SAE Aerospace
An SAE International Group

AEROSPACE STANDARD

AS **1284A**

Issued January 1973
Revised March 1984
Reaffirmed December 2007

STANDARD TEST PROCEDURE AND LIMIT VALUE FOR SHUTOFF SURGE PRESSURE OF PRESSURE FUEL DISPENSING SYSTEMS

1. PURPOSE: This standard establishes a test procedure and related limit value for shutoff surge pressure of pressure fuel dispensing systems.

2. SCOPE: The test procedure and related limit value are intended to apply to fixed and mobile ground pressure fuel dispensing systems and to aerial refueling tankers.

3. PROCEDURE:

3.1 Test Equipment:

3.1.1 For Systems with Single Dispensing Line: Test apparatus as shown in Figure 1 shall be connected at the dispensing system pressure fueling nozzle. The test adapter, line segments and valves shall have flow areas at least equal to that of the dispensing system flow line. The length of the line segment between the adapter and the test shutoff valve (inlet line segment, item 4 in Figure 1) shall not exceed 30 diameters. The test shutoff valve (item 6 in Figure 1) closure time shall be 0.5 seconds ±5% with a linear time rate of change of flow area, ±5%, from full open to zero flow area. The shutoff valve shall incorporate a means to record its shutoff characteristic. To assure that dispensing system flow is not abnormally restricted, the pressure drop of the test shutoff valve, in its full open position, shall not be greater than that length equivalent to 50 diameters of adjacent line. The pressure transducer (item 5 in Figure 1) shall be connected to a high response, recording, pressure measuring device, such as an oscillograph. The pressure transducer and recording measuring device shall have a suitable pressure range and its minimum frequency response shall be 600 Hertz. It shall be verified by static pressure calibration that the error of the transducer and recording, measuring device at 120 psig (830 kPa) is not greater than ±1%.

The flow control valve (item 8 in Figure 1) shall provide readily adjustable throttling and shall have a maximum pressure drop, in its full open position, not greater than that length equivalent to 50 diameters of adjacent line. The total length of the discharge line segments shall not exceed 50 diameters.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

3.1.1 (Cont'd):

Flow rate shall be measured using the flow meter which is already part of the dispensing flow system. If the flow meter is a quantity meter rather than a rate meter, flow rate normally will be obtained by the "time rate of change of quantity" method. The error for flow rate measurement shall not exceed ± 5%.

Electrostatic bonding shall be provided for the system elements as necessary to eliminate sparking and fire hazard.

3.1.2 For Systems with Multiple Dispensing Lines: Test apparatus shall be as shown in Figure 2. Requirements concerning the test apparatus shall be as stated in 3.1.1.

3.2 Test for System with Single Dispensing Lines:

3.2.1 Preparation: Prior to commencing the surge test, it shall be verified that the dispensing system pressure regulator is adjusted to its prescribed no-flow pressure. With the test shutoff valve, (item 6 in Figure 1) in its full open position, the flow control valve (item 8 in Figure 1) shall be opened slowly until the flow rate through the dispensing system is the maximum obtainable. This shall be determined by repeated trial. During each trial, as nozzle pressure (shown by the gage item 1 in Figure 1) is decreased by progressive opening of the flow control valve, the highest nozzle pressure at which the maximum flow rate occurs shall be observed also. For the surge test, the flow control valve shall be opened just to the extent necessary to produce the maximum flow rate and nozzle pressure found previously by trial. The maximum flow rate and the corresponding nozzle pressure shall be recorded.

NOTE: If flow rate continues to increase as nozzle pressure is decreased (by progressive opening of the flow control valve shown in Figure 1), rather than to stabilize at some maximum value (or automatically shut-off) before nozzle pressure falls below 35 psig, the system shall be considered as not having flow rate limiting mechanisms. Flow rate limiting mechanisms, which act only to prevent the exceeding of some prescribed maximum flow rate, are usually provided as a secondary control to the nozzle pressure control mechanism. For systems considered as not having such a flow rate limit mechanism, the test flow rate shall be that flow rate which occurs when the nozzle pressure is reduced to between 34-35 psig (234-242 kPa). The flow rate and nozzle pressure shall be recorded.

