material respect than the part you described.
 - (3) Modify an FEL for an engine 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 locomotive model or configuration you intend to make.
 - (2) Include engineering evaluations or data showing that the amended engine family complies with all applicable requirements. You may do this by showing that the original emission-data locomotive is still appropriate for showing that the amended family complies with all applicable requirements.
 - (3) If the original emission-data locomotive for the engine family is not appropriate to show compliance for the new or modified locomotive, include new test data showing that the new or modified locomotive meets the requirements of this part.
 - (4) Include any other information needed to make your application correct and complete.
- (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 engine families already covered by a certificate of conformity, we will determine whether the existing certificate of conformity covers your new or modified locomotive. You may ask for a hearing if we deny your request (see § 1033.920).
- (e) For engine families already covered by a certificate of conformity, you may start producing the new or modified locomotive anytime after you send us your amended application, before we make a decision under paragraph (d) of this section. However, if we determine that the affected locomotives do not meet applicable requirements, we will notify you to cease production of the locomotives and may require you to recall the locomotives at no expense to the owner. Choosing to produce locomotives under this paragraph (e) is deemed to be consent to recall all locomotives 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 locomotives.
- (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 locomotives you have already introduced into U.S. commerce, except as described in this paragraph (f). If we approve a changed FEL after the start of production, you must include the new FEL on the emission control information label for all locomotives produced after the change. 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 engine family 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. If you amend your application by submitting new test data to include a newly added or modified locomotive, as described in paragraph (b)(3) of this section, use the appropriate FELs with corresponding production volumes to calculate emission credits for the model year, as described in subpart H of this part. In all other circumstances, you must use the higher FEL for the entire family to calculate emission credits under subpart H of this part.
- (2) You may ask to lower the FEL for your emission family only if you have test data from production locomotives showing that emissions are below the proposed lower FEL. The lower FEL applies only to engines or fuel-system components 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.
- (g) You may produce engines as described in your amended application for certification and consider those engines to be in a certified configuration if we approve a new or modified engine configuration during the model year under paragraph (d) of this section. Similarly, you may modify in-use engines as described in your amended application for certification and consider those engines to be in a certified configuration if we approve a new or modified engine configuration at any time under paragraph (d) of this section. Modifying a new or in-use engine to be in a certified configuration does not violate the tampering prohibition of 40 CFR 1068.101(b)(1), as long as this does not involve changing to a certified configuration with a higher family emission limit.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22983, Apr. 30, 2010; 81 FR 74005, Oct. 25, 2016]

§ 1033.230 Grouping locomotives into engine families.

- (a) Divide your product line into engine families of locomotives that are expected to have similar emission characteristics throughout the useful life. Your engine family is limited to a single model year. Freshly manufactured locomotives may not be included in the same engine family as remanufactured locomotives, except as allowed by paragraph (f) of this section. Paragraphs (b) and (c) of this section specify default criteria for dividing locomotives into engine families. Paragraphs (d) and (e) of this section allow you deviate from these defaults in certain circumstances.
- (b) This paragraph (b) applies for all locomotives other than Tier 0 locomotives. Group locomotives in the same engine family if they are the same in all the following aspects:
 - (1) The combustion cycle (e.g., diesel cycle).
 - (2) The type of engine cooling employed and procedure(s) employed to maintain engine temperature within desired limits (thermostat, on-off radiator fan(s), radiator shutters, etc.).
 - (3) The nominal bore and stroke dimensions.
 - (4) The approximate intake and exhaust event timing and duration (valve or port).
 - (5) The location of the intake and exhaust valves (or ports).
 - (6) The size of the intake and exhaust valves (or ports).
 - (7) The overall injection or ignition timing characteristics (i.e., the deviation of the timing curves from the optimal fuel economy timing curve must be similar in degree).

- (8) The combustion chamber configuration and the surface-to-volume ratio of the combustion chamber when the piston is at top dead center position, using nominal combustion chamber dimensions.
 - (9) The location of the piston rings on the piston.
 - (10) The method of air aspiration (turbocharged, supercharged, naturally aspirated, Roots blown).
 - (11) The general performance characteristics of the turbocharger or supercharger (e.g., approximate boost pressure, approximate response time, approximate size relative to engine displacement).
 - (12) The type of air inlet cooler (air-to-air, air-to-liquid, approximate degree to which inlet air is cooled).
 - (13) The intake manifold induction port size and configuration.
 - (14) The type of fuel and fuel system configuration.
 - (15) The configuration of the fuel injectors and approximate injection pressure.
 - (16) The type of fuel injection system controls (i.e., mechanical or electronic).
 - (17) The type of smoke control system.
 - (18) The exhaust manifold port size and configuration.
 - (19) The type of exhaust aftertreatment system (oxidation catalyst, particulate trap), and characteristics of the aftertreatment system (catalyst loading, converter size vs. engine size).
- (c) Group Tier 0 locomotives in the same engine family if they are the same in all the following aspects:
- (1) The combustion cycle (e.g., diesel cycle).
 - (2) The type of engine cooling employed and procedure(s) employed to maintain engine temperature within desired limits (thermostat, on-off radiator fan(s), radiator shutters, etc.).
 - (3) The approximate bore and stroke dimensions.
 - (4) The approximate location of the intake and exhaust valves (or ports).
 - (5) The combustion chamber general configuration and the approximate surface-to-volume ratio of the combustion chamber when the piston is at top dead center position, using nominal combustion chamber dimensions.
 - (6) The method of air aspiration (turbocharged, supercharged, naturally aspirated, Roots blown).
 - (7) The type of air inlet cooler (air-to-air, air-to-liquid, approximate degree to which inlet air is cooled).
 - (8) The type of fuel and general fuel system configuration.
 - (9) The general configuration of the fuel injectors and approximate injection pressure.
 - (10) The type of fuel injection system control (electronic or mechanical).
- (d) You may subdivide a group of locomotives that is identical under paragraph (b) or (c) of this section into different engine families if you show the expected emission characteristics are different during the useful life. This allowance also covers locomotives for which only calculated emission rates differ, such as locomotives with and without energy-saving design features. For the purposes of determining whether an engine family is a small engine family in § 1033.405(a)(2), we will consider the number of locomotives that could have been classed together under paragraph (b) or (c) of this section, instead of the number of locomotives that are included in a subdivision allowed by this paragraph (d).

- (e) In unusual circumstances, you may group locomotives that are not identical with respect to the things listed in paragraph (b) or (c) of this section in the same engine family if you show that their emission characteristics during the useful life will be similar.
- (f) During the first six calendar years after a new tier of standards becomes applicable, remanufactured engines/locomotives may be included in the same engine family as freshly manufactured locomotives, provided the same engines and emission controls are used for locomotive models included in the engine family.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008]

§ 1033.235 Emission testing required for certification.

This section describes the emission testing you must perform to show compliance with the emission standards in § 1033.101.

- (a) Select an emission-data locomotive (or engine) from each engine family for testing. It may be a low mileage locomotive, or a development engine (that is equivalent in design to the engines of the locomotives being certified), or another low hour engine. Use good engineering judgment to select the locomotive configuration that is most likely to exceed (or have emissions nearest to) an applicable emission standard or FEL. In making this selection, consider all factors expected to affect emission control performance and compliance with the standards, including emission levels of all exhaust constituents, especially NO_x and PM.
- (b) Test your emission-data locomotives using the procedures and equipment specified in subpart F of this part. In the case of dual-fuel locomotives, measure emissions when operating with each type of fuel for which you intend to certify the locomotive. In the case of flexible-fuel locomotives, measure emissions when operating with the fuel mixture that best represents in-use operation or is most likely to have the highest NO_x emissions, though you may ask us instead to perform tests with both fuels separately if you can show that intermediate mixtures are not likely to occur in use.
- (c) We may perform confirmatory testing by measuring emissions from any of your emission-data locomotives or other locomotives from the engine family.
 - (1) We may decide to do the testing at your plant or any other facility. If we do this, you must deliver the locomotive to a test facility we designate. If we do the testing at your plant, you must schedule it as soon as possible and make available the instruments, personnel, and equipment we need.
 - (2) If we measure emissions from one of your locomotives, the results of that testing become the official emission results for the locomotive. Unless we later invalidate these data, we may decide not to consider your data in determining if your engine family meets applicable requirements.
 - (3) Before we test one of your locomotives, we may set its adjustable parameters to any point within the adjustable ranges (see § 1033.115(b)).
 - (4) Before we test one of your locomotives, we may calibrate it within normal production tolerances for anything we do not consider an adjustable parameter. For example, this would apply for a parameter that is subject to production variability because it is adjustable during production, but is not considered an adjustable parameter (as defined in § 1033.901) because it is permanently sealed.
- (d) You may ask to use carryover emission data from a previous model year instead of doing new tests if all the following are true:

- (1) The engine family from the previous model year differs from the current engine family only with respect to model year, items identified in § 1033.225(a), or other factors not related to emissions. We may waive this criterion for differences we determine not to be relevant.
 - (2) The emission-data locomotive from the previous model year remains the appropriate emission-data locomotive under paragraph (b) of this section.
 - (3) The data show that the emission-data locomotive would meet all the requirements that apply to the engine family covered by the application for certification.
- (e) You may ask to use emission data from a different engine family you have already certified instead of testing a locomotive in the second engine family if all the following are true:
- (1) The same engine is used in both engine families.
 - (2) You demonstrate to us that the differences in the two families are sufficiently small that the locomotives in the untested family will meet the same applicable notch standards calculated from the test data.
- (f) We may require you to test a second locomotive of the same or different configuration in addition to the locomotive tested under paragraph (b) of this section.
- (g) If you use an alternate test procedure under 40 CFR 1065.10 and later testing shows that such testing does not produce results that are equivalent to the procedures specified in subpart F of this part, we may reject data you generated using the alternate procedure.
- (h) The requirement to measure smoke emissions is waived for certification and production line testing, except where there is reason to believe your locomotives do not meet the applicable smoke standards.
- (i) Measure CO₂ with each test. Measure CH₄ with each low-hour certification test using the procedures specified in 40 CFR part 1065 starting in the 2012 model year. Also measure N₂O with each low-hour certification test using the procedures specified in 40 CFR part 1065 for any engine family that depends on NO_x aftertreatment to meet emission standards. Small manufacturers/remanufacturers may omit measurement of N₂O and CH₄. Use the same units and modal calculations as for your other results to report a single weighted value for CO₂, N₂O, and CH₄. Round the final values as follows:
- (1) Round CO₂ to the nearest 1 g/bhp-hr.
 - (2) Round N₂O to the nearest 0.001 g/bhp-hr.
 - (3) Round CH₄ to the nearest 0.001g/bhp-hr.

[73 FR 37197, June 30, 2008, as amended at 74 FR 56508, Oct. 30, 2008; 75 FR 22984, Apr. 30, 2010; 81 FR 74005, Oct. 25, 2016]

§ 1033.240 Demonstrating compliance with exhaust emission standards.

- (a) For purposes of certification, your engine family is considered in compliance with the applicable numerical emission standards in § 1033.101 if all emission-data locomotives representing that family have test results showing official emission results and deteriorated emission levels at or below these standards.
- (1) If you include your locomotive in the ABT program in subpart H of this part, your FELs are considered to be the applicable emission standards with which you must comply.

- (2) If you do not include your remanufactured locomotive in the ABT program in subpart H of this part, but it was previously included in the ABT program in subpart H of this part, the previous FELs are considered to be the applicable emission standards with which you must comply.
- (b) Your engine family is deemed not to comply if any emission-data locomotive representing that family has test results showing an official emission result or a deteriorated emission level for any pollutant that is above an applicable emission standard. Use the following steps to determine the deteriorated emission level for the test locomotive:
 - (1) Collect emission data using measurements with enough significant figures to calculate the cycle-weighted emission rate to at least one more decimal place than the applicable standard. Apply any applicable humidity corrections before weighting emissions.
 - (2) Apply the regeneration factors if applicable. At this point the emission rate is generally considered to be an official emission result.
 - (3) Apply the deterioration factor to the official emission result, as described in § 1033.245, then round the adjusted figure to the same number of decimal places as the emission standard. This adjusted value is the deteriorated emission level. Compare these emission levels from the emission-data locomotive with the applicable emission standards. In the case of NO_x + NMHC standards, apply the deterioration factor to each pollutant and then add the results before rounding.
 - (4) The highest deteriorated emission levels for each pollutant are considered to be the certified emission levels.
- (c) An owner/operator remanufacturing its locomotives to be identical to their previously certified configuration may certify by design without new emission test data. To do this, submit the application for certification described in § 1033.205, but instead of including test data, include a description of how you will ensure that your locomotives will be identical in all material respects to their previously certified condition. You may use reconditioned parts consistent with good engineering judgment. You have all of the liabilities and responsibilities of the certificate holder for locomotives you certify under this paragraph.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22984, Apr. 30, 2010]

§ 1033.245 Deterioration factors.

Establish deterioration factors for each pollutant to determine whether your locomotives will meet emission standards for each pollutant throughout the useful life, as described in § 1033.240. Determine deterioration factors as described in this section, either with an engineering analysis, with pre-existing test data, or with new emission measurements. The deterioration factors are intended to reflect the deterioration expected to result during the useful life of a locomotive maintained as specified in § 1033.125. If you perform durability testing, the maintenance that you may perform on your emission-data locomotive is limited to the maintenance described in § 1033.125. You may carry across a deterioration factor from one engine family to another consistent with good engineering judgment.

- (a) Your deterioration factors must take into account any available data from in-use testing with similar locomotives, consistent with good engineering judgment. For example, it would not be consistent with good engineering judgment to use deterioration factors that predict emission increases over the useful life of a locomotive or locomotive engine that are significantly less than the emission increases over the useful life observed from in-use testing of similar locomotives.

(b) Apply deterioration factors as follows:

- (1) **Additive deterioration factor for exhaust emissions.** Except as specified in paragraph (b)(2) of this section, 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 locomotive at the selected test point by adding the factor to the measured emissions. The deteriorated emission level is intended to represent the highest emission level during the useful life. Thus, if the factor is less than zero, use zero. Additive deterioration factors must be specified to one more decimal place than the applicable standard.
- (2) **Multiplicative deterioration factor for exhaust emissions.** Use a multiplicative deterioration factor if good engineering judgment calls for the deterioration factor for a pollutant to be the ratio of exhaust emissions at the end of the useful life to exhaust emissions at the low-hour test point. For example, if you use aftertreatment technology that controls emissions of a pollutant proportionally to engine-out emissions, it is often appropriate to use a multiplicative deterioration factor. Adjust the official emission results for each tested locomotive at the selected test point by multiplying the measured emissions by the deterioration factor. The deteriorated emission level is intended to represent the highest emission level during the useful life. Thus, if the factor is less than one, use one. A multiplicative deterioration factor may not be appropriate in cases where testing variability is significantly greater than locomotive-to-locomotive variability. Multiplicative deterioration factors must be specified to one more significant figure than the applicable standard.
- (3) **Sawtooth and other nonlinear deterioration patterns.** The deterioration factors described in paragraphs (b)(1) and (2) of this section assume that the highest useful life emissions occur either at the end of useful life or at the low-hour test point. The provisions of this paragraph (b)(3) apply where good engineering judgment indicates that the highest emissions over the useful life will occur between these two points. For example, emissions may increase with service accumulation until a certain maintenance step is performed, then return to the low-hour emission levels and begin increasing again. Base deterioration factors for locomotives with such emission patterns on the difference between (or ratio of) the point at which the highest emissions occur and the low-hour test point. Note that this applies for maintenance-related deterioration only where we allow such critical emission-related maintenance.
- (4) **Dual-fuel and flexible-fuel engines.** In the case of dual-fuel and flexible-fuel locomotives, apply deterioration factors separately for each fuel type by measuring emissions with each fuel type at each test point. You may accumulate service hours on a single emission-data engine using the type of fuel or the fuel mixture expected to have the highest combustion and exhaust temperatures; you may ask us to approve a different fuel mixture if you demonstrate that a different criterion is more appropriate.
- (5) **Deterioration factor for crankcase emissions.** If your engine vents crankcase emissions to the exhaust or to the atmosphere, you must account for crankcase emission deterioration, using good engineering judgment. You may use separate deterioration factors for crankcase emissions of each pollutant (either multiplicative or additive) or include the effects in combined deterioration factors that include exhaust and crankcase emissions together for each pollutant.

(c) Deterioration factors for smoke are always additive.

- (d) If your locomotive vents crankcase emissions to the exhaust or to the atmosphere, you must account for crankcase emission deterioration, using good engineering judgment. You may use separate deterioration factors for crankcase emissions of each pollutant (either multiplicative or additive) or include the effects in combined deterioration factors that include exhaust and crankcase emissions together for each pollutant.
- (e) Include the following information in your application for certification:
 - (1) If you determine your deterioration factors based on 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 determine your deterioration factors based on engineering analysis, explain why this is appropriate and include a statement that all data, analyses, evaluations, and other information you used are available for our review upon request.
 - (3) 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.
- (f) You may alternatively determine and verify deterioration factors based on bench-aged aftertreatment as described in 40 CFR 1036.245 and 1036.246, with the following exceptions:
 - (1) The minimum required aging for locomotive engines as specified in 40 CFR 1036.245(c)(2) is 3,000 hours. Operate the engine for service accumulation using the same sequence of duty cycles that would apply for determining a deterioration factor under paragraphs (a) through (d) of this section.
 - (2) Perform verification testing as described in subpart F of this part rather than 40 CFR 1036.555. The provisions of 40 CFR 1036.246(d)(2) do not apply. Perform testing consistent with the original certification to determine whether tested locomotives meet the duty-cycle emission standards in § 1033.101.
 - (3) Apply infrequent regeneration adjustment factors as specified in § 1033.535 rather than 40 CFR 1036.580.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74005, Oct. 25, 2016; 88 FR 4485, Jan. 24, 2023]

§ 1033.250 Reporting and recordkeeping.

- (a) Within 45 days after the end of the model year, send the Designated Compliance Officer a report describing the following information about locomotives you produced during the model year:
 - (1) Report the total number of locomotives you produced in each engine family by locomotive model and engine model.
 - (2) If you produced exempted locomotives, report the number of exempted locomotives you produced for each locomotive model and identify the buyer or shipping destination for each exempted locomotive. You do not need to report under this paragraph (a)(2) locomotives that were temporarily exempted, exported locomotives, locomotives exempted as manufacturer/remanufacturer-owned locomotives, or locomotives exempted as test locomotives.
- (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 § 1033.205 that you were not required to include in your application.
- (3) A detailed history of each emission-data locomotive. For each locomotive, describe all of the following:
 - (i) The emission-data locomotive's construction, including its origin and buildup, steps you took to ensure that it represents production locomotives, any components you built specially for it, and all the components you include in your application for certification.
 - (ii) How you accumulated locomotive operating hours (service accumulation), including the dates and the number of hours accumulated.
 - (iii) All maintenance, including modifications, parts changes, and other service, and the dates and reasons for the maintenance.
 - (iv) All your emission tests (valid and invalid), including the date and purpose of each test and documentation of test parameters as specified in part 40 CFR part 1065, and the date and purpose of each test.
 - (v) All tests to diagnose locomotive or emission control performance, giving the date and time of each and the reasons for the test.
 - (vi) Any other significant events.
- (4) If you test a development engine for certification, you may omit information otherwise required by paragraph (b)(3) of this section that is unrelated to emissions and emission-related components.
- (5) Production figures for each engine family divided by assembly plant.
- (6) Keep a list of locomotive identification numbers for all the locomotives you produce under each certificate of conformity.
- (c) Keep required data from emission tests and all other information specified in this section for eight years after we issue your certificate. If you use the same emission data or other information for a later model year, the eight-year period restarts with each year that you continue to rely on the information.
- (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.
- (e) Send us copies of any locomotive maintenance instructions or explanations if we ask for them.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74006, Oct. 25, 2016]

§ 1033.255 EPA decisions.

- (a) If we determine an application is complete and shows that the engine family meets all the requirements of this part and the Clean Air Act, we will issue a certificate of conformity for the engine family for that model year. We may make the approval subject to additional conditions.
- (b) We may deny an application for certification if we determine that an engine 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 an application, we will explain why in writing.

- (c) In addition, we may deny your application or suspend or revoke a certificate of conformity if you do any of the following:
 - (1) Refuse to comply with any testing or reporting requirements in this part.
 - (2) Submit false or incomplete information. This includes doing anything after submitting an application that causes submitted information to be false or incomplete.
 - (3) Cause any test data to become inaccurate.
 - (4) Deny us from completing authorized activities (see 40 CFR 1068.20). This includes a failure to provide reasonable assistance.
 - (5) Produce locomotives 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 an application to include all locomotives being produced.
 - (7) Take any action that otherwise circumvents the intent of the Clean Air Act or this part.
- (d) We may void a certificate of conformity 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 a certificate of conformity if we find that you intentionally submitted false or incomplete information. This includes doing anything after submitting an application that causes submitted information to be false or incomplete.
- (f) If we deny an application or suspend, revoke, or void a certificate, you may ask for a hearing (see § 1033.920).

[73 FR 37197, June 30, 2008, as amended at 75 FR 22984, Apr. 30, 2010; 81 FR 74006, Oct. 25, 2016; 86 FR 34375, June 29, 2021]

Subpart D—Manufacturer and Remanufacturer Production Line Testing and Audit Programs

§ 1033.301 Applicability.

The requirements of this part apply to manufacturers/remanufacturers of locomotives certified under this part, with the following exceptions:

- (a) The requirements of §§ 1033.310, 1033.315, 1033.320, and 1033.330 apply only to manufacturers of freshly manufactured locomotives or locomotive engines (including those used for repowering). We may also apply these requirements to remanufacturers of any locomotives for which there is reason to believe production problems exist that could affect emission performance. When we make a determination that production problems may exist that could affect emission performance, we will notify the remanufacturer(s). The requirements of §§ 1033.310, 1033.315, 1033.320, and 1033.330 will apply as specified in the notice.
- (b) The requirements of § 1033.335 apply only to remanufacturers.
- (c) As specified in § 1033.1(d), we may apply the requirements of this subpart to manufacturers/remanufacturers that do not certify the locomotives. However, unless we specify otherwise, the requirements of this subpart apply to manufacturers/remanufacturers that hold the certificates for the locomotives.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74006, Oct. 25, 2016]

§ 1033.305 General requirements.

