



Determination of Deposits in the Fuel System

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. This test procedure describes the determination of substances from fuel hoses and other elastomeric parts of the fuel system which could form deposits on copper and copper alloys.

1.2 Applicability. All gasoline fuel systems.

1.3 Remarks. None.

2 References

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

2.1 External Standards/Specifications.

ISO 4794

2.2 GM Standards/Specifications.

GMW14914

2.3 Additional References.

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.

3.2.1 Erlenmeyer flask 250 ml.

3.2.2 Round-bottom flask 250 ml.

3.2.3 Folded filter diameter 125 mm.

3.2.4 Glass funnel.

3.2.5 Glass beads diameter 1.5 mm.

3.2.6 Copper chips.

3.2.7 Conventional gasoline test fuel per GMW14914 Table 1.

3.2.8 Glass filter crucible number four (4), per ISO 4794, porosity 10 m^{-6} to 16 m^{-6} .

3.2.9 Balance with an accuracy of 0.1 mg.

3.2.10 Water jet pump.

3.2.11 Desiccator.

3.3 Test Vehicle/Test Piece. Elastomer sample must be taken from the inner liner of the fuel hose. The elastomers to be tested shall be cut into small cubes with 2 mm to 3 mm in width. For one (1) test, approximately 20 g of elastomer are required.

3.4 Test Time. Reference the lab test procedures in Section 4 for timing details.

3.5 Test Required Information. See 5.3.

3.6 Personnel/Skills. Conform to company and/or laboratory requirements. Technician training records must be available upon request.

4 Procedure

4.1 Preparation. For initial sample approval and arbitration purposes, the minimum time between manufacturing and testing of elastomers shall be seven (7) days. For routine quality control purposes, the time between manufacturing and testing of elastomers shall be a minimum of 72 h. Before testing, the test pieces shall be stored at a temperature of $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ for at least 8 h and shall be free from strain during this period.

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 Before testing, all glassware shall be rinsed with test fuel per GMW14914.

4.3.2 Twenty (20) g of the test pieces, 10 g of the copper chips, and 100 ml of the test fuel per GMW14914, shall be filled together with two (2) glass beads into the round bottom flask and shall be boiled $1\text{ h} \pm 0.1\text{ h}$ on reflux.

4.3.3 After $1\text{ h} \pm 0.1\text{ h}$ of cooling down, the fuel shall be filtered through the folded filter into the Erlenmeyer flask.

4.3.4 The filtrate shall be stored in the closed Erlenmeyer flask in darkness for $48\text{ h} + 0\text{ h} - 2\text{ h}$ at $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results.

5.2.1 After $48\text{ h} + 0\text{ h} - 2\text{ h}$ storage in darkness, the fluid shall be visually inspected for cloudy or crystalline deposits. Color changes of the fuel are negligible. In the presence of deposits, see 5.2.2.1 thru 5.2.3.2.

5.2.2 Deposits. In the presence of deposits, the following procedure shall be performed.

5.2.2.1 The glass filter crucible shall be rinsed with test fuel to GMW14914, Table 1, "Conventional Gasoline", and shall be dried for at least 4 h at $+50\text{ }^{\circ}\text{C}$. After cooling down for $1\text{ h} \pm 0.1\text{ h}$ in a desiccator, the weight of the glass filter crucible shall be determined with an accuracy of 0.1 mg. The deposits from the Erlenmeyer flask shall be completely transferred to the glass filter crucible, and the fuel shall be simultaneously sucked off using a water jet pump.

5.2.2.2 The glass filter crucible shall be dried for at least 4 h at $+50\text{ }^{\circ}\text{C}$. After cooling down for $1\text{ h} \pm 0.1\text{ h}$ in a desiccator, the weight of the glass filter crucible shall be determined with an accuracy of 0.1 mg and the amount of deposits shall be calculated.

5.2.2.3 Observe the color of the deposits. Deposits that are brown shall be determined by infrared (IR) spectroscopy for the presence of dimethyldithiocarbamate, if found the test is not fulfilled even if the amount is $< 20\text{ mg}$ (dimethyldithiocarbamate electrically insulates the fuel pump.)

5.2.3 Procedure Result.

5.2.3.1 Test is Fulfilled When.

- No deposits are in the fuel.
- Found deposits in the amount of $< 20\text{ mg}$ per 20 g elastomer portion and deposits are in a light color.

5.2.3.2 Test is Not Fulfilled When.

- Any deposits with an amount $> 20\text{ mg}$ per 20 g elastomer portion, independent of color or nature of deposits.
- The presence of dimethyldithiocarbamate is found, irrespective of the amount of deposits.