



Federal and California Exhaust and Evaporative Emission Standards for Light-Duty Vehicles and Light-Duty Trucks

Federal and California Exhaust and Evaporative Emission Standards for Light-Duty Vehicles and Light-Duty Trucks

Certification and Compliance Division
Office of Air Transportation and Air Quality
U.S. Environmental Protection Agency

NOTICE

*This technical report does not necessarily represent final EPA decisions or positions.
It is intended to present technical analysis of issues using data which are currently available.*

*The purpose in the release of such reports is to facilitate the exchange of
technical information and to inform the public of technical developments which
may form the basis for a final EPA decision, position, or regulatory action.*



**Federal Certification Exhaust Emission Standards
for Light-Duty Vehicles (Passenger Cars) and Light Light-Duty Trucks:
Federal Test Procedure (FTP), Cold CO, and Highway & Idle Tests
(grams/mile)**

US Environmental Protection Agency
Office of Transportation and Air Quality
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	Vehicle Type	Emission Category	Vehicle Useful Life														
			5 Years / 50,000 Miles								10 Years / 100,000 Miles						
			THC ^[2,5,39]	NMHC ^[3]	NMOG	CO ^[35,39]	NOx	PM ^[29]	HCHO	THC ^[2,5]	NMHC ^[3]	NMOG	CO ^[38]	NOx	PM ^[29]	HCHO	
Federal	LDV ^[37,40,43]	Tier 0	0.41	^[6] 0.34	-	3.4	1.0	^[4] 0.20	-	-	-	-	-	-	-	-	
		Tier 1	^[28] 0.41	0.25	-	3.4	^[7] 0.4	0.08	-	-	0.31	-	4.2	^[9] 0.6	0.10	-	
	LDT1 ^[37,40,43]	Tier 0 ^[26]	-	-	-	-	-	-	-	0.80	^[6] 0.67	-	10	1.2	^[4] 0.26	-	
		Tier 1	-	0.25	-	3.4	^[7] 0.4	0.08	-	^[26,28] 0.80	0.31	-	4.2	^[9] 0.6	0.10	-	
	LDT2 ^[37,40,43]	Tier 0 ^[26]	-	-	-	-	-	-	-	0.80	^[6] 0.67	-	10	1.7	^[4] 0.13	-	
		Tier 1	-	0.32	-	4.4	^[8] 0.7	0.08	-	^[26,28] 0.80	0.40	-	5.5	0.97	0.10	-	
Federal National Low Emission Vehicle (NLEV) Program	LDV ^[36,40,41]	TLEV	^[28] 0.41	-	^[1,31] 0.125	3.4	^[34] 0.4	0.08	0.015	-	-	^[1,31] 0.156	4.2	^[34] 0.6	^[32] 0.08	0.018	
		LEV ^[42]	^[28] 0.41	-	^[1,31] 0.075	3.4	^[34] 0.2	0.08	0.015	-	-	^[1,31] 0.090	4.2	^[34] 0.3	^[32] 0.08	0.018	
		ULEV ^[42]	^[28] 0.41	-	^[1,31] 0.040	1.7	^[34] 0.2	0.08	0.008	-	-	^[1,31] 0.055	2.1	^[34] 0.3	^[32] 0.04	0.011	
		ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000	
	LDT1 ^[36,40,41]	TLEV	-	-	^[1,31] 0.125	3.4	^[34] 0.4	0.08	0.015	^[26,28] 0.80	-	^[1,31] 0.156	4.2	^[34] 0.6	^[32] 0.08	0.018	
		LEV ^[42]	-	-	^[1,31] 0.075	3.4	^[34] 0.2	0.08	0.015	^[26,28] 0.80	-	^[1,31] 0.090	4.2	^[34] 0.3	^[32] 0.08	0.018	
		ULEV ^[42]	-	-	^[1,31] 0.040	1.7	^[34] 0.2	0.08	0.008	^[26,28] 0.80	-	^[1,31] 0.055	2.1	^[34] 0.3	^[32] 0.04	0.011	
		ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000	
	LDT2 ^[36,40,41]	TLEV	-	-	^[1,31] 0.160	4.4	^[34] 0.7	0.08	0.018	^[26,28] 0.80	-	^[1,31] 0.200	5.5	^[34] 0.9	^[32] 0.10	0.023	
		LEV ^[42]	-	-	^[1,31] 0.100	4.4	^[34] 0.4	0.08	0.018	^[26,28] 0.80	-	^[1,31] 0.130	5.5	^[34] 0.5	^[32] 0.10	0.023	
		ULEV ^[42]	-	-	^[1,31] 0.050	2.2	^[34] 0.4	0.08	0.009	^[26,28] 0.80	-	^[1,31] 0.070	2.8	^[34] 0.5	^[32] 0.05	0.013	
		ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000	
	Federal Clean Fueled Vehicle (CFV) Program	LDV ^[37,40,41]	LEV	^[28] 0.41	-	^[30] 0.075	3.4	^[34] 0.2	-	0.015	-	-	^[30] 0.090	4.2	^[34] 0.3	^[10] 0.08	0.018
			ILEV ^[33]	^[28] 0.41	-	0.075	3.4	^[34] 0.2	-	0.015	-	-	0.090	4.2	^[34] 0.3	^[10] 0.08	0.018
			ULEV	^[28] 0.41	-	^[30] 0.040	1.7	^[34] 0.2	-	0.008	-	-	^[30] 0.055	2.1	^[34] 0.3	^[10] 0.04	0.011
			ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000
LDT1 ^[37,40,41]		LEV	-	-	^[30] 0.075	3.4	^[34] 0.2	-	0.015	^[26,28] 0.80	-	^[30] 0.090	4.2	^[34] 0.3	^[10] 0.08	0.018	
		ILEV ^[33]	-	-	0.075	3.4	^[34] 0.2	-	0.015	^[26,28] 0.80	-	0.090	4.2	^[34] 0.3	^[10] 0.08	0.018	
		ULEV	-	-	^[30] 0.040	1.7	^[34] 0.2	-	0.008	^[26,28] 0.80	-	^[30] 0.055	2.1	^[34] 0.3	^[10] 0.04	0.011	
		ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000	
LDT2 ^[37,40,41]		LEV	-	-	^[30] 0.100	4.4	^[34] 0.4	-	0.018	^[26,28] 0.80	-	^[30] 0.130	5.5	^[34] 0.5	^[10] 0.08	0.023	
		ILEV ^[33]	-	-	0.100	4.4	^[34] 0.4	-	0.018	^[26,28] 0.80	-	0.130	5.5	^[34] 0.5	^[10] 0.08	0.023	
		ULEV	-	-	^[30] 0.050	2.2	^[34] 0.4	-	0.009	^[26,28] 0.80	-	^[30] 0.070	2.8	^[34] 0.5	^[10] 0.04	0.013	
		ZEV	0.00	0.00	0.000	0.0	^[34] 0.0	0.00	0.000	0.00	0.000	0.000	0.0	^[34] 0.0	0.00	0.000	



