BUS POWER

L9 AND L9N EURO VI ENGINES

Cummins

FOR A WORLD THAT'S ALWAYS ON™

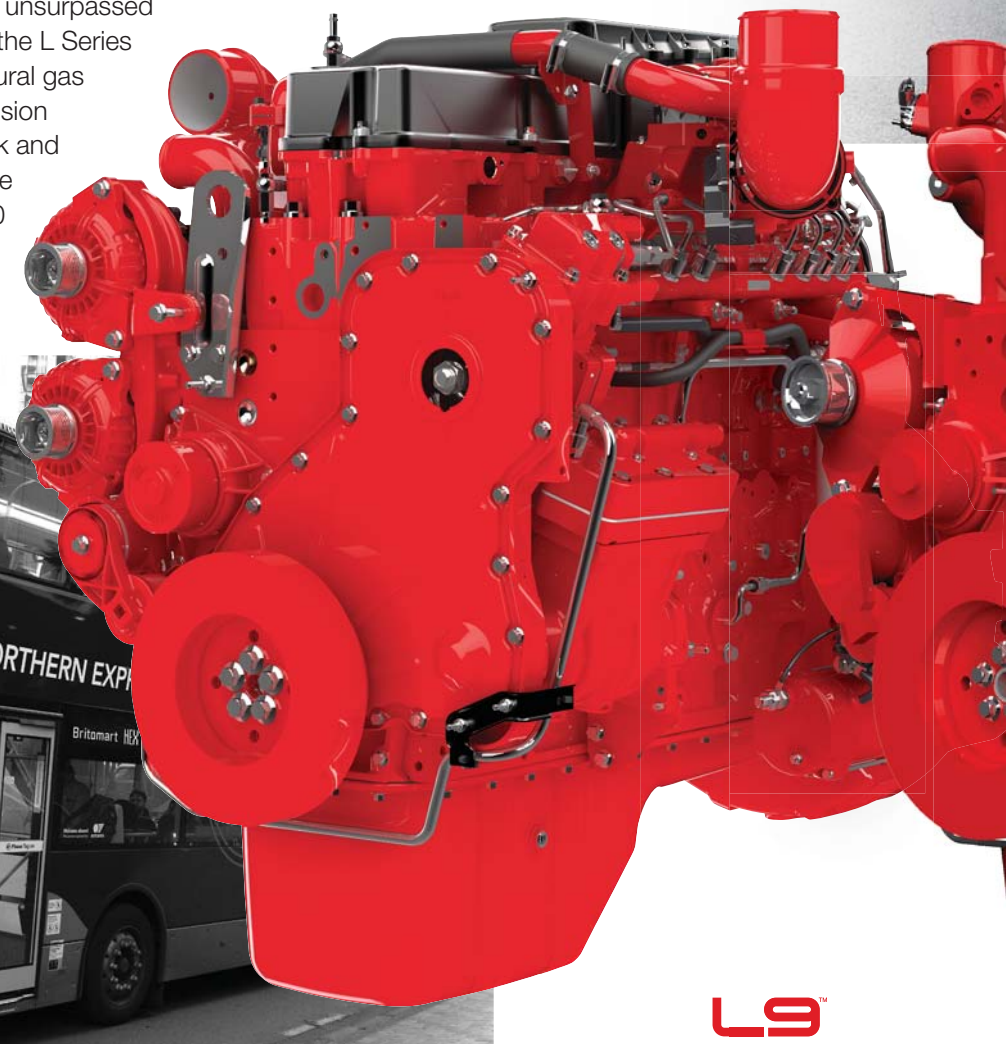
DELIVERING PREMIUM PERFORMANCE

Unique among engine platforms, the 8.9-litre L Series combine the robust characteristics of a higher displacement, heavy-duty engine with the efficiency and lower operating costs of a smaller, midrange engine. This fusion of attributes gives the ability to power a remarkably broad range of vehicles, from 12 to 24-metre buses, including tri-axle double-deckers, as well as touring, commuter and intercity coaches.

