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NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION
NEW JERSEY ADMINISTRATIVE CODE
TITLE 7
CHAPTER 27B
SUBCHAPTER 4

**AIR TEST METHOD 4: TESTING PROCEDURES FOR DIESEL-POWERED MOTOR
VEHICLES**

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7:27B-4.1 Definitions

The following words and terms, when used in this subchapter, have the following meanings, unless the context clearly indicates otherwise.

“Alternative smoke opacity standard” means the smoke opacity standard applicable to a specific vehicle-engine-chassis combination, as determined by the procedure set forth at N.J.A.C. 7:27B-4.5.

“Best available retrofit technology” or “BART” means an aftermarket particulate emissions control device that, as determined by the Department, can be used on or in a regulated vehicle or regulated equipment, at a reasonable cost to achieve substantial reduction of fine particulate diesel emissions, and is either a diesel emissions control strategy for which CARB has issued an Executive Order, or a verified retrofit technology for which the USEPA has issued a Verification Letter. “Best available retrofit technology” includes only those retrofit devices and fuel for which the retrofit device manufacturer or fuel manufacturer certifies that the installation and use would not jeopardize the original engine warranty in effect at the time of the installation or the commencement of use of the retrofit device or fuel, and for which the manufacturer has issued a warranty pursuant to N.J.A.C. 7:27-32.9.

“BART 1” means a BART that achieves a minimum particulate emissions control level of 25 percent reduction in mass.

“BART 2” means a BART that achieves a minimum particulate emissions control level of 50 percent reduction in mass.

“BART 3” means a BART that achieves a minimum particulate emissions control level of 85 percent reduction in mass.

“California Air Resources Board” or “CARB” means the agency of the State of California established and empowered to regulate sources of air contaminant emissions, including motor vehicles, pursuant to California Health and Safety Code, Sections 39500 et seq.

“Certified configuration” means a heavy-duty diesel engine design or a light-duty diesel-powered motor vehicle-engine-chassis design certified by either of the following agencies as meeting the applicable emission standards for heavy-duty diesel engines or light-duty diesel-powered motor vehicles manufactured in a given model year:

1. EPA, for model year 1971 or for a more recent model year heavy-duty diesel vehicle engine;

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2. EPA, for model year 1968 or for a more recent model year light-duty diesel vehicle;
3. CARB, for model year 1973 or for a more recent model year heavy-duty diesel vehicle engine; or
4. CARB, for model year 1966 or for a more recent model year light-duty diesel vehicle.

“Chassis dynamometer” or “dynamometer” means a power absorption device utilizing a set of rollers on which a motor vehicle is driven to simulate on-road vehicle operation.

“Closed crankcase ventilation system” or “CCVS” means a system, installed upon an internal combustion engine that is designed to capture all solids, liquids and gases that are emitted from the vent and to divert them to the engine intake air plenum for recombustion.

“Department” means the New Jersey Department of Environmental Protection.

“Dew point” means the temperature to which air must be cooled for saturation to occur.

“Diesel bus” means any diesel-powered autobus or motorbus of any size or configuration, whether registered in this State or elsewhere, that is designed or used for intrastate or interstate transportation of passengers for hire or otherwise on a public road, street or highway or any public or quasi-public property in this State, including, but not limited to, autobuses under the jurisdiction of the New Jersey Department of Transportation pursuant to Titles 27 or 48 of the Revised Statutes; autobuses of the New Jersey Transit Corporation and its contract carriers that are under the inspection jurisdiction of the New Jersey Department of Transportation; autobuses that are subject to federal motor carrier safety regulations; autobuses under the authority of the Interstate Commerce Commission or its successor agency; school buses, as defined pursuant to N.J.S.A. 39:1-1; and hotel, casino, charter, and special buses.

“Diesel emissions inspection center” or “DEIC” means a facility licensed by the Division of Motor Vehicles pursuant to N.J.S.A. 39:8-69 and N.J.A.C. 13:20-47.

“Diesel engine” means a compression ignition type of internal combustion engine.

“Diesel-powered” means utilizing a diesel engine.

“Element of design” means any part or system on a motor vehicle or a motor vehicle engine pertaining to the vehicle’s or engine’s certified configuration.

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“Emission control apparatus” means any device utilized by the vehicle manufacturer and/or the engine manufacturer to control the emission of any regulated emission, including any associated component which monitors the function and maintenance of such a device.

“Engine RPM rise time” means the time period, in seconds, during acceleration between curb idle and high idle.

“EPA” means the United States Environmental Protection Agency.

“Exhaust after treatment” means any element of design which affects or alters the molecular content of the exhaust emissions of a diesel engine.

“Exhaust emissions” means the emissions (including any liquid or solid particles in the gaseous stream) released into the atmosphere from any opening downstream from the exhaust ports of a motor vehicle engine.

“Exhaust leak” means any condition of the exhaust system which permits exhaust emissions to escape into the atmosphere at any point between the exhaust ports of a motor vehicle engine and the outlet of the engine exhaust pipe.