- (a) Manufacturers (and remanufacturers, where applicable) are required to test production line locomotives using the test procedures specified in § 1033.315. While this subpart refers to locomotive testing, you may ask to test locomotive engines instead of testing locomotives.
- (b) Remanufacturers are required to conduct audits according to the requirements of § 1033.335 to ensure that remanufactured locomotives comply with the requirements of this part.
- (c) If you certify an engine family with carryover emission data, as described in § 1033.235, and these equivalent engine families consistently pass the production-line testing requirements over the preceding two-year period, you may ask for a reduced testing rate for further production-line testing for that family. If we reduce your testing rate, we may limit our approval to any number of model years. In determining whether to approve your request, we may consider the number of locomotives that have failed emission tests.
- (d) You may ask to use an alternate program or measurement method for testing production-line engines. In your request, you must show us that the alternate program gives equal assurance that your engines meet the requirements of this part. We may waive some or all of this subpart's requirements if we approve your alternate program.

§ 1033.310 Sample selection for testing.

- (a) At the start of each model year, begin randomly selecting locomotives from each engine family for production line testing at a rate of one percent. Make the selection of the test locomotive after it has been assembled. Perform the testing throughout the entire model year to the extent possible, unless we specify a different schedule for your tests. For example, we may require you to disproportionately select locomotives from the early part of a model year for a new locomotive model that has not been subject to PLT previously.
 - (1) The required sample size for an engine family (provided that no locomotive tested fails to meet applicable emission standards) is the lesser of five tests per model year or one percent of projected annual production, with a minimum sample size for an engine family of one test per model year. See paragraph (d) of this section to determine the required number of test locomotives if any locomotives fail to comply with any standards.
 - (2) You may elect to test additional locomotives. All additional locomotives must be tested in accordance with the applicable test procedures of this part.
- (b) You must assemble the test locomotives using the same production process that will be used for locomotives to be introduced into commerce. You may ask us to allow special assembly procedures for catalyst-equipped locomotives.
- (c) Unless we approve it, you may not use any quality control, testing, or assembly procedures that you do not use during the production and assembly of all other locomotives of that family. This applies for any test locomotive or any portion of a locomotive, including engines, parts, and subassemblies.
- (d) If one or more locomotives fail a production line test, then you must test two additional locomotives from the next fifteen produced in that engine family for each locomotive that fails. These two additional locomotives do not count towards your minimum number of locomotives. For example, if you are required to test a minimum of four locomotives under paragraph (a) of this section and the second locomotive

fails to comply with one or more standards, then you must test two additional locomotives from the next fifteen produced in that engine family. If both of those locomotives pass all standards, you are required to test two additional locomotives to complete the original minimum number of four. If they both pass, you are done with testing for that family for the year since you tested six locomotives (the four originally required plus the two additional locomotives).

§ 1033.315 Test procedures.

- (a) **Test procedures.** Use the test procedures described in subpart F of this part, except as specified in this section.
 - (1) You may ask to use other test procedures. We will approve your request if we determine that it is not possible to perform satisfactory testing using the specified procedures. We may also approve alternate test procedures under § 1033.305(d).
 - (2) If you used test procedures other than those in subpart F of this part during certification for the engine family (other than alternate test procedures necessary for testing a development engine or a low hour engine instead of a low mileage locomotive), use the same test procedures for production line testing that you used in certification.
- (b) **Modifying a test locomotive.** Once an engine is selected for testing, you may adjust, repair, maintain, or modify it or check its emissions only if one of the following is true:
 - (1) You document the need for doing so in your procedures for assembling and inspecting all your production engines and make the action routine for all the engines in the engine family.
 - (2) This subpart otherwise specifically allows your action.
 - (3) We approve your action in advance.
- (c) **Adjustable parameters.**
 - (1) Confirm that adjustable parameters are set to values or positions that are within the range recommended to the ultimate purchaser.
 - (2) We may require to be adjusted any adjustable parameter to any setting within the specified adjustable range of that parameter prior to the performance of any test.
- (d) **Stabilizing emissions.** You may stabilize emissions from the locomotives to be tested through service accumulation by running the engine through a typical duty cycle. Emissions are considered stabilized after 300 hours of operation. You may accumulate fewer hours, consistent with good engineering judgment. You may establish a Green Engine Factor for each regulated pollutant for each engine family, instead of (or in combination with) accumulating actual operation, to be used in calculating emissions test results. You must obtain our approval prior to using a Green Engine Factor. For catalyst-equipped locomotives, you may operate the locomotive for up to 1000 hours (in revenue or other service) prior to testing.
- (e) **Adjustment after shipment.** If a locomotive is shipped to a facility other than the production facility for production line testing, and an adjustment or repair is necessary because of such shipment, you may perform the necessary adjustment or repair only after the initial test of the locomotive, unless we determine that the test would be impossible to perform or would permanently damage the locomotive.

- (f) **Malfunctions.** If a locomotive cannot complete the service accumulation or an emission test because of a malfunction, you may request that we authorize either the repair of that locomotive or its deletion from the test sequence.
- (g) **Retesting.** If you determine that any production line emission test of a locomotive is invalid, you must retest it in accordance with the requirements of this subpart. Report emission results from all tests to us, including test results you determined are invalid. You must also include a detailed explanation of the reasons for invalidating any test in the quarterly report required in § 1033.320(e). In the event a retest is performed, you may ask us within ten days of the end of the production quarter for permission to substitute the after-repair test results for the original test results. We will respond to the request within ten working days of our receipt of the request.

§ 1033.320 Calculation and reporting of test results.

- (a) Calculate initial test results using the applicable test procedure specified in § 1033.315(a). Include applicable non-deterioration adjustments such as a Green Engine Factor or regeneration adjustment factor. Round the results to one more decimal place than the applicable emission standard.
- (b) If you conduct multiple tests on any locomotives, calculate final test results by summing the initial test results derived in paragraph (a) of this section for each test locomotive, dividing by the number of tests conducted on the locomotive, and rounding to one more decimal place than the applicable emission standard. For catalyst-equipped locomotives, you may ask us to allow you to exclude an initial failed test if all of the following are true:
 - (1) The catalyst was in a green condition when tested initially.
 - (2) The locomotive met all emission standards when retested after degreening the catalyst.
 - (3) No additional emission-related maintenance or repair was performed between the initial failed test and the subsequent passing test.
- (c) Calculate the final test results for each test locomotive by applying the appropriate deterioration factors, derived in the certification process for the engine family, to the final test results, and rounding to one more decimal place than the applicable emission standard.
- (d) If, subsequent to an initial failure of a production line test, the average of the test results for the failed locomotive and the two additional locomotives tested, is greater than any applicable emission standard or FEL, the engine family is deemed to be in non-compliance with applicable emission standards, and you must notify us within ten working days of such noncompliance.
- (e) Within 45 calendar days of the end of each quarter, you must send to the Designated Compliance Officer a report with the following information:
 - (1) The location and description of the emission test facilities which you used to conduct your testing.
 - (2) Total production and sample size for each engine family tested.
 - (3) The applicable standards against which each engine family was tested.
 - (4) For each test conducted, include all of the following:
 - (i) A description of the test locomotive, including:
 - (A) Configuration and engine family identification.
 - (B) Year, make, and build date.

- (C) Engine identification number.
- (D) Number of megawatt-hours (or miles if applicable) of service accumulated on locomotive prior to testing.
- (E) Description of Green Engine Factor; how it is determined and how it is applied.
- (ii) Location(s) where service accumulation was conducted and description of accumulation procedure and schedule, if applicable. If the locomotive was introduced into service between assembly and testing, you are only required to summarize the service accumulation, rather than identifying specific locations.
- (iii) Test number, date, test procedure used, initial test results before and after rounding, and final test results for all production line emission tests conducted, whether valid or invalid, and the reason for invalidation of any test results, if applicable.
- (iv) A complete description of any adjustment, modification, repair, preparation, maintenance, and testing which was performed on the test locomotive, has not been reported pursuant to any other paragraph of this subpart, and will not be performed on other production locomotives.
- (v) Any other information we may ask you to add to your written report so we can determine whether your new engines conform with the requirements of this part.
- (5) For each failed locomotive as defined in § 1033.330(a), a description of the remedy and test results for all retests as required by § 1033.340(g).
- (6) The following signed statement and endorsement by an authorized representative of your company:

We submit this report under sections 208 and 213 of the Clean Air Act. Our production-line testing conformed completely with the requirements of 40 CFR part 1033. We have not changed production processes or quality-control procedures for the test locomotives in a way that might affect emission controls. All the information in this report is true and accurate to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)

[73 FR 37197, June 30, 2008, as amended at 81 FR 74006, Oct. 25, 2016]

§ 1033.325 Maintenance of records; submittal of information.

- (a) You must establish, maintain, and retain the following adequately organized and indexed test records:
 - (1) A description of all equipment used to test locomotives. The equipment requirements in subpart F of this part apply to tests performed under this subpart. Maintain these records for each test cell that can be used to perform emission testing under this subpart.
 - (2) Individual test records for each production line test or audit including:
 - (i) The date, time, and location of each test or audit.
 - (ii) The method by which the Green Engine Factor was calculated or the number of hours of service accumulated on the test locomotive when the test began and ended.
 - (iii) The names of all supervisory personnel involved in the conduct of the production line test or audit;

- (iv) A record and description of any adjustment, repair, preparation or modification performed on test locomotives, giving the date, associated time, justification, name(s) of the authorizing personnel, and names of all supervisory personnel responsible for the conduct of the action.
 - (v) If applicable, the date the locomotive was shipped from the assembly plant, associated storage facility or port facility, and the date the locomotive was received at the testing facility.
 - (vi) A complete record of all emission tests or audits performed under this subpart (except tests performed directly by us), including all individual worksheets and/or other documentation relating to each test, or exact copies thereof, according to the record requirements specified in subpart F of this part and 40 CFR part 1065.
 - (vii) A brief description of any significant events during testing not otherwise described under this paragraph (a)(2), commencing with the test locomotive selection process and including such extraordinary events as engine damage during shipment.
- (b) Keep all records required to be maintained under this subpart for a period of eight years after completion of all testing. Store these records in any format and on any media, as long as you can promptly provide to us organized, written records in English if we ask for them and all the information is retained.
 - (c) Send us the following information with regard to locomotive production if we ask for it:
 - (1) Projected production for each configuration within each engine family for which certification has been requested and/or approved.
 - (2) Number of locomotives, by configuration and assembly plant, scheduled for production.
 - (d) Nothing in this section limits our authority to require you to establish, maintain, keep or submit to us information not specified by this section. We may also ask you to send less information.
 - (e) Send all reports, submissions, notifications, and requests for approval made under this subpart to the Designated Compliance Officer using an approved format.
 - (f) You must keep a copy of all reports submitted under this subpart.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22984, Apr. 30, 2010]

§ 1033.330 Compliance criteria for production line testing.

There are two types of potential failures: failure of an individual locomotive to comply with the standards, and a failure of an engine family to comply with the standards.

- (a) A failed locomotive is one whose final test results pursuant to § 1033.320(c), for one or more of the applicable pollutants, exceed an applicable emission standard or FEL.
- (b) An engine family is deemed to be in noncompliance, for purposes of this subpart, if at any time throughout the model year, the average of an initial failed locomotive and the two additional locomotives tested, is greater than any applicable emission standard or FEL.

§ 1033.335 Remanufactured locomotives: installation audit requirements.

The section specifies the requirements for certifying remanufacturers to audit the remanufacture of locomotives covered by their certificates of conformity for proper components, component settings and component installations on randomly chosen locomotives in an engine family.

- (a) You must ensure that all emission related components are properly installed on the locomotive and are set to the proper specification as indicated in your instructions. You may submit audits performed by the owners/operators of the locomotives, provided the audits are performed in accordance with the provisions of this section. We may require that you obtain affidavits for audits performed by owners/operators.
- (b) Audit at least five percent of your annual production per model year per installer or ten per engine family per installer, whichever is less. You must perform more audits if there are any failures. Randomly select the locomotives to be audited after the remanufacture is complete. We may allow you to select locomotives prior to the completion of the remanufacture, if the preselection would not have the potential to affect the manner in which the locomotive was remanufactured (e.g., where the installer is not aware of the selection prior to the completion of the remanufacture). Unless we specify otherwise, you are not required to audit installers that remanufacture fewer than 10 locomotives per year under your certificates (combined for all of your engine families).
- (c) The audit should be completed as soon as is practical after the remanufacture is complete. In no case may the remanufactured locomotive accumulate more than 45,000 miles prior to an audit.
- (d) A locomotive fails if any emission related components are found to be improperly installed, improperly adjusted or incorrectly used.
- (e) If a remanufactured locomotive fails an audit, then you must audit two additional locomotives from the next ten remanufactured in that engine family by that installer.
- (f) An engine family is determined to have failed an audit, if at any time during the model year, you determine that the three locomotives audited are found to have had any improperly installed, improperly adjusted or incorrectly used components. You must notify us within 2 working days of a determination of an engine family audit failure.
- (g) Within 45 calendar days of the end of each quarter, the remanufacturer must send the Designated Compliance Officer a report which includes the following information:
 - (1) The location and description of your audit facilities which were utilized to conduct auditing reported pursuant to this section;
 - (2) Total production and sample size for each engine family;
 - (3) The applicable standards and/or FELs against which each engine family was audited;
 - (4) For each audit conducted:
 - (i) A description of the audited locomotive, including:
 - (A) Configuration and engine family identification;
 - (B) Year, make, build date, and remanufacture date; and
 - (C) Locomotive and engine identification numbers;
 - (ii) Any other information we request relevant to the determination whether the new locomotives being remanufactured do in fact conform with the regulations with respect to which the certificate of conformity was issued;
 - (5) For each failed locomotive as defined in paragraph (d) of this section, a description of the remedy as required by § 1033.340(g);

- (6) The following signed statement and endorsement by your authorized representative:

We submit this report under sections 208 and 213 of the Clean Air Act. Our production-line auditing conformed completely with the requirements of 40 CFR part 1033. We have not changed production processes or quality-control procedures for the audited locomotives in a way that might affect emission controls. All the information in this report is true and accurate to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008]

§ 1033.340 Suspension and revocation of certificates of conformity.

- (a) A certificate can be suspended for an individual locomotive as follows:
- (1) The certificate of conformity is automatically suspended for any locomotive that fails a production line test pursuant to § 1033.330(a), effective from the time the testing of that locomotive is completed.
 - (2) The certificate of conformity is automatically suspended for any locomotive that fails an audit pursuant to § 1033.335(d), effective from the time that auditing of that locomotive is completed.
- (b) A certificate can be suspended for an engine family as follows:
- (1) We may suspend the certificate of conformity for an engine family that is in noncompliance pursuant to § 1033.330(b), thirty days after the engine family is deemed to be in noncompliance.
 - (2) We may suspend the certificate of conformity for an engine family that is determined to have failed an audit pursuant to § 1033.335(f). This suspension will not occur before thirty days after the engine family is deemed to be in noncompliance.
- (c) If we suspend your certificate of conformity for an engine family, the suspension may apply to all facilities producing engines from an engine family, even if you find noncompliant engines only at one facility.
- (d) We may revoke a certificate of conformity for any engine family in whole or in part if:
- (1) You fail to comply with any of the requirements of this subpart.
 - (2) You submit false or incomplete information in any report or information provided to us under this subpart.
 - (3) You render inaccurate any test data submitted under this subpart.
 - (4) An EPA enforcement officer is denied the opportunity to conduct activities authorized in this subpart.
 - (5) An EPA enforcement officer is unable to conduct authorized activities for any reason.
- (e) We will notify you in writing of any suspension or revocation of a certificate of conformity in whole or in part; a suspension or revocation is effective upon receipt of such notification or thirty days from the time a locomotive or engine family is deemed to be in noncompliance under §§ 1033.320(d), 1033.330(a), 1033.330(b), or 1033.335(f) is made, whichever is earlier, except that the certificate is immediately suspended with respect to any failed locomotives as provided for in paragraph (a) of this section.

- (f) We may revoke a certificate of conformity for an engine family when the certificate has been suspended under paragraph (b) or (c) of this section if the remedy is one requiring a design change or changes to the locomotive, engine and/or emission control system as described in the application for certification of the affected engine family.
- (g) Once a certificate has been suspended for a failed locomotive, as provided for in paragraph (a) of this section, you must take all the following actions before the certificate is reinstated for that failed locomotive:
 - (1) Remedy the nonconformity.
 - (2) Demonstrate that the locomotive conforms to applicable standards or family emission limits by retesting, or reauditing if applicable, the locomotive in accordance with this part.
 - (3) Submit a written report to us after successful completion of testing (or auditing, if applicable) on the failed locomotive, which contains a description of the remedy and testing (or auditing) results for each locomotive in addition to other information that may be required by this part.
- (h) Once a certificate for a failed engine family has been suspended pursuant to paragraph (b) or (c) of this section, you must take the following actions before we will consider reinstating the certificate:
 - (1) Submit a written report to us identifying the reason for the noncompliance of the locomotives, describing the remedy, including a description of any quality control measures you will use to prevent future occurrences of the problem, and stating the date on which the remedies will be implemented.
 - (2) Demonstrate that the engine family for which the certificate of conformity has been suspended does in fact comply with the regulations of this part by testing (or auditing) locomotives selected from normal production runs of that engine family. Such testing (or auditing) must comply with the provisions of this subpart. If you elect to continue testing (or auditing) individual locomotives after suspension of a certificate, the certificate is reinstated for any locomotive actually determined to be in conformance with the applicable standards or family emission limits through testing (or auditing) in accordance with the applicable test procedures, provided that we have not revoked the certificate under paragraph (f) of this section.
- (i) If the certificate has been revoked for an engine family, you must take the following actions before we will issue a certificate that would allow you to continue introduction into commerce of a modified version of that family:
 - (1) If we determine that the change(s) in locomotive design may have an effect on emission deterioration, we will notify you within five working days after receipt of the report in paragraph (h) of this section, whether subsequent testing/auditing under this subpart will be sufficient to evaluate the change(s) or whether additional testing (or auditing) will be required.
 - (2) After implementing the change or changes intended to remedy the nonconformity, you must demonstrate that the modified engine family does in fact conform with the regulations of this part by testing locomotives (or auditing for remanufactured locomotives) selected from normal production runs of that engine family. When both of these requirements are met, we will reissue the certificate or issue a new certificate. If this subsequent testing (or auditing) reveals failing data the revocation remains in effect.

- (j) At any time subsequent to an initial suspension of a certificate of conformity for a test or audit locomotive pursuant to paragraph (a) of this section, but not later than 30 days (or such other period as may we allow) after the notification our decision to suspend or revoke a certificate of conformity in whole or in part pursuant to this section, you may request a hearing as to whether the tests or audits have been properly conducted or any sampling methods have been properly applied. (See § 1033.920.)
- (k) Any suspension of a certificate of conformity under paragraphs (a) through (d) of this section will be made only after you have been offered an opportunity for a hearing conducted in accordance with § 1033.920. It will not apply to locomotives no longer in your possession.
- (l) If we suspend, revoke, or void a certificate of conformity, and you believe that our decision was based on erroneous information, you may ask us to reconsider our decision before requesting a hearing. If you demonstrate to our satisfaction that our decision was based on erroneous information, we will reinstate the certificate.
- (m) We may conditionally reinstate the certificate for that family so that you do not have to store non-test locomotives while conducting subsequent testing or auditing of the noncomplying family subject to the following condition: you must commit to recall all locomotives of that family produced from the time the certificate is conditionally reinstated if the family fails subsequent testing, or auditing if applicable, and must commit to remedy any nonconformity at no expense to the owner.

Subpart E—In-use Testing

§ 1033.401 Applicability.

The requirements of this subpart are applicable to certificate holders for locomotives subject to the provisions of this part. These requirements may also be applied to other manufacturers/remanufacturers as specified in § 1033.1(d).

§ 1033.405 General provisions.

- (a) Each year, we will identify engine families and configurations within families that you must test according to the requirements of this section.
 - (1) We may require you to test one engine family each year for which you have received a certificate of conformity. If you are a manufacturer that holds certificates of conformity for both freshly manufactured and remanufactured locomotive engine families, we may require you to test one freshly manufactured engine family and one remanufactured engine family. We may require you to test additional engine families if we have reason to believe that locomotives in such families do not comply with emission standards in use.
 - (2) For engine families of less than 10 locomotives per year, no in-use testing will be required, unless we have reason to believe that those engine families are not complying with the applicable emission standards in use.
- (b) Test a sample of in-use locomotives from an engine family, as specified in § 1033.415. We will use these data, and any other data available to us, to determine the compliance status of classes of locomotives, including for purposes of recall under 40 CFR part 1068, and whether remedial action is appropriate.

§ 1033.410 In-use test procedure.

- (a) You must test the complete locomotives; you may not test engines that are not installed in locomotives at the time of testing.
- (b) Test the locomotive according to the test procedures outlined in subpart F of this part, except as provided in this section.
- (c) Use the same test procedures for in-use testing as were used for certification, except for cases in which certification testing was not conducted with a locomotive, but with a development engine or other engine. In such cases, we will specify deviations from the certification test procedures as appropriate. We may allow or require other alternate procedures, with advance approval.
- (d) Set all adjustable locomotive or engine parameters to values or positions that are within the range specified in the certificate of conformity. We may require you to set these parameters to specific values.
- (e) We may waive a portion of the applicable test procedure that is not necessary to determine in-use compliance.

§ 1033.415 General testing requirements.

- (a) **Number of locomotives to be tested.** Determine the number of locomotives to be tested by the following method:
 - (1) Test a minimum of 2 locomotives per engine family, except as provided in paragraph (a)(2) of this section. You must test additional locomotives if any locomotives fail to meet any standard. Test 2 more locomotives for each failing locomotive, but stop testing if the total number of locomotives tested equals 10.
 - (2) If an engine family has been certified using carryover emission data from a family that has been previously tested under paragraph (a)(1) of this section (and we have not ordered or begun to negotiate remedial action of that family), you need to test only one locomotive per engine family. If that locomotive fails to meet applicable standards for any pollutant, testing for that engine family must be conducted as outlined under paragraph (a)(1) of this section.
 - (3) You may ask us to allow you to test more locomotives than the minimum number described above or you may concede failure before testing 10 locomotives.
- (b) **Compliance criteria.** We will consider failure rates, average emission levels and the existence of any defects among other factors in determining whether to pursue remedial action. We may order a recall pursuant to 40 CFR part 1068 before testing reaches the tenth locomotive.
- (c) **Collection of in-use locomotives.** Procure in-use locomotives that have been operated for 50 to 75 percent of the locomotive's useful life for testing under this subpart. Complete testing required by this section for any engine family before useful life of the locomotives in the engine family passes. (NOTE: § 1033.820 specifies that railroads must make reasonable efforts to enable you to perform this testing.)

