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Cummins Tier 4 Final QSL9 Revealed at CONEXPO

Ultra-Clean Aftertreatment System Combines Cummins Compact Catalyst With Selective Catalytic Reduction To Meet Near-Zero Emissions

LAS VEGAS--(BUSINESS WIRE)-- Cummins Inc. (NYSE: CMI) today revealed the latest generation of the QSL9 engine at CONEXPO-CON/AGG - capable of meeting near-zero emissions levels. This 9-liter engine achieves 2014 EPA Tier 4 Final and EU Stage IV standards with an ultra-clean aftertreatment system, combining the Cummins Compact Catalyst with Selective Catalytic Reduction (CCC-SCR).

With up to 400-hp (298 kW) output, the QSL9 makes no performance compromises to meet near-zero emissions, retaining the higher output and faster engine response demonstrated by the Tier 4 Interim QSL9. Fuel efficiency at Tier 4 Final will be further improved over that achieved for the Tier 4 Interim engine.

The CCC-SCR ultra-clean aftertreatment system is specifically configured to provide a more compact and flexible equipment installation for Tier 4 Final. The Cummins Compact Catalyst, previously used for ratings below 174 hp (130 kW), is scaled-up in size for the 9-liter platform. Combined with SCR, the aftertreatment system achieves near-zero emissions with fully passive, flow-through operation.

In addition to the QSL9, the CCC-SCR system will be utilized by the QSB6.7, QSB4.5 and QSB3.3 engines to offer a common aftertreatment solution from 75 hp to 400 hp (56 kW to 298 kW). The scalability of the CCC-SCR system enables sizing to be configured for specific power outputs across the 3.3-liter to 9-liter engine range.

"We listened to equipment manufacturers before developing our Tier 4 Final architecture for the QSB3.3 to QSL9 product line, and the clear message we heard was to focus on reducing installation complexity as much as possible - while also retaining the high power output and performance offered by our Tier 4 Interim products," said Jeff Weikert, Vice President - Cummins MidRange Engineering.

"I am very pleased to say that with the CCC-SCR ultra-clean aftertreatment system, we are able to meet and exceed our customer expectations for Tier 4 Final. With the addition of SCR, we now have the ability to precisely balance NOx reduction between aftertreatment

and cooled Exhaust Gas Recirculation on the engine - giving us more control over the combustion formula than ever before.

"This means we are able to retain the impressive power output and transient response of the Tier 4 Interim products, with fuel consumption reduced even further. Importantly, we have been able to reduce engine-out PM to a level low enough to extend the use of the Cummins Compact Catalyst right across our QSB6.7 and QSL9 ratings to provide a fully passive aftertreatment solution," explained Weikert.

As the CCC is significantly smaller than a Particulate Filter, it offers a substantial benefit for increasingly space-constrained installations. At Tier 4 Interim, this space-saving advantage has been especially important for four-cylinder applications - but looking ahead to Tier 4 Final, the need to minimize space claim moves beyond this to the 6.7-liter and 9-liter six-cylinder platforms up to 400 hp (298 kW).

At Tier 4 Interim 2011 emissions levels, the QSB6.7 and QSL9 engines are capable of achieving up to 5 percent improved fuel efficiency compared to Tier 3, depending on duty cycle and machine optimization. Fuel efficiency will be further increased for Tier 4 Final 2014 by an additional 2 percent to 3 percent.

CCC-SCR Ultra-Clean Aftertreatment

To meet Tier 4 Final in 2014, particulate matter (PM) reduces to 0.02 g/kW-hr and oxides of nitrogen (NOx) reduce to 0.40 g/kW-hr. Compared to Tier 3 emissions levels, this represents a 90 percent reduction for both PM and NOx.

The SCR system developed by Cummins for Tier 4 Final is a next-generation design that moves beyond the SCR technology currently in use for Tier 4 Interim. The system incorporates a copper zeolite-based catalyst capable of up to 95 percent NOx conversion and able to operate more efficiently at lower temperatures. The system features advanced sensors to provide full closed-loop control. Diesel Exhaust Fluid (DEF) dosing levels are minimized with enhanced mixing in the decomposition pipe.

The CCC is positioned in front of the SCR in the exhaust stream, and provides easier and more flexible installation options. Efficient PM reduction is achieved with a catalytic coating, substrate and sizing that are uniquely tailored for the Cummins engine platform.

By passively oxidizing PM from the exhaust stream, the CCC is a maintenance-free "fit and forget" device offering an inherent operational simplicity ideally suited for rental equipment applications.

The CCC-SCR aftertreatment will be available in multiple configurations, including switchback, horizontal and vertical. Optimization work will continue to refine aftertreatment packaging and evaluate innovative solutions to further enhance installation flexibility.

Cummins experience with SCR technology is unrivaled in the industry, dating to 2005. Today, around 75,000 EPA 2010 on-highway engines with SCR are operating in North America, meeting near-zero emissions standards similar to those of Tier 4 Final. This enables Cummins to deliver the right emissions solution by leveraging preceding on-highway technology and then optimizing for off-highway customers.

Pre-Designed For Final

The QSL9 engine revealed at CONEXPO-CON/AGG for Tier 4 Final 2014 is almost identical to the engine introduced to meet Tier 4 Interim 2011. This ability to move forward to meet the near-zero emissions standards is pre-designed into the existing engine platform, with no significant change required for engine systems or installation profile.

With performance-enhancing systems such as Cummins Variable Geometry Turbocharger (VGT(TM)) and Xtra-High Pressure Injection (XPI) fuel system, the QSL9 continues to equal the power productivity of higher-displacement engines.

Cummins Direct Flow(TM) air cleaner technology brings a further installation advantage with a smaller profile than typical cylindrical cleaners, together with the benefit of extended service change intervals.

About Cummins Inc.

Cummins Inc., a global power leader, is a corporation of complementary business units that design, manufacture, distribute and service engines and related technologies, including fuel systems, controls, air handling, filtration, emission solutions and electrical power generation systems. Headquartered in Columbus, Indiana (USA), Cummins employs approximately 40,000 people worldwide and serves customers in approximately 190 countries and territories through a network of more than 600 company-owned and independent distributor locations and approximately 6,000 dealer locations. Cummins earned $1.0 billion on sales of $13.2 billion in 2010. Press releases can be found on the Web at cummins.com or cumminsengines.com. Follow Cummins on Twitter at http://twitter.com/cumminsengines and YouTube at http://youtube.com/cumminsengines.

Note to editor:

The following photographs can be downloaded at http://cumminsengines.com/press:

- Cummins QSL9 with ultra-clean exhaust aftertreatment achieves near-zero emissions

- Cummins Compact Catalyst and Selective Catalytic Reduction (CCC-SCR) aftertreatment system for the Tier 4 Final QSL9 engine

- Cummins Tier 4 Final test cell work

Source: Cummins Inc.