Across these applications, the L9 clean diesel delivers premium levels of performance and has earned a reputation for dependability unsurpassed in the bus industry. The capability of the L Series is further enhanced with the L9N natural gas version, achieving close-to-zero emission levels. Sharing the same engine block and electronic management system as the L9 diesel also brings the benefit of 80 percent component commonality between the two engines.

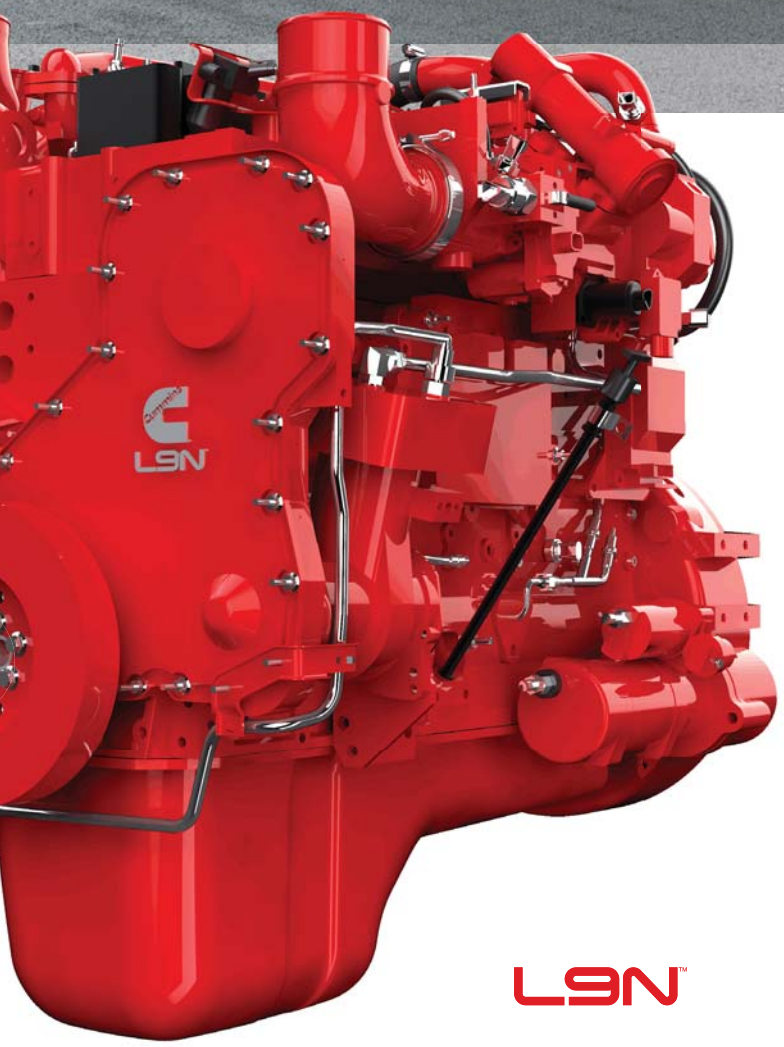
RELIABILITY DESIGNED-IN

Stable platform architecture has driven a long track record of success, reflected today by the fact that around 50,000 L Series engines enter service every year. Successive engine upgrades have avoided adding unnecessary complexity, an approach that can be seen with the latest engines certified to Euro VI Phase-E. While meeting strict emissions criteria, they retain all the inherent reliability, strength and deep reserves of torque that operators have come to expect from their L engines.



SMART EFFICIENCY

The compact envelope and high power density of the L9 and L9N bring a significant installation advantage, together with an engine management system that seamlessly integrates into the vehicle controls. Smarter electronics also means that engine diagnostics and trip data can be quickly accessed with Cummins digital service tools, and instantly converted into easy to read analytics to enable proactive maintenance when its needed.



