

# Stationary Emissions Regs Provide For Cleaner Air — And Fresh Opportunities

BY JAY WARNER

Earlier this year, the U.S. Environmental Protection Agency (EPA) adopted national emissions standards for hazardous air pollutants (NESHAP) for existing stationary reciprocating compression ignition engines (RICE) that either are located at area sources of hazardous air pollutant (HAP) emissions or that have a site rating of less than or equal to 500 bhp and are located at major sources of HAP emissions.

In addition, the EPA developed national emissions standards for hazardous air pollutants for existing non-emergency stationary compression ignition engines greater than 500 bhp that are located at major sources of HAP emissions. Final compliance to these standards will be required by 2013.

While such government regulations are looked upon as impediments, the RICE NESHAP standards should be looked on positively, as they will result in cleaning up harmful emissions from stationary engines in applications such as power generation, compression and irrigation and pumping. Along with that, the new standards could prove to provide some segments of the industry with a significant business opportunity.

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According to the EPA, there are more than 900,000 engines in the U.S. that are affected by this rulemaking. Business opportunities abound, as the rule is likely to foster new engine sales, sales of exhaust emissions aftertreatment such as catalysts and installation of those systems.

Engine distributors particularly have an opportunity to generate revenue from this ruling for a variety of reasons:

- they already have a database of previously sold engines;
- they have existing relationships with engine users as they provide them service and/or replacement parts;
- their customers will be looking to them for answers to compliance questions; and
- customers with noncompliant engines may opt to purchase a new compliant engine instead of retrofitting.

For those choosing to retrofit their existing engines, the primary emissions control technology that will be employed is the diesel oxidation catalyst (DOC). While many in the industry are familiar with DOCs — which have been widely used on heavy-duty trucks and are now being applied more frequently on nonroad machinery — there are several considerations that need to be addressed when retrofitting a DOC to a stationary engine.

There should be an awareness of what type of washcoat has been applied to the catalyst element's substrate. Platinum-coated substrates are more durable than palladium. Platinum lasts longer and is more resistant to "poisons" such as sulfur.

The RICE NESHAP standards re-



(Photo courtesy of Universal.)

Several configurations, like the combination catalyst/silencer shown here, will need to be addressed when retrofitting a diesel oxidation catalyst (DOC) to a stationary engine in order to meet the EPA's new national emissions standards, which will be fully implemented in 2013.

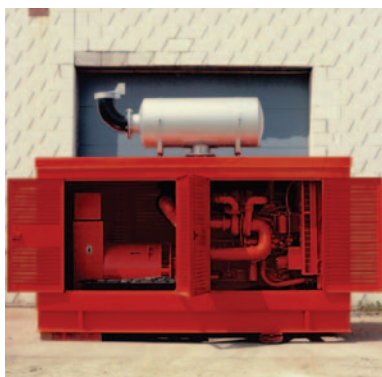
quire CO reductions of 70%. Most catalysts on the market today are calibrated to deliver reductions of around 90%, meaning the standard catalyst would be more expensive. Catalyst suppliers that can adapt to the lower CO reduction requirements should be sought.

When adding a catalyst to an existing engine system, exhaust system backpressure is another serious consideration. The addition of a catalyst can add backpressure that may exceed the engine exhaust backpressure threshold. A catalyst can add an additional 3 to 4 in. of water to engine backpressure.

There are a number of options to address this issue. They include



(Photos courtesy of Universal.)



Serviceability is a key consideration in the retrofitting of catalyst systems, so proper positioning of access doors can be crucial. Particularly challenging are cases where catalysts need to be added to enclosed systems. In such cases, an integrated silencer/catalyst system is one option.

replacing the silencer with a combination silencer/catalyst unit. These combination systems provide lower backpressure by reducing the number of expansion and contraction phases of the exhaust gases. Another option is that the catalyst itself can be designed for lower backpressure.

Placement of the catalyst in the exhaust system is also critical, as the exhaust gas temperature needs to be managed properly to ensure that the catalyst works properly. Most catalysts need to operate at temperatures above 482°F. The farther down the exhaust stream the catalyst is positioned, the lower the temperature. In some applications, this may require additional insulation around the exhaust system in order to maintain the proper exhaust temperature throughout.

The system also needs to be optimized for the lowest temperature seen throughout the year. For example, colder climates may need additional insulation because of winter temperatures. Proper attention also needs to be paid to the components upstream from the catalyst system. If an installation incorporates a packed silencer in sequence with the catalyst system, fibers from the packed silencer may come loose, which can coat or plug the catalyst element and reduce its effectiveness. In these instances, the catalyst system should be located upstream from the packed silencer.

Before installation of a catalyst system, the physical support structure needs to be assessed. For larger catalyst systems, the connecting pipe will not be able to support the catalyst's weight. An additional structural support system may be required to support the catalyst housing. The supporting structures should be fabricated before on-site installation to minimize service time.

Proper attention needs to be given to catalyst sizing. The volume of the catalyst must be correctly calculated for the exhaust flow rate to meet the required emissions reduction target. If it is undersized, it won't allow the unit to meet the emissions target. If oversized, it's likely to be expensive and uncompetitive from a commercial standpoint.

Like most components in any engine system, catalysts require periodic servicing — typically every 8700 hours of operation. The catalyst system needs to be positioned where it can be easily accessed, whether near a service panel or open area. Engines smaller than 500 hp may utilize a disposable/nonserviceable catalyst housing. For larger engine applications, it is more cost-effective to utilize a removable catalyst element housing design. This design should allow easy access and removal to the catalyst element without special tools or cumbersome capture mechanisms. The easier and faster it is to remove and replace a

catalyst element, the more time technicians have for other jobs.

Exhaust bypass — where exhaust gas circumvents the element and thereby is not directed through the catalyst — is a common problem in some catalyst housing designs that will impact the effectiveness of the overall system. The problem can be avoided by selecting a catalyst system that incorporates a positive seal between the catalyst and the housing, ensuring all the exhaust gas flows through the catalyst element.

Many of the engines that will be affected by the RICE NESHAP rules are enclosed skid-mounted packages. Space inside the enclosures is at a premium, and finding a location for a catalyst can be difficult. However, by utilizing an integrated silencer/catalyst system, it may be possible to maintain the same footprint as the current silencer. Packaging within an enclosure is also likely to require the use of catalyst housings that provide different mounting configurations, such as end-in/end-out, side-in/end-out and high-side in/end-out.

Operators of existing stationary engines that require the addition of a catalyst system need to work with suppliers that can provide before and after emissions testing to validate compliance. The emissions control supplier can receive information immediately if changes need to be made to meet compliance.

The RICE NESHAP ruling requires operators of engines that are larger than 500 hp and are a major source of hazardous air pollutants to maintain a service log of catalyst differential pressures and temperatures. One way to meet this stipulation is through the installation of a continuous monitoring system that allows the storage of multiple readings. A monitoring device with CANbus and/or Modbus capabilities provides integration into a facility's Building Automation System. Monitoring services can be offered to handle data tracking requirements for a monthly or yearly fee. **dp**