§ 1033.420 Maintenance, procurement and testing of in-use locomotives.

- (a) A test locomotive must have a maintenance history that is representative of actual in-use conditions, and identical or equivalent to your recommended emission-related maintenance requirements.
 - (1) When procuring locomotives for in-use testing, ask the end users about the accumulated usage, maintenance, operating conditions, and storage of the test locomotives.

- (2) Your selection of test locomotives is subject to our approval. Maintain the information you used to procure locomotives for in-use testing in the same manner as is required in § 1033.250.
- (b) You may perform minimal set-to-spec maintenance on a test locomotive before conducting in-use testing. Maintenance may include only that which is listed in the owner's instructions for locomotives with the amount of service and age of the acquired test locomotive. Maintain documentation of all maintenance and adjustments.
- (c) If the locomotive selected for testing is equipped with emission diagnostics meeting the requirements in § 1033.110 and the MIL is illuminated, you may read the code and repair the malfunction according to your emission-related maintenance instructions, but only to the degree that an owner/operator would be required to repair the malfunction under § 1033.815.
- (d) Results of at least one valid set of emission tests using the test procedure described in subpart F of this part is required for each in-use locomotive.
- (e) If in-use testing results show that an in-use locomotive fails to comply with any applicable emission standards, you must determine the reason for noncompliance and report your findings in the quarterly in-use test result report described in § 1033.425.

§ 1033.425 In-use test program reporting requirements.

- (a) Within 90 days of completion of testing, send us all emission test results generated from the in-use testing program. Report all of the following information for each locomotive tested:
 - (1) Engine family, and configuration.
 - (2) Locomotive and engine models.
 - (3) Locomotive and engine serial numbers.
 - (4) Date of manufacture or remanufacture, as applicable.
 - (5) Megawatt-hours of use (or miles, as applicable).
 - (6) Date and time of each test attempt.
 - (7) Results of all emission testing.
 - (8) Results (if any) of each voided or failed test attempt.
 - (9) Summary of all maintenance and/or adjustments performed.
 - (10) Summary of all modifications and/or repairs.
 - (11) Determinations of noncompliance.
 - (12) The following signed statement and endorsement by an authorized representative of your company.

We submit this report under sections 208 and 213 of the Clean Air Act. Our in-use testing conformed completely with the requirements of 40 CFR part 1033. All the information in this report is true and accurate to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)
- (b) Report to us within 90 days of completion of testing the following information for each engine family tested:

- (1) The serial numbers of all locomotive that were excluded from the test sample because they did not meet the maintenance requirements of § 1033.420.
- (2) The owner of each locomotive identified in paragraph (b)(1) of this section (or other entity responsible for the maintenance of the locomotive).
- (3) The specific reasons why the locomotives were excluded from the test sample.
- (c) Submit the information outlined in paragraphs (a) and (b) of this section electronically using an approved format. We may exempt you from this requirement upon written request with supporting justification.
- (d) Send all testing reports and requests for approvals to the Designated Compliance Officer.

Subpart F—Test Procedures

§ 1033.501 General provisions.

- (a) Except as specified in this subpart, use the equipment and procedures for compression-ignition engines in 40 CFR part 1065 to determine whether your locomotives meet the duty-cycle emission standards in § 1033.101. Use the applicable duty cycles specified in this subpart. Measure emissions of all the pollutants we regulate in § 1033.101 plus CO₂. Measure N₂O, and CH₄ as described in § 1033.235. The general test procedure is the procedure specified in 40 CFR part 1065 for steady-state discrete-mode cycles. However, if you use the optional ramped modal cycle in § 1033.520, follow the procedures for ramped modal testing in 40 CFR part 1065. The following exceptions from the 1065 procedures apply:
 - (1) You must average power and emissions over the sampling periods specified in this subpart for both discrete-mode testing and ramped modal testing.
 - (2) The test cycle is considered to be steady-state with respect to operator demand rather than engine speed and load.
 - (3) The following provisions apply for engine mapping, duty-cycle generation, and cycle validation to account for the fact that locomotive operation and locomotive duty cycles are based on operator demand from locomotive notch settings, not on target values for engine speed and load:
 - (i) The provisions related to engine mapping, duty-cycle generation, and cycle validation in 40 CFR 1065.510, 1065.512, and 1065.514 do not apply for testing complete locomotives.
 - (ii) The provisions related to engine mapping and duty-cycle generation in 40 CFR 1065.510 and 1065.512 are not required for testing with an engine dynamometer; however, the cycle validation criteria of 40 CFR 1065.514 apply for such testing. Demonstrate compliance with cycle validation criteria based on manufacturer-declared values for maximum torque, maximum power, and maximum test speed, or determine these values from an engine map generated according to 40 CFR 1065.510. If you test using a ramped-modal cycle, you may perform cycle validation over all the test intervals together.
 - (4) If you perform discrete-mode testing and use only one batch fuel measurement to determine your mean raw exhaust flow rate, you must target a constant sample flow rate over the mode. Verify proportional sampling as described in 40 CFR 1065.545 using the mean raw exhaust molar flow rate paired with each recorded sample flow rate.

- (5) If you perform discrete-mode testing by grouping the modes in the same manner as the test intervals of the ramped modal cycle using three different dilution settings for the groups, as allowed in § 1033.515(c)(5)(ii), you may verify proportional sampling over each group instead of each discrete mode.
- (b) You may use special or alternate procedures to the extent we allow as them under 40 CFR 1065.10. In some cases, we allow you to use procedures that are less precise or less accurate than the specified procedures if they do not affect your ability to show that your locomotives comply with the applicable emission standards. This generally requires emission levels to be far enough below the applicable emission standards so that any errors caused by greater imprecision or inaccuracy do not affect your ability to state unconditionally that the locomotives meet all applicable emission standards.
- (c) This part allows (with certain limits) testing of either a complete locomotive or a separate uninstalled engine. When testing a locomotive, you must test the complete locomotive in its in-use configuration, except that you may disconnect the power output and fuel input for the purpose of testing. To calculate power from measured alternator/generator output, use an alternator/generator efficiency curve that varies with speed/load, consistent with good engineering judgment.
- (d) Unless smoke standards do not apply for your locomotives or the testing requirement is waived, measure smoke emissions using the procedures in § 1033.525.
- (e) Use the applicable fuel listed in 40 CFR part 1065, subpart H, to perform valid tests.
 - (1) For diesel-fueled locomotives, use the appropriate diesel fuel specified in 40 CFR part 1065, subpart H, for emission testing. The applicable diesel test fuel is either the ultra low-sulfur diesel or low-sulfur diesel fuel, as specified in § 1033.101. Identify the test fuel in your application for certification and ensure that the fuel inlet label is consistent with your selection of the test fuel (see §§ 1033.101 and 1033.135).
 - (2) You may ask to use as a test fuel commercially available diesel fuel similar but not identical to the applicable fuel specified in 40 CFR part 1065, subpart H; we will approve your request if you show us that it does not affect your ability to demonstrate compliance with the applicable emission standards. If your locomotive uses sulfur-sensitive technology, you may not use an in-use fuel that has a lower sulfur content than the range specified for the otherwise applicable test fuel in 40 CFR part 1065. If your locomotive does not use sulfur-sensitive technology, we may allow you to use an in-use fuel that has a lower sulfur content than the range specified for the otherwise applicable test fuel in 40 CFR part 1065, but may require that you correct PM emissions to account for the sulfur differences.
 - (3) For service accumulation, use the test fuel or any commercially available fuel that is representative of the fuel that in-use locomotives will use.
- (f) See § 1033.505 for information about allowable ambient testing conditions for testing.
- (g) This subpart is addressed to you as a manufacturer/remanufacturer, but it applies equally to anyone who does testing for you, and to us when we perform testing to determine if your locomotives meet emission standards.
- (h) We may also perform other testing as allowed by the Clean Air Act.

- (i) For passenger locomotives that can generate hotel power from the main propulsion engine, the locomotive must comply with the emission standards when in non-hotel setting. For hotel mode, the locomotive is subject to the notch cap provisions of § 1033.101 and the defeat device prohibition of § 1033.115.
- (j) The following provisions apply for locomotives using aftertreatment technology with infrequent regeneration events that may occur during testing:
 - (1) Adjust measured emissions to account for aftertreatment technology with infrequent regeneration as described in § 1033.535.
 - (2) Invalidate a smoke test if active regeneration starts to occur during the test.

[73 FR 37197, June 30, 2008, as amended at 74 FR 56508, Oct. 30, 2008; 75 FR 22984, Apr. 30, 2010; 81 FR 74006, Oct. 25, 2016]

§ 1033.505 Ambient conditions.

This section specifies the allowable ambient conditions (including temperature and pressure) under which testing may be performed to determine compliance with the emission standards of § 1068.101. Manufacturers/remanufacturers may ask to perform testing at conditions other than those allowed by this section. We will allow such testing provided it does not affect your ability to demonstrate compliance with the applicable standards. See §§ 1033.101 and 1033.115 for more information about the requirements that apply at other conditions.

(a) **Temperature.**

- (1) Testing may be performed with ambient temperatures from 15.5 °C (60 °F) to 40.5 °C (105 °F). Do not correct emissions for temperature effects within this range.
- (2) It is presumed that combustion air will be drawn from the ambient air. Thus, the ambient temperature limits of this paragraph (a) apply for intake air upstream of the engine. If you do not draw combustion air from the ambient air, use good engineering judgment to ensure that any temperature difference (between the ambient air and combustion air) does not cause the emission measurement to be unrepresentative of in-use emissions.
- (3) If we allow you to perform testing at ambient temperatures below 15.5 °C, you must correct NO_x emissions for temperature effects, consistent with good engineering judgment. For example, if the intake air temperature (at the manifold) is lower at the test temperature than it would be for equivalent operation at an ambient temperature of 15.5 °C, you generally will need to adjust your measured NO_x emissions to account for the effect of the lower intake air temperature. However, if you maintain a constant manifold air temperature, you will generally not need to correct emissions.

- (b) **Altitude/pressure.** Testing may be performed with ambient pressures from 88.000 kPa (26.0 in Hg) to 103.325 kPa (30.5 in Hg). This is intended to correspond to altitudes up to 4000 feet above sea level. Do not correct emissions for pressure effects within this range.

- (c) **Humidity.** Testing may be performed with any ambient humidity level. Correct NO_x emissions as specified in 40 CFR 1065.670. Do not correct any other emissions for humidity effects.

- (d) **Wind.** If you test outdoors, use good engineering judgment to ensure that excessive wind does not affect your emission measurements. Winds are excessive if they disturb the size, shape, or location of the exhaust plume in the region where exhaust samples are drawn or where the smoke plume is measured, or

otherwise cause any dilution of the exhaust. Tests may be conducted if wind shielding is placed adjacent to the exhaust plume to prevent bending, dispersion, or any other distortion of the exhaust plume as it passes through the optical unit or through the sample probe.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22984, Apr. 30, 2010]

§ 1033.510 Auxiliary power units.

If your locomotive is equipped with an auxiliary power unit (APU) that operates during an idle shutdown mode, you must account for the APU's emissions rates as specified in this section, unless the APU is part of an AESS system that was certified separately from the rest of the locomotive. This section does not apply for auxiliary engines that only provide hotel power.

- (a) Adjust the locomotive main engine's idle emission rate (g/hr) as specified in § 1033.530. Add the APU emission rate (g/hr) that you determine under paragraph (b) of this section. Use the locomotive main engine's idle power as specified in § 1033.530.
- (b) Determine the representative emission rate for the APU using one of the following methods.
 - (1) **Installed APU tested separately.** If you separately measure emission rates (g/hr) for each pollutant from the APU installed in the locomotive, you may use the measured emissions rates (g/hr) as the locomotive's idle emissions rates when the locomotive is shutdown and the APU is operating. For all testing other than in-use testing, apply appropriate deterioration factors to the measured emission rates. You may ask to carryover APU emission data for a previous test, or use data for the same APU installed on locomotives in another engine family.
 - (2) **Uninstalled APU tested separately.** If you separately measure emission rates (g/hr) over an appropriate duty-cycle for each pollutant from the APU when it is not installed in the locomotive, you may use the measured emissions rates (g/hr) as the locomotive's idle emissions rates when the locomotive is shutdown and the APU is operating. For the purpose of this paragraph (b)(2), an appropriate duty-cycle is one that approximates the APU engine's cycle-weighted power when operating in the locomotive. Apply appropriate deterioration factors to the measured emission rates. You may ask to carryover APU emission data for a previous test, or use data for the same APU installed on locomotives in another engine family.
 - (3) **APU engine certification data.** If the engine used for the APU has been certified to EPA emission standards you may calculate the APU's emissions based upon existing EPA-certification information about the APU's engine. In this case, calculate the APU's emissions as follows:
 - (i) For each pollutant determine the brake-specific standard/FEL to which the APU engine was originally EPA-certified.
 - (ii) Determine the APU engine's cycle-weighted power when operating in the locomotive.
 - (iii) Multiply each of the APU's applicable brake-specific standards/FELs by the APU engine's cycle-weighted power. The results are the APU's emissions rates (in g/hr).
 - (iv) Use these emissions rates as the locomotive's idle emissions rates when the locomotive is shutdown and the APU is running. Do not apply a deterioration factor to these values.
 - (4) **Other.** You may ask us to approve an alternative means to account for APU emissions.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008]

§ 1033.515 Discrete-mode steady-state emission tests of locomotives and locomotive engines.

This section describes how to test locomotives at each notch setting so that emissions can be weighted according to either the line-haul duty cycle or the switch duty cycle. The locomotive test cycle consists of a warm-up followed by a sequence of nominally steady-state discrete test modes, as described in Table 1 to this section. The test modes are steady-state with respect to operator demand, which is the notch setting for the locomotive. Engine speeds and loads are not necessarily steady-state.

- (a) Follow the provisions of 40 CFR part 1065, subpart F for general pre-test procedures (including engine and sampling system pre-conditioning which is included as engine warm-up). You may operate the engine in any way you choose to warm it up prior to beginning the sample preconditioning specified in 40 CFR part 1065.
- (b) Begin the test by operating the locomotive over the pre-test portion of the cycle specified in Table 1 to this section. For locomotives not equipped with catalysts, you may begin the test as soon as the engine reaches its lowest idle setting. For catalyst-equipped locomotives, you may begin the test in normal idle mode if the engine does not reach its lowest idle setting within 15 minutes. If you do start in normal idle, run the low idle mode after normal idle, then resume the specified mode sequence (without repeating the normal idle mode).
- (c) Measure emissions during the rest of the test cycle.
 - (1) Each test mode begins when the operator demand to the locomotive or engine is set to the applicable notch setting.
 - (2) Start measuring gaseous emissions, power, and fuel consumption at the start of the test mode A and continue until the completion of test mode 8. You may zero and span analyzers between modes (or take other actions consistent with good engineering judgment).
 - (i) The sample period over which emissions for the mode are averaged generally begins when the operator demand is changed to start the test mode and ends within 5 seconds of the minimum sampling time for the test mode is reached. However, you need to shift the sampling period to account for sample system residence times. Follow the provisions of 40 CFR 1065.308 and 1065.309 to time align emission and work measurements.
 - (ii) The sample period is 300 seconds for all test modes except mode 8. The sample period for test mode 8 is 600 seconds.
 - (3) If gaseous emissions are sampled using a batch-sampling method, begin proportional sampling at the beginning of each sampling period and terminate sampling once the minimum time in each test mode is reached, ± 5 seconds.
 - (4) If applicable, begin the smoke test at the start of the test mode A. Continue collecting smoke data until the completion of test mode 8. You may perform smoke measurements independent of criteria pollutant measurements by repeating the test over the duty cycle. If you choose this option, the minimum time-in-notch is 3.0 minutes for duty cycles in which only smoke is measured. Refer to § 1033.101 to determine applicability of smoke testing and § 1033.525 for details on how to conduct a smoke test.

- (5) Begin proportional sampling of PM emissions at the beginning of each sampling period and terminate sampling within ± 5 seconds of the specified time in each test mode. If the PM sample is not sufficiently large, take one of the following actions consistent with good engineering judgment:
 - (i) Extend the sampling period up to a maximum of 15 minutes.
 - (ii) Group the modes in the same manner as the test intervals of the ramped modal cycle and use three different dilution settings for the groups. Use one setting for both idle modes, one for dynamic brake through Notch 5, and one for Notch 6 through Notch 8. For each group, ensure that the mode with the highest exhaust flow (typically normal idle, Notch 5, and Notch 8) meets the criteria for minimum dilution ratio in 40 CFR part 1065.
- (6) Proceed through each test mode in the order specified in Table 1 to this section until the locomotive test cycle is completed.
- (7) At the end of each numbered test mode, you may continue to operate sampling and dilution systems to allow corrections for the sampling system's response time.
- (8) Following the completion of Mode 8, conduct the post sampling procedures in § 1065.530. Note that cycle validation criteria do not apply to testing of complete locomotives.

TABLE 1 TO § 1033.515—LOCOMOTIVE TEST CYCLE

Test mode	Notch setting	Time in mode (minutes) ¹	Sample averaging period for emissions ¹
Pre-test idle	Lowest idle setting	10 to 15 ³	Not applicable
A	Low idle ²	5 to 10	300 \pm 5 seconds
B	Normal idle	5 to 10	300 \pm 5 seconds
C	Dynamic brake ²	5 to 10	300 \pm 5 seconds
1	Notch 1	5 to 10	300 \pm 5 seconds
2	Notch 2	5 to 10	300 \pm 5 seconds
3	Notch 3	5 to 10	300 \pm 5 seconds
4	Notch 4	5 to 10	300 \pm 5 seconds
5	Notch 5	5 to 10	300 \pm 5 seconds
6	Notch 6	5 to 10	300 \pm 5 seconds
7	Notch 7	5 to 10	300 \pm 5 seconds
8	Notch 8	10 to 15	600 \pm 5 seconds

¹ The time in each notch and sample averaging period may be extended as needed to allow for collection of a sufficiently large PM sample.

² Omit if not so equipped.

³ See paragraph (b) of this section for alternate pre-test provisions.

- (d) Use one of the following approaches for sampling PM emissions during discrete-mode steady-state testing:

- (1) *Engines certified to a PM standard/FEL at or above 0.05 g/bhp-hr.* Use a separate PM filter sample for each test mode of the locomotive test cycle according to the procedures specified in paragraph (a) through (c) of this section. You may ask to use a shorter sampling period if the total mass expected to be collected would cause unacceptably high pressure drop across the filter before reaching the end of the required sampling time. We will not allow sampling times shorter than 60 seconds. When we conduct locomotive emission tests, we will adhere to the time limits for each of the numbered modes in Table 1 to this section.
- (2) *Engines certified to a PM standard/FEL below 0.05 g/bhp-hr.*
 - (i) You may use separate PM filter samples for each test mode as described in paragraph (d)(1) of this section; however, we recommend that you do not. The low rate of sample filter loading will result in very long sampling times and the large number of filter samples may induce uncertainty stack-up that will lead to unacceptable PM measurement accuracy. Instead, we recommend that you measure PM emissions as specified in paragraph (d)(2)(ii) of this section.
 - (ii) You may use a single PM filter for sampling PM over all of the test modes of the locomotive test cycle as specified in this paragraph (d)(2). Vary the sample time to be proportional to the applicable line-haul or switch weighting factors specified in § 1033.530 for each mode. The minimum sampling time for each mode is 400 seconds multiplied by the weighting factor. For example, for a mode with a weighting factor of 0.030, the minimum sampling time is 12.0 seconds. PM sampling in each mode must be proportional to engine exhaust flow as specified in 40 CFR part 1065. Begin proportional sampling of PM emissions at the beginning of each test mode as is specified in paragraph (c) of this section. End the sampling period for each test mode so that sampling times are proportional to the weighting factors for the applicable duty cycles. If necessary, you may extend the time limit for each of the test modes beyond the sampling times in Table 1 to this section to increase the sampled mass of PM emissions or to account for proper weighting of the PM emission sample over the entire cycle, using good engineering judgment.
- (e) This paragraph (e) describes how to test locomotive engines when not installed in a locomotive. Note that the test procedures for dynamometer engine testing of locomotive engines are intended to produce emission measurements that are the same as emission measurements produced during testing of complete locomotives using the same engine configuration. The following requirements apply for all engine tests:
 - (1) Specify a second-by-second set of engine speed and load points that are representative of in-use locomotive operation for each of the set-points of the locomotive test cycle described in Table 1 to this section, including transitions from one notch to the next. This is your reference cycle for validating your cycle. You may ignore points between the end of the sampling period for one mode and the point at which you change the notch setting to begin the next mode.
 - (2) Keep the temperature of the air entering the engine after any charge air cooling to within 5 °C of the typical intake manifold air temperature when the engine is operated in the locomotive under similar ambient conditions.
 - (3) Proceed as specified in paragraphs (a) through (d) of this section for testing complete locomotives.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 74 FR 8424, Feb. 24, 2009; 75 FR 22985, Apr. 30, 2010; 81 FR 74006, Oct. 25, 2016]

§ 1033.520 Alternative ramped modal cycles.