L9N™

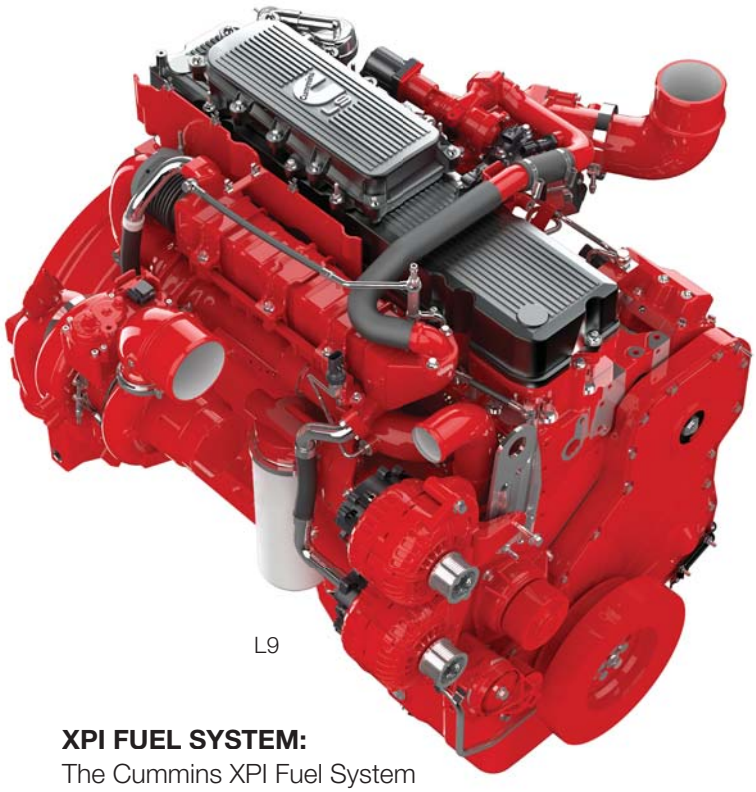
The L Series engines feature turbochargers specifically designed by Cummins to enable a more rapid response to increasing engine loads. The L9 diesel utilises a Variable Geometry Turbocharger (Cummins VGT™) to realise higher torque delivery and lower emissions, while the L9N features a simpler wastegate turbocharger ideally suited to cleaner natural gas combustion.

EXTENDED LIFE

While the L9 and L9N achieve the longest life to overhaul of any comparable engine, Cummins goes even further by designing-in ease of mid-life overhaul so that operators can maximise their investment by keeping buses on the road for longer. Scheduled engine service requirements are few and far between, meaning that a bus fleet goal of over 95 percent uptime availability is fully achievable with the L Series.

The L9 and L9N are packed with high-strength componentry to significantly lower thermal and mechanical stress levels. As a result, the L Series achieves remarkably high standards of in-service dependability and long-term durability, while operating even under the most challenging duty cycles. These premium features include:

- Wet cylinder liners ensure better heat dissipation and a faster engine warm-up time
- Replaceable liner design for easier mid-life overhaul
- Forged-steel crankshaft and connecting rods for extra strength
- Steel pistons with targeted oil cooling to lower temperatures
- Robust steel roller cam followers for reduced friction



L9

XPI FUEL SYSTEM:
The Cummins XPI Fuel System utilised on the L9 diesel is derived from the larger X12 and X15 engines, bringing the advantage of extra-high pressure fuel injection with cleaner, more fuel-efficient combustion at all engine speeds. This state-of-the-art common rail design delivers smoother and more rapid engine response to increasing vehicle demands, with the Cummins engine control module adjusting fuel injector and pump parameters to ensure consistent fuel injection performance. The compact, single-cylinder XPI pump is self-lubricated by the fuel, avoiding the need for oil cooling with a corresponding reduction in oil consumption.

STEP AHEAD TO PHASE-E

The 2021 Euro VI Phase-E regulatory step is particularly relevant for bus operations, as it is focused on tighter control limits for NOx emissions during lower speed city operations and under cold start conditions. Certification is dependent on test results taken during real-world driving operations, verifying results first taken under engine emissions test cell conditions. On-road testing with Cummins Phase-E engines during typical city bus duty cycles have indicated a further 25 percent reduction in Nitrogen Oxides (NOx) compared to the initial Phase-A engines when Euro VI was first introduced in 2015.

