CALIFORNIA AIR RESOURCES BOARD	DETROIT DIESEL CORPORATION	EXECUTIVE ORDER A-290-0170 New On-Road Heavy-Duty Engines Page 1 of 2 Pages

Pursuant to the authority vested in California 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]
2019	KDDXH15.6GED	15.6	Diesel	Diesel	HHDD	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)
15.6	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	*	*
FEL	*	*	*	*	*	*	*	*	*	*	*	*
CERT	0.000	0.000	0.13	0.01	*	*	0.3	0.01	0.000	0.000	*	*
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 December 12, 2002, as last amended September 1, 2017 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	
	KDDXH15.6GED-004		TRACTOR/VOCATIONAL	
In g/bhp-hr	CO_2		CH_4	N_2O
	FTP	SET		
STD	555	460	0.10	0.10
FCL	521	458	*	*
FEL	537	472	0.10	0.10
CERT	513	447	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: 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 December 12, 2002, as last amended September 1, 2017, 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: 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: 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 three deficiencies. The listed engine models are approved subject to the manufacturer paying a fine of $25 per engine for the third deficiency in the listed engine family that is produced and delivered for sale in California. On a quarterly basis, the manufacturer shall submit to the California 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 2019 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 $37,500 per engine pursuant to
HSC Section 43154.

BE IT FURTHER RESOLVED: The listed engine models are conditionally certified. These engine models may be sold and or marketed prior to Detroit Diesel Corporation updating the engines with revised HD OBD strategies approved by the California Air Resources Board. Detroit Diesel Corporation shall submit a recall plan pursuant to 13 CCR 1971.5 to the California Air Resources Board by March 31, 2019, to ensure that engine models produced under this conditional Executive Order are reprogrammed in the field to incorporate the California Air Resources Board approved revised HD OBD strategies. The aforementioned reprogramming shall be implemented free of charge based upon a plan approved by the California Air Resources Board. No later than March 31, 2019, engine models produced shall incorporate the California Air Resources Board approved revised HD OBD strategies. Engine models produced after March 31, 2019 not incorporating the California Air Resources Board approved HD OBD strategies will be deemed uncertified and shall be cause for California Air Resources Board to revoke the conditional Executive Order ab initio. Any engines introduced into commerce under the conditional Executive Order shall be deemed uncertified and subject to a civil penalty of up to $37,500 per engine pursuant to HSC Section 43154.

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).

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 3 day of December 2018.

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

ATTACHMENT 1 OF 1

Engine Model Summary Template A-290-0170

11/15/2018

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
KDDXH15.6GED	I	DD16	500@1800	267.9	160.0	1850@1120	316.6	118.5	ECM, TC, CAC
KDDXH15.6GED		DD16	560@1800	299.3	178.9	1850@1120	316.6	118.5	EGR, PTOX
KDDXH15.6GED	II	DD16	530@1800	283.5	169.3	1850@1120	316.6	118.5	DDI, OC
KDDXH15.6GED	III	DD16	600@1800	320.4	191.6	1850@1120	316.6	118.5	AMOX, SCR-U
KDDXH15.6GED	IV	DD16	560@1800	299.3	178.9	2050@1120	353.0	132.2	(all ratings)
KDDXH15.6GED	V	DD16	600@1800	320.4	191.6	2050@1120	353.0	132.2	

Part Number Summary Template

Engine Family	Engine Code	Engine Model	Fuel Injector	Turbocharger	EGR Assemblies		After Treatment Device (Specify)	Injector Doser - DPF	Sensor Assemblies	
					Description	Part Number	ATD Assembly		Description	Part Number
KDDXH15.6GED	I	DD16	A4720701187	A4730962099	cooler asm-EGR	A4731400575	OneBox System	A0000705546	timing synch	A0071535928
KDDXH15.6GED			(all ratings)	(all ratings)	valve-EGR	A4721401360	A0024901592	(all ratings)	timing refer	A0061534228
KDDXH15.6GED	II	DD16			actuator-EGR vlv	A4731500594	A0024901692		fuel rail press	A0071530228
KDDXH15.6GED						(all ratings)	A0024901792		coolant out temp	A0041534228 o
KDDXH15.6GED	III	DD16					A0024901892			A0041534328
KDDXH15.6GED							A0024901992		oil temp	A0041534228 o
KDDXH15.6GED	IV	DD16					A0024902492			A0041534328
KDDXH15.6GED							A0024902592		intake mnf temp	A0091538928
KDDXH15.6GED	V	DD16							turbo air inlet temp	A0081538628
KDDXH15.6GED									intercooler out	A0101535428
KDDXH15.6GED									press & temp	
KDDXH15.6GED									fuel temp	A0041534228 o
KDDXH15.6GED										A0041534328
KDDXH15.6GED									EGR delta P	A4701530428
KDDXH15.6GED									venturi	A4711427104
KDDXH15.6GED									coolant in temp	A0041534228 o
KDDXH15.6GED										A0041534328
KDDXH15.6GED										
KDDXH15.6GED										
KDDXH15.6GED									Soot sensor	A0111533228
KDDXH15.6GED									NOx inlet	A0101531928
KDDXH15.6GED									NOx outlet	A0101536928
KDDXH15.6GED									Temp DOC in	A6805401917
KDDXH15.6GED									Temp DOC out	A6805402117
KDDXH15.6GED									Temp DPF out	A6805401317
KDDXH15.6GED									Temp SCR out	A6805402117
KDDXH15.6GED									Pres DPF out	A4721530828