

Appendix 5

U.S. Emission Standards for Mobile Sources

Table A5-1. On-Road Regulations for PM Control. (Source: U.S. EPA)

Regulation	Sector	Model Years Applicable	PM Standard	Units
Tier 0 rule	light duty diesel trucks 1	1981-1993	0.26	g/mile
Tier 0 rule	light duty diesel trucks 2	1981-1993	0.13	g/mile
1985 Heavy Duty Diesel Rule	heavy-duty highway CI engines	1988-90	0.60	g/bhp-hr
1991 Heavy Duty Diesel Rule	heavy-duty highway CI engines	1991-1993	0.25	g/bhp-hr
1991 Heavy Duty Diesel Rule	urban buses	1991-1993	0.10	g/bhp-hr
Tier 1 rule	light duty diesel trucks 1 and 2	1994-1999	0.10	g/mile
1994 Heavy Duty Diesel Rule	heavy-duty highway CI engines	1994-2006	0.10	g/bhp-hr
1994 Heavy Duty Diesel Rule	urban buses	1994-1995	0.07	g/bhp-hr
1994 Heavy Duty Diesel Rule	urban buses	1996-2006	0.05	g/bhp-hr
2001 Heavy Duty Diesel Rule	heavy duty onroad CI engines	2007+	0.01	g/bhp-hr
NLEV rule	light duty diesel LEV cars and trucks	1999-2003	0.08	g/mile
NLEV rule	light duty diesel ZLEV cars and trucks	1999-2003	0.04	g/mile
2000 Tier 2 Rule	LDV LLDT bins 2-6	2004	0.01	g/mile
2000 Tier 2 Rule	LDV LLDT - 50% bins 2-6	2005	0.01	g/mile
2000 Tier 2 Rule	LDV LLDT - 75% bins 2-6	2006	0.01	g/mile
2000 Tier 2 Rule	LDV LLDT - bins 2-6	2007	0.01	g/mile
2000 Tier 2 Rule	LDV LLDT - 25% bins 7-8	2004	0.02	g/mile
2000 Tier 2 Rule	LDV LLDT - 50% bins 7-8	2005	0.02	g/mile
2000 Tier 2 Rule	LDV LLDT - 75% bins 7-8	2006	0.02	g/mile
2000 Tier 2 Rule	LDV LLDT - bins 7-8	2007	0.02	g/mile
2000 Tier 2 Rule	LDV LLDT - bin 9	2004-2006	0.06	g/mile
2000 Tier 2 Rule	LDV LLDT - bin 10	2004-2006	0.08	g/mile

Table A5-2. On-Road Gasoline-Vehicle Regulations. (Source: U.S. EPA)

Regulation	Sector	Model Years Applicable	PM Standard	Units
2000 Tier 2 Rule	Onroad Gasoline - 25% bins 2-6	2004	0.01	g/mile
2000 Tier 2 Rule	Onroad Gasoline - 50% bins 2-6	2005	0.01	g/mile
2000 Tier 2 Rule	Onroad Gasoline - 75% bins 2-6	2006	0.01	g/mile
2000 Tier 2 Rule	Onroad Gasoline - bins 2-6	2007	0.01	g/mile
2000 Tier 2 Rule	Onroad Gasoline - 25% bins 7-8	2004	0.02	g/mile
2000 Tier 2 Rule	Onroad Gasoline - 50% bins 7-8	2005	0.02	g/mile
2000 Tier 2 Rule	Onroad Gasoline - 75% bins 7-8	2006	0.02	g/mile
2000 Tier 2 Rule	Onroad Gasoline - bins 7-8	2007	0.02	g/mile
2000 Tier 2 Rule	Onroad Gasoline - bin 9	2004-2006	0.06	g/mile
2000 Tier 2 Rule	Onroad Gasoline - bin 10	2004-2006	0.08	g/mile
2001 Heavy Duty Diesel Rule	Heavy Duty Onroad Gasoline 50%	2008	0.01	g/bhp-hr
2001 Heavy Duty Diesel Rule	Heavy Duty Onroad Gasoline 100%	2009	0.01	g/bhp-hr

Table A5-3. Nonroad Diesel Regulations. (Source: U.S. EPA)

Regulation	Sector	Model Years Applicable	PM Standard	Units
2004 Nonroad Tier 4	Nonroad Diesel, hp<25	2008	0.3	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, 25≤hp<75	2008	0.22	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, 75≤hp<175	2012	0.01	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, 175≤hp<750	2011	0.01	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, hp750	2011	0.075	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, hp750 generator sets	2015	0.02	g/bhp-hr
2004 Nonroad Tier 4	Nonroad Diesel, hp750, all other eqpt	2015	0.03	g/bhp-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, kW<8	2000	1	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, kW<8	2005	0.8	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 8≤kW<19	2000	0.8	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 8≤kW<19	2005	0.8	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 19≤kW<38	1999	0.8	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 19≤kW<38	2004	0.6	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 37≤kW<75	2004	0.4	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 75≤kW<130	2003	0.3	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 130≤kW<225	1996	0.54	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 130≤kW<225	2003	0.2	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 225≤kW<450	1996	0.54	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 225≤kW<450	2001	0.2	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 450≤kW<560	1996	0.54	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, 450≤kW<560	2002	0.2	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, kW>560	2000	0.54	g/kW-hr
1998 Nonroad Diesel Engines Rule	Nonroad Diesel, kW>560	2006	0.2	g/kW-hr