Both the L9 and L9N feature a crankcase ventilation system designed by Cummins to re-route gases back to the engine to give a more complete combustion and help eliminate oil-based emissions.

L9N

HYBRID L9

Cummins has achieved a Euro VI and EPA technology achievement by powering thousands of hybrid buses operating in Europe and North America, making a major contribution to improving air quality and reducing the carbon footprint. Cummins 'H' version of the L9 is specially configured to integrate with the hybrid driveline and provide a seamless engine on/engine off function for the vehicle. On-road testing with Cummins engines on city bus duty cycles has indicated that Nitrogen Oxide (NOx) emissions are capable of being reduced to 50 percent below the Euro VI standard.

Hybrid drive buses typically reduce fuel consumption and related CO_2 emissions by around 33 percent, with the downsized engine contributing an important part of that reduction. With hybrid engine capability, this provides operators with the energy choice they need alongside conventional clean diesel drivelines, the option of renewable natural gas power, full electric and fuel cell solutions from Cummins.

CLOSE-TO-ZERO L9N

The L9N offers a low-cost natural gas pathway to achieve close-to-zero emissions. Testing under bus duty cycle conditions has demonstrated the ability of the L9N to reach NOx emissions levels around 80 percent below that of the Euro VI standard. The reduction in Particulate Matter emissions is equally impressive, with levels around 90 percent lower than the Euro VI standard.

The spark-ignited stoichiometric combustion is more efficient with upgraded electronic controls and a new Ignition Control Module introduced to meet the Phase-E emission standard.

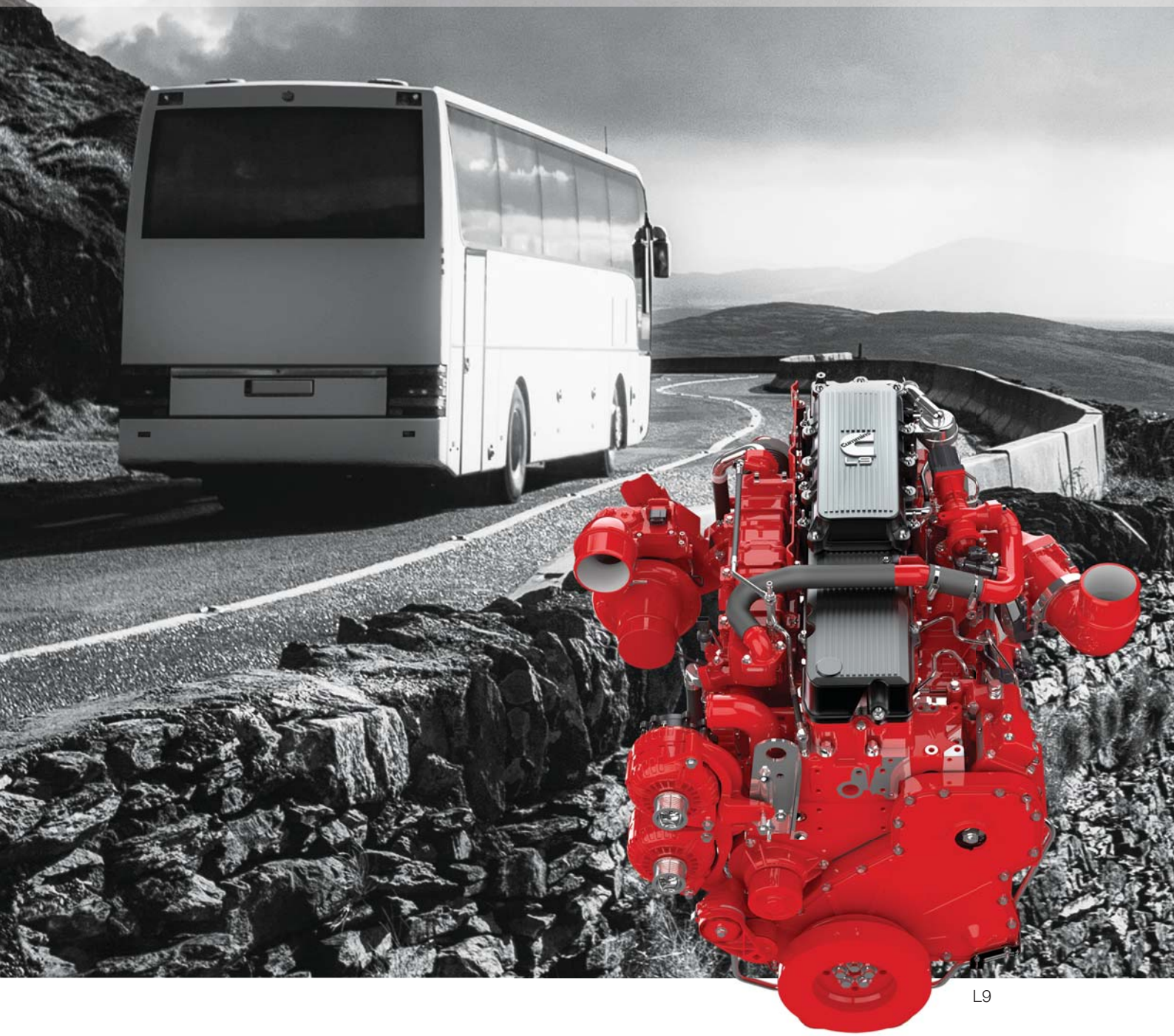
Vehicle sociability is further enhanced with the L9N natural gas engine bringing a substantial reduction in engine noise across all engine speeds compared to a diesel engine. When tested at full engine load, the L9N achieves close to a 70 percent reduction in sound pressure levels.