**Federal Certification Exhaust Emission Standards
for Heavy Light-Duty Trucks:
Federal Test Procedure (FTP), Cold CO, and Highway & Idle Tests
(grams/mile)**

	Vehicle Type	Emission Category	Vehicle Useful Life												
			5 Years / 50,000 Miles						11 Years / 120,000 Miles						
			NMHC ^[3]	NMOG	CO ^[35,39]	NOx ^[8]	PM	HCHO	THC ^[2,5,39]	NMHC ^[3]	NMOG	CO ^[38]	NOx	PM	HCHO
Federal ^[37,40,43]	LDT3	Tier 0							0.80 ^[6]	0.67	-	10	1.7 ^[4]	0.26	-
		Tier 1	0.32	-	4.4	0.7	-	-	0.80	0.46	-	6.4	0.98	0.10	-
	LDT4	Tier 0							0.80 ^[6]	0.67	-	10	1.7 ^[4]	0.13	-
		Tier 1	0.39	-	5.0	1.1	-	-	0.80	0.56	-	7.3	1.53	0.12	-
Federal Clean Fueled Vehicle (CFV) Program ^[37,40]	LDT3 0-3750	LEV	-	^[30] 0.125	3.4	0.4	-	0.015	-	-	^[30] 0.180	5.0	0.6 ^[10]	0.08	0.022
		ILEV ^[33]	-	0.125	3.4	0.2	-	0.015	-	-	0.180	5.0	0.3 ^[10]	0.08	0.022
		ALVW ULEV	-	^[30] 0.075	1.7	0.2	-	0.008	-	-	^[30] 0.107	2.5	0.3 ^[10]	0.04	0.012
	LDT3 3751-5750	LEV	-	^[30] 0.160	4.4	0.7	-	0.018	-	-	^[30] 0.230	6.4	1.0 ^[10]	0.10	0.027
		ILEV ^[33]	-	0.160	4.4	0.4	-	0.018	-	-	0.230	6.4	0.5 ^[10]	0.10	0.027
		ALVW ULEV	-	^[30] 0.100	2.2	0.4	-	0.009	-	-	^[30] 0.143	3.2	0.5 ^[10]	0.05	0.013
	LDT4 5751-8500	LEV	-	^[30] 0.195	5.0	1.1	-	0.022	-	-	^[30] 0.280	7.3	1.5 ^[10]	0.12	0.032
		ILEV ^[33]	-	0.195	5.0	0.6	-	0.022	-	-	0.280	7.3	0.8 ^[10]	0.12	0.032
		ALVW ULEV	-	^[30] 0.117	2.5	0.6	-	0.011	-	-	^[30] 0.167	3.7	0.8 ^[10]	0.06	0.016



**Federal and California Certification Exhaust Emission Standards
for Light-Duty Vehicles (Passenger Cars), Light-Duty Trucks, and Medium-Duty Vehicles:
Supplemental Federal Test Procedure (SFTP)
(grams/mile)**