“Full-flow smokemeter” means a smokemeter which measures smoke opacity by passing a beam of light through the axis of the exhaust plume as the exhaust exits the tailpipe of a motor vehicle.

“Governor” means a mechanism installed on a diesel engine by the original equipment manufacturer for the purpose of limiting the maximum engine RPM.

“Gross combination weight rating” or “GCWR” means the GVWR of a combination (articulated) vehicle, which is defined as the GVWR of the power unit plus the GVWR of the towed unit or units.

“Gross vehicle weight rating” or “GVWR” means the value specified by the vehicle manufacturer as the maximum loaded weight of a single or combination vehicle. When used in connection with a combination or articulated vehicle, GVWR refers to the “gross combination weight rating” or “GCWR,” of the combination or articulated vehicle, which is defined as the GVWR of the power unit plus the GVWR of the towed unit or units.

“Heavy-duty diesel vehicle” or “HDDV” means a diesel-powered motor vehicle, other than a diesel bus, that has a GVWR exceeding 8,500 pounds and is designed primarily for transporting persons or property.

“High idle” means the highest engine speed obtainable when the engine is disengaged from the transmission and is free-wheeling.

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“High speed diesel engine” means any diesel engine with a maximum governed engine speed over 2,800 RPM.

“Idle” means an operating mode where the vehicle engine is not engaged in gear and where the engine operates at a speed at the revolutions per minute specified by the engine or vehicle manufacturer.

“Inspector” means any person authorized by the State of New Jersey to determine whether a vehicle complies with the requirements of N.J.A.C. 7:27-14 and 32.

“Light-duty diesel vehicle” or “LDDV” means a diesel-powered motor vehicle, other than a diesel bus, that has a GVWR of 8,500 pounds or less and is designed primarily for transporting persons or property.

“Low idle” or “curb idle” means the minimum operating speed of an engine with the accelerator pedal released and the transmission disengaged, as specified by the engine manufacturer.

“Low speed diesel engine” means any diesel engine with a maximum governed engine speed of no more than 2,200 RPM.

“Maximum governed RPM” means, for an engine which has a functioning governor, the manufacturer’s recommended maximum engine speed as restricted by the governor. For an engine which does not have a functioning governor, this term means a value of 80 percent of the manufacturer’s recommended maximum engine speed.

“Measurement path” means the linear path between the sending and receiving points of a full-flow smokemeter.

“Medium speed diesel engine” means any diesel engine with a maximum governed engine speed of 2,201 RPM to 2,800 RPM.

“Motor vehicle” means all vehicles propelled otherwise than by muscular power, excepting motorized bicycles and such vehicles as run only upon rails or tracks.

“Motorized bicycle” means a pedal bicycle having a helper motor characterized in that either the maximum piston displacement is less than 50 cubic centimeters, or said motor is rated at no more than 1.5 brake horsepower and said bicycle is capable of a maximum speed of no more than 25 miles per hour on a flat surface.

“MPH” means miles per hour.

“MVC” means the New Jersey Motor Vehicle Commission.

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“Neutral density filter“ means a device used to calibrate or verify the accuracy of the raw opaque value within the measurement path of a smokemeter which consists of a lens of neutral particle density and which filters visible light to a known opacity value.

“Nominal stack size” means the exhaust pipe diameter to be used in conducting smoke opacity measurements to determine compliance with diesel smoke opacity standards, based on engine horsepower, as set forth in N.J.A.C. 7:27B-4.3 Table 1.

“Oil temperature probe” means a device integral to a smokemeter which measures the engine crankcase oil temperature.

“Opacity” means the property of a substance whereby it partially or wholly obstructs the transmission of visible light expressed as the percentage to which light is obstructed.

“Partial-flow smokemeter” means a smokemeter which samples, at frequent intervals, a representative portion of the total exhaust flow and directs it to a measurement cell, and which calculates smoke opacity based upon the sample smoke density and the diameter of the exhaust pipe.

“Particles” means any material, except uncombined water, which exists as liquid particles or solid particles at standard conditions.

“Peak smoke opacity” means the highest numerical value of smoke opacity measured during a snap acceleration smoke opacity test at N.J.A.C. 7: 27B-4.3(a), a rolling acceleration smoke opacity test at N.J.A.C. 7: 27B-4.3(b), or a power brake smoke opacity test at N.J.A.C. 7: 27B-4.3(c).

“Person” means an individual, public or private corporation, company, partnership, firm, association, society or joint stock company, municipality, state, interstate body, the United States, or any board, commission, employee, agent, officer or political subdivision of a state, an interstate body or the United States. “Person“ expressly includes the Port Authority of New York and New Jersey, and the South Jersey Port Corporation.

“Regulated emission” means any solid, liquid or gaseous substance which is emitted from a motor vehicle or motor vehicle engine and which is regulated by the EPA pursuant to 40 C.F.R. Part 86.