COACH POWER

The L9 engine offers a highly productive power solution for high-deck 12-metre coaches focused on cost-effective versatility for operating on touring, commuter, intercity or student transportation. For these applications the L9 is available with specific coach ratings up to 400 hp and 1700 Nm peak torque, releasing the full potential of the 8.9-litre while retaining much lower operating costs than engines in the 11-to-13-litre class.

The L9 achieves this while delivering rapid acceleration and high cruising speeds, but what really sets the L Series apart from much larger coach engines are the remarkably lower costs for operators in terms of not just fuel consumption, but also service and maintenance.

Fuel and CO_2 reductions are even more impressive with a next generation of coaches looking to use the L9 hybrid-adapted engine or the L9N natural gas engine with close-to-zero emissions. Utilising these engines brings the benefit of carbon reduction while also allowing coaches to freely operate in city low emission zones and in other environmentally sensitive areas.



FLEET DECARBONISATION

BIODIESEL HVO

Beyond the substantial fuel saving benefits offered by the latest L9 engine, an even lower carbon footprint can be achieved when running on low carbon B20 biodiesel or HVO (Hydrated Vegetable Oil) renewable fuel. Compared with conventional fossil-based fuel, HVO offers the potential to reduce greenhouse gas (GHG) emissions by 40 to 90 percent, depending on the feedstock of the fuel.

With the ability to run on either Compressed Natural Gas (CNG) or Liquified Natural Gas (LNG), the L9N reduces CO_2 greenhouse gas emissions by around 15 percent compared to an equivalent diesel engine. The L9N is fully compatible with operating on Biogas, also known as Renewable Natural Gas (RNG), replacing fossil-based natural gas with a sustainable fuel option to offer the option of fleet decarbonisation. Biogas is used as either a blend with, or as a 100 percent substitute for compressed natural gas.

CNG LNG RNG

ENGINE RANGE SPECIFICATIONS

BUS RATINGS		
L9	370 hp @ 2100 rpm (276 kW)	1600 Nm @ 1300 rpm
	340 hp @ 2100 rpm (254 kW)	1500 Nm @ 1200 rpm
L9N	320 hp @ 2000 rpm (239 kW)	1356 Nm @ 1300 rpm
	280 hp @ 2000 rpm (209 kW)	1220 Nm @ 1300 rpm
COACH RATINGS		
L9	400 hp @ 2100 rpm (298 kW)	1700 Nm @ 1300 rpm
	370 hp @ 2100 rpm (276 kW)	1600 Nm @ 1300 rpm
L9N	320 hp @ 2000 rpm (239 kW)	1356 Nm @ 1300 rpm
HYBRID RATINGS		
L9-H	370 hp @ 2100 rpm (276 kW)	1600 Nm @ 1300 rpm

