TP-933

Test Procedure for Determining Evaporative Emissions from Off-Highway Recreational Vehicles

ATP-02

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Alternative Test Procedure Approved April 6, 2017

California Air Resources Board

Monitoring and Laboratory Division

Note: This is a newly adopted test procedure shown without underline as permitted by California Code of Regulations.

This alternative test procedure is formatted in a style to indicate changes from the existing test procedures. All existing language is indicated by plain type. All additions to the existing language are indicated by highlighted yellow. All deletions to the existing language are indicated by strikeout. Only those sections containing the modifications from the existing language are included. All other portions remain unchanged and are indicated by the notation [* * * * *] for reference.

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5.1 Soak Fuel System Components

Precondition the tank and other fuel delivery system components by filling the tank to its nominal capacity with fresh test fuel. Cap the tank within one minute of filling. After filling the tank, start the vehicle engine and allow it to idle for approximately fifteen minutes. Precondition the whole vehicle or rig continuously following one of the following 3 options defined below:

1. Soak for a total of 3,360 hours while maintaining an ambient temperature between 68º F and 86ºF or;
2. Soak for 1680 hours while maintaining an ambient temperature between 104 ◦F and 113 ◦F or;
3. Soak for an equivalent combination of two soaks in either of the temperature ranges listed in 1 and 2 above. Soak time will be calculated by adding the weighted time at each test temperature until the vehicle is 100% soaked using the following values: 1 hour at 68ºF to 86ºF equals 1/3360th of a test, 1 hour at 104 ◦F to 113 ◦F equals 1/1680th of a test.

Soak the tank and other components continuously for a total of 3,360 hours while maintaining an ambient temperature between 68ºF and 86ºF. Alternatively, components may be preconditioned using a fuel system test rig. The test rig must include all the components of the fuel and evaporative emissions control system connected and oriented as they would be installed in the vehicle. The tank and fuel lines must be filled with test fuel at the beginning of the test. A fuel system may be soaked for less than 3,360 hours if data is provided using one of the following two documents incorporated by reference: "TP901 - Test Procedure for Determining Permeation Emissions from Small Off-Road Engines and Equipment Fuel Tanks" adopted July 26, 2004 or 40 CFR section1060.520 (2012) that shows steady state permeation has been reached. If slosh testing is required, the slosh time may be considered part of the preconditioning period, provided all fuel system components tested remain filled with fuel, and are never empty for more than one hour over the entire preconditioning period.

If the fuel system is allowed to sit more than 6 weeks at 68°F to 86°F, or was subjected to accelerated conditioning at a temperature above 86°F, a 1-week presoak must be conducted with fresh fuel before testing begins. The fresh fuel presoak can be counted as part of the 3,360-hour soak, so long as the fuel system is empty less than one hour.

Prior to beginning any test sequence to measure running loss, hot soak, or diurnal emissions, a vehicle may, at the manufacturer's option, be preconditioned to minimize non-fuel emissions by being soaked at an elevated temperature prior to testing. To ensure steady state permeation rates, the vehicle must be soaked for at least 7 days at a temperature no higher than 95°F immediately prior to emissions testing.

The fuel tank, fuel line system, and/or vapor vent line system can be preconditioned as separate components from the whole vehicle as long as the reason for the separate component preconditioning is accepted by ARB prior to vehicle certification and the components are subjected to the equivalent conditioning required for a whole vehicle (See second paragraph of section 5.1 above). Acceptance will be based on verification of good engineering judgement used to ensure components are subjected to conditions similar to what would be found on the vehicle during conditioning. These conditions include, but are not limited to, physical deformations, fuel fill volume for tanks, and fuel reservoir for fuel hoses and related components. Vapor vent lines must be exposed to liquid fuel for component condition. All components that are installed on the vehicle must be attached as it would be on a factory production vehicle.

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6.2 Running Loss Conditioning

The running loss test is designed to simulate vehicle operation and canister purging during operation. Follow the dynamometer schedules in 40 CFR section 86.515-78 (2012), which is hereby incorporated by reference. For the purpose of this running loss conditioning, all soak and test temperatures are 86° ± 3°F.

6.2.1 The following steps shall be performed before beginning the running loss test:

6.2.1.1 The fuel tank of the vehicle to be tested shall be drained and refilled to 50 **+/- 5** percent with test fuel.

6.2.1.2 Soak for at least 6 hours after being refueled. Following this soak period, conduct a refueling cycle by running the test vehicle through one Urban Dynamometer Driving Schedule (UDDS) driving cycle. The drain and fill and 6-hour soak may be omitted on subsequent tests of the vehicle if the vehicle remains under laboratory temperatures between tests. The later test preconditioning will begin with subsection 6.2.1.5.

6.2.1.3 Install fuel temperature sensors as needed.

6.2.1.4 Drain and refill the fuel tank of the vehicle to 50 **+/- 5** percent with test fuel.

6.2.1.5 Soak the vehicle with the key off for 12 to 36 hours between the end of the refueling and the start of the cold start preconditioning cycle.

6.2.1.6 During the soak period, perform the tip test specified in subsection 6.1 and purge and load the evaporative control system canister using the procedures defined in sections 5.2.2, 5.2.3, and 5.2.4. The evaporative control system canister is not required to be installed while performing the tip test specified in subsection 6.1.

6.2.1.7 The location and speed of a fan used to cool the vehicle must comply with the requirements described in Appendix B.

6.2.1.8 The speed profile is the U.S. Environmental Protection Agency (U.S. EPA) UDDS as specified in 40 CFR section 86.515-78 (2012). The same cycle (Class I or Class II) must be used as is required for exhaust emissions

certification. The steady state engine test for All-Terrain Vehicles (ATV) is not allowed for this test procedure.

6.2.1.9 Perform a cold start UDDS preconditioning cycle on the dynamometer.

6.2.1.10 Perform a hot start UDDS preconditioning cycle on the dynamometer.

Following the completion of the running loss preconditioning, a hot soak preconditioning must be conducted as specified in subsection 6.3.

6.3 Hot Soak Preconditioning

The hot soak evaporative emission preconditioning is designed to soak the OHRV after operation. The test temperature for the hot soak is 86° ± 3°F.

6.3.1 The hot soak must be performed within 7 minutes **max** of the completion of the UDDS hot start cycle, performed in subsection 6.2.

6.3.2 Turn off all engine cooling fans when the engine is turned off.

6.3.3 During the time between the end of the UDDS hot start cycle and the beginning of the hot soak preconditioning, the engine is allowed to be shut off for no more than 4 minutes immediately preceding the start of the hot soak preconditioning.

6.3.4 Soak the OHRV at 86° ± 3°F for 90 ±1 minutes.

6.3.5 If the Calculation Method is to be used for the diurnal test, the carbon canister must be removed immediately following the hot soak test and the butane working capacity must be determined by loading the canister to 2 grams breakthrough with a 50/50 mixture by volume of butane and nitrogen, at a rate of 15 ± 2 grams butane per hour per liter of canister volume.

6.3.6 Upon completion of the hot soak test, proceed to the diurnal test in subsection 6.4.

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