3.2.2 Test: Subsequent to establishment of the maximum flow, the test shutoff valve shall be closed. The test shutoff valve closing time, time rate of change of flow area, and resulting variations in pressure at the pressure transducer shall be recorded.

3.2.3 Acceptable Result: The maximum surge pressure shall not exceed 120 psig (830 kPa) total pressure.

3.2.4 Test Records: For each test conducted, a complete written record shall be made describing the test apparatus, type of fuel, fuel temperature and fuel specific gravity in addition to the data required in 3.2.1 and 3.2.2. The test description shall include test valve, flow control valve, and instrumentation descriptions.

3.3 Test for System with Multiple Dispensing Lines:

3.3.1 Preparation: Requirements shall be as stated in 3.2.1, except refer to Figure 2.

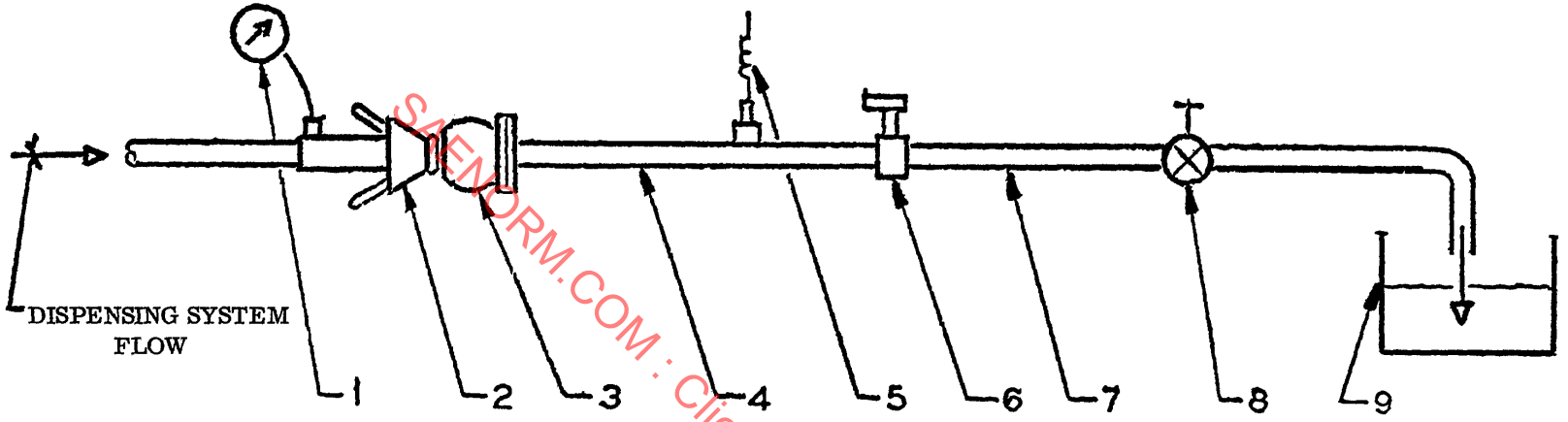
3.3.2 Test: The test shall be conducted as described in 3.2.2 for the dispensing lines singly and in combination: that is, with each line active alone and then with all lines active simultaneously. Inactivation of lines shall be by removing the unused pressure refueling nozzle.

3.3.3 Acceptable Results: Requirements shall be as stated in 3.2.3.

3.3.4 Test Records: Requirements shall be as stated in 3.2.4.

4. SYSTEM CHANGES: Changes or modifications of the fuel dispensing system which could increase its surge potential, such as increased line lengths, increase in pumping capacity, changes in flow control equipment, changes in pressure controller equipment or changes in system restriction, shall require retesting in accordance with this standard.

PREPARED BY
SAE COMMITTEE AE-5, AEROSPACE FUEL, OIL & OXIDIZER SYSTEMS



1. Pressure Gage
2. Ground Pressure Fueling Nozzle, Aerial Tanker Boom Nozzle, or Probe Drogue Tanker Coupling
3. Single Point Adapter, Boom Receptacle, or Probe Nozzle
4. Inlet Line Segment
5. Pressure Transducer
6. Test Shutoff Valve
7. Discharge Line Segment
8. Flow Control Valve
9. Catch Tank

FIGURE 1. SINGLE HOSE DISPENSING SYSTEM (GROUND OR AERIAL)