- (a) Locomotive testing over a ramped modal cycle is intended to improve measurement accuracy at low emission levels by allowing the use of batch sampling of PM and gaseous emissions over multiple locomotive notch settings. Ramped modal cycles combine multiple test modes of a discrete-mode steady-state into a single sample period. Time in notch is varied to be proportional to weighting factors. The ramped modal cycle for line-haul locomotives is shown in Table 1 to this section. The ramped modal cycle for switch locomotives is shown in Table 2 to this section. Both ramped modal cycles consist of a warm-up followed by three test intervals that are each weighted in a manner that maintains the duty-cycle weighting of the line-haul and switch locomotive duty cycles in § 1033.530. You may use ramped modal cycle testing for any locomotives certified under this part.
- (b) Ramped modal testing requires continuous gaseous analyzers and three separate PM filters (one for each test interval). You may collect a single batch sample for each test interval, but you must also measure gaseous emissions continuously to allow calculation of notch caps as required under § 1033.101.
- (c) You may operate the engine in any way you choose to warm it up. Then follow the provisions of 40 CFR part 1065, subpart F for general pre-test procedures (including engine and sampling system pre-conditioning).
- (d) Begin the test by operating the locomotive over the pre-test portion of the cycle. For locomotives not equipped with catalysts, you may begin the test as soon as the engine reaches its lowest idle setting. For catalyst-equipped locomotives, you may begin the test in normal idle mode if the engine does not reach its lowest idle setting within 15 minutes. If you do start in normal idle, run the low idle mode after normal idle, then resume the specified mode sequence (without repeating the normal idle mode).
- (e) Start the test according to 40 CFR 1065.530.
 - (1) Each test interval begins when operator demand is set to the first operator demand setting of each test interval of the ramped modal cycle. Each test interval ends when the time in mode is reached for the last mode in the test interval.
 - (2) For PM emissions (and other batch sampling), the sample period over which emissions for the test interval are averaged generally begins within 10 seconds after the operator demand is changed to start the test interval and ends within 5 seconds of the sampling time for the test mode is reached (see Table 1 to this section). You may ask to delay the start of the sample period to account for sample system residence times longer than 10 seconds.
 - (3) Use good engineering judgment when transitioning between test intervals.
 - (i) You should come as close as possible to simultaneously:
 - (A) Ending batch sampling of the previous test interval.
 - (B) Starting batch sampling of the next test interval.
 - (C) Changing the operator demand to the notch setting for the first mode in the next test interval.
 - (ii) Avoid the following:
 - (A) Overlapping batch sampling of the two test intervals.
 - (B) An unnecessarily long delay before starting the next test interval.

- (iii) For example, the following sequence would generally be appropriate:
 - (A) End batch sampling for Interval 2 after 304 seconds in Notch 5.
 - (B) Switch the operator demand to Notch 6 one second later.
 - (C) Begin batch sampling for Interval 3 one second after switching to Notch 6.
- (4) If applicable, begin the smoke test at the start of the first test interval of the applicable ramped modal cycle. Continue collecting smoke data until the completion of final test interval. You may perform smoke measurements independent of criteria pollutant measurements by rerunning the test over the duty cycle. If you choose this option, the minimum time-in-notch is 3.0 minutes for duty cycles in which only smoke is measured. Refer to § 1033.101 to determine applicability of the smoke standards and § 1033.525 for details on how to conduct a smoke test.
- (5) Proceed through each test interval of the applicable ramped modal cycle in the order specified until the test is completed.
- (6) If you must void a test interval, you may repeat it. To do so, begin with a warm engine operating at the notch setting for the last mode in the previous test interval. You do not need to repeat later test intervals if they were valid. (NOTE: You must report test results for all voided tests and test intervals.)
- (7) Following the completion of the third test interval of the applicable ramped modal cycle, conduct the post-test sampling procedures specified in 40 CFR 1065.530.
- (f) Calculate your cycle-weighted brake-specific emission rates as follows:
 - (1) For each test interval j:
 - (i) Calculate emission rates (E_{ij}) for each pollutant i as the total mass emissions divided by the total time in the test interval.
 - (ii) Calculate average power (P_j) as the total work divided by the total time in the test interval.
 - (2) For each pollutant, calculate your cycle-weighted brake-specific emission rate using the following equation, where w_j is the weighting factor for test interval j:

$$E_{ij} = \frac{w_1 \cdot E_{i1} + w_2 \cdot E_{i2} + w_3 \cdot E_{i3}}{w_1 \cdot P_1 + w_2 \cdot P_2 + w_3 \cdot P_3}$$

(g) The following tables define applicable ramped modal cycles for line-haul and switch locomotives:

TABLE 1 TO § 1033.520—LINE-HAUL LOCOMOTIVE RAMPED MODAL CYCLE

RMC test interval	Weighting factor	RMC mode	Time in mode (seconds)	Notch setting
Pre-test idle	NA	NA	600 to 900	Lowest idle setting. ¹
Interval 1 (Idle test)	0.380	A	600	Low Idle. ²
		B	600	Normal Idle.
INTERVAL TRANSITION				
Interval 2	0.389	C	1000	Dynamic Brake. ³
		1	520	Notch 1.
		2	520	Notch 2.
		3	416	Notch 3.
		4	352	Notch 4.
		5	304	Notch 5.
INTERVAL TRANSITION				
Interval 3	0.231	6	144	Notch 6.
		7	111	Notch 7.
		8	600	Notch 8.

¹ See paragraph (d) of this section for alternate pre-test provisions.

² Operate at normal idle for modes A and B if not equipped with multiple idle settings.

³ Operate at normal idle if not equipped with a dynamic brake.

TABLE 2 TO § 1033.520—SWITCH LOCOMOTIVE RAMPED MODAL CYCLE

RMC test interval	Weighting factor	RMC mode	Time in mode (seconds)	Notch setting
Pre-test idle	NA	NA	600 to 900	Lowest idle setting. ¹
Interval 1 (Idle test)	0.598	A	600	Low Idle. ²
		B	600	Normal Idle.
INTERVAL TRANSITION				
Interval 2	0.377	1	868	Notch 1.
		2	861	Notch 2.
		3	406	Notch 3.

¹ See paragraph (d) of this section for alternate pre-test provisions.

² Operate at normal idle for modes A and B if not equipped with multiple idle settings.

RMC test interval	Weighting factor	RMC mode	Time in mode (seconds)	Notch setting
		4	252	Notch 4.
		5	252	Notch 5.
INTERVAL TRANSITION				
Interval 3	0.025	6	1080	Notch 6.
		7	144	Notch 7.
		8	576	Notch 8.

¹ See paragraph (d) of this section for alternate pre-test provisions.

² Operate at normal idle for modes A and B if not equipped with multiple idle settings.

[81 FR 74007, Oct. 25, 2016]

§ 1033.525 Smoke opacity testing.

Analyze exhaust opacity test data as follows:

- (a) Measure exhaust opacity using the procedures specified in 40 CFR 1065.1125. Perform the opacity test with a continuous digital recording of smokemeter response identified by notch setting over the entire locomotive test cycle specified in § 1033.515(c)(4) or § 1033.520(e)(4). Measure smokemeter response in percent opacity to within one percent resolution.
- (b) Calibrate the smokemeter as follows:
 - (1) Calibrate using neutral density filters with approximately 10, 20, and 40 percent opacity. Confirm that the opacity values for each of these reference filters are NIST-traceable within 185 days of testing, or within 370 days of testing if you consistently protect the reference filters from light exposure between tests.
 - (2) Before each test, remove the smokemeter from the exhaust stream, if applicable, and calibrate as follows:
 - (i) **Zero.** Adjust the smokemeter to give a zero response when there is no detectable smoke.
 - (ii) **Linearity.** Insert each of the qualified reference filters in the light path perpendicular to the axis of the light beam and adjust the smokemeter to give a result within 1 percentage point of the named value for each reference filter.
- (c) Use computer analysis to evaluate percent opacity for each notch setting. Treat the start of the first idle mode as the start of the test. Each mode ends when operator demand changes for the next mode (or for the end of the test). Analyze the opacity trace using the following procedure:
 - (1) **3 second peak.** Identify the highest opacity value over the test and integrate the highest 3 second average including that highest value.

- (2) **30 second peak.** Divide the test into a series of 30 second segments, advancing each segment in 1 second increments. Determine the opacity value for each segment and identify the highest opacity value from all the 30 second segments.
- (3) **Steady-state.** Calculate the average of second-by-second values between 120 and 180 seconds after the start of each mode. For RMC modes that are less than 180 seconds, calculate the average over the last 60 seconds of the mode. Identify the highest of those steady-state values from the different modes.
- (d) Determine values of standardized percent opacity, κ_{std} , by correcting to a reference optical path length of 1 meter for comparing to the standards using the following equation:

$$\kappa_{std} = 100 \cdot \left(1 - \left(1 - \frac{\kappa_{meas}}{100} \right)^{\frac{1}{l_{meas}}} \right)$$

Eq. 1033.525-1

Where:

κ_{meas} = the value of percent opacity from paragraphs (c)(1) through (3) of this section.

l_{meas} = the smokemeter's optical path length in the exhaust plume, expressed to the nearest 0.01 meters.

Example:

$\kappa_{meas} = 14.1\%$

$l_{meas} = 1.11 \text{ m}$

$$\kappa_{std} = 100 \cdot \left(1 - \left(1 - \frac{14.1}{100} \right)^{\frac{1}{1.11}} \right)$$

$\kappa_{std} = 12.8\%$

[88 FR 4485, Jan. 24, 2023]

§ 1033.530 Duty cycles and calculations.

This section describes how to apply the duty cycle to measured emission rates to calculate cycle-weighted average emission rates.

- (a) **Standard duty cycles and calculations.** Tables 1 and 2 of this section show the duty cycle to use to calculate cycle-weighted average emission rates for locomotives equipped with two idle settings, eight propulsion notches, and at least one dynamic brake notch and tested using the Locomotive Test Cycle. Use the appropriate weighting factors for your locomotive application and calculate cycle-weighted average emissions as specified in 40 CFR part 1065, subpart G.

TABLE 1 TO § 1033.530—STANDARD DUTY CYCLE WEIGHTING FACTORS FOR CALCULATING EMISSION RATES FOR LOCOMOTIVES WITH MULTIPLE IDLE SETTINGS

Notch setting	Test mode	Line-haul weighting factors	Line-haul weighting factors (no dynamic brake)	Switch weighting factors
Low Idle	A	0.190	0.190	0.299
Normal Idle	B	0.190	0.315	0.299
Dynamic Brake	C	0.125	(¹)	0.000
Notch 1	1	0.065	0.065	0.124
Notch 2	2	0.065	0.065	0.123
Notch 3	3	0.052	0.052	0.058
Notch 4	4	0.044	0.044	0.036
Notch 5	5	0.038	0.038	0.036
Notch 6	6	0.039	0.039	0.015
Notch 7	7	0.030	0.030	0.002
Notch 8	8	0.162	0.162	0.008

¹ Not applicable.

TABLE 2 TO § 1033.530—STANDARD DUTY CYCLE WEIGHTING FACTORS FOR CALCULATING EMISSION RATES FOR LOCOMOTIVES WITH A SINGLE IDLE SETTING

Notch setting	Test mode	Line-haul	Line-haul (no dynamic brake)	Switch
Normal Idle	A	0.380	0.505	0.598
Dynamic Brake	C	0.125	(¹)	0.000
Notch 1	1	0.065	0.065	0.124
Notch 2	2	0.065	0.065	0.123
Notch 3	3	0.052	0.052	0.058

¹ Not applicable.

Notch setting	Test mode	Line-haul	Line-haul (no dynamic brake)	Switch
Notch 4	4	0.044	0.044	0.036
Notch 5	5	0.038	0.038	0.036
Notch 6	6	0.039	0.039	0.015
Notch 7	7	0.030	0.030	0.002
Notch 8	8	0.162	0.162	0.008

¹ Not applicable.

(b) **Idle and dynamic brake notches.** The test procedures generally require you to measure emissions at two idle settings and one dynamic brake, as follows:

- (1) If your locomotive is equipped with two idle settings and one or more dynamic brake settings, measure emissions at both idle settings and the worst case dynamic brake setting, and weight the emissions as specified in the applicable table of this section. Where it is not obvious which dynamic brake setting represents worst case, do one of the following:
 - (i) You may measure emissions and power at each dynamic brake point and average them together.
 - (ii) You may measure emissions and power at the dynamic brake point with the lowest power.
- (2) If your locomotive is equipped with two idle settings and is not equipped with dynamic brake, use a normal idle weighting factor of 0.315 for the line-haul cycle. If your locomotive is equipped with only one idle setting and no dynamic brake, use an idle weighting factor of 0.505 for the line-haul cycle.

(c) **Nonstandard notches or no notches.** If your locomotive is equipped with more or less than 8 propulsion notches, recommend an alternate test cycle based on the in-use locomotive configuration. Unless you have data demonstrating that your locomotive will be operated differently from conventional locomotives, recommend weighting factors that are consistent with the power weightings of the specified duty cycle. For example, the average load factor for your recommended cycle (cycle-weighted power divided by rated power) should be equivalent to those of conventional locomotives. We may also allow the use of the standard power levels shown in Table 3 to this section for nonstandard locomotive testing subject to our prior approval. This paragraph (c) does not allow engines to be tested without consideration of the actual notches that will be used.

TABLE 3 TO § 1033.530—STANDARD NOTCH POWER LEVELS EXPRESSED AS A PERCENTAGE OF RATED POWER

	Percent
Normal Idle	0.00

	Percent
Dynamic Brake	0.00
Notch 1	4.50
Notch 2	11.50
Notch 3	23.50
Notch 4	35.00
Notch 5	48.50
Notch 6	64.00
Notch 7	85.00
Notch 8	100.00

- (d) **Optional Ramped Modal Cycle Testing.** Tables 1 and 2 of § 1033.520 show the weighting factors to use to calculate cycle-weighted average emission rates for the applicable locomotive ramped modal cycle. Use the weighting factors for the ramped modal cycle for your locomotive application and calculate cycle-weighted average emissions as specified in 40 CFR part 1065, subpart G.
- (e) **Automated Start-Stop.** For a locomotive equipped with features that shut the engine off after prolonged periods of idle, multiply the measured idle mass emission rate over the idle portion of the applicable test cycles by a factor equal to one minus the estimated fraction reduction in idling time that will result in use from the shutdown feature. Do not apply this factor to the weighted idle power. Application of this adjustment is subject to our approval if the fraction reduction in idling time that is estimated to result from the shutdown feature is greater than 25 percent. This paragraph (e) does not apply if the locomotive is (or will be) covered by a separate certificate for idle control.
- (f) **Multi-engine locomotives.** This paragraph (f) applies for locomotives using multiple engines where all engines are identical in all material respects. In cases where we allow engine dynamometer testing, you may test a single engine consistent with good engineering judgment, as long as you test it at the operating points at which the engines will operate when installed in the locomotive (excluding stopping and starting). Weigh the results to reflect the power demand/power-sharing of the in-use configuration for each notch setting.
- (g) **Representative test cycles for freshly manufactured locomotives.** As specified in this paragraph (g), manufacturers may be required to use an alternate test cycle for freshly manufactured Tier 3 and later locomotives.
- (1) If you determine that you are adding design features that will make the expected average in-use duty cycle for any of your freshly manufactured locomotive engine families significantly different from the otherwise applicable test cycle (including weighting factors), you must notify us and recommend an alternate test cycle that represents the expected average in-use duty cycle. You should also obtain preliminary approval before you begin collecting data to support an alternate test cycle. We will specify whether to use the default duty cycle, your recommended cycle, or a different cycle, depending on which cycle we believe best represents expected in-use operation.
- (2) The provisions of this paragraph (g) apply differently for different types of locomotives, as follows:

- (i) For Tier 4 and later line-haul locomotives, use the cycle required by (g)(1) of this section to show compliance with the line-haul cycle standards.
 - (ii) For Tier 3 and later switch locomotives, use the cycle required by (g)(1) of this section to show compliance with the switch cycle standards.
 - (iii) For Tier 3 line-haul locomotives, if we specify an alternate cycle, use it to show compliance with the line-haul cycle standards. If you include the locomotives in the ABT program of subpart H of this part, calculate line-haul cycle credits (positive or negative) using the alternate cycle and the line-haul cycle standards. Your locomotive is deemed to also generate an equal amount of switch cycle credits.
- (3) For all locomotives certified using an alternate cycle, include a description of the cycle in the owners manual such that the locomotive can be remanufactured using the same cycle.
- (4) For example, if your freshly manufactured line-haul locomotives are equipped with load control features that modify how the locomotive will operate when it is in a consist, and such features will cause the locomotives to operate differently from the otherwise applicable line-haul cycle, we may require you to certify using an alternate cycle.
- (5) See paragraph (h) of this section for cycle-changing design features that also result in energy savings.
- (h) **Calculation adjustments for energy-saving design features.** The provisions of this paragraph (h) apply for locomotives equipped with new energy-saving locomotive design features. They do not apply for features that only improve the engine's brake-specific fuel consumption. They also do not apply for features that were commonly incorporated in locomotives before 2008. See paragraph (h)(6) of this section for provisions related to determining whether certain features are considered to have been commonly incorporated in locomotives before 2008.
- (1) Manufacturers/remanufacturers choosing to adjust emissions under this paragraph (h) must do all of the following for certification:
- (i) Describe the energy-saving features in your application for certification.
 - (ii) Describe in your installation instruction and/or maintenance instructions all steps necessary to utilize the energy-saving features.
- (2) If your design feature will also affect the locomotives' duty cycle, you must comply with the requirements of paragraph (g) of this section.
- (3) Calculate the energy savings as follows:
- (i) Estimate the expected mean in-use fuel consumption rate (on a BTU per ton-mile basis) with and without the energy saving design feature, consistent with the specifications of paragraph (h)(4) of this section. The energy savings is the ratio of fuel consumed from a locomotive operating with the new feature to fuel consumed from a locomotive operating without the feature under identical conditions. Include an estimate of the 80 percent confidence interval for your estimate of the mean and other statistical parameters we specify.
 - (ii) Your estimate must be based on in-use operating data, consistent with good engineering judgment. Where we have previously certified your design feature under this paragraph (h), we may require you to update your analysis based on all new data that are available. You must obtain approval before you begin collecting operational data for this purpose.

- (iii) We may allow you to consider the effects of your design feature separately for different route types, regions, or railroads. We may require that you certify these different locomotives in different engine families and may restrict their use to the specified applications.
 - (iv) Design your test plan so that the operation of the locomotives with and without is as similar as possible in all material aspects (other than the design feature being evaluated). Correct all data for any relevant differences, consistent with good engineering judgment.
 - (v) Do not include any brake-specific energy savings in your calculated values. If it is not possible to exclude such effects from your data gathering, you must correct for these effects, consistent with good engineering judgment.
- (4) Calculate adjustment factors as described in this paragraph (h)(4). If the energy savings will apply broadly, calculate and apply the adjustment on a cycle-weighted basis. Otherwise, calculate and apply the adjustment separately for each notch. To apply the adjustment, multiply the emissions (either cycle-weighted or notch-specific, as applicable) by the adjustment. Use the lower bound of the 80 percent confidence interval of the estimate of the mean as your estimated energy savings rate. We may cap your energy savings rate for this paragraph (h)(4) at 80 percent of the estimate of the mean. Calculate the emission adjustment factors as:
- $$AF = 1.000 - (\text{energy savings rate})$$
- (5) We may require you to collect and report data from locomotives we allow you to certify under this paragraph (h) and to recalculate the adjustment factor for future model years based on such data.
- (6) Features that are considered to have not been commonly incorporated in locomotives before 2008 include but are not limited to those identified in this paragraph (h)(6).
- (i) Electronically controlled pneumatic (ECP) brakes, computerized throttle management control, and advanced hybrid technology were not commonly incorporated in locomotives before 2008. Manufacturers may claim full credit for energy savings that result from applying these features to freshly manufactured and/or remanufactured locomotives.
 - (ii) Distributed power systems that use radio controls to optimize operation of locomotives in the middle and rear of a train were commonly incorporated in some but not all locomotives in 2008. Manufacturers may claim credit for incorporating these features into locomotives as follows:
 - (A) Manufacturers may claim prorated credit for incorporating distributed power systems in freshly manufactured locomotives. Multiply the energy saving rate by 0.50 when calculating the adjustment factor:
$$AF = 1.000 - (\text{energy savings rate}) \times (0.50)$$
 - (B) Manufacturers may claim full credit for retrofitting distributed power systems in remanufactured locomotives.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 75 FR 22985, Apr. 30, 2010]

§ 1033.535 Adjusting emission levels to account for infrequently regenerating aftertreatment devices.

For locomotives using aftertreatment technology with infrequent regeneration events that may occur during testing, take one of the following approaches to account for the emission impact of regeneration:

- (a) You may use the calculation methodology described in 40 CFR 1065.680 to adjust measured emission results. Do this by developing an upward adjustment factor and a downward adjustment factor for each pollutant based on measured emission data and observed regeneration frequency as follows:
 - (1) Adjustment factors should generally apply to an entire engine family, but you may develop separate adjustment factors for different configurations within an engine family. Use the adjustment factors from this section for all testing for the engine family.
 - (2) You may use carryover or carry-across data to establish adjustment factors for an engine family as described in § 1033.235, consistent with good engineering judgment.
 - (3) Determine the frequency of regeneration, F , as described in 40 CFR 1065.680 from in-use operating data or from running repetitive tests in a laboratory. If the engine is designed for regeneration at fixed time intervals, you may apply good engineering judgment to determine F based on those design parameters.
 - (4) Identify the value of F in each application for the certification for which it applies.
 - (5) Apply the provisions for ramped-modal testing based on measurements for each test interval rather than the whole ramped-modal test.
- (b) You may ask us to approve an alternate methodology to account for regeneration events. We will generally limit approval to cases where your engines use aftertreatment technology with extremely infrequent regeneration and you are unable to apply the provisions of this section.
- (c) You may choose to make no adjustments to measured emission results if you determine that regeneration does not significantly affect emission levels for an engine family (or configuration) or if it is not practical to identify when regeneration occurs. If you choose not to make adjustments under paragraph (a) or (b) of this section, your locomotives must meet emission standards for all testing, without regard to regeneration.

[81 FR 74008, Oct. 25, 2016]

Subpart G—Special Compliance Provisions

§ 1033.601 General compliance provisions.

Locomotive manufacturer/remanufacturers, as well as owners and operators of locomotives subject to the requirements of this part, and all other persons, must observe the provisions of this part, the requirements and prohibitions in 40 CFR part 1068, and the provisions of the Clean Air Act. The provisions of 40 CFR part 1068 apply for locomotives as specified in that part, except as otherwise specified in this section.