Vehicle Type	Emission Category	4,000 Miles				5 Years / 50,000 Miles				10 Years / 100,000 Miles				
		US06 TEST		A/C TEST		COMPOSITE	A/C TEST	US06	COMPOSITE	COMPOSITE	A/C TEST	US06	COMPOSITE	
		NMHC+NOx	CO	NMHC+NOx	CO	NMHC+NOx	CO	CO	CO	NMHC+NOx	CO	CO	CO	
Federal	LDV	Tier 1 ^[27]				^[21] 0.65	3.0	9.0	3.4	^[22] 0.91	3.7	11.1	4.2	
	LDT1	Tier 1 ^[27]				^[21] 0.65	3.0	9.0	3.4	^[22] 0.91	3.7	11.1	4.2	
	LDT2	Tier 1 ^[12]				1.02	3.9	11.6	4.4	1.37	4.9	14.6	5.5	
	LDT3	Tier 1 ^[12]				1.02	3.9	11.6	4.4	^[26] 1.44	^[26] 5.6	^[26] 16.9	^[26] 6.4	
	LDT4	Tier 1 ^[12]				1.49	4.4	13.2	5.0	^[26] 2.09	^[26] 6.4	^[26] 19.3	^[26] 7.3	
Federal NLEV & California Programs	LDV/PC	Tier 1/TLEV ^[27]				^[21] 0.65	^[8] 3.0	9.0	3.4	^[22] 0.91	^[8] 3.7	11.1	4.2	
		LEV/ULEV ^[27]	0.14	8.0	0.20	2.7								
	LDT1	Tier 1/TLEV ^[27]					^[21] 0.65	^[8] 3.0	9.0	3.4	^[22] 0.91	^[8] 3.7	11.1	4.2
		LEV/ULEV ^[27]	0.14	8.0	0.20	2.7								
		Tier 1/TLEV ^[12]					1.02	3.9	11.6	4.4	1.37	4.9	14.6	5.5
	LEV/ULEV ^[27]	0.25	10.5	0.27	3.5									
California	MDV1					N/A								
	MDV2	LEV/ULEV/SULEV	0.40	10.5	0.31	3.5								
	MDV3	LEV/ULEV/SULEV	0.60	11.8	0.44	4.0								
	MDV4					N/A								
	MDV5					N/A								



**Federal Certification Evaporative Emission Standards
 for Light-Duty Vehicles (Passenger Cars) and Light-Duty Trucks:
 Evaporative and Onboard Refueling (ORVR) Test Procedures**
 (including NLEV and CVF programs)

	Emission Standards	Vehicle Class	Useful Life (years/miles)	Evaporative Test Fuel	Test Procedure					
					(2) 1-hour Hot Soaks (grams/test)	3-Day Diurnal plus Hot Soak (grams/test)	2-Day Diurnal plus Hot Soak (grams/test)	Running Losses (grams/mile)	Spitback ^[48] (grams liquid)	ORVR (grams/gal of fuel dispensed)
Federal	Standard (Pre-Enhanced)	LDV	5/50,000	EPA Gasoline	2.0 (THC)					
				Methanol (M10)	2.0 (THCE)					
		LDT	11/120,000	EPA Gasoline	^[51] 2.0 (THC)					
				Methanol (M10)	^[51] 2.0 (THCE)					
	Enhanced Evaporative and ORVR	LDV, LDT 1 & 2, LDT 3 & 4 (<30 gal fuel tank)	10/100,000 10/100,000 11/120,000	EPA Gasoline		2.0 (THC)	2.5 (THC)	0.05 (THC)	1.0 (fuel)	0.20 (THC)
				Methanol (M10)		2.0 (THCE)	2.5 (THCE)	0.05 (THCE)	1.0 (fuel)	0.20 (THCE)
				Ethanol (E10) ^[47]		2.0 (THCE)	2.5 (THCE)	0.05 (THCE)	1.0 (fuel)	0.20 (THCE)
				CNG		2.0 (THC)				^[49] NA
				LPG		2.0 (THC)				0.15 (THC)
				Diesel Fuel						^[50] 0.20 (THC)
		LDT 3 & 4 (≥30 gal fuel tank)	11/120,000	EPA Gasoline		2.5 (THC)	3.0 (THC)	0.05 (THC)	1.0 (fuel)	0.20 (THC)
				Methanol (M10)		2.5 (THCE)	3.0 (THCE)	0.05 (THCE)	1.0 (fuel)	0.20 (THCE)
				Ethanol (E10) ^[47]		2.5 (THCE)	3.0 (THCE)	0.05 (THCE)	1.0 (fuel)	0.20 (THCE)
				CNG		2.0 (THC)				^[49] NA
				LPG		2.0 (THC)				0.15 (THC)
				Diesel Fuel						^[50] 0.20 (THC)



Federal Evaporative & Onboard Refueling (ORVR) Implementation Schedule for Light-Duty Vehicles (Passenger Cars) and Light-Duty Trucks

	Emission Standards	Vehicle Class	Emission Standards													
				1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	
Federal	Pre-Enhanced	LDV, LDT	Cert & In-use	100%	80% Max	60% Max	10% Max							Tier 2 Requirements Begin See www.epa.gov/oms/tr2home.htm		
	Enhanced	LDV, LDT	Cert & In-use ^[44]		20% Min	40% Min	90% Min	100%	100%	100%	100%	100%				
	ORVR	LDV	Cert & In-use ^[44]				40% Min	80% Min	100%	100%	100%	100%				
		LDT 1 & 2	Cert & In-use							40% Min	80% Min	100%				
		LDT 3 & 4	Cert & In-use										40% Min	80% Min	100%	



**California Certification Exhaust Emission Standards
for Light-Duty Vehicles (Passenger Cars) and Light Light-Duty Trucks:
Federal Test Procedure (FTP)
(grams/mile)**