“Retrofit device” means a best available retrofit technology that is installed on an on-road diesel vehicle or on a piece of off-road diesel equipment pursuant to N.J.A.C. 7:27-32.

“RPM” means revolutions per minute.

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“RPM sensor” means a mechanism integral to the smokemeter which senses the engine speed in revolutions per minute.

“SAE J1667” means the recommended practice incorporated in document number J1667 published by the Society of Automotive Engineers in February 1996, entitled Snap-Acceleration Smoke Test Procedure for Heavy-Duty Diesel-Powered Vehicles, and all appendices attached thereto, incorporated herein by reference.

“School bus” means a school bus as defined under [N.J.S.A. 39:1-1](#)

“Smoke” means the emissions, including airborne solid and/or liquid particles, exclusive of water vapor, released into the atmosphere from a process of combustion.

“Smokemeter” means smoke measurement equipment designed and manufactured in accordance with specifications set forth at N.J.A.C. 7:27B-4.6.

“Tailpipe” means the final downstream section of pipe in a motor vehicle’s exhaust system.

“Wide open throttle” or “WOT” means, in reference to a diesel-powered motor vehicle, the positioning of the primary engine power control to deliver maximum potential power and fuel. In most cases this is the positioning of the vehicle’s accelerator control at its forward-most or downward-most position.

7:27B-4.2 General instructions for all tests

- (a) An inspector conducting an emissions test on a diesel-powered motor vehicle pursuant to any provision of this subchapter including, but not limited to, N.J.A.C. 7:27B-4.3, 4.4(a) and 4.4(b), shall perform the test in accordance with the following general procedures:
1. Test the vehicle in as-received condition;
 2. Prior to testing, verify that the smokemeter is calibrated in accordance with the manufacturer’s requirements;
 3. Prior to testing, ensure that the engine is at normal operating temperature by operating the vehicle on a highway or a chassis dynamometer with a road load for a minimum of 15 minutes. For testing at a DEIC, only, confirm proper engine operating temperature by inserting an oil temperature probe through the oil dipstick tube into the crankcase oil, so that the oil temperature as measured during the test will be recorded as part of the analyzer printout at the conclusion of the test. Oil temperature shall be at least 70 degrees Celsius (160 degrees Fahrenheit), and water temperature shall be at least 82 degrees Celsius (180 degrees Fahrenheit) but not overheating;

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4. Examine the vehicle's exhaust system for integrity. For testing at a DEIC, only, tighten all loose pipe connections and repair all significant exhaust leaks before performing a test;
5. Prior to conducting a smoke opacity test on a diesel-powered motor vehicle equipped with multiple exhaust outlets, determine which exhaust outlet exhibits the highest opacity level by visually comparing the opacity level of each outlet during a single repetition of the snap acceleration test as set forth at N.J.A.C. 7:27B-4.3(a), if appropriate, or by liberally accelerating the engine at WOT, not to exceed maximum governed RPM. Conduct the testing using the highest-opacity exhaust outlet;
6. Ensure that the ambient temperature at the test location is between 35 degrees and 95 degrees Fahrenheit and that the temperature is above the dew point by using a thermometer and hygrometer. If the testing is conducted outdoors, do not conduct the test if there is any visible precipitation, such as rain or fog, at the test site during the time of testing. Do not conduct the test if the temperature at the test location is below 35 degrees or above 95 degrees Fahrenheit, or if the temperature is at or below the dew point;
7. Prior to testing, turn off the engine brake and all vehicle accessories, including, but not limited to, air conditioning, heating, defroster, radio and lights;
8. Determine that the engine speed governor is in proper operating condition. For DEICs only, make this determination as follows: operate the engine with the transmission in neutral and the clutch disengaged. Gradually increase the engine speed from curb idle to high idle while observing an RPM sensor connected to the engine. The engine speed should not exceed high idle as specified by the engine manufacturer with the accelerator pedal fully depressed. If the engine speed continues increasing beyond the manufacturer's rated high idle, immediately release the accelerator pedal. If the engine speed increases uncontrollably, immediately release the accelerator pedal and shut off the engine's fuel supply. Discontinue emission testing of any vehicle with dysfunctional or out-of-specification engine speed governors. Do not resume testing unless and until speed governor repairs are made;
9. If inspecting a vehicle which was either equipped by the manufacturer or was retrofitted in accordance with state or federal law or regulation with a catalytic converter, particulate trap or trap oxidizer, or any other exhaust after treatment device, inspect the exhaust system for the presence of the device and for its physical integrity. Discontinue testing of any motor vehicle which exhibits any missing exhaust after treatment device or perforating rust, crack, hole, tear, or other such physical defect in the device. If the vehicle being tested is a heavy-duty diesel vehicle or diesel bus with an exhaust after treatment device, discontinue testing and

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fail the vehicle if the device is found not to be in proper functioning condition. Do not resume testing unless and until the defect(s) are repaired;