- (a) **Meaning of terms.** When used in 40 CFR part 1068, apply meanings for specific terms as follows:
 - (1) “Manufacturer” means manufacturer and/or remanufacturer.
 - (2) “Date of manufacture” means date of original manufacture for freshly manufactured locomotives and the date on which a remanufacture is completed for remanufactured engines.
- (b) **Engine rebuilding.** The provisions of 40 CFR 1068.120 do not apply when remanufacturing locomotives under a certificate of conformity issued under this part.
- (c) **Exemptions.**

- (1) The exemption provisions of 40 CFR 1068.240 (i.e., exemptions for replacement engines) do not apply for domestic or imported locomotives. (Note: You may introduce into commerce freshly manufactured replacement engines under this part, provided the locomotives into which they are installed are covered by a certificate of conformity.)
 - (2) The exemption provisions of 40 CFR 1068.250 and 1068.255 (i.e., exemptions for hardship relief) do not apply for domestic or imported locomotives. See § 1033.620 for provisions related to hardship relief.
 - (3) The exemption provisions of 40 CFR 1068.261 (i.e., exemptions for delegated assembly) do not apply for domestic or imported locomotives, except as specified in § 1033.630.
 - (4) The provisions for importing engines and equipment under the identical configuration exemption of 40 CFR 1068.315(h) do not apply for locomotives.
 - (5) The provisions for importing engines and equipment under the ancient engine exemption of 40 CFR 1068.315(i) do not apply for locomotives.
- (d) **SEAs, defect reporting, and recall.** The provisions of 40 CFR part 1068, subpart E (i.e., SEA provisions) do not apply for locomotives. Except as noted in this paragraph (d), the provisions of 40 CFR part 1068, subpart F, apply to certificate holders for locomotives as specified for manufacturers in that part.
- (1) When there are multiple persons meeting the definition of manufacturer or remanufacturer, each person meeting the definition of manufacturer or remanufacturer must comply with the requirements of 40 CFR part 1068, subpart F, as needed so that the certificate holder can fulfill its obligations under those subparts.
 - (2) The defect investigation requirements of 40 CFR 1068.501(a)(5), (b)(1) and (b)(2) do not apply for locomotives. Instead, use good engineering judgment to investigate emission-related defects consistent with normal locomotive industry practice for investigating defects. You are not required to track parts shipments as indicators of possible defects.
- (e) **Introduction into commerce.** The placement of a new locomotive or new locomotive engine back into service following remanufacturing is a violation of 40 CFR 1068.101(a)(1), unless it has a valid certificate of conformity for its model year and the required label.
- (f) **Multi-fuel locomotives.** Subpart C of this part describes how to test and certify dual-fuel and flexible-fuel locomotives. Some multi-fuel locomotives may not fit either of those defined terms. For such locomotives, we will determine whether it is most appropriate to treat them as single-fuel locomotives, dual-fuel locomotives, or flexible-fuel locomotives based on the range of possible and expected fuel mixtures. For example, a locomotive might burn natural gas but initiate combustion with a pilot injection of diesel fuel. If the locomotive is designed to operate with a single fueling algorithm (i.e., fueling rates are fixed at a given engine speed and load condition), we would generally treat it as a single-fuel locomotive. In this context, the combination of diesel fuel and natural gas would be its own fuel type. If the locomotive is designed to also operate on diesel fuel alone, we would generally treat it as a dual-fuel locomotive. If the locomotive is designed to operate on varying mixtures of the two fuels, we would generally treat it as a flexible-fuel locomotive. To the extent that requirements vary for the different fuels or fuel mixtures, we may apply the more stringent requirements.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 75 FR 22986, Apr. 30, 2010; 81 FR 74009, Oct. 25, 2016; 86 FR 34376, June 29, 2021]

§ 1033.610 Small railroad provisions.

In general, the provisions of this part apply for all locomotives, including those owned by Class II and Class III railroads. This section describes how these provisions apply for railroads meeting the definition of “small railroad” in § 1033.901. (NOTE: The term “small railroad” excludes all Class II railroads and some Class III railroads, such as those owned by large parent companies.)

- (a) Locomotives become subject to the provisions of this part when they become “new” as defined in § 1033.901. Under that definition, a locomotive is “new” when first assembled, and generally becomes “new” again when remanufactured. As an exception to this general concept, locomotives that are owned and operated by railroads meeting the definition of “small railroad” in § 1033.901 do not become “new” when remanufactured, unless they were previously certified to EPA emission standards. Certificate holders may require written confirmation from the owner/operator that the locomotive qualifies as a locomotive that is owned and operated by a small railroad. Such written confirmation to a certificate holder is deemed to also be a submission to EPA and is thus subject to the reporting requirements of 40 CFR 1068.101.
- (b) The provisions of subpart I of this part apply to all owners and operators of locomotives subject to this part 1033. However, the regulations of that subpart specify some provisions that apply only for Class I freight railroads, and others that apply differently to Class I freight railroads and other railroads.
- (c) We may exempt new locomotives that are owned or operated by small railroads from the prohibition against remanufacturing a locomotive without a certificate of conformity as specified in this paragraph (c). This exemption is only available in cases where no certified remanufacturing system is available for the locomotive. For example, it is possible that no remanufacturer will certify a system for very old locomotive models that comprise a tiny fraction of the fleet and that are remanufactured infrequently. We will grant the exemption in all cases in which no remanufacturing system has been certified for the applicable engine family and model year. We may also grant an exemption where we determine that a certified system is unavailable. We may consider the issue of excessive costs in determining the availability of certified systems. If we grant this exemption for a previously certified locomotive, you are required to return the locomotive to its previously certified configuration. Send your request for such exemptions to the Designated Compliance Officer.
- (d) Non-Class I railroads that do not meet the definition of “small railroad” in § 1033.901 may ask that their remanufactured locomotives be excluded from the definition of “new” in § 1033.901 in cases where no certified remanufacturing system is available for the locomotive. We will grant the exemption in all cases in which no remanufacturing system has been certified for the applicable engine family and model year. If we grant this exemption for a previously certified locomotive, you are required to return the locomotive to its previously certified configuration. Send your request for such exemptions to the Designated Compliance Officer.

§ 1033.615 Voluntarily subjecting locomotives to the standards of this part.

The provisions of this section specify the cases in which an owner or manufacturer of a locomotive or similar piece of equipment can subject it to the standards and requirements of this part. Once the locomotive or equipment becomes subject to the locomotive standards and requirements of this part, it remains subject to the standards and requirements of this part for the remainder of its service life.

- (a) *Equipment excluded from the definition of “locomotive”.*

- (1) Manufacturers/remanufacturers of equipment that is excluded from the definition of “locomotive” because of its total power, but would otherwise meet the definition of locomotive may ask to have it considered to be a locomotive. To do this, submit an application for certification as specified in subpart C of this part, explaining why it should be considered to be a locomotive. If we approve your request, it will be deemed to be a locomotive for the remainder of its service life.
- (2) In unusual circumstances, we may deem other equipment to be locomotives (at the request of the owner or manufacturer/remanufacturer) where such equipment does not conform completely to the definition of locomotive, but is functionally equivalent to a locomotive.
- (b) ***Locomotives excluded from the definition of “new”.*** Owners of remanufactured locomotives excluded from the definition of “new” in § 1033.901 under paragraph (2) of that definition may choose to upgrade their locomotives to subject their locomotives to the standards and requirements of this part by complying with the specifications of a certified remanufacturing system, including the labeling specifications of § 1033.135.

§ 1033.620 Hardship provisions for manufacturers and remanufacturers.

- (a) If you qualify for the economic hardship provisions specified in 40 CFR 1068.245, we may approve a period of delayed compliance for up to one model year total.
- (b) The provisions of this paragraph (b) are intended to address problems that could occur near the date on which more stringent emission standards become effective, such as the transition from the Tier 2 standards to the Tier 3 standards for line-haul locomotives on January 1, 2012.
 - (1) In appropriate extreme and unusual circumstances that are clearly outside the control of the manufacturer and could not have been avoided by the exercise of prudence, diligence, and due care, we may permit you, for a brief period, to introduce into commerce locomotives which do not comply with the applicable emission standards if all of the following conditions apply:
 - (i) You cannot reasonably manufacture the locomotives in such a manner that they would be able to comply with the applicable standards.
 - (ii) The manufacture of the locomotives was substantially completed prior to the applicability date of the standards from which you seek the relief. For example, you may not request relief for a locomotive that has been ordered, but for which you will not begin the assembly process prior to the applicability date of the standards. On the other hand, we would generally consider completion of the underframe weldment to be a substantial part of the manufacturing process.
 - (iii) Manufacture of the locomotives was previously scheduled to be completed at such a point in time that locomotives would have been included in the previous model year, such that they would have been subject to less stringent standards, and that such schedule was feasible under normal conditions.
 - (iv) You demonstrate that the locomotives comply with the less stringent standards that applied to the previous model year's production described in paragraph (b)(1)(iii) of this section, as prescribed by subpart C of this part (i.e., that the locomotives are identical to locomotives certified in the previous model year).
 - (v) You exercised prudent planning, were not able to avoid the violation, and have taken all reasonable steps to minimize the extent of the nonconformity.
 - (vi) We approve your request before you introduce the locomotives into commerce.

(2) You must notify us as soon as you become aware of the extreme or unusual circumstances.

(3)

(i) Include locomotives for which we grant relief under this section in the engine family for which they were originally intended to be included.

(ii) Where the locomotives are to be included in an engine family that was certified to an FEL above the applicable standard, you must reserve credits to cover the locomotives covered by this allowance and include the required information for these locomotives in the end-of-year report required by subpart H of this part.

(c) In granting relief under this section, we may also set other conditions as appropriate, such as requiring payment of fees to negate an economic gain that such relief would otherwise provide.

§ 1033.625 Special certification provisions for non-locomotive-specific engines.

You may certify freshly manufactured or remanufactured locomotives using non-locomotive-specific engines (as defined in § 1033.901) using the normal certification procedures of this part. Locomotives certified in that way are generally treated the same as other locomotives, except where specified otherwise. The provisions of this section provide for design certification to the locomotive standards in this part for locomotives using engines included in engine families certified under 40 CFR part 1039 (or part 89) in limited circumstances.

(a) Remanufactured or freshly manufactured switch locomotives powered by non-locomotive-specific engines may be certified by design without the test data required by § 1033.235 if all of the following are true:

(1) Before being installed in the locomotive, the engines were covered by a certificate of conformity issued under 40 CFR Part 1039 (or part 89) that is effective for the calendar year in which the manufacture or remanufacture occurs. You may use engines certified during the previous years if they were subject to the same standards. You may not make any modifications to the engines unless we approve them.

(2) The engines were certified to PM, NO_x, and hydrocarbon standards that are numerically lower than the applicable locomotive standards of this part.

(3) More engines are reasonably projected to be sold and used under the certificate for non-locomotive use than for use in locomotives.

(4) The number of such locomotives certified under this section does not exceed 30 in any three-year period. We may waive this sales limit for locomotive models that have previously demonstrated compliance with the locomotive standards of § 1033.101 in-use.

(5) We approved the application as specified in paragraph (d) of this section.

(b) To certify your locomotives by design under this section, submit your application as specified in § 1033.205, with the following exceptions:

(1) Include the following instead of the locomotive test data otherwise required by § 1033.205:

(i) A description of the engines to be used, including the name of the engine manufacturer and engine family identifier for the engines.

(ii) A brief engineering analysis describing how the engine's emission controls will function when installed in the locomotive throughout the locomotive's useful life.

(iii) The emission data submitted under 40 CFR part 1039 (or part 89).

(2) You may separately submit some of the information required by § 1033.205, consistent with the provisions of § 1033.1(d). For example, this may be an appropriate way to submit detailed information about proprietary engine software. Note that this allowance to separately submit some of the information required by § 1033.205 is also available for applications not submitted under this section.

(c) Locomotives certified under this section are subject to all the requirements of this part except as specified in paragraph (b) of this section. The engines used in such locomotives are not considered to be included in the otherwise applicable engines family of 40 CFR part 1039 (or part 89).

(d) We will approve or deny the application as specified in subpart C of this part. For example, we will deny your application for certification by design under this section in any case where we have evidence that your locomotives will not conform to the requirements of this part throughout their useful lives.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22986, Apr. 30, 2010; 76 FR 53780, Sept. 15, 2011]

§ 1033.630 Staged-assembly and delegated assembly exemptions.

(a) **Staged assembly.** You may ask us to provide a temporary exemption to allow you to complete production of your engines and locomotives at different facilities, as long as you maintain control of the engines until they are in their certified configuration. We may require you to take specific steps to ensure that such locomotives are in their certified configuration before reaching the ultimate purchaser. You may request an exemption under this paragraph (a) in your application for certification, or in a separate submission. If you include your request in your application, your exemption is approved when we grant your certificate. Note that no exemption is needed to ship an engine that has been assembled in its certified configuration, is properly labeled, and will not require an aftertreatment device to be attached when installed in the locomotive.

(b) **Delegated assembly.** This paragraph (b) applies where the engine manufacturer/remanufacturer does not complete assembly of the locomotives and the engine is shipped after being manufactured or remanufactured (partially or completely). The provisions of this paragraph (b) apply differently depending on who holds the certificate of conformity and the state of the engine when it is shipped. You may request an exemption under this paragraph (b) in your application for certification, or in a separate submission. If you include your request in your application, your exemption is approved when we grant your certificate. A manufacturer/remanufacturer may request an exemption under 40 CFR 1068.261 instead of under this section.

(1) In cases where an engine has been assembled in its certified configuration, properly labeled, and will not require an aftertreatment device to be attached when installed in the locomotive, no exemption is needed to ship the engine. You do not need an exemption to ship engines without specific components if they are not emission-related components identified in appendix A of 40 CFR part 1068.

(2) In cases where an engine has been properly labeled by the certificate holder and assembled in its certified configuration except that it does not yet have a required aftertreatment device, an exemption is required to ship the engine. You may ask for this exemption if you do all of the following:

- (i) You note on the Engine Emission Control Information label that the locomotive must include the aftertreatment device to be covered by the certificate.
- (ii) You make clear in your emission-related installation instructions that installation of the aftertreatment device is required for the locomotive to be covered by the certificate.
- (3) In cases where an engine will be shipped to the certificate holder in an uncertified configuration, an exemption is required to ship the engine. You may ask for this exemption under 40 CFR 1068.262.
- (c) **Other exemptions.** In unusual circumstances, you may ask us to provide an exemption for an assembly process that is not covered by the provisions of paragraphs (a) and (b) of this section. We will make the exemption conditional based on you complying with requirements that we determine are necessary to ensure that the locomotives are assembled in their certified configuration before being placed (back) into service.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 88 FR 4486, Jan. 24, 2023]

§ 1033.640 Provisions for repowered and refurbished locomotives.

- (a) The provisions of this section apply for locomotives that are produced from an existing locomotive so that the new locomotive contains both previously used parts and parts that have never been used before.
 - (1) Repowered locomotives are used locomotives in which a freshly manufactured propulsion engine is installed. As described in this section, a repowered locomotive is deemed to be either remanufactured or freshly manufactured, depending on the total amount of unused parts on the locomotive. It may also be deemed to be a refurbished locomotive.
 - (2) Refurbished locomotives are locomotives that contain more unused parts than previously used parts. As described in this section, a locomotive containing more unused parts than previously used parts may be deemed to be either remanufactured or freshly manufactured, depending on the total amount of unused parts on the locomotive. Note that § 1033.901 defines refurbishment of a pre-1973 locomotive to be an upgrade of the locomotive.
- (b) A single existing locomotive cannot be divided into parts and combined with new parts to create more than one remanufactured locomotive. However, any number of locomotives can be divided into parts and combined with new parts to create more than one remanufactured locomotive, provided the number of locomotives created (remanufactured and freshly manufactured) does not exceed the number of locomotives that were disassembled.
- (c) You may determine the relative amount of previously used parts consistent with the specifications of the Federal Railroad Administration. Otherwise, determine the relative amount of previously used parts as follows:
 - (1) Identify the parts in the fully assembled locomotive that have been previously used and those that have never been used before.
 - (2) Weight the unused parts and previously used parts by the dollar value of the parts. For example, a single part valued at \$1200 would count the same as six parts valued at \$200 each. Group parts by system where possible (such as counting the engine as one part) if either all the parts in that system are used or all the parts in that system are unused. Calculate the used part values using dollar values from the same year as the new parts.

- (3) Sum the values of the unused parts. Also sum the values of the previously used parts. The relative fraction of used parts is the total value of previously used parts divided by the combined value of the unused parts and previously used parts.
- (d) If the weighted fraction of the locomotive that is comprised of previously used parts is greater than or equal to 25 percent, then the locomotive is considered to be a remanufactured locomotive and retains its original date of manufacture. Note, however, that if the weighted fraction of the locomotive that is comprised of previously used parts is less than 50 percent, then the locomotive is also considered to be a refurbished locomotive.
- (e) If the weighted fraction of the locomotive that is comprised of previously used parts is less than 25 percent, then the locomotive is deemed to be a freshly manufactured locomotive and the date of original manufacture is the most recent date on which the locomotive was assembled using less than 25 percent previously used parts. For example:
 - (1) If you produce a new locomotive that includes a used frame, but all other parts are unused, then the locomotive would likely be considered to be a freshly manufactured locomotive because the value of the frame would likely be less than 25 percent of the total value of the locomotive. Its date of original manufacture would be the date on which you complete its assembly.
 - (2) If you produce a new locomotive by replacing the engine in a 1990 locomotive with a freshly manufactured engine, but all other parts are used, then the locomotive would likely be considered to be a remanufactured locomotive and its date of original manufacture is the date on which assembly was completed in 1990. (NOTE: such a locomotive would also be considered to be a repowered locomotive.)
- (f) Locomotives containing used parts that are deemed to be freshly manufactured locomotives are subject to the same provisions as all other freshly manufactured locomotives. Other refurbished locomotives are subject to the same provisions as other remanufactured locomotives, with the following exceptions:
 - (1) **Switch locomotives.**
 - (i) Prior to January 1, 2015, remanufactured Tier 0 switch locomotives that are deemed to be refurbished are subject to the Tier 0 line-haul cycle and switch cycle standards. Note that this differs from the requirements applicable to other Tier 0 switch locomotives, which are not subject to the Tier 0 line-haul cycle standards.
 - (ii) Beginning January 1, 2015, remanufactured Tier 3 and earlier switch locomotives that are deemed to be refurbished are subject to the Tier 3 switch standards.
 - (2) **Line-haul locomotives.** Remanufactured line-haul locomotives that are deemed to be refurbished are subject to the same standards as freshly manufactured line-haul locomotives, except that line-haul locomotives with rated power less than 3000 hp that are refurbished before January 1, 2015 are subject to the same standards as refurbished switch locomotives under paragraph (e)(1)(i) of this section. However, line-haul locomotives less than 3000 hp may not generate emission credits relative to the standards specified in paragraph (e)(1)(i) of this section.
 - (3) **Labels for switch and line-haul locomotives.** Remanufacturers that refurbish a locomotive must add a secondary locomotive label that includes the following:
 - (i) The label heading: "REFURBISHED LOCOMOTIVE EMISSION CONTROL INFORMATION."

- (ii) The statement identifying when the locomotive was refurbished and what standards it is subject to, as follows: "THIS LOCOMOTIVE WAS REFURBISHED IN [year of refurbishment] AND MUST COMPLY WITH THE TIER [applicable standard level] EACH TIME THAT IT IS REMANUFACTURED, EXCEPT AS ALLOWED BY 40 CFR 1033.750."

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 74 FR 8425, Feb. 24, 2009; 81 FR 74009, Oct. 25, 2016]

§ 1033.645 Non-OEM component certification program.

This section describes a voluntary program that allows you to get EPA approval of components you manufacture for use during remanufacturing.

- (a) **Applicability.** This section applies only for components that are commonly replaced during remanufacturing. It does not apply for other types of components that are replaced during a locomotive's useful life, but not typically replaced during remanufacture. Certified components may be used for remanufacturing or other maintenance.
 - (1) The following components are eligible for approval under this section:
 - (i) Cylinder liners.
 - (ii) Pistons.
 - (iii) Piston rings.
 - (iv) Heads
 - (v) Fuel injectors.
 - (vi) Turbochargers
 - (vii) Aftercoolers and intercoolers.
 - (2) Catalysts and electronic controls are not eligible for approval under this section.
 - (3) We may determine that other types of components can be certified under this section, consistent with good engineering judgment.
- (b) **Approval.** To obtain approval, submit your request to the Designated Compliance Officer.
 - (1) Include all of the following in your request:
 - (i) A description of the component(s) for which you are requesting approval.
 - (ii) A list of all engine/locomotive models and engine families for which your component would be used. You may exclude models that are not subject to our standards or will otherwise not be remanufactured under a certificate of conformity.
 - (iii) A copy of the maintenance instructions for engines using your component. You may reference the other certificate holder's maintenance instructions in your instructions. For example, your instructions may specify to follow the other certificate holder's instructions in general, but list one or more exceptions to address the specific maintenance needs of your component.