Vehicle Type	Emission Category	Vehicle Useful Life														
		5 Years / 50,000 Miles							10 Years / 100,000 Miles							
		THC ^[2,5]	NMHC ^[3]	NMOG ^[1]	CO	NOx	PM ^[10]	HCHO ^[11]	THC ^[2,5]	NMHC ^[3]	NMOG ^[1]	CO	NOx	PM ^[10]	HCHO ^[11]	
California	PC	Tier 0	-	0.39	-	7.0	0.4	^[10] 0.08	^[11] 0.015							
		Tier 1	-	0.25	-	3.4	0.4	^[10] 0.08	^[11] 0.015	-	0.31	-	4.2	0.6	-	-
		TLEV	-	-	0.125	3.4	0.4	-	0.015	-	-	0.156	4.2	0.6	^[10] 0.08	0.018
		LEV	-	-	0.075	3.4	0.2	-	0.015	-	-	0.090	4.2	0.3	^[10] 0.08	0.018
		ULEV	-	-	0.040	1.7	0.2	-	0.008	-	-	0.055	2.1	0.3	^[10] 0.04	0.011
		ZEV	0.00	0.00	0.000	0.0	0.0	0.00	0.000	0.00	0.000	0.000	0.0	0.0	0.00	0.000
	LDT1	Tier 0	-	0.39	-	9.0	0.4	^[10] 0.08	^[11] 0.015							
		Tier 1	-	0.25	-	3.4	0.4	^[10] 0.08	^[11] 0.015	-	0.31	-	4.2	0.6	-	-
		TLEV	-	-	0.125	3.4	0.4	-	0.015	-	-	0.156	4.2	0.6	^[10] 0.08	0.018
		LEV	-	-	0.075	3.4	0.2	-	0.015	-	-	0.090	4.2	0.3	^[10] 0.08	0.018
		ULEV	-	-	0.040	1.7	0.2	-	0.008	-	-	0.055	2.1	0.3	^[10] 0.04	0.011
		ZEV	0.00	0.00	0.000	0.0	0.0	0.00	0.000	0.00	0.000	0.000	0.0	0.0	0.00	0.000
	LDT2	Tier 0	-	0.50	-	9.0	1.0	^[10] 0.08	^[11] 0.018							
		Tier 1	-	0.32	-	4.4	0.7	^[10] 0.08	^[11] 0.018	-	0.40	-	5.5	0.97	-	-
		TLEV	-	-	0.160	4.4	0.7	-	0.018	-	-	0.200	5.5	0.9	^[10] 0.10	0.023
		LEV	-	-	0.100	4.4	0.4	-	0.018	-	-	0.130	5.5	0.5	^[10] 0.10	0.023
		ULEV	-	-	0.050	2.2	0.4	-	0.009	-	-	0.070	2.8	0.5	^[10] 0.05	0.013
		ZEV	0.00	0.00	0.000	0.0	0.0	0.00	0.000	0.00	0.000	0.000	0.0	0.0	0.00	0.000



**California Certification Exhaust Emission Standards
for Medium-Duty Vehicles:
Federal Test Procedure (FTP)
(grams/mile)**

	Vehicle Type	Emission Category	Vehicle Useful Life												
			5 Years / 50,000 Miles												
			NMHC ^[3]	NMOG ^[1]	CO	NO _x	PM	HCHO	NMHC ^[3]	NMOG ^[1]	CO	NO _x	PM	HCHO	
California	MDV1	Tier 0	0.39	-	9.0	0.4 ^[10]	0.08	^[11] 0.015							
		Tier 1	0.25	-	3.4	0.4	-	^[11] 0.015	0.36	-	5.0	0.55	^[10] 0.08	-	
		LEV	-	0.125	3.4	0.4	-	0.015	-	0.180	5.0	0.6	^[10] 0.08	0.022	
		ULEV	-	0.075	1.7	0.2	-	0.008	-	0.107	2.5	0.3	^[10] 0.04	0.012	
	MDV2	Tier 0	0.50	-	9.0	1.0 ^[10]	0.08	^[11] 0.018							
		Tier 1	0.32	-	4.4	0.7	-	^[11] 0.018	0.46	-	6.4	0.98	^[10] 0.10	-	
		LEV	-	0.160	4.4	^[13] 0.4	-	0.018	-	0.230	6.4	^[14] 0.6	^[10] 0.10	0.027	
		ULEV	-	0.100	4.4	0.4	-	0.009	-	0.143	6.4	0.6	^[10] 0.05	0.013	
		SULEV	-	0.050	2.2	0.2	-	0.004	-	0.072	3.2	0.3	^[10] 0.05	0.006	
	MDV3	Tier 0	0.60	-	9.0	1.5 ^[10]	0.08	^[11] 0.022							
		Tier 1	0.39	-	5.0	1.1	-	^[11] 0.022	0.56	-	7.3	1.53	^[10] 0.12	-	
		LEV	-	0.195	5.0	^[15] 0.6	-	0.022	-	0.280	7.3	^[16] 0.9	^[10] 0.12	0.032	
		ULEV	-	0.117	5.0	0.6	-	0.011	-	0.167	7.3	0.9	^[10] 0.06	0.016	
		SULEV	-	0.059	2.5	0.3	-	0.006	-	0.084	3.7	0.45	^[10] 0.06	0.008	
	MDV4	Tier 1	0.46	-	5.5	1.3	-	^[11] 0.028	0.66	-	8.1	1.81	^[10] 0.12	-	
		LEV	-	0.230	5.5	^[17] 0.7	-	0.028	-	0.330	8.1	^[18] 1.0	^[10] 0.12	0.040	
		ULEV	-	0.138	5.5	0.7	-	0.014	-	0.197	8.1	1.0	^[10] 0.06	0.021	
		SULEV	-	0.069	2.8	0.35	-	0.007	-	0.100	4.1	0.5	^[10] 0.06	0.010	
	MDV5	Tier 1	0.60	-	7.0	2.0	-	^[11] 0.036	0.86	-	10.3	2.77	^[10] 0.12	-	
		LEV	-	0.300	7.0	^[19] 1.0	-	0.036	-	0.430	10.3	^[20] 1.5	^[10] 0.12	0.052	
ULEV		-	0.180	7.0	1.0	-	0.018	-	0.257	10.3	1.5	^[10] 0.06	0.026		
SULEV		-	0.090	3.5	0.5	-	0.009	-	0.130	5.2	0.7	^[10] 0.06	0.013		

