California Environmental Protection Agency Air Resources Board	CUMMINS INC.	EXECUTIVE ORDER A-021-0637 New On-Road Heavy-Duty Engines Page 1 of 2 Pages

Pursuant to the authority vested in the Air Resources Board by Health and Safety Code Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by Health and Safety Code Sections 39515 and 39516 and Executive Order G-14-012;

IT IS ORDERED AND RESOLVED: The engine and emission control systems produced by the manufacturer are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	ENGINE SIZES (L)	FUEL TYPE [1]	STANDARDS & TEST PROCEDURE	INTENDED SERVICE CLASS [2]	ECS & SPECIAL FEATURES [3]	DIAGNOSTIC [6]
2016	GCEXH0540LAV	8.9	Diesel	Diesel	MHDD	DDI, TC, CAC, ECM, EGR, OC, PTOX, SCR-U, AMOX	OBD($)

PRIMARY ENGINE'S IDLE EMISSIONS CONTROL [5]	ADDITIONAL IDLE EMISSIONS CONTROL [5]
30g	N/A

ENGINE (L)	ENGINE MODELS / CODES (rated power, in hp)
8.9	See Attachment for engine models and ratings

* =not applicable; **GVWR**=gross vehicle weight rating; **13 CCR xyz**=Title 13, California Code of Regulations, Section xyz; **40 CFR 86.abc**=Title 40, Code of Federal Regulations, Section 86.abc; **L**=liter; **hp**=horsepower; **kw**=kilowatt; **hr**=hour;

[1] **CNG/LNG**=compressed/liquefied natural gas; **LPG**=liquefied petroleum gas; **E85**=85% ethanol fuel; **MF**=multi fuel a.k.a. **BF**=bi fuel; **DF**=dual fuel; **FF**=flexible fuel;

[2] **L/M/H HDD**=light/medium/heavy heavy-duty diesel; **UB**=urban bus; **HDO**=heavy duty Otto;

[3] **ECS**=emission control system; **TWC/OC**=three-way/oxidizing catalyst; **NAC**=NOx adsorption catalyst; **SCR-U / SCR-N**=selective catalytic reduction – urea / – ammonia; **WU (prefix)** =warm-up catalyst; **DPF**=diesel particulate filter; **PTOX**=periodic trap oxidizer; **HO2S/O2S**=heated/oxygen sensor; **HAFS/AFS**=heated/air-fuel-ratio sensor (a.k.a., universal or linear oxygen sensor); **TBI**=throttle body fuel injection; **SFI/MFI**=sequential/multi port fuel injection; **DGI**=direct gasoline injection; **GCARB**=gaseous carburetor; **IDI/DDI**=indirect/direct diesel injection; **TC/SC**=turbo/super charger; **CAC**=charge air cooler; **EGR / EGR-C**=exhaust gas recirculation / cooled EGR; **PAIR/AIR**=pulsed/secondary air injection; **SPL**=smoke puff limiter; **ECM/PCM**=engine/powertrain control module; **EM**=engine modification; **2 (prefix)**=parallel; **(2) (suffix)**=in series;

[5] **ESS**=engine shutdown system (per 13 CCR 1956.8(a)(6)(A)(1); **30g**=30 g/hr NOx (per 13 CCR 1956.8(a)(6)(C); **APS** =internal combustion auxiliary power system; **ALT**=alternative method (per 13 CCR 1956.8(a)(6)(D); **Exempt**=exempted per 13 CCR 1956.8(a)(6)(B) or for CNG/LNG fuel systems; **N/A**=not applicable (e.g., Otto engines and vehicles);

[6] **EMD**=engine manufacturer diagnostic system (13 CCR 1971); OBD**(F) / (P)** / **($)**=full / partial / partial with a fine / on-board diagnostic;);

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.8; 2) the SET and NTE limits under the applicable California exhaust emission standards and test procedures for heavy-duty diesel engines and vehicles (Test Procedures); and 3) the corresponding certification levels, for this engine family. "Diesel" CO, SET and NTE certification compliance may have been demonstrated by the manufacturer as provided under the applicable Test Procedures in lieu of testing. (For flexible- and dual-fueled engines, the CERT values in brackets [ ] are those when tested on conventional test fuel. For multi-fueled engines, the STD and CERT values for default operation permitted in 13 CCR 1956.8 are in parentheses.).[4]

in g/bhp-hr	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	SET	FTP	SET	FTP	SET	FTP	SET	FTP	SET	FTP	SET
STD	0.14	0.14	0.20	0.20	*	*	15.5	15.5	0.01	0.01	*	*
CERT	0.01	0.004	0.19	0.15	*	*	0.05	0.00	0.000	0.001	*	*
NTE	0.21		0.30		*		19.4		0.02		*	

