

ATTACHMENT D

PROPOSED AMENDMENTS TO THE CALIFORNIA REGULATIONS FOR 2011 AND
LATER TIER 4 OFF-ROAD COMPRESSION-IGNITION ENGINES
(SELECT EXCERPTS - TABLES ONLY)

California Off-Road Compression-Ignition New Engine Regulation

Chapter 9. Off Road Vehicles and Engines Pollution Control Devices

Article 4. Off-Road Compression Ignition Engines and Equipment

Proposed Modifications

(Select Excerpts)

§ 2423. Exhaust Emission Standards and Test Procedures – Off-Road Compression-Ignition Engines.

2423(b)(1)(B) Table 1b. – Tier 4 Exhaust Emission Standards

2423(b)(2)(B) Table 2b. – Upper Limit for Tier 4 Family Emission Limits (FEL)s and Alternate Allowances – Part 1

Table 2b. – Upper Limit for Tier 4 Family Emission Limits (FEL)s and Alternate Allowances – Part 2

Table 1b. – Tier 4 Exhaust Emission Standards
(grams per kilowatt-hour)

MAXIMUM ENGINE POWER	MODEL YEAR	TYPE	PM	NMHC+NOX	NMHC	NOX	CO
			grams per kilowatt-hour				
kW<8 ¹	2008 and later	FINAL	0.40 ²	7.5	-	-	8.0
8≤kW<19 ¹							6.6
19≤kW<37 ¹	2008-2012	INTERIM	0.30	7.5	-	-	5.5
	2013 and later	FINAL	0.03	4.7			
37≤kW<56 ³	2008-2012	INTERIM	0.30	4.7	-	-	5.0
	2013 and later	FINAL	0.03				
56≤kW<75	2012-2014 ⁴	PHASE-IN	0.02	-	0.19	0.40	5.0
		PHASE-OUT		4.7	-	-	
		or/ ALT NOX		-	0.19	3.4 ⁵	
	2015 and later	FINAL	0.02	-	0.19	0.40	5.0
	2012-2014 ⁴	ALT NOx+HC Std	0.02	3.5 ⁵	-	-	5.0
75≤kW<130	2012-2014 ⁴	PHASE-IN	0.02	-	0.19	0.40	5.0
		PHASE-OUT		4.0	-	-	
		or/ ALT NOX		-	0.19	3.4 ⁵	
	2015 and later	FINAL	0.02	-	0.19	0.40	5.0
	2012-2014 ⁴	ALT NOx+HC Std	0.02	3.5 ⁵	-	-	5.0
130≤kW≤560	2011-2013	PHASE-IN	0.02	-	0.19	0.40	3.5
		PHASE-OUT		4.0	-	-	
		or/ ALT NOX		-	0.19	2.0	
	2014 and later	FINAL	0.02	-	0.19	0.40	5.0
	2011-2013	ALT NOx+HC Std	0.02	2.1	-	-	5.0
560 kW<GEN ⁶ ≤900 kW	2011-2014	INTERIM	0.10	-	0.40	3.5	3.5
	2015 and later	FINAL	0.03	-	0.19	0.67	
GEN>900 kW	2011-2014	INTERIM	0.10	-	0.40	0.67	3.5
	2015 and later	FINAL	0.03	-	0.19		
ELSE ⁷ >560 kW	2011-2014	INTERIM	0.10	-	0.40	3.5	3.5
	2015 and later	FINAL	0.04	-	0.19		

Notes:

- 1 Propulsion marine compression-ignition engines below 37 kW are not subject to Tier 4 standards or requirements. All previously adopted requirements remain applicable for these engines.
- 2 The Tier 4 PM standard for hand-start, air cooled, direct injection engines below 8 kW is 0.60 g/kW-hr, but is not required until 2010.
- 3 Engine families in this power category may alternately meet Tier 3 PM standards from 2008-2011 in exchange for introducing final PM standards in 2012.
- 4 Manufacturers have the option of complying with the Tier 4 standards over a two year period at 50% per year using banked Tier 2 credits or over a three year period at 25% per year without the use of Tier 2 credits. The three year phase-in period is shown. The 2014 model year cannot extend beyond December 30, 2014, when the 3 year phase-in option is used.
- 5 Manufacturers may comply with the standards during the transitional implementation years using either a phase-in / phase-out approach or by using the Alternate NOx approach. The three year 25% alternate NOx standard is shown in the table. The two year 50% phase-in NOx standard would be 2.3 g/kW-hr. **The two year 50% phase-in NOx+HC standard would be 2.4 g/kW-hr.**
- 6 "GEN" refers to generator engines only.
- 7 "ELSE" refers to all mobile machinery excluding generator engines.

serves as the emission standard for that engine family, and is used for determining NTE limits in conjunction with the criteria in Table 1c. Temporary compliance adjustment factors, as explained in the 2008 and Later Test Procedures, shall be applied by the manufacturer to compensate for the use of transitional alternate FELs (Type ALT 20% in Table 2b) when calculating emission credits. Table 2b follows:

Table 2b – Upper Limit for Tier 4 Family Emission Limits (FELs) and Alternate Allowances
Part 1

