



Vehicle Fuel System Flush

1 Scope

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. The purpose of this procedure is to provide a guideline for flushing the fuel systems of vehicles or simulation test bucks that will undergo inertially-reacted simulation durability testing in the laboratory, which require accurately ballasting the fuel system such that accurate testing may be done safely. Many fuels, e.g., gasoline, can be inflammable and should be purged prior to adding fuel ballast.

The fuel will be replaced by a less flammable liquid, referred to as the “**fuel ballast**”. This fuel ballast is often Stoddard solvent (also known as white spirit) which may not be available in some regions. Alternatives such as diesel fuel (first choice) or kerosene (second choice) may be used. If diesel or kerosene is used, reduce the volume of fuel ballast by ~15% to account for the higher density.

1.2 Foreword. Not applicable.

1.3 Applicability. This standard applies to any test vehicle or simulation test buck with a fuel system that consists of one or more fuel tanks that contain any amount of fuel. If the vehicle or test buck is to undergo laboratory testing, fuel must be evacuated from the fuel system. Note that different regions will have different regulations which may limit choices in fuel ballast alternatives. This procedure is intended to be general in nature and may be adjusted as needed to account for these differences.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

- An approved fuel containment unit.
- An approved hazardous material container.
- An approved Lower Explosive Limit (LEL) recording device.
- Depending on local work rules – a remote, flashing strobe light to warn of possible explosive vapors

3.3 Test Vehicle/Test Piece. Test Vehicle/Test Buck.

3.4 Test Time. Not applicable.

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May 2013

Page 1 of 4

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation. Not applicable.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions. Diesel engine vehicles do not need to perform steps 4.3.1 through 4.3.5.2.

4.3.1 Determine if the Vehicle/Buck has a Complete or Partial Fuel System. Before initiating the fuel evacuation process, it must be determined if the fuel system is functional and complete or if the fuel system is non-functional and/or partial (open). Once the determination has been made, refer to 4.3.2.

4.3.2 Remove Fuel from Vehicle/Buck Fuel System. Fuel must be evacuated from the fuel system and stored in an approved fuel containment unit.

4.3.2.1 If the vehicle or test buck has a complete fuel system, use the following steps to drain the fuel from the fuel tank.

4.3.2.1.1 Ground the fuel system to the containment unit and ground the containment unit to earth ground.

4.3.2.1.2 Attach an auxiliary tube to the fuel pressure check valve. The tube must be equipped with a fitting that will depress the valve pin in the fuel pressure check valve. If check valve is not accessible, disconnect fuel line from fuel rail and attaché hose to fuel line fitting.

4.3.2.1.3 Attach an appropriate voltage supply to the fuel pump or remote harness that powers up the fuel pump.

4.3.2.1.4 Drain as much fuel as possible from the fuel tank into the containment unit, via the auxiliary tube, by cycling the fuel pump until no more fuel can be extracted.

4.3.2.1.5 Remove the auxiliary tube and check valve fitting or reconnect fuel line if removed from fuel rail.

4.3.2.2 If the vehicle or test buck has a partial fuel system, use the following steps to drain the fuel:

4.3.2.2.1 Insert a siphon tube into the fuel tank via the fuel filler neck.

4.3.2.2.2 Attach the tube to a siphon pump and ground the siphon pump to the vehicle.

4.3.2.2.3 Pump as much fuel as possible from the fuel tank into the containment unit.

4.3.3 Measure the Lower Explosive Limit (LEL) of the designated supply of fuel ballast. The supply of fuel ballast that will be used in place of fuel during simulation testing of the vehicle must be checked for unacceptable limits of hazardous vapors using an approved LEL recording device (example: BW Technologies, GasAlertMax, Model GAMAX 2-4). Measure the LEL of the supply of fuel ballast.

4.3.3.1 If the LEL is less than 10%, the supply of fuel ballast can be used for simulation testing.

4.3.3.2 If the LEL is higher than 10%, the supply of fuel ballast must be disposed of and a different supply of fuel ballast must be used. The LEL of the new supply must be checked and held to the aforementioned criteria (4.3.3).

4.3.4 Flush the Vehicle/Buck Fuel System.

4.3.4.1 If the fuel system is complete, the presence of fuel in the lines and tank is possible after 4.3.2.1 have been completed. Use the following steps to flush the fuel from the entire system.

4.3.4.1.1 Ground the fuel ballast supply and pump to the vehicle and ground the containment unit to earth ground.

4.3.4.1.2 Fill the fuel tank with 7.6 L (2 gal) of fuel ballast.

4.3.4.1.3 Ensure that the fuel pressure check valve is closed and all lines closed.

4.3.4.1.4 Cycle the fuel pump to flush the fuel system with fuel ballast.

Note: Some vehicles do not have return fuel flow, so there would be no need to remove line and seal up system in 4.3.2.1.5.

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Page 2 of 4