

## **SMOKE TESTING COMPLIANCE ADVISORY—CALIFORNIA’S PERIODIC SMOKE INSPECTION PROGRAM (PSIP) FOR HEAVY-DUTY DIESEL VEHICLES**

This regulatory advisory is to help inform the end user on the proper reading and interpretation of opacity test results using currently available smoke meters for heavy-duty diesel vehicles.

### **NEW OPACITY STANDARDS**

The California Air Resources Board (CARB) has recently reduced the opacity standards for all heavy-duty diesel vehicles operating in California. As of July 1, 2019, heavy-duty diesel vehicles greater than 6,000 pounds gross vehicle weight rating (GVWR) must be tested annually<sup>i</sup> in accordance with the Society of Automotive Engineers (SAE) Recommended Practice J1667 "Snap-Acceleration Smoke Test Procedure for Heavy-Duty Diesel Powered Vehicles" (issued February 1996) and shall not exceed the following smoke opacity percentages (see Table 1 below):

**Table 1: Opacity Limits for the Heavy-Duty Vehicle Inspection Program and PSIP:**

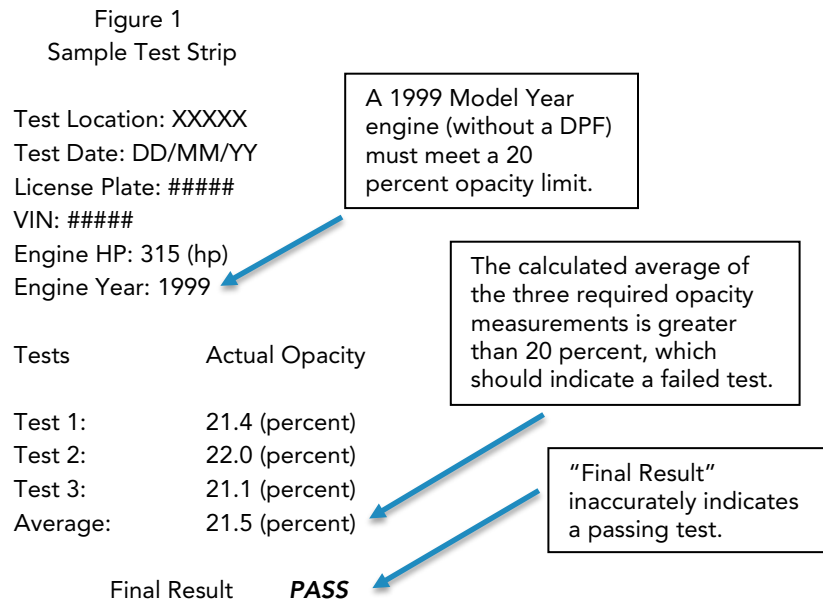
<b>2006 Model Year and Older Engines without DPFs (Diesel Particulate Filter)</b>	
Pre -1991 Model Year	40% Opacity Limit
1991-1996 Model Year	30% Opacity Limit
1997 - 2006 Model Year	20% Opacity Limit
<b>2007 Model Year or subsequent Model Year Engine</b>	
5% Opacity Limit	
<b>2007 Model Year and Newer Engines and Engines Equipped with a Level 3 Verified Diesel Emissions Control System (VDECS)</b>	
5% Opacity Limit	
<b>Engines Equipped with a Level 2 VDECS</b>	
20% Opacity Limit	
<b>Two Engine Cranes Driven by a non-DPF Off-Road Engine</b>	
40% Opacity Limit	

### **PROPERLY INTERPRETING TEST RESULTS WHEN USING EXISTING SMOKE METERS TO DETERMINE COMPLIANCE WITH NEW PSIP OPACITY STANDARDS**

Existing smoke meters generally provide a “Pass/Fail” output on the test strip for two opacity thresholds, 40 percent and 55 percent, coinciding with the previous PSIP opacity standards in effect since the 1990s. Unless the existing smoke meter settings

have been modified to incorporate an appropriate "Pass/Fail" threshold for each lower opacity standard, **fleets should not rely on the default printout of either "Pass" or "Fail" to determine compliance.**

Rather, compliance with a specific opacity standard must be determined by looking at the calculated average of the three required opacity measurements as shown on the output printout (see Figure 1 below as an example).