10. If, at any time before or during the inspection of a diesel-powered motor vehicle, continuous blue smoke is observed in the exhaust emissions for more than three seconds, discontinue the testing and determine that the vehicle has failed to pass the smoke opacity test conducted pursuant to N.J.A.C. 7:27-14.6;

11. At the conclusion of the inspection of a diesel-powered motor vehicle at a DEIC, ensure that a printed test report has been produced by the smokemeter which, at a minimum, includes (a) 11 i through xvii below. If the smokemeter is not capable of printing out (a) 11 xiv through xvii below, this information shall be manually entered in the print test report by the inspector.

i. The smoke opacity value for each snap in sequence, including preliminary cleanouts;

ii. The final test result, in percent opacity;

iii. The engine oil temperature;

iv. The engine RPM and smoke opacity strip chart; or the engine curb idle speed and high idle speeds during the test, and the engine RPM rise times;

v. The date;

vi. The time;

vii. The location;

viii. The name of the diesel emission inspection center;

ix. The diesel emission inspection center license number;

x. The stack size;

xi. The smoke opacity standard;

xii. "Pass" or "Fail" of test results compared to the appropriate smoke opacity standard;

xiii. The license number of the diesel emission inspection center employee conducting the smoke opacity test;

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- xiv. The customer name;
 - xv. The tractor VIN;
 - xvi. The engine model year; and
 - xvii. The customer drivers license number; and
12. At the conclusion of the smoke opacity test, confirm that the smokemeter reads a value of less than ∇ 2.0 percent opacity when the smokemeter is disengaged from the vehicle exhaust stream.
- (b) Equipment to be used in conducting a smoke opacity test on a diesel-powered motor vehicle in accordance with N.J.A.C. 7:27-14.5 shall satisfy all specifications and standards for a smokemeter as set forth in N.J.A.C. 7:27B-4.15.
- (c) An inspector conducting a motor vehicle emissions test on a diesel-powered motor vehicle as set forth in this subchapter shall use only motor vehicle emission testing equipment that has been approved by the Department prior to its use in the test. Approval by the Department is based on the following criteria:
- 1. The equipment meets all applicable specifications;
 - 2. The equipment hardware and software comply with the data collection and transfer protocols in use throughout New Jersey's motor vehicle inspection programs;
 - 3. The equipment maintains compatibility with other test equipment used concurrently during the motor vehicle inspection process with which it is required to interface; and
 - 4. The equipment is complete in that it includes all options and accessories necessary for performing each emissions inspection test procedure for which it was designed and it is to be used.
- (d) The Department maintains a list of approved equipment for specific test procedures. The Department shall periodically review and evaluate equipment offered by manufacturers of motor vehicle testing equipment of which it is aware or has been made aware and update this list. A copy of this list can be obtained from:

New Jersey Department of Environmental Protection
Diesel Inspection & Maintenance Program
P.O. Box 418
Trenton, N.J. 08625-0418

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7:27B-4.3 Procedures for using a smokemeter to measure the smoke opacity of heavy-duty diesel vehicles and diesel buses

- (a) The testing procedures for the snap acceleration smoke opacity test, required pursuant to N.J.A.C. 7:27-14.5, shall be performed on heavy-duty diesel vehicles and diesel buses which are equipped with low or medium-speed diesel engines as follows:
1. Determine the engine horsepower from the engine identification plate or engine serial number. Refer to Table 1 and input the nominal stack size into the smokemeter. If the engine identification plate is missing, inaccessible or illegible, measure the outside diameter of the exhaust pipe extending from the exhaust manifold with a precision caliper or equivalent gauge, rounding to the nearest inch;
 2. For a DEIC, only, affix the RPM sensor to the engine and vehicle according to the smokemeter manufacturer's instructions;
 3. For a DEIC, only, insert the engine oil temperature sensor into the oil dipstick tube and into the crankcase oil according to the smokemeter manufacturer's instructions;
 4. For a DEIC, only, connect the engine RPM and oil temperature sensors to the smokemeter according to the smokemeter manufacturer's instructions;
 5. Affix the smokemeter according to the manufacturer's instructions to the end of the vehicle's exhaust pipe. For full-flow smokemeters, ensure that the final two feet and the exit of the exhaust pipe is straight, with an internal diameter not to exceed five inches. Appropriate exhaust pipe adapters shall be used as necessary to comply with these specifications. Do not use full-flow smokemeters on vehicles with underbody exhaust pipes which direct the exhaust flow to the ground unless the exhaust gases are redirected away from the ground by the appropriate exhaust pipe adaptor mentioned above;
 6. Chock the drive-wheels and release all tractor and trailer brakes;
 7. Ensure that the transmission is in neutral and start the engine;
 8. Ensure that the smokemeter is warmed up and calibrated according to N.J.A.C. 7:27B-4.2 and the manufacturer's instructions.
 9. Initiate the test sequence on the smokemeter;
 10. If using a partial-flow smokemeter, select the appropriate smoke opacity pass/fail standards, set forth at N.J.A.C. 7:27-14.6, based upon the engine model year. If using