MAXIMUM ENGINE POWER	FEL TYPE	MODEL YEAR	PM	NOX	NMHC+ NOX
			grams per kilowatt-hour		
kW<8	Primary	2008 and later	0.80	-	10.5
8≤kW<19	Primary	2008 and later	0.80	-	9.5
19≤kW<37	Interim	2008-2012	0.60	-	9.5
	Primary	2013 and later	0.05	-	7.5
	ALT 20% ¹	2013-2016 ³	0.30	-	7.5
ALT 5% ²	2017 and later ³				
37≤kW<56	Interim	2008-2012 ³	0.40	-	7.5
	Primary	2013 and later ³	0.05	-	7.5
	ALT 20%	2013-2016 ³	0.30	-	7.5
	ALT 5%	2017 and later ³			
56≤kW<75	Phase-in	2012-2013/2014 ⁵	0.04	0.80	-
	Phase-out			-	7.5
	Alternate NOx Std ⁴	2012-2013	0.04	3.0 ⁷	-
		2012-2014		4.4	-
	Primary	2014/2015 ⁵ and later	0.04	0.80	-
	ALT 20% PM	2012-2015	0.40		-
	ALT 20% NOX	2012-2014-2015 ⁶		4.4	-
ALT 5%	2016 and later	0.40	4.4	-	

Notes:

- 1 This alternate FEL option is transitional for the four years specified and applies to at most 20% of a manufacturer's U.S. directed population of engine families per year.
- 2 This alternate FEL option is available indefinitely, but only applies to 5% of a manufacturer's U.S. directed population of engine families per year.
- 3 These dates correspond to the compliance option of meeting interim standards in 2008; else the primary and alternate FEL caps would begin and end one year earlier, and 2008-2011 engines would not be eligible for participation in the Tier 4 ABT program.
- 4 Two alternate NOx standards and corresponding FEL caps are available for this category with corresponding alternate phase-in options.
- 5 The effective date of the primary FEL cap follows the phase-in period of the selected NOx FEL cap.
- ~~6 If interim Tier 4 standards are not met in 2008, the alternate NOx FEL would only be available for 2015.~~
- 7 If neither the alternate phase-in option nor banked Tier 2 credits are used, either NOx standard and corresponding FEL may be applied for this category.

and/or

ALT NOx+HC Std⁴ 2012-2014⁵ 0.04 --- 4.7

and use of banked Tier 2 NOx credits

6 For manufacturers certifying engines in this power category using a percentage phase-in/phase-out approach instead of the alternate NOx standards of §1039.102(e)(1), the alternate NOx FEL cap in the table applies only in the 2014–2015 model years if certifying under §1039.102(d)(1), and only in the 2015 model year if certifying under §1039.102(d)(2).

Table 2b – Upper Limit for Tier 4 Family Emission Limits (FELs) and Alternate Allowances Part 2

MAXIMUM ENGINE POWER	FEL TYPE	MODEL YEAR	PM	NOX	NMHC+ NOX	
			grams per kilowatt-hour			
75≤kW<130	Phase-in	2012-2013 /2014 ⁵	0.04	0.80	-	
	Phase-out			-	6.6	
	Alternate NOx Std ⁴	2012-2013		3.0 ⁷	-	
		2012-2014		3.8	-	
	Primary	2014/2015 ⁵ and later		0.80	-	
	ALT 20% PM	2012-2015		0.30		-
	ALT 20% NOX	2012-2014-2015 ⁶			3.8	-
ALT 5%	2016 and later	0.30	3.8	-		
	ALT NOx+HC Std ⁴	2012-2014 ⁵	0.04	---	4.0	
130≤kW≤560	Phase-in	2011-2013	0.04	0.80	-	
	Phase-out			-	6.6/6.4 ⁸	
	Alternate NOx Std	2011-2013		2.7	-	
	Primary	2014 and later		0.80	-	
	ALT 20% PM	2011-2014		0.20		-
	ALT 20% NOX	2011-2014 ⁹			3.8	-
	ALT 5%	2015 and later		0.20	3.8	-
	ALT NOx+HC Std	2011-2013	0.04	---	4.0	
GEN>560kW	Primary	2015 and later	0.05	1.07	-	
	ALT 20%	2015-2018	0.10	3.5	-	
	ALT 5%	2019 and later			-	
ELSE>560kW	Interim	2011-2014	0.20	6.2	-	
	Primary	2015 and later	0.07		-	
	ALT 20%	2015-2018	0.10		-	
	ALT 5%	2019 and later			-	

Notes:

- 4 Two alternate NOx standards and corresponding FEL caps are available for this category with corresponding alternate phase-in options.
- 5 The effective date of the primary FEL cap follows the phase-in period of the selected NOx FEL cap.
- 6 ~~If interim Tier 4 standards are not met in 2009, the alternate NOx FEL would only be available for 2015.~~
- 7 If neither the alternate phase-in option nor banked Tier 2 credits are used, either NOx standard and corresponding FEL may be applied for this category.
- 8 The phase-out NMHC+NOX FEL cap is 6.6 g/kW-hr for engines < 225 kW, and 6.4 g/kW-hr for engines ≥ 225 kW in this category.

and use of banked Tier 2 NOx credits

(C) *Split family provision.* For generating or ~~use of banked Tier 2 NOx credits~~ 6 ≤ kW ≤ 560 power categories during the phase-in of Tier 4 standards, engine manufacturers may elect to split an engine family into two subfamilies (e.g., one which uses credits and one which generates credits for the same pollutant). The engine manufacturer must indicate in the application for certification that the engine family is to be split, and may calculate

6 For manufacturers certifying engines in this power category using a percentage phase-in/phase-out approach instead of the alternate NOx standards of §1039.102(e)(1), the alternate NOx FEL cap in the table applies only in the 2014–2015 model years if certifying under §1039.102(d)(1), and only in the 2015 model year if certifying under §1039.102(d)(2).

9 For manufacturers certifying engines in this power category using the percentage phase-in/phase-out approach instead of the alternate NOx standard of §1039.102(e)(2), the alternate NOx FEL cap in the table applies only for the 2014 model year.