Exhaust and Evaporative Emission Standards

Footnotes to the tables of emission standards

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12. GASOLINE VEHICLES ONLY
13. 0.7 THROUGH MODEL YEAR 1997
14. 1.0 THROUGH MODEL YEAR 1997
15. 1.1 THROUGH MODEL YEAR 1997
16. 1.5 THROUGH MODEL YEAR 1997
17. 1.3 THROUGH MODEL YEAR 1997
18. 1.8 THROUGH MODEL YEAR 1997
19. 2.0 THROUGH MODEL YEAR 1997
20. 2.8 THROUGH MODEL YEAR 1997
21. 1.48 FOR DIESEL-FUELED VEHICLES
22. 2.07 FOR DIESEL-FUELED VEHICLES
23. OTHER EQUIVALENT SCHEDULES ALLOWED.
24. PC/LDV MAY BE COMBINED WITH LDT1 & LDT2 FOR TIER 1 PHASE-IN
25. PC/LDV & LDT1 COMBINED WITH LDT2 FOR SFTP PHASE-IN
26. STANDARDS APPLY AT A USEFUL LIFE OF 11 YEARS / 120,000 MILES
27. GASOLINE AND DIESEL VEHICLES ONLY
28. TOTAL HC COMPLIANCE STATEMENT ALLOWED (IN LIEU OF TEST DATA)
29. PARTICULATES COMPLIANCE STATEMENT ALLOWED FOR NON-DIESEL CYCLE VEHICLES (IN LIEU OF SUPPLYING ACTUAL TEST DATA)
30. SPECIAL NMOG STANDARDS APPLY TO DUAL & FLEXIBLE FUEL VEHICLES, SEE 40 CFR 88.104-94(h) & (i)
31. DUAL & FLEXIBLE FUEL VEHICLES MAY MEET NEXT HIGHER (LESS STRINGENT) NMOG STANDARD WHEN OPERATING ON GASOLINE.
32. 0.10 GM/MILE PARTICULATE STANDARD APPLIES TO NON-DIESEL VEHICLES
33. SPECIAL EVAPORATIVE REQUIREMENTS APPLY (5.0 GRAMS MAX WITH THE EVAPORATIVE SYSTEM DISCONNECTED)
34. HIGHWAY NO_x EMISSIONS SHALL NOT EXCEED 1.33 TIMES THE APPLICABLE FTP (CITY) NO_x STANDARDS
35. COLD CO EMISSIONS FOR GASOLINE FUELED VEHICLES SHALL NOT EXCEED 10.0 GR/MILE (LDV, LDT1, LDT2) OR 12.5 GM/MILE (LDT3 & LDT4) AT 50K MILES