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a full-flow smokemeter, enter the engine horsepower and stack diameter as measured from the vehicle exhaust stack;

11. If using a smokemeter without horsepower input, select the appropriate stack size from Table 1 below based upon the vehicles' engine horsepower;
 12. With each prompt from the smokemeter to "accelerate engine," rapidly depress the accelerator pedal to the floor and hold it there until prompted by the smokemeter to release the pedal;
 13. Repeat (a)12 at least four more times. This shall include, at a minimum, two preliminary snap accelerations to remove loose soot from the exhaust system for a stabilized reading, and a minimum of three snap accelerations for the official test, the average of which shall constitute the final test result; and
 14. The pass/fail determination shall be based upon three valid smoke opacity test results averaged arithmetically and compared to the pass/fail standards appropriate for the engine model year.
- (b) The testing procedures for the rolling acceleration smoke opacity test, required pursuant to N.J.A.C. 7:27-14.5, shall be performed on a straight and level road course, as follows:
1. Determine the engine horsepower from the engine identification plate or engine serial number. Refer to Table 1 below and input the nominal stack size into the smokemeter. If the engine identification plate is missing, inaccessible or illegible, measure the outside diameter of the exhaust pipe extending from the exhaust manifold with a precision caliper or equivalent gauge, rounding to the nearest inch;
 2. For a DEIC, only, affix the RPM sensor to the engine and vehicle according to the smokemeter manufacturer's instructions;
 3. For a DEIC, only, insert the engine oil temperature sensor into the oil dipstick tube and into the crankcase oil according to the smokemeter manufacturer's instructions;
 4. For a DEIC, only, connect the engine RPM and oil temperature sensors to the smokemeter according to the smokemeter manufacturer's instructions;
 5. Affix the smokemeter according to the manufacturer's instructions to the end of the vehicle's exhaust pipe. For full-flow smokemeters, ensure that the final two feet and the exit of the exhaust pipe is straight, with an internal diameter not to exceed five inches. Appropriate exhaust pipe adapters shall be used as necessary to comply with these specifications. Do not use full-flow smokemeters on vehicles with underbody exhaust pipes which direct the exhaust flow to the ground unless the exhaust gases are redirected away from the ground by the appropriate exhaust pipe adaptor mentioned above;

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6. Ensure that the smokemeter is warmed up and calibrated according to N.J.A.C. 7:27B-4.2 and the manufacturer's instructions;
7. Start the engine and operate at curb idle speed;
8. Purge the exhaust system of loose soot and stabilize the smoke opacity readings. For vehicles with low speed diesel engines, conduct one rolling acceleration by rapidly depressing the accelerator pedal to the floor and holding it there for three to five seconds, or until prompted by the smokemeter to release the pedal. For vehicles with medium or high speed diesel engines, conduct three rolling accelerations by rapidly depressing the accelerator pedal to the floor and briefly holding it there until the engine speed reaches approximately 2,500 RPM, then release. The rolling acceleration portion of the test sequence shall be deemed to be complete as soon as:
 - i. The vehicle has reached a speed of 10 miles per hour;
 - ii. The engine has reached maximum governed RPM, or
 - iii. The engine has reached 2,500 RPM
9. Initiate the test sequence on the smokemeter;
10. Select the appropriate smoke opacity pass/fail standard from N.J.A.C. 7:27-14.6, based upon the engine model year;
11. If using a partial-flow smokemeter, select the appropriate stack size from Table 1 below, based upon the engine horsepower. If using a full-flow smokemeter, enter the engine horsepower and nominal stack size as measured on the vehicle;
12. If using a smokemeter without horsepower input, select the appropriate stack size from Table 1 below based upon the vehicles engine horsepower;
13. When testing a vehicle with a manual transmission, depress the clutch and select the appropriate low gear for the degree to which the vehicle is laden to avoid over-gearing or lugging. When testing a vehicle with an automatic transmission, place the transmission in "D" or "Drive" only, or the gear position immediately next to "N" or "Neutral;"
14. When testing a vehicle with a manual transmission, gradually engage the clutch;
15. Accelerate until the vehicle is rolling forward at a speed equivalent to the engine curb idle, then increase the engine speed by 200 RPM, ∇ 50 RPM;
16. When testing a vehicle with a low speed diesel engine, rapidly depress the accelerator pedal to the floor and hold for approximately three to five seconds or until prompted by the smokemeter to release the accelerator. When testing a vehicle

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with a medium or high speed diesel engine, rapidly depress the accelerator pedal to the floor and hold it there until an engine RPM of approximately 2,500 RPM is achieved, then release the accelerator pedal. When testing a vehicle with a manual transmission, do not shift to the next gear. The rolling acceleration portion of the test sequence shall be deemed to be complete as soon as:

