

(e) Subparts E, F, G, and H of this part specify requirements for manufacturers and remanufacturers after certification; that is during production and use of the locomotives and locomotive engines.

(f) Subpart I of this part contains requirements applicable to the importation of locomotives and locomotive engines.

(g) Subpart K of this part contains requirements applicable to the owners and operators of locomotives and locomotive engines.

(h) Subpart L of this part describes prohibited acts and contains other enforcement provisions relating to locomotives and locomotive engines.

(i) Unless specified otherwise, the provisions of this part apply to all locomotives and locomotive engines subject to the emission standards of this part.

§ 92.7 General standards.

(a) Locomotives and locomotive engines may not be equipped with defeat devices.

(b) New locomotives fueled with a volatile fuel shall be designed to minimize evaporative emissions during normal operation, including periods when the engine is shut down.

(c)(1) Locomotive hardware for refueling locomotives fueled with a volatile fuel shall be designed so as to minimize the escape of fuel vapors.

(2) Hoses used to refuel gaseous-fueled locomotives shall not be designed to be bled or vented to the atmosphere under normal operating conditions.

(3) No valves or pressure relief vents shall be used on gaseous-fueled locomotives except as emergency safety devices, and these shall not operate at normal system operating flows and pressures.

(d) All new locomotives and new locomotive engines subject to any of the standards imposed by this subpart shall, prior to sale, introduction into service, or return to service, be designed to include features that compensate for changes in altitude to ensure that the locomotives or locomotive engines will comply with the applicable emission standards when op-

erated at any altitude less than 7000 feet above sea level.

§ 92.8 Emission standards.

(a) *Exhaust standards.* Exhaust emissions from locomotives and locomotive engines, when measured in accordance with the provisions of Subpart B of this part, shall comply with both the applicable line-haul duty-cycle standards, and the applicable switch duty-cycle standards of paragraph (a)(1) (and/or the standards of paragraphs (a)(3) and (a)(4) of this section, as applicable) of this section, and the smoke standards of paragraph (a)(2) of this section. Emissions that do not exceed the standards comply with the standards.

(1) *Gaseous and particulate standards.* Gaseous and particulate emission standards are expressed as gram per brake horsepower hour (g/bhp-hr). Non-methane hydrocarbon standards apply to locomotives and locomotive engines fueled with natural gas, and any combination of natural gas and other fuels where natural gas is the primary fuel; total hydrocarbon equivalent standards apply to locomotives and locomotive engines fueled with an alcohol, and any combination of alcohol and other fuels where alcohol is the primary fuel. Total hydrocarbon standards apply to all other locomotives and locomotive engines; that is, those not fueled by natural gas or alcohol. The line-haul duty-cycle standards and switch duty-cycle standards apply to the respective cycle-weighted emission rates as calculated in subpart B of this part.

(i) *Tier 0.* The following locomotives (and the engines used in the following locomotives) are subject to the Tier 0 emission standards listed in Table A8-1 of this section: Locomotives manufactured on, or after, January 1, 1973, and before January 1, 2002; and upgraded locomotives manufactured prior to January 1, 1973. The standards apply when such a locomotive or locomotive engine is manufactured, remanufactured, or imported on or after January 1, 2002; except where the locomotive was previously certified to one or more FELs under subpart D of this part instead of the applicable standards, in which case, the applicable standards are replaced at each subsequent remanufacture by the FELs specified by

the previous certificate. Example: a locomotive that is certified to a NO_x FEL of 8.0 g/bhp-hr must be recertified to a NO_x FEL of 8.0 g/bhp-hr at each subsequent remanufacture, except as allowed by paragraph (a)(4)(iii) of this section.

(ii) *Tier 1.* Locomotives and engines used in locomotives manufactured on, or after, January 1, 2002, and before January 1, 2005 are subject to the Tier 1 standards listed in Table A8-2 of this section. The standards apply when such a locomotive or locomotive engine is manufactured or imported, and each time it is remanufactured; except where the locomotive was previously certified to one or more FELs under subpart D of this part instead of the applicable standard, in which case, the standards are replaced at each subsequent remanufacture by the FELs specified by the previous certificate.

(iii) *Tier 2.* Locomotives and engines used in locomotives manufactured on, or after, January 1, 2005 are subject to the Tier 2 standards listed in Table A8-3 of this section. The standards apply when such a locomotive or locomotive engine is manufactured or imported, and each time it is remanufactured except where the locomotive was previously certified to one or more FELs under subpart D of this part instead of the applicable standard, in which case, the standards are replaced at each subsequent remanufacture by the FELs specified by the previous certificate.

(2) *Smoke standards.* The smoke opacity standards listed in Table A8-4 of this section apply, as specified in the table, to locomotives and locomotive engines subject to the Tier 0, Tier 1, or Tier 2 standards. Smoke emissions, when measured in accordance with the provisions of Subpart B of this part, shall not exceed the standards of Table A8-4 of this section.

