

the provisions of part 1065 of this chapter to test locomotives to determine whether they meet the 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.

Subpart B—Emission Standards and Related Requirements

§ 1033.101 Exhaust emission standards.

See §§ 1033.102 and 1033.150 to determine how the emission standards of this section 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	^a 0.10	0.30	1.5
2012–2014	Tier 3 ^c	5.5	0.10	0.30	1.5
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 de-

finer 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
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.

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^bThe PM standard for new Tier 2 switch locomotives is 0.24 g/bhp-hr until January 1, 2013, except as specified in § 1033.150(a).

^cManufacturers may elect to meet a combined NO_x+HC standard of 1.3 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. No FEL may be higher than the previously applicable Tier of standards. For example, no FEL for a Tier 1 locomotive may be higher than the Tier 0 standard.

(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:

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

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: NMHC emissions.

(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.

(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 Low Sulfur Diesel (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 Tier 0, Tier 1, or Tier 2 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 less than or equal to one-half of the otherwise applicable PM standard. For example, a manufacturer certifying Tier 1 locomotives to a 0.11 g/bhp-hr PM standard may certify those locomotives to the alternate CO standard of 10.0 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 loco-

motives 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.

§ 1033.102 Transition to the standards of this part.

(a) Except as specified in § 1033.150(a), the Tier 0 and Tier 1 standards of § 1033.101 apply for new locomotives beginning January 1, 2010, except as specified in § 1033.150(a). The Tier 0 and Tier 1 standards of 40 CFR part 92 apply for earlier model years.

(b) Except as specified in § 1033.150(a), the Tier 2 standards of § 1033.101 apply for new locomotives beginning January 1, 2013. The Tier 2 standards of 40 CFR part 92 apply for earlier model years.

(c) The Tier 3 and Tier 4 standards of § 1033.101 apply for the model years specified in that section.

§ 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.