	L9	L9N
Displacement	8.9-litre	8.9-litre
Architecture	EGR and Variable Geometry Turbocharger	EGR and Wastegate Turbocharger
Ratings Range	254-298 kW / 340-400 hp	209-239 kW / 280-320 hp
Peak Torque	1700 Nm @ 1300 rpm	1356 Nm @ 1300 rpm
Dry Weight	712 kg	737 kg
Size L x W x H	1097 x 958 x 1160 mm	1125 x 956 x 1167 mm
Oil Drain Interval	Up to 1,500 hours Up to 45,000 km (city bus) or 96,000 km (intercity/coach)	Up to 1,500 hours Up to 36,000 km (city bus) or 60,000 km (intercity/coach)

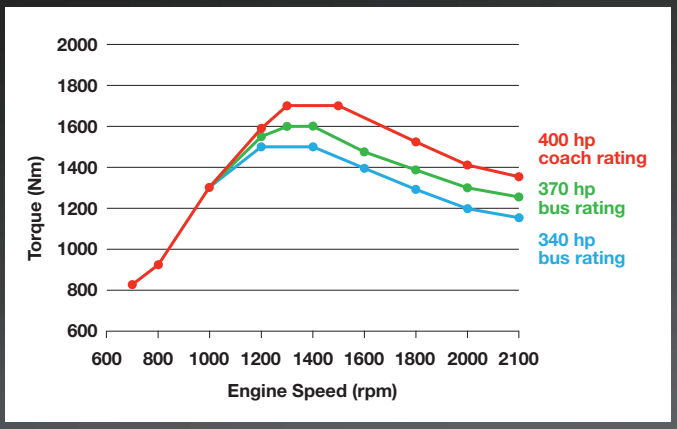
Note: oil drain intervals are dependent on application / duty cycle, based on using CK-4 API oil specification (CES 20086 approved for diesel and CES 20092 for natural gas) and average vehicle speeds.

EXHAUST AFTERTREATMENT	L9	L9N
Architecture	DPF-SCR switchback unit	3-Way Catalyst
Weight	105 kg	45 kg
Size L x W x H	1100 x 700 x 800 mm	1208 x 338 x 330 mm

DPF-SCR: The Diesel Particulate Filter and Selective Catalytic Reduction (DPF-SCR) exhaust aftertreatment is modular and configurable, designed by Cummins to work with the engine as an integrated emissions control system. The DPF-SCR combines with in-cylinder combustion and the Exhaust Gas Recirculation (EGR) system to lower PM and NOx, certified to the 2021 Phase-E requirement of the Euro VI regulations.

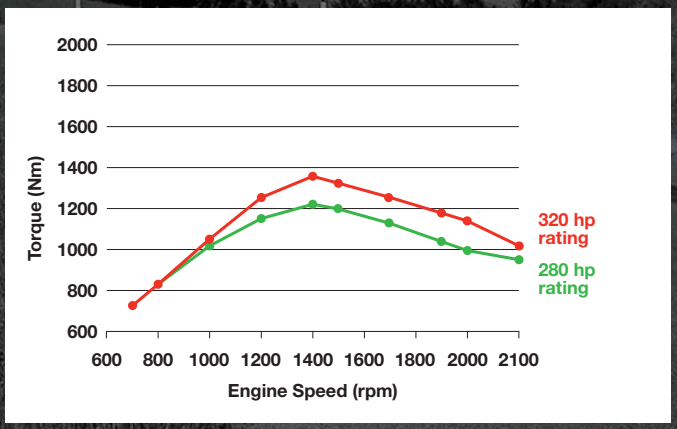
TWC: The Three-Way Catalyst (TWC) aftertreatment upgraded for Euro VI Phase-E features a large catalytic surface area and smart logic to help eliminate emissions during idle, cold starts or during multiple stop-start operations. The ‘fit and forget’ aftertreatment is fully passive and requires no AdBlue injection, cleaning or maintenance intervention.