Table A5-4. Locomotive Regulations.^a (Source: U.S. EPA)

Regulation	Sector	Model Years Applicable	PM Standard	Units
2008 LocoMarine Rule	Locomotive - Line Haul	Tier 0 (1973-1992)	0.22	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Switch	Tier 0 (1973-2001)	0.26	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Line Haul	Tier 1 (1993-2004)	0.22	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Switch	Tier 1 (2002-2004)	0.26	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Line Haul	Tier 2 (2005-2011)	0.10	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Switch	Tier 2 (2005-2010)	0.13	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Line Haul	Tier 3 (2012-2014)	0.10	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Switch	Tier 3 (2011-2014)	0.10	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Line Haul	Tier 4 (2015+)	0.03	g/bhp-hr
2008 LocoMarine Rule	Locomotive - Switch	Tier 4 (2015+)	0.03	g/bhp-hr
1997 Locomotive Stds	Locomotive - Line Haul	Tier 0 (1973-2001)	0.60	g/bhp-hr
1997 Locomotive Stds	Locomotive - Switch	Tier 0 (1973-2001)	0.72	g/bhp-hr
1997 Locomotive Stds	Locomotive - Line Haul	Tier 1 (2002-2004)	0.45	g/bhp-hr
1997 Locomotive Stds	Locomotive - Switch	Tier 1 (2002-2004)	0.54	g/bhp-hr
1997 Locomotive Stds	Locomotive - Line Haul	Tier 2 (2005+)	0.20	g/bhp-hr
1997 Locomotive Stds	Locomotive - Switch	Tier 2 (2005+)	0.24	g/bhp-hr

^a Note that in the 2008 Locomotive/Marine Rule, EPA revised its emission standards for remanufactured locomotives to redesignate as Tier 1 most locomotives originally built between 1993 and 2001. EPA determined that these locomotives could be readily retrofitted to meet the more stringent Tier 1 standards when remanufactured.

Table A5-5. Commercial Marine Regulations. (Source: U.S. EPA)

Regulation	Sector	Model Years Applicable	PM standard	Units
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, <19kW Max power, <0.9L/cylinder	2009+	0.30	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 19<75kW Max power, <0.9L/cylinder	2009+	0.22	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 75<3700kW Max power, <0.9L/cylinder	2012	0.10	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 75<3700kW Max power, 0.9<1.2L/cylinder	2013	0.09	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 75<3700kW Max power, 1.2<2.5L/cylinder	2014	0.08	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 75<3700kW Max power, 2.5<3.5L/cylinder	2013	0.08	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Commercial Stnd Power Density, 75<3700kW Max power, 3.5<7.0L/cylinder	2012	0.08	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, <19kW Max power, <0.9L/cylinder	2009+	0.30	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 19<75kW Max power, <0.9L/cylinder	2009+	0.22	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 75<3700kW Max power, <0.9L/cylinder	2012	0.11	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 75<3700kW Max power, 0.9<1.2L/cylinder	2013	0.10	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 75<3700kW Max power, 1.2<2.5L/cylinder	2014	0.09	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 75<3700kW Max power, 2.5<3.5L/cylinder	2013	0.09	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C1 Rec and Com High Power Density, 75<3700kW Max power, 3.5<7.0L/cylinder	2012	0.08	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C2,<3700kW,7-<15L/cylinder	2013	0.10	g/bhp-hr
2008 LocoMarine Rule - Tier 3	C2,<3700kW,15-<30L/cylinder	2014	0.20	g/bhp-hr
2008 LocoMarine Rule - Tier 4	C1&C2, >3700 kW	2014	0.09	g/bhp-hr
2008 LocoMarine Rule - Tier 4	C1&C2, >3700 kW	2016	0.04	g/bhp-hr
2008 LocoMarine Rule - Tier 4	C1&C2, 600 to <3700	2014	0.03	g/bhp-hr
1999 C1&C2 Marine Engine Rule	C1, power ≤37 kW disp. <0.9	2005+	0.40	g/kW-hr
1999 C1&C2 Marine Engine Rule	C1, 0.9≤disp.< 1.2	2004+	0.30	g/kW-hr
1999 C1&C2 Marine Engine Rule	C1, 1.2≤disp.<2.5	2004+	0.20	g/kW-hr
1999 C1&C2 Marine Engine Rule	C1, 2.5≤disp.<5.0	2007+	0.20	g/kW-hr
1999 C1&C2 Marine Engine Rule	C2, 5.0≤disp.<15.0	2007+	0.27	g/kW-hr
1999 C1&C2 Marine Engine Rule	C2, 15.0≤disp.<30.0	2007+	0.50	g/kW-hr