- (iv) An engineering analysis (including test data in some cases) demonstrating to us that your component will not cause emissions to increase. The analysis must address both low-hour and end-of-useful life emissions. The amount of information required for this analysis is less than is required to obtain a certificate of conformity under subpart C of this part and will vary depending on the type of component being certified.
 - (v) The following statement signed by an authorized representative of your company: We submit this request under 40 CFR 1033.645. All the information in this report is true and accurate to the best of my knowledge. I know of the penalties for violating the Clean Air Act and the regulations. (Authorized Company Representative)
- (2) If we determine that there is reasonable technical basis to believe that your component is sufficiently equivalent that it will not increase emissions, we will approve your request and you will be a certificate holder for your components with respect to actual emissions performance for all locomotives that use those components (in accordance with this section).
- (c) **Liability.** Being a certificate holder under this section means that if in-use testing indicates that a certified locomotive using one or more of your approved components does not comply with an applicable emission standard, we will presume that you and other certificate holders are liable for the noncompliance. However, we will not hold you liable in cases where you convince us that your components did not cause the noncompliance. Conversely, we will not hold other certificate holders liable for noncompliance caused solely by your components. You are also subject to the warranty and defect reporting requirements of this part for your certified components. Other requirements of this part apply as specified in § 1033.1.
- (d) **In-use testing.** Locomotives containing your components must be tested according to the provisions of this paragraph (d).
- (1) Except as specified in paragraph (d)(5) of this section, you must test at least one locomotive if 250 locomotives use your component under this section. You must test one additional locomotive for the next additional 500 locomotives that use your component under this section. After that, we may require you to test one additional locomotive for each additional 1000 locomotives that use your component under this section. These numbers apply across model years. For example, if your component is used in 125 remanufactures per year under this section, you must test one of the first 250 locomotives, one of the next 500 locomotives, and up to one every eight years after that. Do not count locomotives that use your components but are not covered by this section.
 - (2) Except for the first locomotive you test for a specific component under this section, locomotives tested under this paragraph (d) must be past the half-way point of the useful life in terms of MW-hrs. For the first locomotive you test, select a locomotive that has operated between 25 and 50 percent of its useful life.
 - (3) Unless we approve a different schedule, you must complete testing and report the results to us within 180 days of the earliest point at which you could complete the testing based on the hours of operation accumulated by the locomotives. For example, if 250 or more locomotives use your part under this section, and the first of these to reach 25 percent of its useful life does so on March 1st of a given year, you must complete testing of one of the first 250 locomotives and report to us by August 28th of that year.
 - (4) Unless we approve different test procedures, you must test the locomotive according to the procedures specified in subpart F of this part.

- (5) If any locomotives fail to meet all standards, we may require you to test one additional locomotive for each locomotive that fails. You may choose to accept that your part is causing an emission problem rather than continuing testing. You may also test additional locomotives at any time. We will consider failure rates, average emission levels and the existence of any defects among other factors in determining whether to pursue remedial action. We may order a recall pursuant to 40 CFR part 1068 before you complete testing additional locomotives.
- (6) You may ask us to allow you to rely on testing performed by others instead of requiring you to perform testing. For example, if a railroad tests a locomotive with your component as part of its testing under § 1033.810, you may ask to submit those test data as fulfillment of your test obligations under this paragraph (d). If a given test locomotive uses different components certified under this section that were manufactured by different manufacturers (such as rings from one manufacturer and cylinder liners from another manufacturer), a single test of it may be counted towards both manufacturers' test obligations. In unusual circumstances, you may also ask us to grant you hardship relief from the testing requirements of this paragraph (d). In determining whether to grant you relief, we will consider all relevant factors including the extent of the financial hardship to your company and whether the test data are available from other sources, such as testing performed by a railroad.
- (e) Components certified under this section may be used when remanufacturing Category 2 engines under 40 CFR part 1042.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59190, Oct. 8, 2008; 74 FR 8425, Feb. 24, 2009]

§ 1033.650 Incidental use exemption for Canadian and Mexican locomotives.

You may ask us to exempt from the requirements and prohibitions of this part locomotives that are operated primarily outside of the United States and that enter the United States temporarily from Canada or Mexico. We will approve this exemption only where we determine that the locomotive's operation within the United States will not be extensive and will be incidental to its primary operation. For example, we would generally exempt locomotives that will not operate more than 25 miles from the border and will operate in the United States less than 5 percent of their operating time. For existing operations, you must request this exemption before January 1, 2011. In your request, identify the locomotives for which you are requesting an exemption, and describe their projected use in the United States. We may grant the exemption broadly or limit the exemption to specific locomotives and/or specific geographic areas. However, we will typically approve exemptions for specific rail facilities rather than specific locomotives. In unusual circumstances, such as cases in which new rail facilities are created, we may approve requests submitted after January 1, 2011.

§ 1033.652 Special provisions for exported locomotives.

- (a) **Uncertified locomotives.** Locomotives covered by an export exemption under 40 CFR 1068.230 may be introduced into U.S. commerce prior to being exported, but may not be used in any revenue generating service in the United States. Locomotives covered by this paragraph (a) may not include any EPA emission control information label. Such locomotives may include emission control information labels for the country to which they are being exported.
- (b) **Locomotives covered by export-only certificates.** Locomotives may be certified for export under 40 CFR 1068.230. Such locomotives may be introduced into U.S. commerce prior to being exported, but may not be used in any revenue generating service in the United States.

- (c) **Locomotives included in a certified engine family.** Except as specified in paragraph (d) of this section, locomotives included in a certified engine family may be exported without restriction. Note that § 1033.705 requires that exported locomotives be excluded from emission credit calculations in certain circumstances.
- (d) **Locomotives certified to FELs above the standards.** The provisions of this paragraph (d) apply for locomotive configurations included in engine families certified to one or more FELs above any otherwise applicable standard. Individual locomotives that will be exported may be excluded from an engine family if they are unlabeled. For locomotives that were labeled during production, you may remove the emission control information labels prior to export. All unlabeled locomotives that will be exported are subject to the provisions of paragraph (a) of this section. Locomotives that are of a configuration included in an engine family certified to one of more FELs above any otherwise applicable standard that include an EPA emission control information label when exported are considered to be part of the engine family and must be included in credit calculations under § 1033.705. Note that this requirement does not apply for locomotives that do not have an EPA emission control information label, even if they have other labels (such as an export-only label).

[75 FR 22986, Apr. 30, 2010]

§ 1033.655 Special provisions for certain Tier 0/Tier 1 locomotives.

- (a) The provisions of this section apply only for the following locomotives (and locomotives in the same engine families as these locomotives):
- (1) Locomotives listed in Table 1 of this section originally manufactured 1986-1994 by General Electric Company that have never been equipped with separate loop aftercooling. The section also applies for the equivalent passenger locomotives.

TABLE 1 TO § 1033.655

8-40C	P32ACDM
8-40B	P42DC
8-32B	8-40BPH
8-40CW	P40DC
8-40BW	8-32BWH
8-40CM	C39-8
8-41CW	B39-8E
8-44CW	

- (2) SD70MAC and SD70IAC locomotives originally manufactured 1996-2000 by EMD.
- (b) Any certifying remanufacturer may request relief for the locomotives covered by this section.

- (c) You may ask us to allow these locomotives to exceed otherwise applicable line-haul cycle NO_x standard for high ambient temperatures and/or altitude because of limitations of the cooling system. However, the NO_x emissions may exceed the otherwise applicable standard only to the extent necessary. Relief is limited to the following conditions:
 - (1) For General Electric locomotives, you may ask for relief for ambient temperatures above 23 °C and/or barometric pressure below 97.5 kPa (28.8 in. Hg). NO_x emissions may not exceed 9.5 g/bhp-hr over the line-haul cycle for any temperatures up to 105 °F and any altitude up to 7000 feet above sea level.
 - (2) For EMD locomotives, you may ask for relief for ambient temperatures above 30 °C and/or barometric pressure below 97.5 kPa (28.8 in. Hg). NO_x emissions may not exceed 8.0 g/bhp-hr over the line-haul cycle for any temperatures up to 105 °F and any altitude up to 7000 feet above sea level.
- (d) All other standards and requirements in this part apply as specified.
- (e) To request this relief, submit to the Designated Compliance Officer along with your application for certification an engineering analysis showing how your emission controls operate for the following conditions:
 - (1) Temperatures 23-40 °C at any altitude up to 7000 feet above sea level.
 - (2) Altitudes 1000-7000 feet above sea level for any temperature from 15-40 °C.

Subpart H—Averaging, Banking, and Trading for Certification

§ 1033.701 General provisions.

- (a) You may average, bank, and trade (ABT) emission credits for purposes of certification as described in this subpart to show compliance with the standards of this part. Participation in this program is voluntary.
- (b) Section 1033.740 restricts the use of emission credits to certain averaging sets.
- (c) The definitions of Subpart J 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) **Applicable emission standard** means an emission standard that is specified in subpart B of this part. Note that for other subparts, “applicable emission standard” is defined to also include FELs.
 - (3) **Averaging set** means a set of locomotives in which emission credits may be exchanged only with other locomotives in the same averaging set.
 - (4) **Broker** means any entity that facilitates a trade of emission credits between a buyer and seller.
 - (5) **Buyer** means the entity that receives emission credits as a result of a trade.
 - (6) **Reserved emission credits** means emission credits you have generated that we have not yet verified by reviewing your final report.
 - (7) **Seller** means the entity that provides emission credits during a trade.
 - (8) **Trade** means to exchange emission credits, either as a buyer or seller.

- (9) **Transfer** means to convey control of credits generated for an individual locomotive to the purchaser, owner, or operator of the locomotive at the time of manufacture or remanufacture; or to convey control of previously generated credits from the purchaser, owner, or operator of an individual locomotive to the manufacturer/remanufacturer at the time of manufacture/remanufacture.
- (d) You may not use emission credits generated under this subpart to offset any emissions that exceed an FEL or standard. This applies for all testing, including certification testing, in-use testing, selective enforcement audits, and other production-line testing. However, if emissions from a locomotive exceed an FEL or standard (for example, during a selective enforcement audit), you may use emission credits to recertify the engine family with a higher FEL that applies only to future production.
- (e) Engine families that use emission credits for one or more pollutants may not generate positive emission credits for another pollutant.
- (f) Emission credits may be used in the model year they are generated or in future model years. Emission credits may not be used for past model years.
- (g) You may increase or decrease an FEL during the model year by amending your application for certification under § 1033.225. The new FEL may apply only to locomotives you have not already introduced into commerce. Each locomotive's emission control information label must include the applicable FELs. You must conduct production line testing to verify that the emission levels are achieved.
- (h) Credits may be generated by any certifying manufacturer/remanufacturer and may be held by any of the following entities:
 - (1) Locomotive or engine manufacturers.
 - (2) Locomotive or engine remanufacturers.
 - (3) Locomotive owners.
 - (4) Locomotive operators.
 - (5) Other entities after notification to EPA.
- (i) All locomotives that are certified to an FEL that is different from the emission standard that would otherwise apply to the locomotives are required to comply with that FEL for the remainder of their service lives, except as allowed by § 1033.750.
 - (1) Manufacturers must notify the purchaser of any locomotive that is certified to an FEL that is different from the emission standard that would otherwise apply that the locomotive is required to comply with that FEL for the remainder of its service life.
 - (2) Remanufacturers must notify the owner of any locomotive or locomotive engine that is certified to an FEL that is different from the emission standard that would otherwise apply that the locomotive (or the locomotive in which the engine is used) is required to comply with that FEL for the remainder of its service life.
- (j) The FEL to which the locomotive is certified must be included on the locomotive label required in § 1033.135. This label must include the notification specified in paragraph (i) of this section.
- (k) You may use either of the following approaches to retire or forego emission credits:

- (1) You may retire emission credits generated from any number of your locomotives. This may be considered donating emission credits to the environment. Identify any such credits in the reports described in § 1033.730. Locomotives must comply with the applicable FELs even if you donate or sell the corresponding emission credits under this paragraph (k). Those credits may no longer be used by anyone to demonstrate compliance with any EPA emission standards.
- (2) You may certify a family using an FEL below the emission standard as described in this part and choose not to generate emission credits for that family. If you do this, you do not need to calculate emission credits for those families and you do not need to submit or keep the associated records described in this subpart for that family.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74009, Oct. 25, 2016; 86 FR 34376, June 29, 2021]

§ 1033.705 Calculating emission credits.

The provisions of this section apply separately for calculating emission credits for NO_x or PM.

- (a) Calculate positive emission credits for an engine family that has an FEL below the otherwise applicable emission standard. Calculate negative emission credits for an engine family that has an FEL above the otherwise applicable emission standard. Do not round until the end of year report.
- (b) For each participating engine family, calculate positive or negative emission credits relative to the otherwise applicable emission standard. For the end of year report, round the sum of emission credits to the nearest one hundredth of a megagram (0.01 Mg). Round your end of year emission credit balance to the nearest megagram (Mg). Use consistent units throughout the calculation. When useful life is expressed in terms of megawatt-hrs, calculate credits for each engine family from the following equation:

$$\text{Emission credits} = (\text{Std} - \text{FEL}) \times (1.341) \times (\text{UL}) \times (\text{Production}) \times (F_p) \times (10^{-3} \text{ kW-Mg/MW-g}).$$

Where:

Std = the applicable NO_x or PM emission standard in g/bhp-hr (except that Std = previous FEL in g/bhp-hr for locomotives that were certified under this part to an FEL other than the standard during the previous useful life).

FEL = the family emission limit for the engine family in g/bhp-hr.

UL = the sales-weighted average useful life in megawatt-hours (or the subset of the engine family for which credits are being calculated), as specified in the application for certification.

Production = the number of locomotives participating in the averaging, banking, and trading program within the given engine family during the calendar year (or the number of locomotives in the subset of the engine family for which credits are being calculated). Quarterly production projections are used for initial certification. Actual applicable production/sales volumes are used for end-of-year compliance determination.

F_p = the proration factor as determined in paragraph (d) of this section.

- (c) When useful life is expressed in terms of miles, calculate the useful life in terms of megawatt-hours (UL) by dividing the useful life in miles by 100,000, and multiplying by the sales-weighted average rated power of the engine family. For example, if your useful life is 800,000 miles for a family with an average rated power of 3,500 hp, then your equivalent MW-hr useful life would be 28,000 MW-hrs. Credits are calculated using this UL value in the equations of paragraph (b) of this section.
- (d) The proration factor is an estimate of the fraction of a locomotive's service life that remains as a function of age. The proration factor is 1.00 for freshly manufactured locomotives.
 - (1) The locomotive's age is the length of time in years from the date of original manufacture to the date at which the remanufacture (for which credits are being calculated) is completed, rounded to the next higher year.
 - (2) The proration factors for line-haul locomotives ages 1 through 20 are specified in Table 1 to this section. For line-haul locomotives more than 20 years old, use the proration factor for 20 year old locomotives. The proration factors for switch locomotives ages 1 through 40 are specified in Table 2 to this section. For switch locomotives more than 40 years old, use the proration factor for 40 year old locomotives.
 - (3) For repower engines, the proration factor is based on the age of the locomotive chassis, not the age of the engine, except for remanufactured locomotives that qualify as refurbished. The minimum proration factor for remanufactured locomotives that meet the definition of refurbished but not freshly manufactured is 0.60. (NOTE: The proration factor is 1.00 for all locomotives that meet the definition of freshly manufactured.)

TABLE 1 TO § 1033.705—PRORATION FACTORS FOR LINE-HAUL LOCOMOTIVES

Locomotive age (years)	Proration factor (F_p)
1	0.96
2	0.92
3	0.88
4	0.84
5	0.81
6	0.77
7	0.73
8	0.69
9	0.65
10	0.61
11	0.57
12	0.54
13	0.50
14	0.47
15	0.43

Locomotive age (years)	Proration factor (F_p)
16	0.40
17	0.36
18	0.33
19	0.30
20	0.27

TABLE 2 TO § 1033.705—PRORATION FACTORS FOR SWITCH LOCOMOTIVES

Locomotive age (years)	Proration factor (F_p)
1	0.98
2	0.96
3	0.94
4	0.92
5	0.90
6	0.88
7	0.86
8	0.84
9	0.82
10	0.80
11	0.78
12	0.76
13	0.74
14	0.72
15	0.70
16	0.68
17	0.66
18	0.64
19	0.62
20	0.60
21	0.58
22	0.56
23	0.54
24	0.52
25	0.50

Locomotive age (years)	Proration factor (F_p)
26	0.48
27	0.46
28	0.44
29	0.42
30	0.40
31	0.38
32	0.36
33	0.34
34	0.32
35	0.30
36	0.28
37	0.26
38	0.24
39	0.22
40	0.20

(e) In your application for certification, base your showing of compliance on projected production volumes for locomotives that will be placed into service in the United States. As described in § 1033.730, compliance with the requirements of this subpart is determined at the end of the model year based on actual production volumes for locomotives that will be placed into service in the United States. Do not include any of the following locomotives to calculate emission credits:

- (1) Locomotives permanently exempted under subpart G of this part or under 40 CFR part 1068.
- (2) Exported locomotives. You may ask to include locomotives sold to Mexican or Canadian railroads if they will likely operate within the United States and you include all such locomotives (both credit using and credit generating locomotives).
- (3) Locomotives not subject to the requirements of this part, such as those excluded under § 1033.5.
- (4) Any other locomotives, where we indicate elsewhere in this part 1033 that they are not to be included in the calculations of this subpart.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22987, Apr. 30, 2010]

§ 1033.710 Averaging emission credits.

- (a) Averaging is the exchange of emission credits among your engine families. You may average emission credits only as allowed by § 1033.740.

- (b) You may certify one or more engine families to an FEL above the applicable emission standard, subject to the 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.
- (c) If you certify an engine family to an FEL that exceeds the otherwise applicable emission standard, you must obtain enough emission credits to offset the engine family's deficit by the due date for the final report required in § 1033.730. The emission credits used to address the deficit may come from your other engine families that generate emission credits in the same model year, from emission credits you have banked from previous model years, or from emission credits generated in the same or previous model years that you obtained through trading or by transfer.

[73 FR 37197, June 30, 2008, as amended at 81 FR 74009, Oct. 25, 2016]

§ 1033.715 Banking emission credits.

- (a) Banking is the retention of emission credits by the manufacturer/remanufacturer generating the emission credits (or owner/operator, in the case of transferred credits) for use in future model years for averaging, trading, or transferring. You may use banked emission credits only as allowed by § 1033.740.
- (b) You may designate any emission credits you plan to bank in the reports you submit under § 1033.730 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, trading, or transferring.
- (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.

[75 FR 22987, Apr. 30, 2010]

§ 1033.720 Trading emission credits.

- (a) Trading is the exchange of emission credits between certificate holders. You may use traded emission credits for averaging, banking, or further trading transactions. Traded emission credits may be used only as allowed by § 1033.740.
- (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.
- (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 § 1033.255(e) for cases involving fraud. We may void the certificates of all engine families participating in a trade that results in a manufacturer/remanufacturer having a negative balance of emission credits. See § 1033.745.

§ 1033.722 Transferring emission credits.

- (a) Credit transfer is the conveying of control over credits, either:
 - (1) From a certifying manufacturer/remanufacturer to an owner/operator.
 - (2) From an owner/operator to a certifying manufacturer/remanufacturer.

- (b) Transferred credits can be:
 - (1) Used by a certifying manufacturer/remanufacturer in averaging.
 - (2) Transferred again within the model year.
 - (3) Reserved for later banking. Transferred credits may not be traded unless they have been previously banked.
- (c) Owners/operators participating in credit transfers must submit the reports specified in § 1033.730.

§ 1033.725 Requirements for your application for certification.

- (a) You must declare in your application for certification your intent to use the provisions of this subpart for each engine family that will be certified using the ABT program. You must also declare the FELs you select for the engine family 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 emission 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.
 - (2) Detailed calculations of projected emission credits (positive or negative) based on projected production volumes. We may require you to include similar calculations from your other engine families to demonstrate that you will be able to avoid negative credit balances for the model year. If you project negative emission credits for a family, state the source of positive emission credits you expect to use to offset the negative emission credits.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22987, Apr. 30, 2010; 81 FR 74009, Oct. 25, 2016]

§ 1033.730 ABT reports.

- (a) If any of your engine 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. We may waive the requirement to send the end-of year report, as long as you send the final report on time.
- (b) Your end-of-year and final reports must include the following information for each engine family participating in the ABT program:
 - (1) Engine family designation and averaging sets (whether switch, line-haul, or both).
 - (2) The emission standards that would otherwise apply to the engine 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 engine identification number for the first engine covered by the new FEL. In this case, identify each applicable FEL and calculate the positive or negative emission credits as specified in § 1033.225.
 - (4) The projected and actual U.S.-directed production volumes for the model year as described in § 1033.705. If you changed an FEL during the model year, identify the actual U.S.-directed production volume associated with each FEL.

- (5) Rated power for each locomotive configuration, and the average locomotive power weighted by U.S.-directed production volumes for the engine family.
- (6) Useful life.
- (7) Calculated positive or negative emission credits for the whole engine family. Identify any emission credits that you traded or transferred, as described in paragraph (d)(1) or (e) of this section.
- (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 engine families in each averaging set in the applicable model year is not negative.
 - (2) State whether you will retain any emission credits for banking. If you choose to retire emission credits that would otherwise be eligible for banking, identify the engine families that generated the emission credits, including the number of emission credits from each family.
 - (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 averaging set corresponding to the engine families that generated emission credits for the trade, including the number of emission credits from each averaging set.
 - (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 for each averaging set.
- (e) If you transfer emission credits, you must send us a report within 90 days after the first transfer to an owner/operator, as follows:
 - (1) Include the following information:
 - (i) The corporate names of the owner/operator receiving the credits.
 - (ii) A copy of any contracts related to the trade.
 - (iii) The serial numbers and engine families for the locomotive that generated the transferred emission credits and the number of emission credits from each family.
 - (2) The requirements of this paragraph (e) apply separately for each owner/operator.
 - (3) We may require you to submit additional 90-day reports under this paragraph (e).
- (f) 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.
- (g) 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 (g)(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.
- (h) We may modify these requirements for owners/operators required to submit reports because of their involvement in credit transferring.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22987, Apr. 30, 2010; 81 FR 74009, Oct. 25, 2016]

§ 1033.735 Required records.

- (a) You must organize and maintain your records as described in this section.
- (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 engines if you do not keep all the records required under this section. You must therefore keep these records to continue to bank valid credits.
- (c) Keep a copy of the reports we require in § 1033.730.
- (d) Keep records of the engine identification number for each locomotive you produce that generates or uses emission credits under the ABT program. If you change the FEL after the start of production, identify the date you started using each FEL and the range of engine identification numbers associated with each FEL. You must also be able to identify the purchaser and destination for each engine you produce.
- (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.

[73 FR 37197, June 30, 2008, as amended at 75 FR 22987, Apr. 30, 2010; 81 FR 74009, Oct. 25, 2016]

§ 1033.740 Credit restrictions.

Use of emission credits generated under this part is restricted depending on the standards against which they were generated.