L9 TORQUE

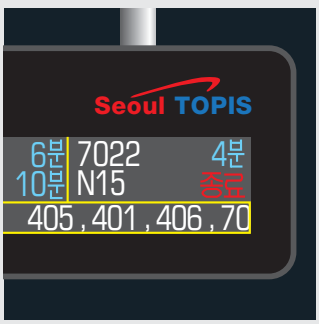


The L9 provides impressive levels of torque to enhance acceleration and gradient climbing.

L9N TORQUE



High torque levels are delivered by the L9N to improve vehicle driveability.



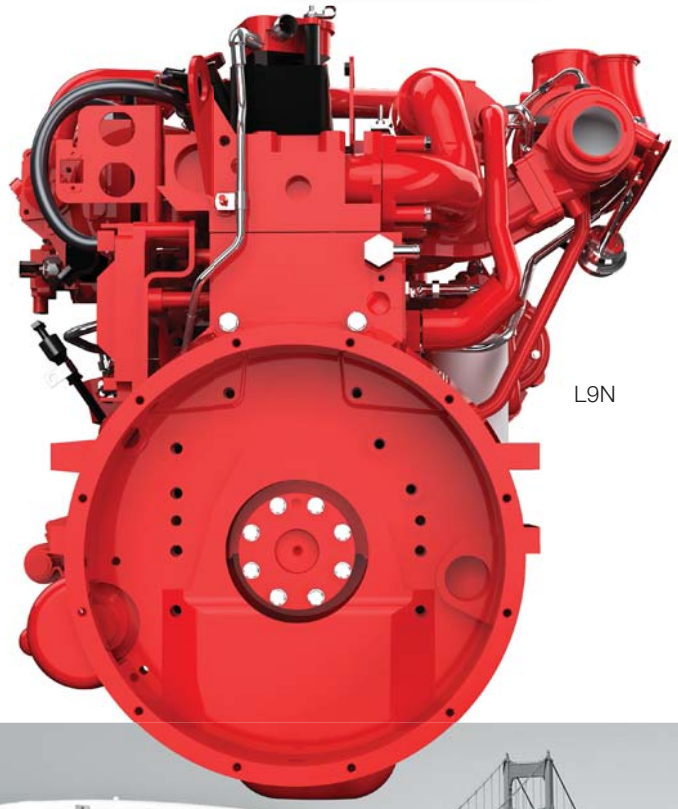
DIGITAL DIAGNOSTICS

Cummins INSITE™ performs engine diagnostics and displays electronic engine information on your PC. With step-by-step diagnostics, built-in engine drawings and schematic diagrams, working with INSITE is easy. Using this software speeds up troubleshooting procedures, helping to minimise downtime and ensures your vehicle can quickly be back on the road again.

Features:

- Quick access to trip information
- Adjust parameters and review/clear fault information quickly and easily
- Easy-to-follow troubleshooting assistance
- Wiring and sensor location diagram
- Store engine and trip information for future use, or as a programming template

Using telematics, you can wirelessly connect your engine for continuous monitoring and diagnosis of system fault alerts using a convenient Cummins mobile app, email or web portal. Products such as Connected Diagnostics and Connected Advisor can play a major role in maximising the uptime availability of your fleet by setting up a diagnostic health report, delivered automatically. This enables preventative maintenance to be scheduled, knowing what needs immediate action and what can wait until the next service inspection.