- i. The vehicle has reached a speed of 10 miles per hour; or
 - ii. The engine has reached maximum governed RPM; or
 - iii. The engine has reached 2,500 RPM;
17. Release the accelerator pedal, disengage the clutch and bring the vehicle to a stop; and
 18. Determine whether the vehicle has passed or failed by comparing the smoke opacity test result to the standards set forth at N.J.A.C. 7:27-14.6 appropriate for the test vehicle's engine model year.
- (c) The testing procedures for the power brake smoke opacity test, required pursuant to N.J.A.C. 7:27-14.5 shall be performed, on a vehicle with a medium or high speed diesel engine and an automatic transmission only, as follows:
1. Unless the vehicle engine is of a torque-tube design, inspect the vehicle's drive shaft, U-joints and slip-joints for mechanical integrity. Discontinue testing of any vehicle exhibiting signs of appreciable looseness or wear in the U-joints or slip-joints, or any damage to the driveshaft which would adversely affect the vehicle's mechanical integrity. Do not resume testing unless and until the defects are repaired;
 2. Ensure that the parking and service brakes are in good operating condition. Discontinue testing of any vehicle exhibiting inoperable or inadequate parking or service brakes. Do not resume testing unless and until the defects are repaired;
 3. Determine the engine horsepower from the engine identification plate or engine serial number. Refer to Table 1 below and input the nominal stack size into the smokemeter. If the engine identification plate is missing, inaccessible or illegible, measure the outside diameter of the exhaust pipe extending from the exhaust manifold with a precision caliper or equivalent gauge, rounding to the nearest inch;
 4. For a DEIC, only, affix the RPM sensor to the engine and vehicle according to the smokemeter manufacturer's instructions;
 5. For a DEIC, only, insert the engine oil temperature sensor into the oil dipstick tube and into the crankcase oil according to the smokemeter manufacturer's instructions;

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6. For a DEIC, only, connect the engine RPM and oil temperature sensors to the smokemeter according to the smokemeter manufacturer's instructions;
7. Affix the smokemeter according to the manufacturer's instructions to the end of the vehicle's exhaust pipe. For full-flow smokemeters, ensure that the final two feet and the exit of the exhaust pipe is straight, with an internal diameter not to exceed five inches. Appropriate exhaust pipe adapters shall be used as necessary to comply with these specifications. Do not use full-flow smokemeters on vehicles with underbody exhaust pipes which direct the exhaust flow to the ground unless the exhaust gases are redirected away from the ground by the appropriate exhaust pipe adaptor mentioned above;
8. Ensure that the smokemeter is warmed up and calibrated according to N.J.A.C. 7:27B-4.2 and the manufacturer's instructions;
9. Chock the drive-wheels;
10. Set the vehicle's parking brake;
11. Start the engine and operate at curb idle speed;
12. Purge the exhaust system of loose soot and stabilize the smoke opacity readings. Conduct at least three snap accelerations by rapidly depressing the accelerator pedal to the floor and holding until the engine speed reaches high idle or 2,500 RPM, whichever is lower before releasing, with five to 45 seconds between accelerations;
13. Initiate the test sequence on the smokemeter. Some smokemeters may not have a testing sequence entitled "power brake acceleration test." For these smokemeters, the snap acceleration test sequence may be used;
14. Select the appropriate smoke opacity pass/fail standard set forth at N.J.A.C. 7:27-14.6, based upon the engine model year;
15. If using a partial-flow smokemeter, select the appropriate stack size from Table 1 below, based upon the engine horsepower. If using a full-flow smokemeter, enter the engine horsepower and the actual stack diameter as measured upon the vehicle exhaust stack outlet;
16. If using a smokemeter without horsepower input, select the appropriate stack size from Table 1, based upon the vehicle's engine horsepower;
17. Apply the service brakes with the left foot;
18. Place the transmission in "D" or "Drive" or the gear position immediately next to "N" or "Neutral." Do not use the "LO" or "1" gear positions;

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19. Rapidly depress the accelerator pedal to the floor and hold it there for approximately three seconds or until the prompted to release it by the smokemeter;
 20. Repeat (c)19 above at least two more times for a minimum total of three accelerations, with a pause of between five and 10 seconds between accelerations or until prompted by the smokemeter;
 21. Three valid power brake accelerations shall constitute a successful test procedure and terminates the test;
 22. Determine whether the vehicle has passed or failed based upon three valid smoke opacity test results averaged arithmetically and compared to the standards set forth at N.J.A.C. 7:27-14.6 appropriate for the test vehicle's engine model year; and
 23. If the test results are invalid and testing must be repeated, allow a minimum of three minutes but no more than five minutes of idling to cool the transmission before repeating the test;
- (d) The testing procedures for the visible black smoke screening test, required pursuant to N.J.A.C. 7:27-14.5, shall be performed as follows:
1. Determine whether the vehicle's governor and automatic transmission, as applicable, are functioning properly. Do not proceed with the testing of a vehicle which is determined to have a disabled or an improperly functioning governor or automatic transmission until the governor or automatic transmission is repaired or a properly functioning governor or automatic transmission is installed;
 2. If the vehicle is equipped with a manual transmission, place the transmission in neutral and release the clutch. If the vehicle is equipped with an automatic transmission and a low speed engine, place the gear selector in the park or neutral position. If the vehicle is equipped with an automatic transmission, but is not equipped with a low speed engine, place the gear selector in drive or low gear. For both manual and automatic transmission vehicles, depress the brakes firmly throughout the remainder of the test;
 3. Observe all exhaust ports of the vehicle for the presence of visible black smoke in the exhaust emissions throughout the duration of the test;
 4. Beginning with the accelerator pedal in the low idle position, rapidly accelerate the engine at wide open throttle and hold the accelerator pedal at wide open throttle for one to three seconds after the engine has achieved maximum governed RPM or, for vehicles with an automatic transmission, only, until the engine speed stabilizes while operating in a forward gear. Release the accelerator pedal and allow the engine to idle for 15 seconds while continuing to observe the exhaust emissions for visible

