

State of California  
AIR RESOURCES BOARD

EXECUTIVE ORDER U-R-18-6

Relating to Certification of New Heavy-Duty Off-Road Equipment Engines

LIEBHERR MACHINES BULLE

Pursuant to the authority vested in the Air Resources Board by Sections 43000.5, 43013 and 43018 of the Health and Safety Code; and,

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-9;

IT IS ORDERED AND RESOLVED: That the following Liebherr Machines Bulle 1997 model-year engine, with rated power between 175 and 750 horsepower, and exhaust emission control systems are certified as described below for use in heavy-duty off-road equipment:

Typical Equipment Usage: Excavator, Loader, Tractor, Rough Terrain Crane

Fuel Type: Diesel

<u>Engine Family</u>	<u>Liters (Cubic Inches)</u>	<u>Exhaust Emission Control Systems and Special Features</u>
VLH17.R6DARA	12.9/17.2 (786/1048)	Turbocharger Charge Air Cooler Smoke Puff Limiter

Engine models and codes are listed on attachments. Production engines shall be in all material respects the same as those for which certification is granted.

The total hydrocarbons (THC), carbon monoxide (CO), nitrogen oxides (NOx), and particulate matter (PM) certification exhaust emission standards, in grams per brake horsepower-hour (g/bhp-hr), and the opacity of smoke emission standards, in percent (%), during acceleration (Accel), lugging (Lug), and peak (Peak) modes, for this engine family are (Title 13, California Code of Regulations, Section 2423):

<u>Exhaust Emissions (g/bhp-hp)</u>				<u>Smoke Opaciity (%)</u>		
<u>THC</u>	<u>CO</u>	<u>NOx</u>	<u>PM</u>	<u>Accel</u>	<u>Lug</u>	<u>Peak</u>
1.0	8.5	6.9	0.4	20	15	50

The THC, CO, NOx and PM exhaust emission certification values, in g/bhp-hr, and the opacity of smoke emission certification values, in percent (%), for this engine family are:

<u>Exhaust Emissions (g/bhp-hr)</u>				<u>Smoke Opacity (%)</u>		
<u>THC</u>	<u>CO</u>	<u>NOx</u>	<u>PM</u>	<u>Accel</u>	<u>Lug</u>	<u>Peak</u>
0.3	0.5	4.0	0.1	10	8	30

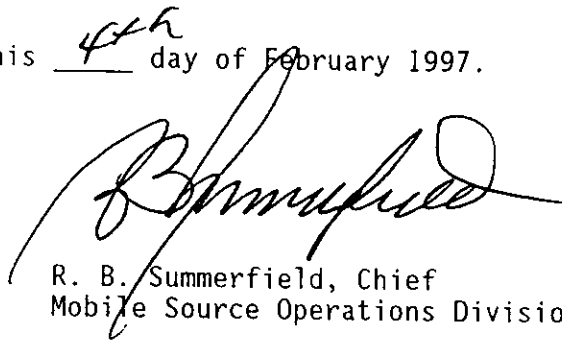
BE IT FURTHER RESOLVED: That the listed engine models comply with the "Exhaust Emission Standards and Test Procedures--Heavy-Duty Off-Road Diesel Cycle Engines" (Title 13, California Code of Regulations, Section 2423) for the aforementioned model year.

BE IT FURTHER RESOLVED: That the listed engine models also comply with the "Emission Control Labels--1996 and Later Heavy-Duty Off-Road Diesel Cycle Engines" (Title 13, California Code of Regulations, Section 2424) for the aforementioned model year.

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the materials to demonstrate certification compliance with the Board's emission control system warranty provisions (Title 13, California Code of Regulations, Section 2425 et seq.).

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

Executed at El Monte, California this 4<sup>th</sup> day of February 1997.



R. B. Summerfield, Chief  
Mobile Source Operations Division

1997 AIR RESOURCE BOARD SUPPLEMENTAL DATA SHEET  
HEAVY-DUTY OFF-ROAD DIESEL ENGINES

E.O. # U-R-18-6

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Manufacturer : Liebherr Machines Bulle Engine Family : VLH17.R6DARA  
 Displacement : 12.88 (17.18) / 786 (1048) Liters / Cubic Inches Engine Conf. : V6 (V8)  
 Valves / Ports per Cylinder : 2 valves per cylinder Stroke per Combustion Cycle : 4-stroke  
 All codes in Eng. Family : CA 49S 50Sxx Cert Stds & Test Procedures : Caxx EPAxx  
 Maximum Rated Power : 570 HP @ 2100 RPM (426 KW @ 2100 RPM)  
 Ignition : Compression xx Compression with Glow Plug \_\_\_\_\_ Spark \_\_\_\_\_  
 Fuel Type(s) : Dedicated xx Flex Fuel \_\_\_\_\_ Dual-Fuel \_\_\_\_\_ Diesel xx M100 \_\_\_\_\_ M85 \_\_\_\_\_  
                   CNG \_\_\_\_\_ LNG \_\_\_\_\_ LPG \_\_\_\_\_ Other (specify) : \_\_\_\_\_  
 Diesel Cert Fuel : 40 CFR 86.1313-94 B2 Other (specify) : \_\_\_\_\_  
 Primary Service Equipment : Excavator, Loader, Tractor, Rough Terrain Crane etc.  
 Exhaust ECS (e.g. OC, TWC, PTOX, IFI, TC, CAC) SPL, TC, CAC

(Use abbreviations per SAE J1930 Jun93)

Engine Model	Rated HP @RPM	Fuel Rate @ Rated HP mm3 /stroke	Fuel Pump & Injector Part No.	ECM / PCM Part No.	EGR Valve Part No.	PTOX / Catalytic Converter Part No.
D 9406 TI	407 @ 2100	214 ± 6	0402646785 KBEL 83P 105 DLLA 145P439	N/A	N/A	N/A
D 9406 TI-E	356 @ 1900	198 ± 6	0402676823 KBEL 83P105 DLLA 145P536	N/A	N/A	N/A
D 9406 TI-E	348 @ 1800	198 ± 6	0402676823 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9406 TI-E	356 @ 1800	200 ± 6	0402676823 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9406 TI-E	410 @ 1900	228 ± 7	0402676823 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9408 TI-E	570 @ 2100	240 ± 7	0402648967 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9408 TI	544 @ 2100	227 ± 7	0402648967 KBEL 83P 105 DLLA 145P439	N/A	N/A	N/A
D 9408 TI-E	536 @ 1900	230 ± 7	0402648967 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9408 TI-E	456 @ 1900	190 ± 6	0402678826 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A
D 9408 TI-E	442 @ 1800	195 ± 6	0402678826 KBEL 83P 105 DLLA 145P536	N/A	N/A	N/A

Date Issued : 12/01/1996

Revision : 1