Exhaust and Evaporative Emission Standards

Footnotes to the tables of emission standards - Continued

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36. CALIFORNIA OBD-II SYSTEM REQUIRED, REF 40 CFR 86.1717-99
37. FEDERAL OBD SYSTEM REQUIRED BEGINNING WITH 1994 MODEL YEAR VEHICLES, REF 40 CFR 86.1806-01
38. IDLE CO EMISSIONS FROM GASOLINE, METHANOL, CNG & LPG TRUCKS SHALL NOT EXCEED 0.50 PERCENT EXHAUST GAS AT 120K MILES/11 YEARS COMPLIANCE STATEMENT ALLOWED (IN LIEU OF ACTUAL TEST DATA)
39. CERTIFICATION SHORT TEST (CST) EMISSIONS FROM GASOLINE VEHICLES SHALL NOT EXCEED 100 PPM HC OR 0.50 PERCENT EXHAUST GAS CO AT IDLE AND 2500 RPM AT 4K MILES; COMPLIANCE STATEMENT ALLOWED (IN LIEU OF DATA)
40. TIER 1, NLEV & CFV VEHICLES MUST MEET TIER 1 EMISSION STANDARDS AT HIGH ALTITUDE; TIER 0 VEHICLES MUST MEET SPECIAL HIGH ALTITUDE STANDARDS; COMPLIANCE STATEMENT ALLOWED (IN LIEU OF ACTUAL TEST DATA)
41. NLEV AND CFV (LDV, LDT1, LDT2) VEHICLES MUST MEET SPECIAL 50 DEG F EMISSION STANDARDS AT 4K MILES (NOT APPLICABLE TO DIESEL, CNG, OR HYBRID ELECTRIC VEHICLES); REF. 40 CFR 86.1708 & 1709-99 (b)(1)(iv)
42. SPECIAL INTERIM IN-USE EMISSION STANDARDS APPLY TO 1999 LEV AND 1999 TO 2002 ULEV VEHICLES; REF. 40 CFR 86.1808 & 1809-99(C) AS CORRECTED IN EPA GUIDANCE LETTER VPCD-98-03, APRIL 8, 1998.
43. TIER 0 AND TIER 1 EMISSION STANDARDS DO NOT APPLY TO ETHANOL VEHICLES
44. SMALL VOLUME MANUFACTURER EXEMPT UNTIL LAST YEAR OF PHASE-IN.
45. NOT APPLICABLE TO LOW VOLUME MANUFACTURERS (MANUFACTURERS WITH ANNUAL NATIONWIDE SALES OF CARS & LLDTs OF 40,000 UNITS OR LESS)
46. EARLY CREDITS AVAILABLE, REF. 40 CFR 86.1710-99(C)(7) & (8) AS CORRECTED IN EPA GUIDANCE LETTER VPCD-98-03, APRIL 8, 1998.
47. COMPLIANCE REQUIRED FOR NLEV AND CFV FLEXIBLE FUELED VEHICLES UNDER DEFEAT DEVICE REGULATIONS, REF. 40 CFR 86.1809-01.
48. WAIVERS ALLOWED IF CERTIFIED TO ORVR STANDARDS, REF. 40 CFR 86.1810-01(L)
49. MUST MEET ANSI/AGA NGV1 RECEPTACLE REQUIREMENTS, REF. 40CFR 86.1810 (K)
50. WAIVERS ALLOWED; REF 40 CFR 86.1810-01(M)
51. 2.6 GRAMS PER TEST AT HIGH ALTITUDE PRIOR TO 1996 MODEL YEAR

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Abbreviations used in the tables of emission standards

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ALVW	Adjusted Loaded Vehicle Weight
CFV	Clean Fueled Vehicle
CNG	Compressed Natural Gas
CO	Carbon Monoxide
E10	A mixture of 10% ethanol and 90 % gasoline
E85	A mixture of 85% ethanol and 15 % gasoline
FTP	Federal Test Procedure
GVWR	Gross Vehicle Weight Rating
HCHO	Formaldehyde
HDV	Heavy-duty Vehicle [California definition] [federal definition]
HLDT	Heavy Light-duty Truck
ILEV	Inherently Low Emission Vehicle
LDT	Light-duty Truck [California definition] [federal definition]
LDT1	Light-duty Truck 1
LDT2	Light-duty Truck 2
LDT3	Light-duty Truck 3
LDT4	Light-duty Truck 4
LDV	Light-duty Vehicle
LLDT	Light Light-duty Truck
LEV	Low Emission Vehicle
LPG	Liquified Petroleum Gas (Propane)
LVW	Loaded Vehicle Weight
MDV	Medium-duty Vehicle
M10	A mixture of 10% methanol and 90 % gasoline
M85	A mixture of 85% methanol and 15 % gasoline
NLEV	National Low Emission Vehicle
NMHC	Non-methane Hydrocarbon
NMOG	Non-methane Organic Gases
NOx	Nitrogen Oxides
ORVR	Onboard Refueling Vapor Recovery
PC	Passenger Car
PM	Particulate Matter
SFTP	Supplemental Federal Test Procedure
SULEV	Super-Ultra-Low-Emission Vehicle
THC	Total Hydrocarbon
THCE	Total Hydrocarbon Equivalent
TLEV	Transitional Low-Emission Vehicle
TW	Test Weight
ULEV	Ultra-Low-Emission Vehicle
ZEV	Zero-Emission Vehicle

Exhaust and Evaporative Emission Standards

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Adjusted Loaded Vehicle Weight (ALVW)

The numerical average of vehicle curb weight and GVWR. (40 CFR 86.1803-01)

[Note: The federal "adjusted loaded vehicle weight" definition is identical to the California definition for "test weight."]

Approach Angle

The smallest angle in a plan side view of an automobile, formed by the level surface on which the automobile is standing and a line tangent to the front tire static loaded radius arc and touching the underside of the automobile forward of the front tire. (40 CFR 86.1803-01)

Axle Clearance

The vertical distance from the level surface on which an automobile is standing to the lowest point on the axle differential of the automobile. (40 CFR 86.1803-01)

Basic Vehicle Frontal Area

The area enclosed by the geometric projection of the basic vehicle along the longitudinal axis, which includes tires but excludes mirrors and air deflectors, onto a plane perpendicular to the longitudinal axis of the vehicle. (40 CFR 86.1803-01)

Breakover Angle

The supplement of the largest angle, in the plan side view of an automobile, that can be formed by two lines tangent to the front and rear static loaded radii arcs and intersecting at a point on the underside of the automobile. (40 CFR 86.1803-01)

Clean Fueled Vehicle (CFV) Program

The Federal program established to promote the sales of low emission vehicles in the State of California (California Pilot Program) and to promote the sales of LEV, ILEV and ULEV vehicles in twenty-two metropolitan areas in the United States (the Clean Fuel Fleet Program). (40 CFR Part 88) Eighteen areas have opted out of the Clean Fuel Fleet Program. The four areas which have adopted federal Clean Fuel Fleet programs are Atlanta, GA; Chicago-Gary-Lake County, IL/IN; Denver-Boulder, CO; and the Milwaukee-Racine, WI metropolitan areas.

