

Understanding Engine Certification

ARB regulates tailpipe emissions for many kinds of engines; everything from lawn equipment to on-road and off-road vehicles. To show compliance with these regulations, engine manufacturers must follow strict testing procedures to demonstrate or certify that their engine or vehicle meets the engine emission standards while operating in a specific service class (test cycle and weight restriction). An engine can not be placed in a vehicle and operated outside its service class designation. Emission standards are set for a variety of service classes including new passenger cars (PC), light-duty trucks (LDT), medium-duty vehicles (MDV), heavy-duty engines (HDE) and vehicles (HDV) including urban buses (UB), on- and off-road motorcycles (ONMC and OFMC), all-terrain vehicles (ATV), and electric golf carts (eGC).

Vehicles regulated by the Fleet Rule for Transit Agencies are powered by engines certified to the heavy-duty engine service class.


Heavy-duty engines operate in vehicles with gross vehicle weight rating (GVWR) of above 8,500 pounds (lbs) in the federal jurisdiction and above 14,000 lbs in California (model year 1995 and newer). Engines used in heavy-duty vehicles are further divided into additional service classes by GVWR, as follows:

- Light heavy-duty (LHD) diesel engines: 8,500 lbs < LHD < 19,500 lbs (14,000 lbs < LHDDE < 19,500 lbs in California, for 1995 and newer model year)
- Medium heavy-duty (MHD) diesel engines: 14,000 lbs ≤ MHD ≤ 33,000 lbs
- Heavy heavy-duty (HHD) diesel engines : HHD > 33,000 lbs
- Urban Bus (UB): An UB is a passenger carrying vehicle owned or operated by a public transit agency, powered by a HHD, or of a type normally powered by a HHD and intended primarily for intra-city operation. A bus normally powered by a HHD is usually 35 feet or longer, and/or greater than 33,000 GVWR. An engine used in an urban bus must be certified to the UB service class.
- Alternative fueled engines typically are certified to the compression ignition (diesel engine) certifications above for the heavy duty service classes.

The United States Environmental Protection Agency (USEPA) has separate vehicle and engine emission standards for engines and vehicles operated outside of California in the other 49 states (49-State certified). A vehicle or engine certified to both California (CA) and USEPA standards are known as 50-State certified. Vehicles and engines are not legal for sale in CA unless they obtain a CA or a 50-State certification for that model year. An Executive Order (EO) is issued by ARB when an engine family is certified. The EO tells the emission standard and service class for that engine family. Each new year the engine manufacturer must recertify their engine, by engine family and service class, resulting in a new EO issued. ARB maintains on its website the list of certifications and corresponding EOs. To find a specific EO, please use the following link; www.arb.ca.gov/msprog/onroad/cert/cert.php.

How do I read the Executive Order?

Pertinent certification information is included in an EO such as executive order number, engine model year, engine family, engine size, fuel type, emission standards, test procedure, intended service class, emission control systems and engine models.

 California Environmental Protection Agency AIR RESOURCES BOARD	CUMMINS INC.	EXECUTIVE ORDER A-021-0435 New On-Road Heavy-Duty Engines

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-02-003;

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
2007	7CEXH0408BAE	6.7	Diesel	Diesel	MHDD	DDI, ECM, TC, CAC, EGR, OC, PTOX
ENGINE (L)	ENGINE MODELS / CODES (rated power, in hp)					
6.7	ISB305 / 1283;FR01464 (305); ISB 305 / 1265;FR91481 (305)					
*	*					
*	*					
*	*					

¹ =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;
² 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;
³ L/M/H HDD=light/medium/heavy heavy-duty diesel; UB=urban bus; HDO=heavy duty Otto;
 ECS=emission control system; TWC/OC=three-way/oxidizing catalyst; WU (prefix) =warm-up catalyst; DPF=diesel particulate filter; PTOX= Periodic Trap Oxidizer (Active Diesel Particulate Filter); HC2S/O2S=heated/oxygen sensor; HAFS/AFS=heated/air-fuel-ratio sensor (a.k.a., universal or linear oxygen sensor); TBI=throttle body fuel injection; SF/MFI=sequential/multi port fuel injection; DGI=direct gasoline injection; GCARB=gaseous carburetor; ID/DDI=indirect/direct diesel injection; TC/SC=turbo/super charger; CAC=charge air cooler; EGR=exhaust gas recirculation; 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 (2006Dec1)

How do I read the engine's emissions data?

Standard (STD): The engine emission standards are requirements that set specific limits to the amount of pollutants that can be released into the environment. The STD is always used to calculate compliance regardless of the engine's age. If no standard is listed, the FEL is used. There are cases where there is neither a standard nor FEL listed. Instead there is a set of asterisks. This indicates the lack of applicability of that constituent pollutant standard or FEL to that engine family for that particular executive order.

Family Emission Limit (FEL): This value is an emission level that is declared by the manufacturer to serve in lieu of an emission standard for certification and for the averaging, banking, and trading program (ABT).

Certification Level (CERT): The CERT listed on the executive order includes the deterioration and adjustment factors, and represents emissions for the useful life of the engine but is not the value used to determine compliance.

Not to Exceed (NTE): ARB randomly audits engines over their useful life. The engine must not exceed the STD or FEL using the required operational test cycle. Also, a limit is placed on emissions that an engine is not to exceed (NTE) during "off" cycle operations. This value should not be used to calculate your emissions or determine compliance. The NTE values are used to determine compliance during In-Use Compliance testing.

Following are: 1) the FTP exhaust emission standards, or family emission limit(s) as applicable, under 13 CCR 1956.1 (urban bus) or 13 CCR 1956.8 (other than urban bus); 2) the EURO 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, in g/bhp-hr, for this engine family. "Diesel" CO, EURO 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 1956.1 or 13 CCR 1956.8 are in parentheses.)

	NMHC		NOx		NMHC+NOx		CO		PM		HCHO	
	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO	FTP	EURO
STD	0.5	0.5	*	*	*	*	15.5	15.5	0.01	0.01	*	*
FEL	*	*	*	*	2.2	2.2	*	*	*	*	*	*
CERT	0.02	0.00	*	*	2.0	1.8	0.1	0.00	0.000	0.000	*	*
NTE	0.625		*		2.75		19.375		0.015		*	

* g/bhp-hr=grams per brake horsepower-hour; FTP=Federal Test Procedure; EURO=Euro III European Steady-State Cycle; 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: Certification to the FEL(s) listed above, as applicable, is subject to the following terms, limitations and conditions. The FEL(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 the manufacturer has submitted the materials to demonstrate certification compliance with 13 CCR 1965 (emission control labels) 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 29th day of January 2007.


Annette Hebert, Chief
Mobile Source Operations Division

How do I calculate the emissions for my entire transit inventory?

You can download our emission calculator for further instructions. The link is located at www.arb.ca.gov/msprog/bus/manualcalc.htm.

Use the standard or FEL value to determine the emissions of your engine(s).