

Standard for In-Tank Electric Fuel Pumps

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STANDARD FOR IN-TANK ELECTRIC FUEL PUMPS

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1.0 SCOPE:

This standard covers the operational characteristics, environment, durability procedures, and test procedures for in-tank electric fuel pumps for automotive gasoline applications. Specific performance and test criteria used in conjunction with this procedure are specified on the pump drawing. Particular sections of this document may be required for all applications. This standard is intended to evaluate specific characteristics as a supplement to normal material inspections, dimensional checking, and in-process controls, and should in no way adversely influence other inspection operations.

1.1 Hazardous Material Control:

Products furnished to the customer and products and processes used by suppliers to manufacture those products must conform to employee and consumer health, employee safety, and environmental requirements.

2.0 OUTLINE:

2.1 General:

Diagrams are provided where necessary to clarify the details of the test procedures. Use fig. 1 for general setup unless otherwise specified. A glossary of terms and equipment are provided in Appendix A. All test procedures and apparatus must meet all applicable codes and shall be the responsibility of the supplier to design such equipment.

3.0 REFERENCE DOCUMENTS AND DEFINITIONS:

Requirement Hierarchy - In the event there is a conflict between this standard, part drawings, and other related standards or specifications, prioritize the order in which requirements are determined as follows:

- 1st - Applicable part drawing(s)
- 2nd - Application Specific Requirements
- 3rd - USCAR Standards
- 4th - Design Verification, Production Validation and Continuing Conformance Requirements
- 5th - Other related standards and specifications

3.1 Symbols:

Safety, noise, emission, or theft prevention significance will apply to this standard only when the corresponding drawing depicts the standard with the respective symbol. To determine which portions of a specification have safety, noise, emission, or theft prevention significance, a review of the part drawing may be necessary.

3.2 Part Drawing:

The part drawing for the fuel pump should contain or reference the following:

A. All dimensional requirements

- Wherever possible the applicable electrical connector should be used in conducting the test sequences contained in this document to simulate actual in-vehicle conditions.
- The circuitry shall be terminated using connectors that comply with SAE/USCAR-2, Standard for Automotive Electrical Connection Systems, and the SAE/USCAR-12, Wiring Component Design Guidelines.

B. Performance requirements

C. Supplier part number

D. Reference to applicable portions of this and other specifications

E. The typical mating connector and terminals

F. Federal Motor Vehicle Safety Standard (FMVSS) Requirement, if applicable

3.3 Application Specific Requirements:

The application specific requirements shall identify the parameters that differ from the general specifications in this document. The application specific requirements may or may not be an integral part of the part drawing.

3.4 Development Tests:

Development tests are frequently used to evaluate specific areas of the design. They are a tool for evaluating design alternatives, proposed improvements, cost reduction proposals, or determining root causes of field problems.

3.4.1 Validation Tests: Validation tests or sample approval tests are acceptance-type tests. Consideration shall be given to the inherent repeatability or subjectivity of certain tests outlined by this specification before designation as a validation or compliance test.

4.0 GENERAL REQUIREMENTS:

4.1 Record Retention:

The supplier shall maintain a central file for the storage of laboratory reports and calibration records. A record retention policy concerning these records shall comply with QS-9000. Customer specific files shall be made available to any and all customer personnel upon request, including but not limited to representatives from the following functions: product engineering, purchasing, quality, and reliability.

4.1.1 Objectives of Record Retention: The following are the main objectives for record retention:

- A. Retain records that will evidence compliance so that the supplier can appropriately respond when or if product compliance is challenged. Files shall exist for the storage of all laboratory records, data, and calibration records. The files shall be available at any time for audit or inspection.
- B. Retain records as needed to assist in evidencing the exercise of "due care" in matters relating to product compliance to government requirements or product liability.
- C. Comply with statutory requirements for the maintenance and retention of specific records to substantiate compliance with legal requirements.

4.1.2 Retention Methods: Method of retention must conform to the suppliers corporate procedures and may include retention of original documents, the use of film, or electronic storage equipment. Records must be stored so that they are accessible in a reasonable amount of time. Storage areas should provide adequate protection from unauthorized access, moisture, and fire.

4.2 Sample Documentation:

Engineering test samples shall be identified by part number and serial number unless otherwise noted.

4.2.1 Required Data Package:

4.2.2 Master Samples: Master samples for performance, noise, or construction, if required by the customer, will be provided at the time of approval.

4.3 Sample Sizes:

Sample sizes will be documented in the application specification.

4.4 Materials and Process Standards:

Suppliers are expected to subscribe to appropriate Materials and Process Standards that are called out by this specification.

The supplier shall not change any material or process requirements subsequent to Design Verification approval without the written consent of the customer's releasing department.

Unless otherwise specified or required by law, suppliers should use the most recent versions of any applicable reference documents or standards.

4.5 Measurement Resolution:

Meters and gages used in measurements of the test sample shall be capable of measuring to one count less than the specified value. For example, even though a 0.1 mm and 0.10 mm might be the same diameter, calipers capable of 0.01 mm resolution may be used to measure the first wire but a micrometer with 0.001 mm resolution is required to measure the second wire.

4.6 Test Repeatability and Calibration:

Repeatability studies shall be performed on all laboratory equipment after initial calibration and before use for product evaluation. Individual gages and meters must be calibrated to the manufacturer's specifications on a regular basis.

4.7 Conformance Determination:

Test conformance shall be determined by the performance requirements of the test being performed. All samples shall satisfy the performance requirements regardless of age, cycles, or temperature, unless otherwise noted on the part drawing.

4.8 Disposition of Samples:

Should a premature test nonconformance occur, contact the requesting party to determine if the test is to be continued to gain additional product experience or if testing is to be suspended. When contact cannot be immediately made, the type of test shall determine the disposition of the samples. If the test order indicates that the test is investigative in nature, continue until the requesting party or parties are available. If the test order is for sample approval or validation, stop the test until the requesting party can be contacted.

4.9 Quality Control:

A supplier who furnishes finished parts is responsible for the quality of all components of the shipped assembly or end item, whether component parts are processed/ manufactured by the supplier or purchased from another source. If required, parts shall be purchased only from customer-approved sources.

4.10 Pump Performance Stabilization:

Before testing, pumps must be run to a stabilization condition. The amount of time required for stabilization will depend on the pump technology. It's expected that this will not exceed 24 h.

4.11 Assembly Plant Performance:

The fuel pump must meet minimum performance requirements dictated by the assembly drawing as received by the customer.

5.0 PERFORMANCE TESTS:

Prior to performance measurements, the fuel pumps shall be run on the test stand at test voltage and pump outlet pressure (according to the approved specification) to stabilize the functional data.

5.1 Pump Output:

Measure flow and current at the following conditions:

- Emission Test Fuel
- $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$, $-30^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- $12.0 \pm 0.1\text{V}$
- Pump Outlet Pressure (per approved specification)

5.1.1 Forward Check Valve Leakage (if required):

- 5.1.1.1 Procedure: Test leakage in the forward direction after soaking in emission test fuel for 10 min. (See test setup in fig. 2.) An air test may be substituted for the In-Process test with suitable correlation data ($r^2 \geq 0.9$ and $n \geq 30$ samples) and approval from the customer.