GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW17751

Diesel Exhaust Fluid (DEF) Leak Path: DEF Contamination Sensitivity Review

1 Introduction

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. To provide a procedure for inspecting a mockup or vehicle for potential sensitivity to Diesel Exhaust Fluid (DEF) contamination of urea sensitive components in non-collision situations. DEF is also referred to as AdBlue (AUS32).

1.2 Applicability. Vehicles equipped with a DEF System.

1.3 Remarks. Evaluations using this procedure may provide an early warning and reduce the potential for failure of critical components. The specific nature of DEF leaks in vehicle use may be difficult to predict due to the customer's in-use service and maintenance habits. Observations from this procedure are to be presented during DEF Subsystem Peer Reviews.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3191

3 Resources

3.1 Facilities. Any location with facilities suitable to review the under hood and underbody components of a vehicle or mockup. Alternatively, for a virtual assessment, any location with suitable Computer Aided Design (CAD) capabilities and display resources for a team to analyze a complete tracking vehicle.

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. A vehicle hoist may be required for reviewing under the vehicle. For a virtual assessment, sufficient computing capabilities and connection speed are needed along with display equipment suitable for viewing by a team.

3.3 Test Vehicle/Test Piece. This procedure requires a representative vehicle or mockup. For a virtual assessment, a representative tracking vehicle containing an expected worst case scenario of available options.

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3.4 Test Time. 3 hours.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. The program DEF Hardware Lead Engineer initiates, coordinates, and documents the activity. A person proficient in this procedure leads the review. Review participants may include system engineers, design release engineers of affected components, and DEF Bill of Material (BOM) Family Owners (BFO).

4 Procedure

4.1 Preparation. The DEF leak path review consists of the activities designated in section 4. Reducing the potential for DEF contamination of critical components is addressed by examining areas of the vehicle for factors related to DEF leakage sensitivity. A checklist, provided in Appendix A, Table A1 may be used as an aide to examine the vehicle.

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.

4.3.1 DEF Leak Sensitivity Factors. A DEF contamination of a critical component event may be classified by two (2) types of contamination: electrical contamination caused by a conductive fluid creating electrical short circuits, and chemical contamination caused by corrosion of metal components. Electrical contamination is characterized by two (2) phases: DEF penetration into the vehicle electronic system and DEF migration through vehicle wiring. DEF penetration into the vehicle wiring can be caused by DEF leaking onto unsealed connectors or components, or by DEF pooling on a sealed connector not rated for DEF. DEF migration will occur where DEF migrates along any wiring harness that isn't constructed with anti-capillary wiring or an anti-capillary barrier, thus carrying DEF to critical components. The focus of this review is on DEF penetration into the vehicle electrical system and chemical contamination of critical components. If the potential occurs for DEF to enter an electrical connector, the potential for the fluid to migrate to other, more-critical components, needs to be understood. The following factors should be considered when reviewing the vehicle:

- Is there potential for DEF to contact an electrical module or connector
- Would the DEF pool, or drain away
- Is the component or connector fully sealed based on the sealing class (see GMW3191)
- Is there potential for DEF to pool on structural metal components (suspension, steering, break hardware, etc.)

4.3.2 Examination of Tank Assembly Component Configuration. This should consist of engineering observations of potential leak paths coming from the DEF tank assembly. This would include leaks caused by bad inlet connections, module to tank shell connections, or any other tank mounted component that could create a leak path. This leak will not be under pressure and can be assumed to take the path as expected for a fluid running down the outside of the tank towards the ground. Awareness should be made for air motion of a moving vehicle which could cause DEF to splash rearward at higher velocities.

4.3.2.1 Examination of Underhood/Underbody Plumbing Component Packaging. Locations of all plumbing connections should be evaluated. The DEF supply line leading from the pump module to the DEF injector can come in multiple pieces resulting in inline connections. This supply line contains pressurized DEF and has the ability to leak at any connection. Warranty data has shown that connection leaks are more likely to occur than any other DEF leakage. A leak resulting in dripping DEF could carry on indefinitely.

4.3.2.2 Examination of Customer Fill/Refill Locations. Customer fill/refill locations should be evaluated for the potential for fluid to be spilled and guided onto an electrical connector, module, or suspension component.

Note: The potential of DEF spillage during fill is higher when portable containers are used for filling. A refill spillage event can be evaluated by pouring DEF into the Fill Pocket until it spills over the outer edge of the pocket and watching if the DEF contacts a potential critical surface.

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