- (a) **Pre-2008 credits.** NO_x and PM credits generated before model year 2008 may be used under this part in the same manner as NO_x and PM credits generated under this part.
- (b) **General cycle restriction.** Locomotives subject to both switch cycle standards and line-haul cycle standards (such as Tier 2 locomotives) may generate both switch and line-haul credits. Except as specified in paragraph (c) of this section, such credits may only be used to show compliance with standards for the same cycle for which they were generated. For example, a Tier 2 locomotive that is certified to a switch cycle NO_x FEL below the applicable switch cycle standard and a line-haul cycle NO_x

FEL below the applicable line-haul cycle standard may generate switch cycle NO_x credits for use in complying with switch cycle NO_x standards and a line-haul cycle NO_x credits for use in complying with line-haul cycle NO_x standards.

- (c) **Single cycle locomotives.** As specified in § 1033.101, Tier 0 switch locomotives, Tier 3 and later switch locomotives, and Tier 4 and later line-haul locomotives are not subject to both switch cycle and line-haul cycle standards.
 - (1) When using credits generated by locomotives covered by paragraph (b) of this section for single cycle locomotives covered by this paragraph (c), you must use both switch and line-haul credits as described in this paragraph (c)(1).
 - (i) For locomotives subject only to switch cycle standards, calculate the negative switch credits for the credit using locomotive as specified in § 1033.705. Such locomotives also generate an equal number of negative line-haul cycle credits (in Mg).
 - (ii) For locomotives subject only to line-haul cycle standards, calculate the negative line-haul credits for the credit using locomotive as specified in § 1033.705. Such locomotives also generate an equal number of negative switch cycle credits (in Mg).
 - (2) Credits generated by Tier 0, Tier 3, or Tier 4 switch locomotives may be used to show compliance with any switch cycle or line-haul cycle standards.
 - (3) Credits generated by any line-haul locomotives may not be used by Tier 3 or later switch locomotives.
- (d) **Tier 4 credit use.** The number of Tier 4 locomotives that can be certified using credits in any year may not exceed 50 percent of the total number of Tier 4 locomotives you produce in that year for U.S. sales.
- (e) **Other restrictions.** Other sections of this part may specify additional restrictions for using emission credits under certain special provisions.

[73 FR 37197, June 30, 2008, as amended at 86 FR 34376, June 29, 2021]

§ 1033.745 Compliance with the provisions of this subpart.

The provisions of this section apply to certificate holders.

- (a) For each engine family participating in the ABT program, the certificate of conformity is conditional 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 an engine family if you fail to comply with any provisions of this subpart.
- (b) You may certify your engine family to an FEL above an applicable emission standard based on a projection that you will have enough emission credits to offset the deficit for the engine family. However, we may void the certificate of conformity if you cannot show in your final report that you have enough actual emission credits to offset a deficit for any pollutant in an engine family.
- (c) We may void the certificate of conformity for an engine family if you fail to keep records, send reports, or give us information we request.
- (d) You may ask for a hearing if we void your certificate under this section (see § 1033.920).

§ 1033.750 Changing a locomotive's FEL at remanufacture.

Locomotives are generally required to be certified to the previously applicable emission standard or FEL when remanufactured. This section describes provisions that allow a remanufactured locomotive to be certified to a different FEL (higher or lower).

- (a) A remanufacturer may choose to certify a remanufacturing system to change the FEL of a locomotive from a previously applicable FEL or standard. Any locomotives remanufactured using that system are required to comply with the revised FEL for the remainder of their service lives, unless it is changed again under this section during a later remanufacture. Remanufacturers changing an FEL must notify the owner of the locomotive that it is required to comply with that FEL for the remainder of its service life.
- (b) Calculate the credits needed or generated as specified in § 1033.705, except as specified in this paragraph. If the locomotive was previously certified to an FEL for the pollutant, use the previously applicable FEL as the standard.

Subpart I—Requirements for Owners and Operators

§ 1033.801 Applicability.

The requirements of this subpart are applicable to railroads and all other owners and operators of locomotives subject to the provisions of this part, except as otherwise specified. The prohibitions related to maintenance in § 1033.815 also applies to anyone performing maintenance on a locomotive subject to the provisions of this part.

§ 1033.805 Remanufacturing requirements.

- (a) See the definition of “remanufacture” in § 1033.901 to determine if you are remanufacturing your locomotive or engine. (NOTE: Replacing power assemblies one at a time may qualify as remanufacturing, depending on the interval between replacement.)
- (b) See the definition of “new” in § 1033.901 to determine if remanufacturing your locomotive makes it subject to the requirements of this part. If the locomotive is considered to be new, it is subject to the certification requirements of this part, unless it is exempt under subpart G of this part. The standards to which your locomotive is subject will depend on factors such as the following:
 - (1) Its date of original manufacture.
 - (2) The FEL to which it was previously certified, which is listed on the “Locomotive Emission Control Information” label.
 - (3) Its power rating (whether it is above or below 2300 hp).
 - (4) The calendar year in which it is being remanufactured.
- (c) You may comply with the certification requirements of this part for your remanufactured locomotive by either obtaining your own certificate of conformity as specified in subpart C of this part or by having a certifying remanufacturer include your locomotive under its certificate of conformity. In either case, your remanufactured locomotive must be covered by a certificate before it is reintroduced into service.
- (d) If you do not obtain your own certificate of conformity from EPA, contact a certifying remanufacturer to have your locomotive included under its certificate of conformity. Confirm with the certificate holder that your locomotive's model, date of original manufacture, previous FEL, and power rating allow it to be covered by the certificate. You must do all of the following:

- (1) Comply with the certificate holder's emission-related installation instructions, which should include the following:
 - (i) A description of how to assemble and adjust the locomotive so that it will operate according to design specifications in the certificate. See paragraph (e) of this section for requirements related to the parts you must use.
 - (ii) Instructions to remove the Engine Emission Control Information label and replace it with the certificate holder's new label.

Note: In most cases, you must not remove the Locomotive Emission Control Information label.

- (2) Provide to the certificate holder the information it identifies as necessary to comply with the requirements of this part. For example, the certificate holder may require you to provide the information specified by § 1033.735.
- (e) For parts unrelated to emissions and emission-related parts not addressed by the certificate holder in the emission-related installation instructions, you may use parts from any source. For emission-related parts listed by the certificate holder in the emission-related installation instructions, you must either use the specified parts or parts certified under § 1033.645 for remanufacturing. If you believe that the certificate holder has included as emission-related parts, parts that are actually unrelated to emissions, you may ask us to exclude such parts from the emission-related installation instructions.

Note: This paragraph (e) does not apply with respect to parts for maintenance other than remanufacturing; see § 1033.815 for provisions related to general maintenance.

- (f) Failure to comply with this section is a violation of 40 CFR 1068.101(a)(1).

§ 1033.810 In-use testing program.

- (a) **Applicability.** This section applies to all Class I freight railroads. It does not apply to other owner/operators.
- (b) **Testing requirements.** Annually test a sample of locomotives in your fleet. For purposes of this section, your fleet includes both the locomotives that you own and the locomotives that you are leasing. Use the test procedures in subpart F of this part, unless we approve different procedures.
 - (1) Except for the cases described in paragraph (b)(2) of this section, test at least 0.075 percent of the average number of locomotives in your fleet during the previous calendar year (i.e., determine the number to be tested by multiplying the number of locomotives in the fleet by 0.00075 and rounding up to the next whole number).
 - (2) We may allow you to test a smaller number of locomotives if we determine that the number of tests otherwise required by this section is not necessary.
- (c) **Test locomotive selection.** Unless we specify a different option, select test locomotives as specified in paragraph (c)(1) of this section (Option 1). In no case may you exclude locomotives because of visible smoke, a history of durability problems, or other evidence of malmaintenance. You may test more locomotives than this section requires.

- (1) **Option 1.** To the extent possible, select locomotives from each manufacturer and remanufacturer, and from each tier level (e.g., Tier 0, Tier 1 and Tier 2) in proportion to their numbers in the your fleet. Exclude locomotives tested during the previous year. If possible, select locomotives that have been operated for at least 100 percent of their useful lives. Where there are multiple locomotives meeting the requirements of this paragraph (c)(1), randomly select the locomotives to be tested from among those locomotives. If the number of certified locomotives that have been operated for at least 100 percent of their useful lives is not large enough to fulfill the testing requirement, test locomotives still within their useful lives as follows:
 - (i) Test locomotives in your fleet that are nearest to the end of their useful lives. You may identify such locomotives as a range of values representing the fraction of the useful life already used up for the locomotives.
 - (ii) For example, you may determine that 20 percent of your fleet has been operated for at least 75 percent of their useful lives. In such a case, select locomotives for testing that have been operated for at least 75 percent of their useful lives.
- (2) **Option 2.** If you hold a certificate for some of your locomotives, you may ask us to allow you to select up to two locomotives as specified in subpart E of this part, and count those locomotives toward both your testing obligations of that subpart and this section.
- (3) **Option 3.** You may ask us to allow you to test locomotives that use parts covered under § 1033.645. If we do, it does not change the number of locomotives that you must test.
- (4) **Option 4.** We may require that you test specific locomotives, including locomotives that do not meet the criteria specified in any of the options in this section. If we do, we will specify which locomotives to test by January 1 of the calendar year for which testing is required.
- (d) **Reporting requirements.** Report all testing done in compliance with the provisions of this section to us within 45 calendar days after the end of each calendar year. At a minimum, include the following:
 - (1) Your full corporate name and address.
 - (2) For each locomotive tested, all the following:
 - (i) Corporate name of the manufacturer and last remanufacturer(s) of the locomotive (including both certificate holder and installer, where different), and the corporate name of the manufacturer or last remanufacturer(s) of the engine if different than that of the manufacturer/ remanufacturer(s) of the locomotive.
 - (ii) Year (and month if known) of original manufacture of the locomotive and the engine, and the manufacturer's model designation of the locomotive and manufacturer's model designation of the engine, and the locomotive identification number.
 - (iii) Year (and month if known) that the engine last underwent remanufacture, the engine remanufacturer's designation that reflects (or most closely reflects) the engine after the last remanufacture, and the engine family identification.
 - (iv) The number of MW-hrs and miles (where available) the locomotive has been operated since its last remanufacture.
 - (v) The emission test results for all measured pollutants.

- (e) You do not have to submit a report for any year in which you performed no emission testing under this section.
- (f) You may ask us to allow you to submit equivalent emission data collected for other purposes instead of some or all of the test data required by this section. If we allow it in advance, you may report emission data collected using other testing or sampling procedures instead of some or all of the data specified by this section.
- (g) Submit all reports to the Designated Compliance Officer.
- (h) Failure to comply fully with this section is a violation of 40 CFR 1068.101(a)(2).

[73 FR 37197, June 30, 2008, as amended at 73 FR 59191, Oct. 8, 2008]

§ 1033.815 Maintenance, operation, and repair.

All persons who own, operate, or maintain locomotives are subject to this section, except where we specify that a requirement applies to the owner.

- (a) Unless we allow otherwise, all owners of locomotives subject to the provisions of this part must ensure that all emission-related maintenance is performed on the locomotives, as specified in the maintenance instructions provided by the certifying manufacturer/remanufacturer in compliance with § 1033.125 (or maintenance that is equivalent to the maintenance specified by the certifying manufacturer/remanufacturer in terms of maintaining emissions performance).
- (b) Perform unscheduled maintenance in a timely manner. This includes malfunctions identified through the locomotive's emission control diagnostics system and malfunctions discovered in components of the diagnostics system itself. For most repairs, this paragraph (b) requires that the maintenance be performed no later than the locomotive's next periodic (92-day or 184-day) inspection. See paragraph (e) of this section, for reductant replenishment requirements in a locomotive equipped with an SCR system.
- (c) Use good engineering judgment when performing maintenance of locomotives subject to the provisions of this part. You must perform all maintenance and repair such that you have a reasonable technical basis for believing the locomotive will continue (after the maintenance or repair) to meet the applicable emission standards and FELs to which it was certified.
- (d) The owner of the locomotive must keep records of all maintenance and repairs that could reasonably affect the emission performance of any locomotive subject to the provisions of this part. Keep these records for eight years.
- (e) For locomotives equipped with emission controls requiring the use of specific fuels, lubricants, or other fluids, proper maintenance includes complying with the manufacturer/remanufacturer's specifications for such fluids when operating the locomotives. This requirement applies without regard to whether misfueling permanently disables the emission controls. For locomotives certified on ultra-low sulfur diesel fuel, but that do not include sulfur-sensitive emission controls, you may use low-sulfur diesel fuel instead of ultra-low sulfur diesel fuel, consistent with good engineering judgment. The following additional provisions apply for locomotives equipped with SCR systems requiring the use of urea or other reductants:
 - (1) You must plan appropriately to ensure that reductant will be available to the locomotive during operation.

- (2) If the SCR diagnostic indicates (or you otherwise determine) that either reductant supply or reductant quality in the locomotive is inadequate, you must replace the reductant as soon as practical.
- (3) If you operate a locomotive without the appropriate urea or other reductant, you must report such operation to us within 30 days. Note that such operation violates the requirement of this paragraph (e); however, we may consider mitigating factors (such as how long the locomotive was operated without the appropriate urea or other reductant) in determining whether to assess penalties for such violations.
- (f) Failure to perform required maintenance is a violation of the tampering prohibition in 40 CFR 1068.101(b)(1). Failure of any person to comply with the recordkeeping requirements of this section is a violation of 40 CFR 1068.101(a)(2).

[73 FR 37197, June 30, 2008, as amended at 81 FR 74010, Oct. 25, 2016; 88 FR 4486, Jan. 24, 2023]

§ 1033.820 In-use locomotives.

- (a) We may require you to supply in-use locomotives to us for testing. We will specify a reasonable time and place at which you must supply the locomotives and a reasonable period during which we will keep them for testing. We will make reasonable allowances for you to schedule the supply of locomotives to minimize disruption of your operations. The number of locomotives that you must supply is limited as follows:
 - (1) We will not require a Class I railroad to supply more than five locomotives per railroad per calendar year.
 - (2) We will not require a non-Class I railroad (or other entity subject to the provisions of this subpart) to supply more than two locomotives per railroad per calendar year. We will request locomotives under this paragraph (a)(2) only for purposes that cannot be accomplished using locomotives supplied under paragraph (a)(1) of this section.
- (b) You must make reasonable efforts to supply manufacturers/remanufacturers with the test locomotives needed to fulfill the in-use testing requirements in subpart E of this part.
- (c) Failure to fully comply with this section is a violation of 40 CFR 1068.101(a)(2).

§ 1033.825 Refueling requirements.

- (a) If your locomotive operates using a volatile fuel, your refueling equipment must be designed and used to minimize the escape of fuel vapors. This means you may not use refueling equipment in a way that renders any refueling emission controls inoperative or reduces their effectiveness.
- (b) If your locomotive operates using a gaseous fuel, the hoses used to refuel it may not be designed to be bled or vented to the atmosphere under normal operating conditions.
- (c) Failing to fully comply with the requirements of this section is a violation of 40 CFR 1068.101(b).

Subpart J—Definitions and Other Reference Information

§ 1033.901 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 Clean Air Act gives to them. The definitions follow:

Adjustable parameter has the meaning given in 40 CFR 1068.50.

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 reduce emissions in the locomotive exhaust before it is exhausted to the environment. Exhaust-gas recirculation (EGR) is not aftertreatment.

Alcohol fuel means a fuel consisting primarily (more than 50 percent by weight) of one or more alcohols: e.g., methyl alcohol, ethyl alcohol.

Alcohol-fueled locomotive means a locomotive with an engine 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.

Alternator/generator efficiency means the ratio of the electrical power output from the alternator/generator to the mechanical power input to the alternator/generator at the operating point. Note that the alternator/generator efficiency may be different at different operating points. For example, the Institute of Electrical and Electronic Engineers Standard 115 ("Test Procedures for Synchronous Machines") is an appropriate test procedure for determining alternator/generator efficiency. Other methods may also be used consistent with good engineering judgment.

Applicable emission standard or applicable standard means a standard to which a locomotive is subject; or, where a locomotive has been or is being certified to another standard or FEL, the FEL or other standard to which the locomotive has been or is being certified is the applicable standard. This definition does not apply to Subpart H of this part.

Auxiliary emission control device means any element of design that senses temperature, locomotive 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.

Auxiliary engine means a nonroad engine that provides hotel power or power during idle, but does not provide power to propel the locomotive.

Averaging means the exchange of emission credits among engine families within a given manufacturer's, or remanufacturer's product line.

Banking means the retention of emission credits by a credit holder for use in future calendar year averaging or trading as permitted by the regulations in this part.

Brake power means the sum of the alternator/generator input power and the mechanical accessory power, excluding any power required to circulate engine coolant, circulate engine lubricant, supply fuel to the engine, or operate aftertreatment devices.

Calibration means the set of specifications, including tolerances, specific to a particular design, version, or application of a component, or components, or assembly capable of functionally describing its operation over its working range.

Carryover means relating to certification based on emission data generated from an earlier model year as described in § 1033.235(d).

Certification means the process of obtaining a certificate of conformity for an engine family that complies with the emission standards and requirements in this part, or relating to that process.

Certified emission level means the highest deteriorated emission level in an engine family for a given pollutant from a given test cycle.

Class I freight railroad means a Class I railroad that primarily transports freight rather than passengers.

Class I railroad means a railroad that has been classified as a Class I railroad by the Surface Transportation Board.

Class II railroad means a railroad that has been classified as a Class II railroad by the Surface Transportation Board.

Class III railroad means a railroad that has been classified as a Class III railroad by the Surface Transportation Board.

Clean Air Act means the Clean Air Act, as amended, 42 U.S.C. 7401-7671q.

Configuration means a unique combination of locomotive hardware and calibration within an engine family. Locomotives within a single configuration differ only with respect to normal production variability (or factors unrelated to engine performance or emissions).

Crankcase emissions means airborne substances emitted to the atmosphere from any part of the locomotive crankcase's ventilation or lubrication systems. The crankcase is the housing for the crankshaft and other related internal parts.

Days means calendar days, unless otherwise specified. For example, where we specify working days, we mean calendar days excluding weekends and U.S. national holidays.

Design certify or certify by design means to certify a locomotive based on inherent design characteristics rather than your test data, such as allowed under § 1033.625. All other requirements of this part apply for such locomotives.

Designated Compliance Officer means the Director, Diesel Engine Compliance Center, U.S. Environmental Protection Agency, 2000 Traverwood Drive, Ann Arbor, MI 48105; complianceinfo@epa.gov; www.epa.gov/ve-certification.

Deteriorated emission level means the emission level that results from applying the appropriate deterioration factor to the official emission result of the emission-data locomotive.

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.

Discrete-mode means relating to the discrete-mode type of steady-state test described in § 1033.515.

Dual-fuel means relating to a locomotive designed for operation on two different fuels but not on a continuous mixture of those fuels (see § 1033.601(f)). For purposes of this part, such a locomotive remains a dual-fuel locomotive even if it is designed for operation on three or more different fuels.

Emission control system means any device, system, or element of design that controls or reduces the regulated emissions from a locomotive.

Emission credits represent the amount of emission reduction or exceedance, by a locomotive engine family, below or above the emission standard, respectively. Emission reductions below the standard are considered as "positive credits," while emission exceedances above the standard are considered as "negative credits." In addition, "projected credits" refer to emission credits based on the projected applicable production/sales volume of the engine family. "Reserved credits" are emission credits generated within a calendar year waiting to be reported to EPA at the end of the calendar year. "Actual credits" refer to emission credits based on actual applicable production/sales volume as contained in the end-of-year reports submitted to EPA.

Emission-data locomotive means a locomotive or engine that is tested for certification. This includes locomotives tested to establish deterioration factors.

Emission-related maintenance means maintenance that substantially affects emissions or is likely to substantially affect emission deterioration.

Engine family has the meaning given in § 1033.230.

Engine used in a locomotive means an engine incorporated into a locomotive or intended for incorporation into a locomotive (whether or not it is used for propelling the locomotive).

Engineering analysis means a summary of scientific and/or engineering principles and facts that support a conclusion made by a manufacturer/remanufacturer, with respect to compliance with the provisions of this part.

EPA Enforcement Officer means any officer or employee of the Environmental Protection Agency so designated in writing by the Administrator or his/her designee.

Exempted means relating to a locomotive that is not required to meet otherwise applicable standards. Exempted locomotives must conform to regulatory conditions specified for an exemption in this part 1033 or in 40 CFR part 1068. Exempted locomotives are deemed to be "subject to" the standards of this part, even though they are not required to comply with the otherwise applicable requirements. Locomotives exempted with respect to a certain tier of standards may be required to comply with an earlier tier of standards as a condition of the exemption; for example, locomotives exempted with respect to Tier 3 standards may be required to comply with Tier 2 standards.

Excluded means relating to a locomotive that either has been determined not to be a locomotive (as defined in this section) or otherwise excluded under section § 1033.5. Excluded locomotives are not subject to the standards of this part.

Exhaust emissions means substances (i.e., gases and particles) emitted to the atmosphere from any opening downstream from the exhaust port or exhaust valve of a locomotive engine.

Exhaust-gas recirculation means a technology that reduces emissions by routing exhaust gases that had been exhausted from the combustion chamber(s) back into the locomotive to be mixed with incoming air before or during combustion. The use of valve timing to increase the amount of residual exhaust gas in the combustion chamber(s) that is mixed with incoming air before or during combustion is not considered exhaust-gas recirculation for the purposes of this part.

Flexible-fuel means relating to a locomotive designed for operation on any mixture of two or more different fuels (see § 1033.601(f)).

Freshly manufactured locomotive means a new locomotive that contains fewer than 25 percent previously used parts (weighted by the dollar value of the parts) as described in § 1033.640.

Freshly manufactured engine means a new engine that has not been remanufactured. An engine becomes freshly manufactured when it is originally manufactured.

Family emission limit (FEL) means an emission level declared by the manufacturer/remanufacturer 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. The family emission limit serves as the emission standard for the engine family with respect to all required testing.

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 tank cap, fuel pump, fuel filters, fuel lines, carburetor or fuel-injection components, and all fuel-system vents.

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.

Gaseous fuel means a fuel which is a gas at standard temperature and pressure. This includes both natural gas and liquefied petroleum gas.

Good engineering judgment means judgments made consistent with generally accepted scientific and engineering principles and all available relevant information. See 40 CFR 1068.5 for the administrative process we use to evaluate good engineering judgment.

Green Engine Factor means a factor that is applied to emission measurements from a locomotive or locomotive engine that has had little or no service accumulation. The Green Engine Factor adjusts emission measurements to be equivalent to emission measurements from a locomotive or locomotive engine that has had approximately 300 hours of use.