Departure Angle

The smallest angle, in a plan side view of an automobile, formed by the level surface on which the automobile is standing and a line tangent to the rear tire static loaded radius arc and touching the underside of the automobile rearward of the rear tire. (40 CFR 86.1803-01)

Federal Test Procedure (FTP)

The test procedure as described in 40 CFR 86.130-00 paragraphs (a) through (d) and (f) which is designed to measure urban driving tail pipe exhaust emissions and evaporative emissions over the Urban Dynamometer Driving Schedule as described in 40 CFR Part 86 Appendix I. (40 CFR 86.1803-01)

Gross Vehicle Weight Rating (GVWR)

The value specified by the manufacturer as the maximum design loaded weight of a single vehicle. (40 CFR 86.1803-01)

Heavy Light-Duty Truck (HLDT)

Heavy light-duty truck means any light-duty truck rated greater than 6,000 lbs GVWR. (40 CFR 86.1803-01)

Heavy-Duty Vehicle (HDV)

Any motor vehicle rated at more than 8,500 pounds GVWR or that has a vehicle curb weight of more than 6000 pounds or that has a basic vehicle frontal area in excess of 45 square feet. (40 CFR 86.1803-01)

Incomplete Truck

Any truck which does not have the primary load carrying device or container attached. (40 CFR 86.1803-01)

Exhaust and Evaporative Emission Standards

Federal Definitions - Continued

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Low-Emission Vehicle (LEV)

Any vehicle certified to low-emission standards.

Light Light-Duty Truck (LLDT)

Light light-duty truck means any light-duty truck rated up through 6,000 lbs GVWR. (40 CFR 86.1803-01)

[Note: The definition for this category of trucks is essentially identical to the California definition for "light-duty truck."]

Light-Duty Truck (LDT)

Any motor vehicle rated at 8,500 pounds GVWR or less which has a vehicle curb weight of 6,000 pounds or less and which has a basic vehicle frontal area of 45 square feet or less, which is:

- (1) Designed primarily for purposes of transportation of property or is a derivation of such a vehicle, or
- (2) Designed primarily for transportation of persons and has a capacity of more than 12 persons, or
- (3) Available with special features enabling off-street or off-highway operation and use. (40 CFR 86.1803-01)

Light-Duty Truck 1 (LDT1)

Any light light-duty truck up through 3,750 lbs loaded vehicle weight. (40 CFR 86.1803-01)

Light-Duty Truck 2 (LDT2)

Any light light-duty truck greater than 3,750 lbs loaded vehicle weight. (40 CFR 86.1803-01)

Light-Duty Truck 3 (LDT3)

Any heavy light-duty truck up through 5,750 lbs adjusted loaded vehicle weight. (40 CFR 86.1803-01)

Light-Duty Truck 4 (LDT4)

Any heavy light-duty truck greater than 5,750 lbs adjusted loaded vehicle weight. (40 CFR 86.1803-01)

Light-Duty Vehicle (LDV)

A passenger car or passenger car derivative capable of seating 12 passengers or less. (40 CFR 86.1803-01)

[Note: The federal "light-duty vehicle" definition is essentially identical to the California definition for "passenger car."]

Loaded Vehicle Weight (LVW)

The vehicle curb weight plus 300 pounds. (40 CFR 86.1803-01)

National Low Emission Vehicle (NLEV) Program

The National Low Emission Vehicle Program (NLEV) program is a voluntary program to introduce cleaner cars and light trucks in all parts of the country. Under the agreement between the States and automobile manufacturers, manufacturers began selling cleaner model year 1999 and 2000 cars and trucks in Connecticut, Delaware, Maryland, New Hampshire, New Jersey, Pennsylvania, Rhode Island, Virginia, and the District of Columbia. (Massachusetts, New York, Vermont and Maine adopted California emission standards beginning in the 1999, 1999, 2000 and 2001 model years, respectively.) Twenty-four of the largest automobile manufacturers have voluntarily entered into the NLEV program. In model year 2001 to 2003 automobile manufacturers will voluntarily sell these cleaner cars and trucks in the 45 states nationwide which are participating in the NLEV program. Although the automobile manufacturers volunteered for the program, the lower emission levels and other requirements of the NLEV program are enforceable like any other federal new vehicle program. The NLEV program will continue to exist until the cleaner Federal Tier 2 emission standards become effective in the 2004 model year. (40 CFR Part 86 Subpart R)

Exhaust and Evaporative Emission Standards

Federal Definitions - Continued

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Non-Methane Organic Gases (NMOG)

The total mass of oxygenated and non-oxygenated hydrocarbon emissions.

