

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-19-095;

IT IS ORDERED AND RESOLVED: The hybrid engine produced by Cummins Inc. (Cummins) and the hybrid system produced by BAE Systems Controls, Inc. (BAE) are certified as described below for use in on-road motor vehicles with a manufacturer's GVWR over 14,000 pounds. The production hybrid engine and the production hybrid system shall be identical in all material respects as those for which certification is granted.

| HYBRID ENGINE DESCRIPTION | | | | | | | | |
|---|---|----------------------|--|------------------------|----------------------------|------------------------|-----------------------|---|
| HYBRID ENGINE MANUFACTURER | MODEL YEAR | ENGINE FAMILY | EXECUTIVE ORDER NUMBER | FUEL TYPE | STANDARDS & TEST PROCEDURE | INTENDED SERVICE CLASS | ENGINE OBD COMPLIANCE | PRIMARY ENGINE'S IDLE EMISSIONS CONTROL |
| CUMMINS INC. | 2022 | NCEXH0540LCB | A-021-0756-1 | Diesel | Diesel | UB, UB-Hybrid | OBD(P) | Exempt |
| ENGINE (L) | ECS & SPECIAL FEATURES | | ENGINE MODELS / CODES (rated power, in hp) | | | | | |
| 8.9 | DDI, TC, CAC, ECM, EGR-C, OC, PTOX, SCR-U, AMOX | | L9 330 / LHUB2 (330) (model with stop / start feature) | | | | | |
| HYBRID SYSTEM DESCRIPTION | | | | | | | | |
| HYBRID SYSTEM MANUFACTURER | HYBRID SYSTEM MODEL YEAR | HYBRID SYSTEM MODELS | | INTENDED SERVICE CLASS | ENERGY STORAGE SYSTEM | | HYBRID OBD COMPLIANCE | |
| BAE SYSTEMS CONTROLS INC. | 2022 | HDS3300LND | | UB-Hybrid | Lithium Ion Battery | | OBD(\$) | |
| HYBRID ENGINE MODELS / CODES | | | | | | | | |
| L9 330 / LHUB2 (model with stop / start feature) | | | | | | | | |
| <small>* =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; K=1000 miles; hp=horsepower; kw=kilowatt; 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); WR-HO2S=wide range oxygen sensor; TBI=throttle body fuel injection; SF1/MF1=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; AMOX=Ammonia Oxidation Catalyst; NOXS=NOx sensor; 2 (prefix)=parallel; (2) (suffix)=in series;</small> | | | | | | | | |

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 | 0.18 | 0.06 | * | * | 0.7 | 0.04 | 0.01 | 0.002 | * | * |
| 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 April 18, 2019.

| PRIMARY INTENDED SERVICE CLASS: Vocational | | | | |
|--|-----------------|-----|-----------------|------------------|
| In g/bhp-hr | CO ₂ | | CH ₄ | N ₂ O |
| | FTP | SET | | |
| STD | 513 | * | 0.10 | 0.10 |
| FCL | 512 | * | * | * |
| FEL | 527 | * | 0.10 | 0.18 |
| CERT | 501 | * | 0.003 | 0.17 |

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; CO₂=carbon dioxide; CH₄=methane; N₂O=nitrous oxide; VOCATIONAL=vocational engine; TRACTOR=tractor engine

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: For the listed engine models Cummins 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) with the exception of monitoring of the hybrid system under 13 CCR 1971.1(g) (Monitoring Requirements For All Engines), and 13 CCR 2035 et seq. (emission control warranty).

BE IT FURTHER RESOLVED: For the listed hybrid system BAE has submitted the materials to demonstrate certification compliance with 13 CCR 1971.1 (on-board diagnostic, full or partial compliance) except 13 CCR 1971.1(e) Monitoring Requirements for Diesel/Compression-Ignition Engines, (f) Monitoring Requirements for Gasoline/Spark-Ignited Engines, and (i) Monitoring System Demonstration Requirements for Certification.

BE IT FURTHER RESOLVED: For the listed hybrid system BAE has submitted the materials to demonstrate certification compliance with 13 CCR 2035 et seq. (emission control warranty).

BE IT FURTHER RESOLVED: The listed Cummins' hybrid engine models and BAE's hybrid system models are conditionally certified in accordance with 13 CCR Section 1971.1(k) (deficiency and fines provisions for certification of the heavy-duty on-board diagnostic (HD OBD) system) because the HD OBD system of the listed hybrid engine and hybrid system models have been determined to have deficiencies. The listed hybrid engine models are approved with two deficiencies. The listed hybrid system models are approved with five deficiencies and are subject to BAE paying a fine for the first through fifth deficiencies in the hybrid system model listed in this Executive Order that is produced and delivered for sale in California. The listed hybrid engine and hybrid system models are approved subject to Cummins and/or BAE paying a fine of \$125 per combined hybrid engine and system that is produced and delivered for sale in California under this Executive Order. On a quarterly basis, Cummins and BAE shall submit to California Air Resources Board reports of the number of engines and hybrid systems 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 2022 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 and hybrid systems 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 \$40,725 per engine pursuant to HSC Section 43154.

BE IT FURTHER RESOLVED: The BAE hybrid system models listed on this Executive Order may only be used with Cummins' hybrid engine models listed on this Executive Order whose on-board diagnostic system have been approved as compatible.

BE IT FURTHER RESOLVED: Sales of the Cummins hybrid engine and BAE hybrid system models using any identification other than that listed, selling the hybrid engine or hybrid system models for an application not listed in this Executive Order, or selling any components of the hybrid engine and hybrid system models as an individual system separately shall be prohibited unless prior approval is obtained by California Air Resources Board.

BE IT FURTHER RESOLVED: Hybrid Engines certified under this Executive Order shall conform to all applicable California emission regulations.

Hybrid systems certified under this Executive Order shall conform to applicable provisions of 13 CCR 1971.1 (on-board diagnostic system, full or partial compliance), 13 CCR 2035 et seq. (emission control warranty), and 13 CCR 2141, 2142, 2144-2146 (emissions warranty information report and field information report).

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

Executed on this 5th day of August 2022.



Robin U. Lang, Chief
Emissions Certification and Compliance Division