High-altitude means relating to an altitude greater than 4000 feet (1220 meters) and less than 7000 feet (2135 meters), or equivalent observed barometric test conditions (approximately 79 to 88 kPa).

High-sulfur diesel fuel means one of the following:

- (1) For in-use fuels, high-sulfur diesel fuel means a diesel fuel with a maximum sulfur concentration greater than 500 parts per million.
- (2) For testing, high-sulfur diesel fuel has the meaning given in 40 CFR part 1065.

Hotel power means the power provided by an engine on a locomotive to operate equipment on passenger cars of a train; e.g., heating and air conditioning, lights, etc.

Hydrocarbon (HC) means the hydrocarbon group (THC, NMHC, or THCE) on which the emission standards are based for each fuel type as described in § 1033.101.

Identification number means a unique specification (for example, a model number/serial number combination) that allows someone to distinguish a particular locomotive from other similar locomotives.

Idle speed means the speed, expressed as the number of revolutions of the crankshaft per unit of time (e.g., rpm), at which the engine is set to operate when not under load for purposes of propelling the locomotive. There are typically one or two idle speeds on a locomotive as follows:

- (1) **Normal idle speed** means the idle speed for the idle throttle-notch position for locomotives that have one throttle-notch position, or the highest idle speed for locomotives that have two idle throttle-notch positions.

- (2) **Low idle speed** means the lowest idle speed for locomotives that have two idle throttle-notch positions.

Inspect and qualify means to determine that a previously used component or system meets all applicable criteria listed for the component or system in a certificate of conformity for remanufacturing (such as to determine that the component or system is functionally equivalent to one that has not been used previously).

Installer means an individual or entity that assembles remanufactured locomotives or locomotive engines.

Line-haul locomotive means a locomotive that does not meet the definition of switch locomotive. Note that this includes both freight and passenger locomotives.

Liquefied petroleum gas means the commercial product marketed as propane or liquefied petroleum gas.

Locomotive means a self-propelled piece of on-track equipment designed for moving or propelling cars that are designed to carry freight, passengers or other equipment, but which itself is not designed or intended to carry freight, passengers (other than those operating the locomotive) or other equipment. The following other equipment are not locomotives (see 40 CFR parts 86, 89, and 1039 for this diesel-powered equipment):

- (1) Equipment designed for operation both on highways and rails is not a locomotive.
- (2) Specialized railroad equipment for maintenance, construction, post-accident recovery of equipment, and repairs; and other similar equipment, are not locomotives.
- (3) Vehicles propelled by engines with total rated power of less than 750 kW (1006 hp) are not locomotives, unless the owner (which may be a manufacturer) chooses to have the equipment certified to meet the requirements of this part (under § 1033.615). Where equipment is certified as a locomotive pursuant to this paragraph (3), it is subject to the requirements of this part for the remainder of its service life. For locomotives propelled by two or more engines, the total rated power is the sum of the rated power of each engine.

Locomotive engine means an engine that propels a locomotive.

Low-hour means relating to a locomotive with stabilized emissions and represents the undeteriorated emission level. This would generally involve less than 300 hours of operation.

Low mileage locomotive means a locomotive during the interval between the time that normal assembly operations and adjustments are completed and the time that either 10,000 miles of locomotive operation or 300 additional operating hours have been accumulated (including emission testing if performed). Note that we may deem locomotives with additional operation to be low mileage locomotives, consistent with good engineering judgment.

Low-sulfur diesel fuel means one of the following:

- (1) For in-use fuels, **low-sulfur diesel fuel** means a diesel fuel market as low-sulfur diesel fuel having a maximum sulfur concentration of 500 parts per million.
- (2) For testing, **low-sulfur diesel fuel** has the meaning given in 40 CFR part 1065.

Malfunction means a condition in which the operation of a component in a locomotive or locomotive engine occurs in a manner other than that specified by the certifying manufacturer/remanufacturer (e.g., as specified in the application for certification); or the operation of the locomotive or locomotive engine in that condition.

Manufacture means the physical and engineering process of designing, constructing, and assembling a locomotive or locomotive engine.

Manufacturer has the meaning given in section 216(1) of the Clean Air Act with respect to freshly manufactured locomotives or engines. In general, this term includes any person who manufactures a locomotive or engine for sale in the United States or otherwise introduces a new locomotive or engine into commerce in the United States. This includes importers who import locomotives or engines for resale.

Manufacturer/remanufacturer means the manufacturer of a freshly manufactured locomotive or engine or the remanufacturer of a remanufactured locomotive or engine, as applicable.

Model year means a calendar year in which a locomotive is manufactured or remanufactured.

New, when relating to a locomotive or locomotive engine, has the meaning given in paragraph (1) of this definition, except as specified in paragraph (2) of this definition:

- (1) A locomotive or engine is new if its equitable or legal title has never been transferred to an ultimate purchaser. Where the equitable or legal title to a locomotive or engine is not transferred prior to its being placed into service, the locomotive or engine ceases to be new when it is placed into service. A locomotive or engine also becomes new if it is remanufactured or refurbished (as defined in this section). A remanufactured locomotive or engine ceases to be new when placed back into service. With respect to imported locomotives or locomotive engines, the term "new locomotive" or "new locomotive engine" also means a locomotive or locomotive engine that is not covered by a certificate of conformity under this part or 40 CFR part 92 at the time of importation, and that was manufactured or remanufactured after January 1, 2000, which would have been applicable to such locomotive or engine had it been manufactured or remanufactured for importation into the United States. Note that replacing an engine in one locomotive with an unremanufactured used engine from a different locomotive does not make a locomotive new.
- (2) The provisions of paragraph (1) of this definition do not apply for the following cases:
 - (i) Locomotives and engines that were originally manufactured before January 1, 1973 are not considered to become new when remanufactured unless they have been upgraded (as defined in this section). The provisions of paragraph (1) of this definition apply for locomotives that have been upgraded.
 - (ii) Locomotives that are owned and operated by a small railroad and that have never been certified (i.e., manufactured or remanufactured into a certified configuration) are not considered to become new when remanufactured. The provisions of paragraph (1) of this definition apply for locomotives that have previously been remanufactured into a certified configuration.
 - (iii) Locomotives originally certified under § 1033.150(e) do not become new when remanufactured, except as specified in § 1033.615.
 - (iv) Locomotives that operate only on non-standard gauge rails do not become new when remanufactured if no certified remanufacturing system is available for them.

Nonconforming means relating to a locomotive that is not covered by a certificate of conformity prior to importation or being offered for importation (or for which such coverage has not been adequately demonstrated to EPA); or a locomotive which was originally covered by a certificate of conformity, but which is not in a certified configuration, or otherwise does not comply with the conditions of that

certificate of conformity. (NOTE: Domestic locomotives and locomotive engines not covered by a certificate of conformity prior to their introduction into U.S. commerce are considered to be noncomplying locomotives and locomotive engines.)

Non-locomotive-specific engine means an engine that is sold for and used in non-locomotive applications much more than for locomotive applications.

Nonmethane hydrocarbon has the meaning given in 40 CFR 1065.1001. This generally means the difference between the emitted mass of total hydrocarbons and the emitted mass of methane.

Nonroad means relating to nonroad engines as defined in 40 CFR 1068.30.

Official emission result means the measured emission rate for an emission-data locomotive on a given duty cycle before the application of any deterioration factor, but after the application of regeneration adjustment factors, Green Engine Factors, and/or humidity correction factors.

Opacity means the fraction of a beam of light, expressed in percent, which fails to penetrate a plume of smoke, as measured by the procedure specified in § 1033.525.

Original manufacture means the event of freshly manufacturing a locomotive or locomotive engine. The date of original manufacture is the date of final assembly, except as provided in § 1033.640. Where a locomotive is manufactured under § 1033.620(b), the date of original manufacture is the date on which the final assembly of locomotive was originally scheduled.

Original remanufacture means the first remanufacturing of a locomotive at which the locomotive is subject to the emission standards of this part.

Owner/operator means the owner and/or operator of a locomotive.

Owners manual means a written or electronic collection of instructions provided to ultimate purchasers to describe the basic operation of the locomotive.

Oxides of nitrogen has the meaning given in 40 CFR part 1065.

Particulate trap means a filtering device that is designed to physically trap all particulate matter above a certain size.

Passenger locomotive means a locomotive designed and constructed for the primary purpose of propelling passenger trains, and providing power to the passenger cars of the train for such functions as heating, lighting and air conditioning.

Petroleum fuel means gasoline or diesel fuel or another liquid fuel primarily derived from crude oil.

Placed into service means put into initial use for its intended purpose after becoming new.

Power assembly means the components of an engine in which combustion of fuel occurs, and consists of the cylinder, piston and piston rings, valves and ports for admission of charge air and discharge of exhaust gases, fuel injection components and controls, cylinder head and associated components.

Primary fuel means the type of fuel (e.g., diesel fuel) that is consumed in the greatest quantity (mass basis) when the locomotive is operated in use.

Produce means to manufacture or remanufacture. Where a certificate holder does not actually assemble the locomotives or locomotive engines that it manufactures or remanufactures, produce means to allow other entities to assemble locomotives under the certificate holder's certificate.

Railroad means a commercial entity that operates locomotives to transport passengers or freight.

Ramped-modal means relating to the ramped-modal type of testing in subpart F of this part.

Rated power has the meaning given in § 1033.140.

Refurbish has the meaning given in § 1033.640.

Remanufacture means one of the following:

(1)

- (i) To replace, or inspect and qualify, each and every power assembly of a locomotive or locomotive engine, whether during a single maintenance event or cumulatively within a five-year period.
- (ii) To upgrade a locomotive or locomotive engine.
- (iii) To convert a locomotive or locomotive engine to enable it to operate using a fuel other than it was originally manufactured to use.
- (iv) To install a remanufactured engine or a freshly manufactured engine into a previously used locomotive.
- (v) To repair a locomotive engine that does not contain power assemblies to a condition that is equivalent to or better than its original condition with respect to reliability and fuel consumption.

(2) Remanufacture also means the act of remanufacturing.

Remanufacture system or remanufacturing system means all components (or specifications for components) and instructions necessary to remanufacture a locomotive or locomotive engine in accordance with applicable requirements of this part.

Remanufactured locomotive means either a locomotive powered by a remanufactured locomotive engine, a repowered locomotive, or a refurbished locomotive.

Remanufactured locomotive engine means a locomotive engine that has been remanufactured.

Remanufacturer has the meaning given to "manufacturer" in section 216(1) of the Clean Air Act with respect to remanufactured locomotives. (See §§ 1033.1 and 1033.601 for applicability of this term.) This term includes:

- (1) Any person that is engaged in the manufacture or assembly of remanufactured locomotives or locomotive engines, such as persons who:
 - (i) Design or produce the emission-related parts used in remanufacturing.
 - (ii) Install parts in an existing locomotive or locomotive engine to remanufacture it.
 - (iii) Own or operate the locomotive or locomotive engine and provide specifications as to how an engine is to be remanufactured (i.e., specifying who will perform the work, when the work is to be performed, what parts are to be used, or how to calibrate the adjustable parameters of the engine).
- (2) Any person who imports remanufactured locomotives or remanufactured locomotive engines.

Repower means replacement of the engine in a previously used locomotive with a freshly manufactured locomotive engine. See § 1033.640.

Repowered locomotive means a locomotive that has been repowered with a freshly manufactured engine.

Revoke has the meaning given in 40 CFR 1068.30. In general this means to terminate the certificate or an exemption for an engine family.

Round means to round numbers as specified in 40 CFR 1065.1001.

Service life means the total life of a locomotive. Service life begins when the locomotive is originally manufactured and continues until the locomotive is permanently removed from service.

Small manufacturer/remanufacturer means a manufacturer/remanufacturer with 1,000 or fewer employees. For purposes of this part, the number of employees includes all employees of the manufacturer/remanufacturer's parent company, if applicable.

Small railroad means a railroad meeting the criterion of paragraph (1) of this definition, but not either of the criteria of paragraphs (2) and (3) of this definition.

- (1) To be considered a small railroad, a railroad must qualify as a small business under the Small Business Administration's regulations in 13 CFR part 121.
- (2) Class I and Class II railroads (and their subsidiaries) are not small railroads.
- (3) Intercity passenger and commuter railroads are excluded from this definition of small railroad. Note that this paragraph (3) does not exclude tourist railroads.

Specified adjustable range means the range of allowable settings for an adjustable component specified by a certificate of conformity.

Specified by a certificate of conformity or specified in a certificate of conformity means stated or otherwise specified in a certificate of conformity or an approved application for certification.

Sulfur-sensitive technology means an emission control technology that would experience a significant drop in emission control performance or emission-system durability when a locomotive is operated on low-sulfur diesel fuel with a sulfur concentration of 300 to 500 ppm as compared to when it is operated on ultra low-sulfur diesel fuel (*i.e.*, fuel with a sulfur concentration less than 15 ppm). Exhaust gas recirculation is not a sulfur-sensitive technology.

Suspend has the meaning given in 40 CFR 1068.30. In general this means to temporarily discontinue the certificate or an exemption for an engine family.

Switch locomotive means a locomotive that is powered by an engine with a maximum rated power (or a combination of engines having a total rated power) of 2300 hp or less. Include auxiliary engines in your calculation of total power if the engines are permanently installed on the locomotive and can be operated while the main propulsion engine is operating. Do not count the power of auxiliary engines that operate only to reduce idling time of the propulsion engine.

Test locomotive means a locomotive or engine in a test sample.

Test sample means the collection of locomotives or engines selected from the population of an engine family for emission testing. This may include testing for certification, production-line testing, or in-use testing.

Tier 0 or Tier 0 + means relating to the Tier 0 emission standards, as shown in § 1033.101.

Tier 1 or Tier 1 + means relating to the Tier 1 emission standards, as shown in § 1033.101.

Tier 2 or Tier 2 + means relating to the Tier 2 emission standards, as shown in § 1033.101.

Tier 3 means relating to the Tier 3 emission standards, as shown in § 1033.101.

Tier 4 means relating to the Tier 4 emission standards, as shown in § 1033.101.

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 hydrocarbon, alcohols and aldehydes, or other organic compounds that are measured separately as contained in a gas sample, expressed as exhaust hydrocarbon from petroleum-fueled locomotives. The atomic hydrogen-to-carbon ratio of the equivalent hydrocarbon is 1.85:1.

Ultimate purchaser means the first person who in good faith purchases a new locomotive for purposes other than resale.

Ultra low-sulfur diesel fuel means one of the following:

- (1) For in-use fuels, *ultra low-sulfur diesel fuel* means a diesel fuel marketed as ultra low-sulfur diesel fuel having a maximum sulfur concentration of 15 parts per million.
- (2) For testing, *ultra low-sulfur diesel fuel* has the meaning given in 40 CFR part 1065.

Upcoming model year means for an engine family the model year after the one currently in production.

Upgrade means one of the following types of remanufacturing.

- (1) Repowering a locomotive that was originally manufactured prior to January 1, 1973.
- (2) Refurbishing a locomotive that was originally manufactured prior to January 1, 1973 in a manner that is not freshly manufacturing.
- (3) Modifying a locomotive that was originally manufactured prior to January 1, 1973 (or a locomotive that was originally manufactured on or after January 1, 1973, and that is not subject to the emission standards of this part), such that it is intended to comply with the Tier 0 standards. See § 1033.615.

Useful life means the period during which the locomotive engine is designed to properly function in terms of reliability and fuel consumption, without being remanufactured, specified as work output or miles. It is the period during which a locomotive is required to comply with all applicable emission standards. See § 1033.101(g).

Void has the meaning given in 40 CFR 1068.30. In general this means to invalidate a certificate or an exemption both retroactively and prospectively.

Volatile fuel means a volatile liquid fuel or any fuel that is a gas at atmospheric pressure. Gasoline, natural gas, and LPG are volatile fuels.

Volatile liquid fuel means any liquid 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.

[73 FR 37197, June 30, 2008, as amended at 73 FR 59191, Oct. 8, 2008; 75 FR 22987, Apr. 30, 2010; 81 FR 74010, Oct. 25, 2016; 86 FR 34376, June 29, 2021; 88 FR 4486, Jan. 24, 2023]

§ 1033.905 Symbols, acronyms, and abbreviations.

The following symbols, acronyms, and abbreviations apply to this part:

ABT averaging, banking, and trading.

AECD auxiliary emission control device.

AESS automatic engine stop/start

AF adjustment factor (see § 1033.530).

CFR Code of Federal Regulations.

CH₄ methane.

CO carbon monoxide.

CO₂ carbon dioxide.

EPA Environmental Protection Agency.

FEL Family Emission Limit.

g/bhp-hr grams per brake horsepower-hour.

HC hydrocarbon.

hp horsepower.

LPG liquefied petroleum gas.

LSD low sulfur diesel.

MW megawatt.

N₂O nitrous oxide.

NIST National Institute of Standards and Technology.

NMHC nonmethane hydrocarbons.

NO_x oxides of nitrogen.

PM particulate matter.

rpm revolutions per minute.

SAE Society of Automotive Engineers.

SCR selective catalytic reduction.

SEA Selective Enforcement Audit.

THC total hydrocarbon.

THCE total hydrocarbon equivalent.

UL useful life.

ULSD ultra low sulfur diesel.

U.S. United States.

U.S.C. United States Code.

[73 FR 37197, June 30, 2008, as amended at 74 FR 56508, Oct. 30, 2008; 75 FR 22987, Apr. 30, 2010]

§ 1033.915 Confidential information.

The provisions of 40 CFR 1068.10 apply for information you consider confidential.

[81 FR 74010, Oct. 25, 2016]

§ 1033.920 How to request 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.
- (c) If we agree to hold a hearing, we will use the procedures specified in 40 CFR part 1068, subpart G.

§ 1033.925 Reporting and recordkeeping 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 are expected to keep your own copy of required records rather than relying on someone else to keep records on your behalf. 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 § 1033.255, 40 CFR 1068.25, and 40 CFR 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 § 1033.801).
- (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. 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 in this chapter. The following items illustrate the kind of reporting and recordkeeping we require for locomotives regulated under this part:
 - (1) We specify the following requirements related to locomotive certification in this part 1033:
 - (i) In § 1033.150 we include various reporting and recordkeeping requirements related to interim provisions.
 - (ii) In subpart C of this part we identify a wide range of information required to certify engines.
 - (iii) In § 1033.325 we specify certain records related to production-line testing.
 - (iv) 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.
 - (v) In §§ 1033.725, 1033.730, and 1033.735 we specify certain records related to averaging, banking, and trading.
 - (vi) In subpart I of this part we specify certain records related to meeting requirements for remanufactured engines.
 - (2) We specify the following requirements related to testing in 40 CFR part 1065:
 - (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 the specific information and data items to record when measuring emissions.
 - (3) We specify the following requirements related to the general compliance provisions in 40 CFR part 1068:
 - (i) In 40 CFR 1068.5 we establish a process for evaluating good engineering judgment related to testing and certification.
 - (ii) In 40 CFR 1068.25 we describe general provisions related to sending and keeping information.
 - (iii) In 40 CFR 1068.27 we require manufacturers to make locomotives available for our testing or inspection if we make such a request.

- (iv) In 40 CFR part 1068, subpart C, we identify several reporting and recordkeeping items for making demonstrations and getting approval related to various exemptions.
- (v) In 40 CFR part 1068, subpart D, we identify several reporting and recordkeeping items for making demonstrations and getting approval related to importing locomotives and engines.
- (vi) In 40 CFR 1068.450 and 1068.455 we specify certain records related to testing production-line locomotives in a selective enforcement audit.
- (vii) In 40 CFR 1068.501 we specify certain records related to investigating and reporting emission-related defects.
- (viii) In 40 CFR 1068.525 and 1068.530 we specify certain records related to recalling nonconforming locomotives.
- (ix) In 40 CFR part 1068, subpart G, we specify certain records for requesting a hearing.

[81 FR 74010, Oct. 25, 2016, as amended at 86 FR 34376, June 29, 2021]

Appendix A to Part 1033—Original Standards for Tier 0, Tier 1 and Tier 2 Locomotives

- (a) Locomotives were originally subject to Tier 0, Tier 1, and Tier 2 emission standards described in paragraph (b) of this appendix as follows:
 - (1) The Tier 0 and Tier 1 standards in paragraph (b) of this appendix applied instead of the Tier 0 and Tier 1 standards of § 1033.101 for locomotives manufactured and remanufactured before January 1, 2010. For example, a locomotive that was originally manufactured in 2004 and remanufactured on April 10, 2011, was subject to the original Tier 1 standards specified in paragraph (b) of this appendix and became subject to the Tier 1 standards of § 1033.101 when it was remanufactured on April 10, 2011.
 - (2) The Tier 2 standards in paragraph (b) of this appendix applied instead of the Tier 2 standards of § 1033.101 for locomotives manufactured and remanufactured before January 1, 2013.
- (b) The following NO_x and PM standards applied before the dates specified in paragraph (a) of this appendix:

TABLE 1 TO APPENDIX A—ORIGINAL LOCOMOTIVE EMISSION STANDARDS

Type of standard	Year of original manufacture	Tier	Standards (g/bhp-hr)		
			NO _x	PM-primary	PM-alternate ^a
Line-haul	1973-1992	Tier 0	9.5	0.60	0.30
	1993-2004	Tier 1	7.4	0.45	0.22
	2005-2011	Tier 2	5.5	0.20	0.10
Switch	1973-1992	Tier 0	14.0	0.72	0.36

^a Locomotives certified to the alternate PM standards are also subject to alternate CO standards of 10.0 for the line-haul cycle and 12.0 for the switch cycle.

Type of standard	Year of original manufacture	Tier	Standards (g/bhp-hr)		
			NO _x	PM-primary	PM-alternate ^a
	1993-2004	Tier 1	11.0	0.54	0.27
	2005-2011	Tier 2	8.1	0.24	0.12

^a Locomotives certified to the alternate PM standards are also subject to alternate CO standards of 10.0 for the line-haul cycle and 12.0 for the switch cycle.

- (c) The original Tier 0, Tier 1, and Tier 2 standards for HC and CO emissions and smoke are the same standards identified in § 1033.101.

[88 FR 4486, Jan. 24, 2023]