[4] **g/bhp-hr**=grams per brake horsepower-hour; **FTP**=Federal Test Procedure; **SET**= Supplemental emissions testing; **NTE**=Not-to-Exceed; **STD**=standard or emission test cap; **FEL**=family emission limit; **CERT**=certification level; **NMHC/HC**=non-methane/hydrocarbon; **NOx**=oxides of nitrogen; **CO**=carbon monoxide; **PM**=particulate matter; **HCHO**=formaldehyde;

BE IT FURTHER RESOLVED: The manufacturer has demonstrated compliance with the Greenhouse Gas Emission Standards as specified in Title 13 CCR 1956.8 and the incorporated "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" (HDDE Test Procedures) adopted Dec. 12, 2002, as last amended Oct. 21, 2014 using the 2014 model year National Heavy-Duty Engine and Vehicle Greenhouse Gas Program as specified in Section 1036.108 of the HDDE Test Procedures. The manufacturer has submitted the required information and therefore has met the criteria necessary to receive a California Executive Order based on the Environmental Protection Agency's Certificate of Conformity for the above listed engine family.

	EPA CERTIFICATE OF CONFORMITY		PRIMARY INTENDED SERVICE CLASS	
	CEX-ONHWY-16-07		VOCATIONAL / TRACTOR	
In g/bhp-hr	CO_2		CH_4	N_2O
	FTP	SET		
STD	576	487	0.10	0.10
FCL	553	497	*	*
FEL	570	512	*	*
CERT	553	497	0.02	0.06

[4] **g/bhp-hr**=grams per brake horsepower-hour; **FTP**=Federal Test Procedure; **SET**=Supplemental emissions testing; **STD** = standard or emission test cap; **FEL**=family emission limit; **FCL**=family certification level; **CERT**=certification level; **CO_2**=carbon dioxide; **CH_4**=methane; **N_2O**=nitrous oxide; **VOCATIONAL**=vocational engine; **TRACTOR**=tractor engine

BE IT FURTHER RESOLVED: That the listed engine family is certified to the Alternate Phase-in CO_2 Emission Standards as specified in 13 CCR 1956.8 and section 40 CFR 1036.150 (e) as incorporated in the "California Exhaust Emission Standards and Test Procedures for 2004 and Subsequent Model Heavy Duty Diesel-Engines and Vehicles" adopted Dec. 12, 2002, as last amended Oct. 21, 2014.

BE IT FURTHER RESOLVED: Certification to the FEL(s) / FCL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(s) / FCL(s) is the emission level declared by the manufacturer and serves in lieu of an emission standard for certification purposes in any averaging, banking, or trading (ABT) programs. It will be used for determining compliance of any engine in this family and compliance with such ABT programs.

BE IT FURTHER RESOLVED: Except in vehicle applications exempted per 13 CCR 1956.8(a)(6)(B), engines in this engine family certified under 13 CCR 1956.8(a)(6)(C) [30 g/hr NOx] and section 35.B.4 of the incorporated "California Exhaust Emissions Standards and Test Procedures for 2004 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" (HDDE Test Procedures) adopted Dec. 12, 2002, as last amended Apr. 18, 2013, shall be provided with an approved "Certified Clean Idle" label that shall be affixed to the vehicle into which the engine is installed.

BE IT FURTHER RESOLVED: For the listed engine models the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR 1965 (emission control labels), 13 CCR 1971.1 (on-board diagnostic, full or partial compliance) and 13 CCR 2035 et seq. (emission control warranty).

BE IT FURTHER RESOLVED: That the manufacturer has elected to include engine models in this engine family which are identified for "emergency vehicle use only". These "emergency vehicle use only" engines are exempt from requirements imposed pursuant to California law and the regulations adopted pursuant thereto for motor vehicle pollution control devices per California Vehicle Code Section 27156.2. The manufacturer must clearly label these engines for "emergency vehicle use only" on the engines' emission control label.

