

**WRITTEN COMMENTS OF THE  
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION  
ON CALIFORNIA AIR RESOURCES BOARD'S  
PROPOSED AMENDMENTS TO THE HEAVY-DUTY VEHICLE INSPECTION  
PROGRAM AND PERIODIC SMOKE INSPECTION PROGRAM**

*May 21, 2018*

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The Manufacturers of Emission Controls Association (MECA) is pleased to respond to the California Air Resources Board's request for public comments on its proposed amendments to the Heavy-Duty Vehicle Inspection Program (HDVIP) and Periodic Smoke Inspection Program (PSIP).

MECA is a trade association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 40 years of experience in developing and manufacturing emission control technology for a wide variety of on-road and off-road vehicles and equipment in all world markets. Our members have been developing and commercializing diesel particulate filters and other emission controls for original equipment manufacturers (OEM) of new vehicles and verified retrofits for diesel engines on in-use vehicles. Some of our members commercialize aftermarket DPFs to replace damaged OEM filter bodies on 2007-2009 model year trucks. Our industry has played an important role in the emissions success story associated with mobile sources, and MECA has continually supported efforts to develop innovative, performance-based, emissions programs to respond to air quality problems.

We support this proposal to ensure that diesel particulate filters (DPF) are working properly on vehicles over their useful life. MECA commends ARB for improving its current I/M programs and encourages ARB staff to continue these effort into the future in order to ensure that California is achieving the emissions benefits of its mobile source regulations. We thank staff for critically reviewing all of the data to establish an appropriate opacity measurement protocol and limits to effectively screen in-use heavy-duty vehicles. This includes the CARB-funded research at the National Renewable Energy Lab (NREL) (Project number 11-600, Task number WW4A.107) that explored the correlation between opacity and particulate matter mass (PM) and evaluated different opacity instruments. We believe that the proposed changes to the opacity limits in the HDVIP and PSIP will result in a cleaner truck fleet as vehicle operators are able to more readily detect and repair engine and emission control issues.

The widespread acceptance of wall-flow particulate filter technology around the world as best available control technology (BACT) speaks to the performance and durability of this technology in both diesel and gasoline direct injected engine applications. There are currently approximately 3.5 million trucks in the United States operating with DPFs as well as over 300,000 retrofit DPFs installed on both on-highway and off-road vehicles and equipment. As has been shown on various engines and applications, DPFs are extremely efficient at reducing particulate emissions over a wide range of particle sizes, including reducing emissions of the smallest, ultrafine particles emitted by a diesel engine.

High efficiency DPFs on new and existing diesel engines provide up to 90% or greater reduction of diesel PM emissions, which qualifies DPFs as Level 3 diesel emission control strategies. When these filters are catalyzed, they reduce HC emissions, polycyclic-aromatic hydrocarbons (PAHs), dioxins and other toxics by 80 percent or more from their engine-out levels. DPFs have also provided important co-benefits on climate change due to the large reductions in black carbon emissions that result from the use of high efficiency DPFs (an ARB funded study, released in June 2013, highlighted the significant climate benefit of reducing black carbon emissions from diesel engines). More information on the effectiveness of DPFs can be found in the reports from the Advanced Collaborative Emission Study (ACES) that was conducted at Southwest Research Institute (<https://www.healtheffects.org/publication/executive-summary-advanced-collaborative-emissions-study-aces>).

Periodic inspection and maintenance (I/M) tests are critical to a comprehensive vehicle emissions reduction strategy. An opacity test is an inexpensive, simple measurement that should be an integral part of a proactive preventative maintenance program. Programs like HDVIP and PSIP, which include opacity tests, will safeguard that DPFs are working in the field and ensure that vehicles meet applicable exhaust emission standards under normal operating conditions. These programs can require significant investments in labor and equipment, as well as in trained personnel to conduct the emissions test, but the investments can be recouped through inspection fees and health benefits. An I/M program is the most effective way to ensure that emission controls are maintained and remain on vehicles and continue to function properly to deliver the expected emission benefits. Timely engine and aftertreatment maintenance will also extend the health of the engine and reduce the total cost of ownership.

MECA members worked with staff to develop opacity limits for retrofits as part of the in-use compliance requirements under the 2012 diesel retrofit verification procedure amendments approved by the Board. In addition, we support work CARB funded in which NREL performed a series of tests exploring the relationship between snap acceleration smoke opacity and gravimetric PM collected during the Federal Test Procedure (FTP) engine cycle. The tests were performed downstream of a partially failed DPF and repeated with varying degrees of failure. These studies have shown that exhaust from a heavy-duty vehicle with a properly functioning DPF measures at near zero opacity levels. While it could be argued that a lower opacity limit would best represent fully functioning DPFs, MECA agrees with ARB's selection of the 5% opacity threshold given the limitations of currently available opacimeters. Independent measurements made by MECA DPF retrofit manufacturers demonstrated that a 5% opacity limit can be easily and repeatably measured in the field. Furthermore, fleets have said that they are comfortable meeting the 5% limit (<http://www.ttnews.com/articles/carb-expected-ok-tougher-smoke-opacity-limits-may>).