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black smoke. If black smoke is observed, the vehicle shall be deemed to have failed to pass the visible black smoke screening test.

(e) (Reserved)

TABLE 1

Engine Horsepower Rating vs. Nominal Stack Size

Manufacturer's Rated Horsepower	*Nominal Stack Size in Inches
Less than 101	2
101-200	3
201-300	4
301 and over	5

*Note: Nominal stack size shall always be used when measuring engine smoke opacity, irrespective of the stack size equipped on the vehicle being tested. For example, a vehicle equipped with an engine rated at 301 horsepower or above which has an exhaust stack measuring seven inches in diameter shall, for purposes of an official test, have a nominal stack size of five inches input to the smokemeter. If, for example, a vehicle has no engine identification plate and is equipped with an exhaust stack measuring six or seven inches in diameter - but the exhaust pipe from the manifold is five inches in diameter - then the nominal stack size shall be five inches.

7:27B-4.4 Emission control apparatus retrofit device and closed crankcase ventilation system examination procedure

- (a) The procedure for examination of the emission control apparatus of a diesel-powered motor vehicle, required at N.J.A.C. 7:27-14.5(e), shall, if the motor vehicle had any exhaust after treatment incorporated within the vehicle's or engine's certified configuration by the vehicle or engine original equipment manufacturer, consist of a visual check to determine whether such exhaust after treatment is present on the motor vehicle.
- (b) The absence of any exhaust after treatment determined pursuant to (a) above to be included in a motor vehicle or diesel engine's certified configuration shall result in a determination of failure to pass the emission control apparatus compliance examination.

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- (c) The procedure for the one-time compliance inspection of the retrofit device of a diesel-powered motor vehicle required to be retrofitted pursuant to N.J.A.C. 7:27-32.7, as required at N.J.A.C. 7:27-32.21 and [14.5\(f\)](#), shall be performed as follows:
1. Confirm that the vehicle identification number on the vehicle matches the vehicle identification number on the compliance form;
 2. Confirm that the diesel emission control strategy family name on the retrofit label matches the diesel emissions control strategy family name on the compliance form;
 3. Confirm that the BART number (BART 1, BART 2 or BART 3) on the compliance form matches the BART number on the retrofit label;
 4. Visually confirm the presence of a retrofit device upon the vehicle;
 5. If the vehicle satisfies all of the conditions of (c)1 through 4 above, certify on the compliance form that the retrofit requirement has been met; and
 6. If the vehicle fails to satisfy any of the conditions at (c)1 through 4 above, certify on the compliance form that the retrofit requirement has not been met.
- (d) The procedure for examination of the closed crankcase ventilation system of a school bus required to have a closed crankcase ventilation system installed pursuant to N.J.A.C. 7:27-32.4 and [N.J.S.A. 26:2C-8.31](#), as required at N.J.A.C. 7:27-32.6 and [14.5\(g\)](#), shall be performed as follows:
1. Confirm that the vehicle identification number on the vehicle matches the vehicle identification number on the compliance form;
 2. Visually confirm the presence of a closed crankcase ventilation system that meets the following:
 - i. The closed crankcase ventilation system must not have any opening that would permit the uncontrolled release of crankcase emissions from the engine, as specified by (d) 2ii through v below;
 - ii. The tubing or similar ducting material originating at the crankcase vent must be ducted to the engine air intake plenum and may include an in-line filtration system;
 - iii. An in-line filtration system may also have a drainpipe that returns condensed fluids to the crankcase or a collection vessel;
 - iv. All tubing, ducting or pipes, or connections thereto, leading from the crankcase vent to the terminal point in the air intake system must be closed

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and secure. This includes connections to any intermediary filters or drain lines, and their terminal points; and

- v. There are no visible indications of leaks from closed crankcase ventilation system, such as oil residue at connection points or visible emissions from the closed crankcase ventilation system;
3. If the vehicle satisfies all of the conditions set forth at (d)1 and 2 above, certify upon the compliance form that the closed crankcase ventilation system installation requirement has been met; and
4. If the vehicle fails to satisfy any of the conditions at (d)1 and 2 above certify on the compliance form that the closed crankcase ventilation system installation requirement has not been met.