BE IT FURTHER RESOLVED: The listed engine models are conditionally certified in accordance with 13 CCR Section 1971.1(k) (deficiency and fines provisions for certification of malfunction and diagnostic system) because the heavy-duty on-board diagnostic (HD OBD) system of the listed engine models has been determined to have nine deficiencies. The listed engine models are approved subject to the manufacturer paying a fine of $250 per engine for the third through ninth deficiencies in the listed engine family that is produced and delivered for sale in California. On a quarterly basis, the manufacturer shall submit to the Air Resources Board reports of the number of engines produced and delivered for sale in California and pay the full fine owed for that quarter pursuant to this conditional certification. Payment shall be made payable to the State Treasurer for deposit in the Air Pollution Control Fund no later than thirty (30) days after the end of each calendar quarter during the 2016 model-year production period. Failure to pay the quarterly fine, in full, in the time provided, may be cause for the Executive Officer to rescind this conditional certification, effective from the start of the quarter in question, in which case all engines covered under this conditional certification for that quarter and all future quarters would be deemed uncertified and subject to a civil penalty of up to $5000 per engine pursuant to HSC Section 43154.

Engines certified under this Executive Order must conform to all applicable California emission regulations.

The Bureau of Automotive Repair will be notified by copy of this Executive Order.

Executed at El Monte, California on this 21 day of October 2015.

Annette Hebert, Chief
Emissions Compliance, Automotive Regulations and Science Division

EO#: A-021-0637

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10-13-2015

Engine Model Summary Template

Engine Family	1.Engine Code	2.Engine Model	3.BHP@RPM (SAE Gross)	4.Fuel Rate: mm/stroke @ peak HP (for diesel only)	5.Fuel Rate: (lbs/hr) @ peak HP (for diesels only)	6.Torque @ RPM (SEA Gross)	7.Fuel Rate: mm/stroke@peak torque	8.Fuel Rate: (lbs/hr)@peak torque	9.Emission Control Device Per SAE J1930
GCEXH0540LAV	4611;FR94830	ISL9 450	450@2100	233	165	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94831	ISL9 400	400@2100	199	141	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94842	ISL9 380	365@21	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94832	ISL9 370	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94836	ISL9 380	352@2200	171	127	1150@1400	222	105	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94833	ISL9 345	330@2100	161	114	1150@1400	214	101	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94837	ISL9 350	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94838	ISL9 330	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94839	ISL9 300	285@2200	137	102	860@1300	164	72	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94840	ISL9 270	260@2200	125	93	800@1300	155	68	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94841	ISL9 260	260@2200	125	93	720@1300	144	63	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94830	PX-9 450	450@2100	233	165	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94831	PX-9 400	400@2100	199	141	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94842	PX-9 380	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94832	PX-9 370	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94836	PX-9 380	352@2200	171	127	1150@1400	222	105	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94833	PX-9 345	330@2100	161	114	1150@1400	214	101	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94837	PX-9 350	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94838	PX-9 330	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94839	PX-9 300	285@2200	137	102	860@1300	164	72	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94840	PX-9 270	260@2200	125	93	800@1300	155	68	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94841	PX-9 260	260@2200	125	93	720@1300	144	63	SCRC, PTOX, PC
~~GCEXH0540LAV~~									
GCEXH0540LAV	Emergency	Vehicle	Ratings	Below					
GCEXH0540LAV	4611;FR94830	ISL9 450 EV	450@2100	233	165	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94831	ISL9 400 EV	400@2100	199	141	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94842	ISL9 380 EV	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94832	ISL9 370 EV	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC

DDI, TC, CAC, ECM, EGR, OC, PTOX, SCR-U, AMOX

Attachment: Page 2 of 2

10-13-2015

EOH: A-021-0637

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GCEXH0540LAV	4611;FR94836	ISL9 380 EV	352@2200	171	127	1150@1400	222	105	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94833	ISL9 345 EV	330@2100	161	114	1150@1400	214	101	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94837	ISL9 350 EV	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94838	ISL9 330 EV	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94839	ISL9 300 EV	285@2200	137	102	860@1300	164	72	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94840	ISL9 270 EV	260@2200	125	93	800@1300	155	68	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94830	PX-9 450EV	450@2100	233	165	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94831	PX-9 400EV	400@2100	199	141	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94842	PX-9 380EV	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94832	PX-9 370EV	365@2100	184	130	1250@1400	239	113	SCRC, PTOX, PC
GCEXH0540LAV	4611;FR94836	PX-9 380EV	352@2200	171	127	1150@1400	222	105	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94833	PX-9 345EV	330@2100	161	114	1150@1400	214	101	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94837	PX-9 350EV	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94838	PX-9 330EV	320@2200	154	114	1000@1400	191	90	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94839	PX-9 300EV	285@2200	137	102	860@1300	164	72	SCRC, PTOX, PC
GCEXH0540LAV	4612;FR94840	PX-9 270EV	260@2200	125	93	800@1300	155	68	SCRC, PTOX, PC
~~GCEXH0540LAV~~									

DDI, TC, CAC, ECM, EGR, OC, PTOX, SCR-U, AMOX