L9N

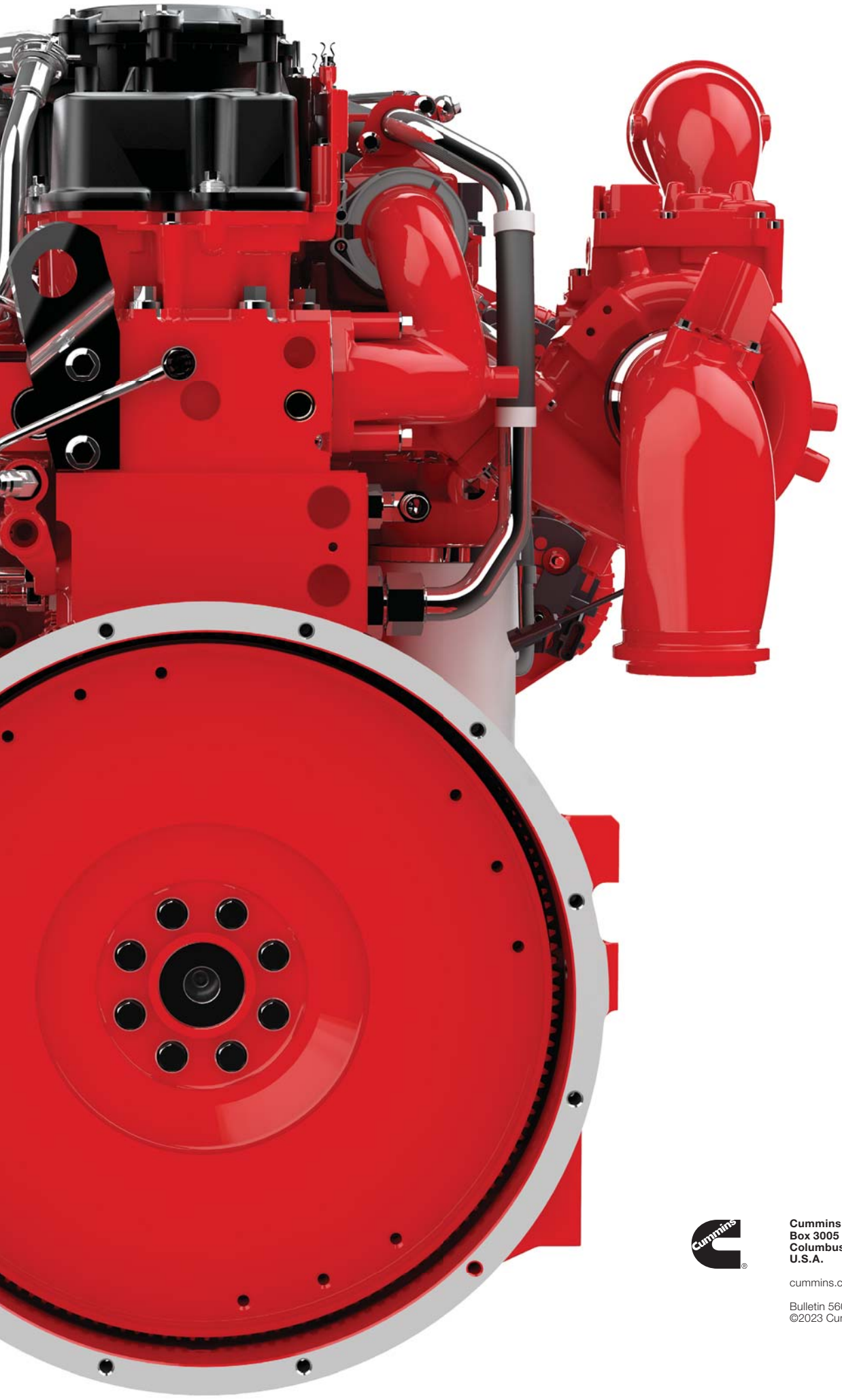
Connected Solutions™

L9

GLOBAL POWER

Cummins L9 and L9N are used by bus and coach manufacturers worldwide to meet all Euro equivalent emissions standards and in North America are by far the highest volume engines in their class meeting EPA regulations. L Series global capability is further enhanced with manufacturing facilities located in Europe, North America, China, Brasil and India.

And, you can be sure, wherever there is a Cummins-powered bus, there is a Cummins service team ready to provide expert technical support. From inspecting engine systems to training-up depot staff or working with operators to minimise fuel consumption, this is all part of Cummins' commitment to support our customers.



Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

cummins.com

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