7:27B-4.5 Procedures for establishing an alternative smoke opacity standard for diesel-powered motor vehicles

- (a) Before December 2, 2009, in the event that a heavy-duty diesel vehicle, which is equipped with an engine model year 1973 or older, fails to pass an exhaust emissions inspection as part of either a periodic inspection or an inspection conducted as part of the roadside enforcement program, the owner or lessee of the heavy-duty diesel vehicle may request the Department to establish an alternative smoke opacity standard for that vehicle-engine-chassis combination, if the cause of the failure is due to the design of the vehicle, rather than to insufficient repair and maintenance. The procedures for obtaining this alternative smoke opacity standard are as follows:
 1. The owner or lessee shall present to the Department the "Heavy-duty Diesel Emission Testing Report" prepared by the inspector who conducted the smoke opacity testing and determined that the vehicle failed to meet the standards set forth at N.J.A.C. 7:27-14.4 and 14.6, as applicable;
 2. The owner or lessee shall submit documentation to the Department, or its designee, demonstrating that the vehicle engine and all fuel control and emissions-related components have been, within 45 calendar days of submission of said documentation:
 - i. Tuned to minimize the level of smoke in the exhaust emissions consistent with the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer; and

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- ii. Determined by a licensed diesel emissions inspection center, to be within the design, specifications and certified configuration, as applicable, prescribed by the original equipment manufacturer;
 3. The owner or lessee shall subject the vehicle to any other examination or testing required by the Department or the Department's designee. Such examination or testing shall be performed by a person of the Department's choosing; and
 4. The owner or lessee shall ensure the performance of any repairs which the Department deems likely to enable the vehicle to meet the smoke opacity standards set forth at N.J.A.C. 7:27-14.4 and 14.6, as applicable.
- (b) If the Department determines that the vehicle cannot be repaired to meet the standards set forth at N.J.A.C. 7:27-14.4 and 14.6, it shall issue an alternative smoke opacity standard report to the owner or lessee which establishes an alternative smoke opacity standard for the specific vehicle-engine-chassis combination. The Department shall establish this alternative smoke opacity standard by adding 10 percentage points or the maximum points as necessary to not yield an alternative smoke opacity standard in excess of 100 percent to the highest smoke opacity percentage obtained from all testing of the vehicle performed subsequent to any tuning, repairing, or rebuilding of the engine pursuant to (a) 2 above.
- (c) In order to have the alternative smoke opacity standard applied when the vehicle is inspected pursuant to the requirements of N.J.A.C. 7:27-14 and this subchapter, an owner or lessee shall present the alternative smoke opacity report issued by the Department to the inspector at the time of the inspection of the vehicle. Failure by the owner or lessee to present the alternative smoke opacity report to the inspector at the time of inspection will result in the application of the smoke opacity standards set forth at N.J.A.C. 7:27-14 otherwise applicable to the vehicle.

7:27B-4.6 Specifications for a smokemeter for determining compliance with N.J.A.C. 7:27-14

- (a) A smokemeter used to measure smoke opacity in the exhaust emissions of a diesel-powered motor vehicle in order to determine the vehicle's compliance with N.J.A.C. 7:27-14 shall conform to the following:
1. The smokemeter shall, at minimum, conform to all specifications and standards set forth in SAE J1667 and incorporated herein by reference; and
 2. The smokemeter shall be capable of accepting as input the vehicle exhaust stack diameter and the engine horsepower;

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- (b) In addition to the requirements set forth at (a)1 and 2 above, a smokemeter, when used by a diesel emissions inspection center to measure smoke opacity in the exhaust emissions of a diesel-powered motor vehicle for determining compliance with N.J.A.C. 7:27-14, shall conform to the following:
1. The smokemeter shall have an integrated engine RPM hookup with an accuracy of ∇ 20 RPM, which shall actively measure engine RPM during testing;
 2. The smokemeter shall have an oil temperature probe which shall measure engine oil temperature in degrees Fahrenheit during testing;
 3. The smokemeter shall have the capability to produce a printed test report, in a format approved by the Department. The report shall include:
 - i. The date and time of testing;
 - ii. The final test score and, if test score averaging is required pursuant to N.J.A.C. 7:27B-4.3(a) and (c), individual test run raw scores;
 - iii. The identification number of the inspector performing the test and the license number of the DEIC at which the test was performed;
 - iv. The vehicle identification number and the model year of the vehicle tested;
 - v. A graphical representation, with a resolution of ∇ 20 RPM, of the pattern measured by the engine RPM hookup during testing; and
 - vi. The oil temperature when measured during testing conducted pursuant to N.J.A.C. 7:27B-4.3(a)5, (b)4 or (c)6.