

them to test in-use nonroad engines in a manner that would permit action against gross emitters of smoke. In a like manner, EPA could propose additional smoke testing regulations as part of any future rulemaking which would address manufacturer's in-use smoke test requirements. The main elements of any in-use smoke program would be a new Federal smoke standard(s) and test procedure for new engines, guidance from EPA for state in-use smoke control programs (including a full smoke test procedure and accompanying state limit values), and a means by which the data from the two programs could be related. The current smoke test procedure from Part 86, Subpart I does not provide data comparable to the most practical in-use smoke test procedure, a snap-idle acceleration test with measured opacity. However, based on the current ISO 8178-9 procedure, EPA believes data from an ISO 8178-9 certification smoke test could provide the desired link.

In applying nonroad smoke standards and procedures to engines rated 50 hp and under, EPA has chosen to exempt one-cylinder engines, the large majority of which are being used in generator sets and other constant-speed applications, from the smoke standards. EPA still believes that testing of these engines is unique in ways that would need to be addressed before requiring smoke standards and testing for this class of engines. These engines tend to produce puffs of smoke that may make the smoke measurement erratic. The Agency believes the air quality impact

of this decision will be minimal. EPA expects to reconsider this issue in the future in relation to other in-use testing concerns.

Finally, the Agency proposes to exempt from smoke standards those nonroad diesel engines which have certified PM emission levels or Family Emission Limits (FELs) below 0.05 g/hp-hr. The Agency believes that engines meeting an FEL below 0.05 g/hp-hr would utilize control technology, such as particulate traps, that would provide adequate smoke control.

4. Steady-State Testing

Recognizing the variety of both power classes and work applications to be found within the nonroad vehicle and engine population, EPA will retain current Federal steady-state test procedures for nonroad engines. The steady state duty cycle applicable in each of the following categories: 1) nonroad engines 25 hp and greater; 2) nonroad engines less than 25 hp; and 3) nonroad engines having constant-speed, variable-load applications, (e.g., generator sets) as set out in Table VII.F-2. The steady-state cycles remain, respectively, the 8-mode cycle, the 6-mode cycle and the 5-mode cycle.³¹⁴ We envision manufacturers that satisfy the requirements to certify on the steady state ISO 8178-D2 duty cycle might likewise satisfy the requirements to test over the Constant Speed Variable Load Duty Cycle (CSVL). Manufacturers will be required to meet emission standards under steady-state conditions, in

addition to meeting emission standards under the proposed supplemental transient test cycle. Steady-state test cycles are needed so that testing for certification will reflect the broad range of operating conditions experienced by these engines. A steady-state test cycle represents an important type of modern engine operation, in power and speed ranges that are typical in-use. The mid-to-high speeds and loads represented by present steady-state testing requirements are the speeds and loads at which these engines are designed to operate for extended periods for maximum efficiency and durability. Details concerning the three steady-state procedures for nonroad engines and equipment can be found in proposed regulations at proposed 40 CFR 1039.510 and in the three appendices which follow that section, one for each cycle.

Manufacturers would perform each steady-state test following all applicable test procedures in proposed regulations at proposed 40 CFR part 1039, e.g., procedures for engine warm-up and exhaust emissions measurement. We are proposing that the testing must be conducted with all emission-related engine control variables in the maximum NO_x-producing condition which could be encountered for a 30 second or longer averaging period at a given test point. Table VII.F.-2 below summarizes the steady-state testing requirements by individual engine power categories.

TABLE VII.F-2.—SUMMARY OF STEADY-STATE TEST REQUIREMENTS

Nonroad engine power classes	Steady-state testing requirements		
	8-Mode cycle (ISO 8178-4 C1)	6-Mode cycle (ISO 8178-4 G3)	5-Mode cycle (ISO 8178-4 D2)
hp < 25 (kW < 19)	NA ^a	applies	applies ^b .
25 ≤ hp < 75 (19 ≤ kW < 56)	applies	NA ^a	applies ^b .
75 ≤ hp < 175 (56 ≤ kW < 130)	applies	NA ^a	applies ^b .
175 ≤ hp ≤ 750 (130 ≤ kW ≤ 560)	applies	NA ^a	applies ^b .
hp > 750 (kW > 560)	applies	NA ^a	applies ^b .

^a Testing procedure not applicable to this class of engines.

^b For constant, or nearly constant, speed engines and equipment with variable, or intermittent, load.

5. Maximum Test Speed

We are proposing to make a slight change to how test cycles are specified. We are proposing to apply the existing definition of maximum test speed in part 1065 to nonroad CI engines. This definition of maximum test speed is the single point on an engine's normalized maximum power versus speed curve that lies farthest away from the zero-

power, zero-speed point. This is intended to ensure that the maximum speed of the test is representative of actual engine operating characteristics and is not improperly used to influence the parameters under which their engines are certified. In establishing this definition of maximum test speed, it was our intent to specify the highest speed at which the engine is likely to be

operated in use. Under normal circumstances this maximum test speed should be close to the speed at which peak power is achieved. However, in past discussions, some manufacturers have indicated that it is possible for the maximum test speed to be unrepresentative of in-use operation. Since we were aware of this potential during the original development of this

³¹⁴ The three proposed steady-state test cycles are similar to test cycles found in the International

Standard ISO 8178-4:1996 (E) and remain

consistent with the existing 40 CFR part 89 steady state duty cycles.