Previously, truck owners have questioned the reliability and safety of retrofit and first-fit DPF devices. At the direction of the Board, ARB staff investigated these claims and found that DPFs, in both retrofit and those originally equipped on trucks since 2007, are operating properly in the field. The study found that most trucking fleets are not having problems with emission control technology, and they do not increase the likelihood of truck fires. Upon further investigation, ARB staff found that fleets that implement regular preventative maintenance practices have far fewer issues with their DPFs. The results of this year-long study can be found

here: <http://www.arb.ca.gov/msprog/onrdiesel/documents/DPFEval.pdf>. An article entitled “Proper Engine Maintenance Necessary to Extend Life of DPFs, Managers Say” in the May 26, 2014 issue of Transport Topics supports the importance of preventative engine and upstream component maintenance on DPF durability in more detail. Upstream engine components should be properly maintained per the manufacturer’s instructions in order to prevent damage to the DPF.

The importance of proper engine maintenance cannot be overemphasized for the durability and long term performance of the vehicle and emissions control system, including the DPF. Regular maintenance is critical for DPF-equipped vehicles because the presence of smoke in the exhaust can no longer be used as an indicator of engine operation problems. DPF-equipped vehicles capture the PM and mask any signs of high smoke that results from problems such as excessive oil consumption or a bad fuel injector. Therefore, MECA believes that it is good regular maintenance practice to have an opacity-based check of the engine-out exhaust, each time a filter is removed for cleaning. Performing an annual, engine-out opacity measurement is a way for fleets to actively monitor the condition of their engines and perform the necessary maintenance to keep their equipment functioning within the engine manufacturer’s recommended guidelines and minimize the chance of filter plugging. This will have the added co-benefit of better performance and longer engine life.

As trucks age, there is a potential need for DPF replacement parts. MECA worked with ARB staff to develop an aftermarket DPF evaluation procedure, which was adopted in April 2016. MECA members have responded by beginning to certify aftermarket DPFs to help fleets maintain their trucks. MECA member companies are committed to developing and commercializing diesel aftermarket DPFs that are durable, reliable and offer a cost effective maintenance part for owners of 2007-2009 trucks in California.

MECA is concerned about the PM emissions durability of off-road Tier 4 engines certified without DPFs, which will emit as much as four to five times more PM in actual use than similar engines certified with DPFs. There is ample evidence that engine-based PM control strategies are prone to higher in-use emissions than DPF-equipped engines, due to factors such as cold starts, poor maintenance, and the large variety of duty cycles encountered in the off-road sector. Given the expected, relatively small compliance margins of off-road Tier 4 final engine designs that do not utilize DPFs, MECA believes that ARB should closely scrutinize Tier 4 final certification packages of non-DPF diesel engines and allocate extra compliance and enforcement resources to follow up with in-use emissions testing of any off-road Tier 4 engines certified without a DPF. MECA also believes that ARB should strongly consider adoption of a manufacturer run, in-use emissions testing program in the off-road sector that utilizes the latest portable emissions measurement technology to ensure that off-road Tier 4 final engines are delivering the emission reductions affirmed in the off-road Tier 4 standards. The off-road sector could also benefit from the adoption of on-board diagnostic requirements that are similar in scope to the heavy-duty highway diesel on-board diagnostic requirements required by ARB. In-use testing and OBD ensure that the emissions performance of the engine/equipment is maintained over the regulated full useful life.

MECA encourages ARB to continue to explore the potential concepts for future comprehensive I/M programs. MECA supports the use of OBD, and potentially telematics, to screen vehicles that were manufactured with the applicable OBD sensors. Future programs may rely on a download of information from the OBD computer module to check if any emission system malfunction codes were recorded. Since this work takes place at truck repair shops or inspection stations, proper training of repair shop technicians and mechanics is vital to an effective I/M program, and MECA supports ARB's efforts to ensure this through licensing or other means. In addition, MECA encourages ARB to share their I/M experience with other states so that all trucks driving on our nation's highways are as clean as possible. The Northeast States for Coordinated Air Use Management (NESCAUM) published a report (<http://www.nescaum.org/topics/inspection-and-maintenance-obd>) that summarized the heavy-duty I/M programs in the Northeast states and the opacity limits used in those programs. The states included a proposal to lower opacity cut-points in heavy-duty I/M programs to better reflect acceptable emissions from modern engines. ARB's proposal will serve as a model for other states that are struggling with measures to upgrade their inspection programs to be more representative of the latest truck emission control technology.

MECA supports ARB's proposed amendments to HDVIP and PSIP, and specifically the lower opacity limits, that will ensure that DPFs are working properly on vehicles that are in-use. The new opacity limits will effectively screen heavy-duty vehicles on the road, resulting in a cleaner truck fleet, by allowing vehicle operators to more easily identify and repair high emitting engines and damaged DPFs. MECA encourages ARB to consider applying the concepts of I/M to the off-road sector, which includes a variety of equipment with engines certified without DPFs, including over 60% of Tier 4 final engines. Finally, MECA will continue to work with ARB staff to develop the next phase of California's I/M program, including the use of OBD and upcoming amendments to the heavy-duty OBD program.

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