To update a smoke meter "Pass/Fail" threshold, choose from one of the following options:

1. Manually override the default "Pass/Fail" opacity limit of the smoke meter by following the instructions specified in the operating/user manual or instructions obtained from the manufacturer.
2. Have the smoke meter updated by the manufacturer to accommodate the new opacity standard thresholds.

Manufacturers may have different procedures for setting the "Pass/Fail" opacity threshold. Table 2 shows the commonly used smoke meters and whether a user can manually set the "Pass/Fail" opacity limit by overriding the default factory setting. **The "Pass/Fail" limit settings of some meters are higher than 5 percent, which could lead to faulty pass results (see Table 2 below).**

Regardless of differences in "Pass/Fail" settings, all properly calibrated smoke meters listed in Table 2 are compliant with SAE J1667 requirements for measuring smoke opacity from diesel vehicles. When auditing fleets for PSIP compliance, CARB staff will rely on the average of the three opacity measurements to determine compliance with

the applicable opacity standard and will not rely on the “Pass/Fail” determination on the test printout.

**Table 2: Commonly Used Smoke Meters and “Pass/Fail” Limit Reset Capabilities:**

Manufacturer	Smoke Meter Model	“Pass/Fail” Limit Settings	Who Can Adjust the “Pass/Fail” Setting	Manufacturer Contact Information
Beryl Technologies LLC	BT2000 Wireless	“Pass/Fail” limits can be set down to 5 percent opacity.	Either user or manufacturer	Phone: (562) 698-2444 Email: <a href="mailto:sales@beryltechnologies.com">sales@beryltechnologies.com</a> Website: <a href="http://www.beryltechnologies.com">www.beryltechnologies.com</a>
Bosch	RTT100	“Pass/Fail” limits can be set down to 10 percent opacity.	Either user or manufacturer	BECS Pacific Phone: (888) 359-3999 Email: <a href="mailto:info@becspacific.com">info@becspacific.com</a> Website: <a href="http://www.becspacific.com">www.becspacific.com</a>
Caltest Instruments	Caltest 1000	“Pass/Fail” limits can be set down to 10 percent opacity.	Either user or manufacturer	Phone: (310) 835-6909 Email: <a href="mailto:customerservice@omstardx1.com">customerservice@omstardx1.com</a> Website: <a href="http://www.omstardx1.com">www.omstardx1.com</a>
Red Mountain, Inc.	Smoke Check 1667	“Pass/Fail” limits can be set down to 5 percent opacity.	Manufacturer only	Phone: (949) 595-4475 Email: <a href="mailto:cmurata@redmtnengr.com">cmurata@redmtnengr.com</a> Website: <a href="http://www.redmtnengr.com">www.redmtnengr.com</a>
Telonic Berkeley, Inc.	TBM300	“Pass/Fail” limits can be set down to 5 percent opacity.	Either user or manufacturer	Phone: (760) 744-8350 Email: <a href="mailto:scottm@telonicberkeley.com">scottm@telonicberkeley.com</a> Website: <a href="http://www.telonicberkeley.com">www.telonicberkeley.com</a>
Wager Company	6500 7500 RHW Wireless	N/A: No “Pass/Fail” setting on devices.	N/A	Phone: (336) 969-6909 Email: <a href="mailto:bcarpenter@wagerusa.com">bcarpenter@wagerusa.com</a> <a href="mailto:rharris@wagerusa.com">rharris@wagerusa.com</a> Website: <a href="http://www.wagerusa.com">www.wagerusa.com</a>

**For More Information:**

For further information on PSIP and other CARB heavy-duty vehicle regulations, please visit our website at [www.arb.ca.gov/truckstop](http://www.arb.ca.gov/truckstop).

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<sup>i</sup> PSIP requires annual smoke opacity tests for most heavy-duty diesel vehicles; however, PSIP provides for biannual testing of some 6,000 to 14,000 GVWR diesel vehicles and specifies exemptions from smoke test requirements for some vehicles, see the [CARB Heavy Duty Vehicle Inspection and Periodic Smoke Inspection Programs](https://ww2.arb.ca.gov/our-work/programs/heavy-duty-diesel-inspection-periodic-smoke-inspection-program) webpage for details: <https://ww2.arb.ca.gov/our-work/programs/heavy-duty-diesel-inspection-periodic-smoke-inspection-program>.