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AEROSPACE STANDARD

AS 1284

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Revised

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 all ground pressure fuel dispensing systems, fixed and mobile.

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 nozzle. The test adapter, line segments and valves shall have flow area at least equal to that of the dispensing system line. The length of the line segment between the adapter and the test shutoff valve (inlet line segment, item 4 in Figures 1 and 2) shall not exceed 30 diameters. The test shutoff valve (item 6 in Figures 1 and 2) shall be capable of closing within 0.5 second in a near linear manner. It shall include means of enabling recording of its shutoff time with accuracy within ± 5%. 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 equivalent to 50 diameters of adjacent line. The pressure transducer (item 5 in Figures 1 and 2) 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 ± 5%.

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 equivalent to 50 diameters of adjacent line. The total length of the discharge line segments shall not exceed 50 diameters.

Flow rate shall be measured using the flow meter which is already part of the 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. A rate meter may be installed in the system in place of the quantity meter for convenience; however, its resistance to flow must not be greater than that of the quantity meter which it replaces. In all cases, 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 the figure), rather than to stabilize at some maximum value (or automatically shutoff) before nozzle pressure falls below 35 psig, the system shall be considered as not having flow rate limiting mechanisms. Flow rate limiting mechanisms, that is, 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 and 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 in 0.5 second or slightly less in a near linear manner. It is of benefit, in terms of surge pressure minimization, to utilize the full 0.5 second maximum allowed, and to shutoff the flow in a near linear manner. The test shutoff valve closing time and resulting peak surge pressure at the pressure transducer shall be recorded.

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

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 above. 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.

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. All lines need not be tested alone unless they differ significantly from one another. Inactivation of lines shall be by normal system means in order that the inactivated lines not give abnormal surge absorption capacity to the system.

3.3.3 Required Results: The maximum surge pressure shall not exceed 120 psig (830 kPa).

3.3.4 Records: Requirements shall be as stated in 3.2.4.

4. SYSTEM CHANGES

Changes or modification of the ground fuel dispensing system which could in any way 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, will require retesting in accordance with this standard.

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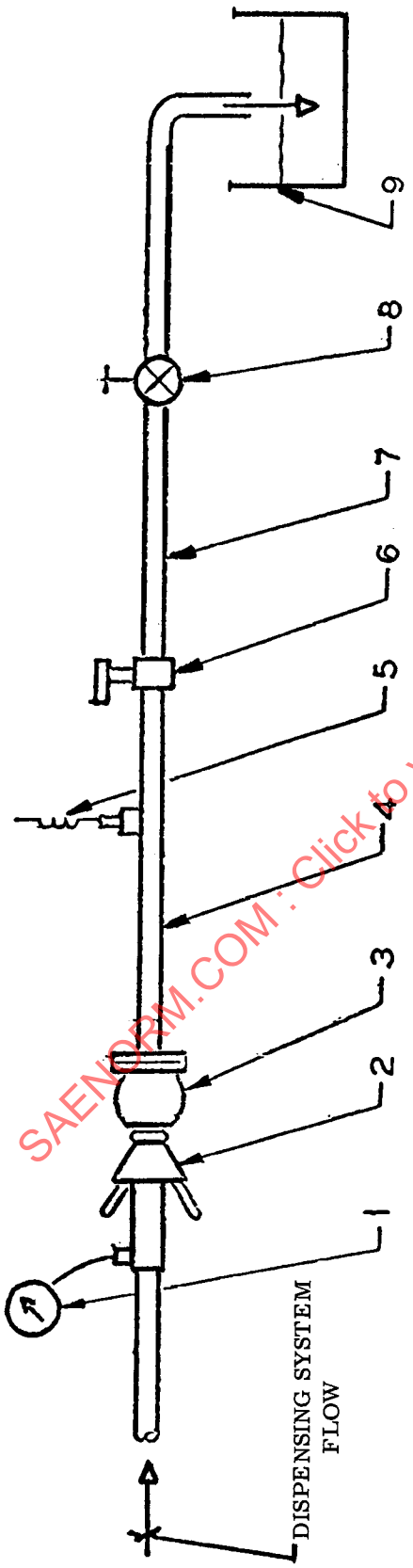

1. Pressure Gage
2. Pressure Fueling Nozzle
3. Adapter
4. Inlet Line Segment
5. Pressure Transducer
6. Test Shutoff Valve
7. Discharge Line Segment
8. Flow Control Valve
9. Catch Tank

FIGURE 1. SINGLE HOSE SYSTEM