(3) *Alternate standards.* In lieu of the CO and PM standards specified in paragraph (a)(1) of this section, manufacturers and remanufacturers may elect to comply with the alternate CO and PM standards listed in Table A8-5 of this section. Manufacturers and remanufacturers electing to comply with these alternate standards must comply with both the CO and PM standards listed in Table A8-5 of this section.

(4) *Averaging, banking and trading.* (i) In lieu of the NO_x and/or PM standards specified in paragraph (a)(1) of this section, manufacturers and remanufacturers may elect to include engine families in the averaging, banking, and trading program, the provisions of which are specified in subpart D of this part. The manufacturer or remanufacturer must set family emission limits (FEL) for the applicable duty-cycle. This FEL serves as the standard for that family.

(ii) When a locomotive is certified to an FEL other than the applicable standard, it must be recertified to that same FEL at all subsequent remanufactures, except as specified otherwise in paragraph (a)(4)(iii) of this section.

(iii) After a locomotive has been certified to any given FEL other than the applicable standard, it may be recertified to a different FEL at a subsequent remanufacture, as allowed by subpart D of this part. For subsequent remanufactures (i.e. those remanufactures that occur after the recertification to a different FEL), the locomotive must be recertified to the FEL(s) and standards that were applicable to the locomotive during its previous useful life, except where specified otherwise by subpart D of this part.

(5) *Tables.* The tables referenced in paragraphs (a) (1) through (3) of this section follow:

TABLE A8-1—TIER 0 STANDARDS
[g/bhp-hr]

	Line-haul ¹ cycle standard	Switch cycle standard
NO _x	9.5	14.0
PM	0.60	0.72
CO	5.0	8.0
THC	1.00	2.10
NMHC	1.00	2.10
THCE	1.00	2.10

¹Line-haul standards do not apply to Tier 0 switch locomotives.

TABLE A8-2—TIER 1 STANDARDS
[g/bhp-hr]

	Line-haul cycle standard	Switch cycle standard
NO _x	7.4	11.0
PM	0.45	0.54
CO	2.2	2.5
THC	0.55	1.20
NMHC	0.55	1.20

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TABLE A8-2—TIER 1 STANDARDS—Continued
[g/bhp-hr]

	Line-haul cycle standard	Switch cycle standard
THCE	0.55	1.20

TABLE A8-3—TIER 2 STANDARDS
[g/bhp-hr]

	Line-haul cycle standard	Switch cycle standard
NO _x	5.5	8.1
PM	0.20	0.24
CO	1.5	2.4
THC	0.30	0.60
NMHC	0.30	0.60
THCE	0.30	0.60

TABLE A8-4—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	20	40	50

TABLE A8-5—ALTERNATE CO AND PM STANDARDS
[g/bhp-hr]

	Line-haul cycle		Switch cycle	
	CO	PM	CO	PM
Tier 0	10.0	0.30	12.0	0.36
Tier 1	10.0	0.22	12.0	0.27
Tier 2	10.0	0.10	12.0	0.12

(b) No crankcase emissions shall be discharged directly into the ambient atmosphere from any new locomotive or new locomotive engine, except as allowed by paragraph (1) of this paragraph (b).

(1) Discharge of crankcase emissions into the engine exhaust complies with this prohibition, provided crankcase emissions are measured and included with exhaust emissions. Other discharge of crankcase emissions complies with this prohibition, provided crankcase emissions are measured in all certification, production-line, and in-use tests and the masses are added mathematically to the exhaust emissions.

(2) Compliance with this standard is required throughout the entire service

life of the locomotive or locomotive engine.

(c) *Notch standards.* (1) Exhaust emissions from locomotives and locomotive engines shall not exceed the notch standards set forth in paragraph (c)(2) of this section, except as allowed in paragraph (c)(3) of this section, when measured using any test procedures under any test conditions.

(2) Notch standards for each pollutant for each notch are calculated from the certified notch emission rate as follows:

$$\text{Notch standard} = (E_x) \times (1.1 + (1 - E_{LHX}/std))$$

Where:

E_x = The deteriorated brake-specific emission rate (for pollutant x) for the notch (i.e., the brake-specific emission rate calculated under subpart B of this part, multiplied by the deterioration factor in the application for certification expressed as a multiplicative deterioration factor); where x is NO_x, HC (or NMHC or THCE, as applicable), CO or PM.

E_{LHX} = The deteriorated line-haul duty-cycle weighted brake-specific emission rate for pollutant x, as reported in the application for certification.

std = The applicable line-haul duty-cycle standard, or the certified line-haul duty-cycle FEL for locomotives or locomotive engines participating in the averaging, banking and trading program for NO_x or PM.

(3) Where exhaust emissions exceed the notch standards set forth in paragraph (c)(2) of this section, the locomotive or locomotive engine is considered to be in compliance with such standards only if:

(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); or

(ii) The exceeding emissions result from a design feature that was described (including its effect on emissions) in the approved application for certification, and is necessary for safety or is otherwise allowed by this part.

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§ 92.9 Compliance with emission standards.

(a) The general standards in § 92.7 and the emission standards in § 92.8 apply to the emissions from new locomotives