SC03 Cycle

The test cycle, described in 40 CFR 86.160-00 and listed in Appendix I, paragraph (a), of 40 CFR part 86, which is designed to represent driving immediately following startup, in 95 degrees F ambient conditions with the vehicle air conditioning on. (40 CFR 86.1803-01)

Special Features Enabling Off-Street Or Off-Highway Operation And Use

A vehicle:

- (1) That has 4-wheel drive; and
- (2) That has at least four of the following characteristics calculated when the automobile is at curb weight, on a level surface, with the front wheels parallel to the vehicle's longitudinal centerline, and the tires inflated to the manufacturer's recommended pressure;
 - (i) Approach angle of not less than 28 degrees;
 - (ii) Breakover angle of not less than 14 degrees;
 - (iii) Departure angle of not less than 20 degrees;
 - (iv) Running clearance of not less than 8 inches;
 - (v) Front and rear axle clearances of not less than 7 inches each. (40 CFR 86.1803-01)

Supplemental Federal Test Procedure

The additional test procedures designed to measure emissions during aggressive and microtransient driving, as described in 40 CFR 86.159-00 over the US06 cycle, and also the test procedure designed to measure urban driving emissions while the vehicle's air conditioning system is operating, as described in 40 CFR 86.160-00 over the SC03 cycle. (40 CFR 86.1803-01)

Transitional Low-Emission Vehicle (TLEV)

Any vehicle certified to transitional low-emission standards.

Ultra-Low-Emission Vehicle (ULEV)

Any vehicle certified to ultra-low emission standards.

US06

The test cycle, described in 40 CFR 86.159-00 and listed in appendix 1, paragraph (g) of 40 CFR part 86, which is designed to evaluate emissions during aggressive and microtransient driving. (40 CFR 86.1803-01)

Vehicle Curb Weight (VCW)

The actual or the manufacturer's estimated weight of the vehicle in operational status with all standard equipment, and weight of fuel at nominal tank capacity, and the weight of optional equipment computed in accordance with 40 CFR 86.082-24; incomplete light-duty trucks shall have the curb weight specified by the manufacturer. (40 CFR 86.1803-01)

Zero-emission vehicle (ZEV)

Any vehicle certified to zero-emission standards.

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Heavy-Duty Vehicle (HDV)

Any motor vehicle having a manufacturer's gross vehicle weight rating greater than 6000 pounds, except passenger cars.

Incomplete Vehicle

Any vehicle which does not have the primary load carrying device or container attached. In situations where individual marketing relationships makes the status of the vehicle questionable, the Executive Officer shall determine whether a specific model complies with the definition of incomplete vehicle.

Light-Duty Truck (LDT)

Any motor vehicle, rated at 6000 pounds gross vehicle weight or less, which is designed primarily for purposes of transportation of property or is a derivative of such a vehicle, or is available with special features enabling off-street or off-highway operation and use.

[Note: The California "light-duty truck" definition is essentially identical to the federal definition for "light light-duty truck."]

Light-Duty Truck 1 (LDT1)

Any light-duty truck up through 3,750 lbs loaded vehicle weight.

[Note: California does not use the terms "light-duty truck 1" and "light-duty truck 2" in an official sense. However, they subdivide their light-duty trucks of less than 6000 pounds GVWR based on LVW in exactly the same way the federal regulations do, so these terms are applied to California emission standards to facilitate comparison.]

Light-Duty Truck 2 (LDT2)

Any light-duty truck greater than 3,750 lbs loaded vehicle weight.

[Note: California does not use the terms "light-duty truck 1" and "light-duty truck 2" in an official sense. However, they subdivide their light-duty trucks of less than 6000 pounds GVWR based on LVW in exactly the same way the federal regulations do, so these terms are applied to California emission standards to facilitate comparison.]

Low-Emission Vehicle (LEV)

Any vehicle certified to low-emission standards.

Medium-Duty Vehicle (MDV)

Any pre-1995 model year heavy-duty vehicle having a manufacturer's gross vehicle weight rating of 8,500 pounds or less, any 1992 and subsequent model year heavy-duty low-emission, ultra-low-emission, super-ultra-low-emission or zero-emission vehicle having a manufacturer's gross vehicle weight rating of 14,000 pounds or less, or any 1995 and subsequent model year heavy duty vehicle having a manufacturer's gross vehicle weight rating of 14,000 pounds or less. Medium-duty vehicles are subdivided into five classes (MDV1-MDV5) based on vehicle test weight.

Non-Methane Organic Gases (NMOG)

The total mass of oxygenated and non-oxygenated hydrocarbon emissions.

Passenger Car (PC)

Any motor vehicle designed primarily for transportation of persons and having a design capacity of 12 persons or less.

[Note: The California "passenger car" definition is essentially identical to the federal definition for "light-duty vehicle."]

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Super-Ultra-Low-Emission Vehicle (SULEV)

Any medium-duty vehicle certified to super-ultra-low-emission standards.

Test Weight (TW)

The average of the vehicle's curb weight and gross vehicle weight.

[Note: The California "test weight" definition is identical to the federal definition of "adjusted loaded vehicle weight."]

Transitional Low-Emission Vehicle (TLEV)

Any vehicle certified to transitional low-emission standards.

Ultra-Low-Emission Vehicle (ULEV)

Any vehicle certified to ultra-low emission standards.

Zero-emission vehicle (ZEV)

Any vehicle certified to zero-emission standards.