SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1624

REAF. SEP2006

Issued 2000-09
Reaffirmed 2006-09

Superseding J1624 SEP2000

Fuel Crossover Line

Foreword—Fuel crossover lines and their supports may be subjected to impacts from road debris during vehicle operations. The road debris objects vary from solid items such as steel pipe, wood blocking, and tire recaps to softer more compliant items such as animal carcasses. On occasion these impacts have resulted in failure of the integrity of the crossover line, causing the fuel in the tanks to spill. These spills may constitute a risk to the motoring public as well as to the environment.

SAE J1624 sets forth a procedure to evaluate the strength and protection of crossover lines and their supports as well as setting minimum performance requirements for these items.

However, no single test or series of tests, including SAE J1624, can predict the performance of crossover lines and their supports in all of the infinite variety of circumstances and situations which may exist in the actual use of fuel crossover lines. Compliance with SAE J1624 will not preclude all crossover line failures due to impacts with road debris.

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1. Scope

1.1 Application—This SAE Recommended Practice applies to all commercial, self-propelled motor vehicles which transport property or passengers when:

1.1.1 GROSS WEIGHT—The vehicle has a gross weight rating of more than 4540 kg (10 000 lb).

1.1.2 FUEL—The fuel used has a boiling point above 0 °C (32 °F) at normal atmospheric pressure.

1.2 Rationale—This document has been reaffirmed to comply with the SAE 5-Year Review policy.

2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J703—Fuel Systems

2.1.2 FEDERAL MOTOR CARRIER SAFETY REGULATIONS—Available from Superintendent of Documents, Attn: New Orders, P.O. Box 371954, Pittsburgh, PA 15250-7954.

FMCS Part 393, Subpart E, Fuel Systems

2.1.3 TECHNOLOGY AND MAINTENANCE COUNCIL PUBLICATION—Available from the Technology and Maintenance Council, American Trucking Associations, 2200 Mill Road, Alexandria, VA 22314, Tel: 703-838-1700, www.truckline.com.

RP 321—Fuel Crossover Line Protection and Configuration Guidelines

3. Definitions

3.1 Crossover Line—Hose, tube, or other device located within 25 cm (10 in) of the bottom of the tank and connecting the liquid space of one or more liquid fuel tanks for the purpose of equalizing liquid levels, equalizing pressure, and/or causing multi-tanks to function as a single liquid fuel tank. Crossover lines shall include any fittings, valves, and other devices which attach them to liquid fuel tanks. Adapters, which are permanently affixed to the fuel tank, are not a part of the crossover line.

3.2 Liquid Fuel Tank—A fuel tank containing a fuel that has a boiling point above 0 °C (32 °F) at normal atmospheric pressure.

3.3 Crossover Line Support—Any structure to which the crossover line is attached for the purpose of supporting, shielding, or protecting the crossover line from damage by struck objects.

3.4 Unprotected End—The end of a crossover line is unprotected whenever:

3.4.1 It's end fittings are located within 25 cm (10 in) vertically of the bottom of the tank and in the rear view the distance between the end of the crossover line support and the fuel tank surface exceeds 16 cm (6 in).

3.4.2 Any portion of the crossover line between the end of the crossover line support and the tank extends below the bottom of the tank or the level of the crossover line support.

3.5 Forward—The same direction and orientation as toward the front of the vehicle when the fuel system is installed in the vehicle.

3.6 Rearward—The same direction and orientation as toward the rear of the vehicle when the fuel system is installed in the vehicle.

4. Crossover Line Tests

4.1 Facilities and Equipment

4.1.1 TEST BUCK—The testing procedure may utilize a test buck consisting of supported and braced frame rail sections and associated cross members at least the length of the fuel tanks, the fuel tanks and their supports, crossover line and supports, and any related structure or components. A vehicle may be used for the testing procedure provided there is sufficient clearance for the test fixture defined in 4.1.2 to be moved through the testing zone without contacting anything except the crossover line and/or its supporting structure.

4.1.2 TEST FIXTURE FOR THE CROSSOVER LINE SUPPORT TEST—Will be:

4.1.2.1 Fabricated from 10 cm (4 in) x 10 cm (4 in) commercial grade material with a minimum wall thickness of 0.63 cm (0.25 in).

4.1.2.2 Oriented so that one of the flat 10 cm (4 in) sides is perpendicular to the rearward direction of the vehicle.

4.1.2.3 The test fixture system shall maintain an angle of 15 degrees from vertical ±2 degrees when a force of 22 240 N (5000 lb) is applied horizontally 1.2 cm (0.5 in) below the top of the fixture.

4.1.2.4 Free of nicks and gouges on the contacting surface.

4.1.3 TEST FIXTURE FOR THE UNPROTECTED END TEST—will be:

4.1.3.1 Fabricated from 5 cm (2 in) x 5 cm (2 in) commercial grade material with a minimum wall thickness of 0.63 cm (0.25 in).

4.1.3.2 Oriented so that one of the flat 5 cm (2 in) sides is perpendicular to the rearward direction of the vehicle.

4.1.3.3 The test fixture system shall maintain an angle of 10 degrees from vertical ±2 degrees when a force of 8900 N (2000 lb) is applied 1.2 cm (0.5 in) below the top of the fixture.

4.1.3.4 Free of nicks and gouges on the contacting surface.

4.1.4 DATA

4.1.4.1 The horizontal force applied by the fixture to the crossover line and its supporting structure as the fixture moves will be recorded so that the work done to deflect the crossover line system can be determined.

4.1.4.2 The distance the fixture moves will be recorded so that the work done to deflect the crossover line system can be determined.

4.1.4.3 The time of any initial leak must be noted on the force and distance recordings referenced in 4.1.4.1 and 4.1.4.2.

4.2 Crossover Line Support Test

4.2.1 INITIAL CONDITIONS—At the start of every test the following conditions will be observed.

4.2.1.1 Test Fixture Location—See Figure 1. The test fixture as described in 4.1.2 will be:

4.2.1.1.1 Positioned forward of the crossover line and the crossover line support, centered between the frame rails, with its contacting surface clean and dry. (See Figure 1.)

4.2.1.1.2 Oriented so that the bottom leads the top and forms an angle of 15 degrees from vertical.

4.2.1.1.3 Positioned so that its top is 30 cm (12 in) above the bottom of the fuel tanks. (See Figures 1 and 2.)

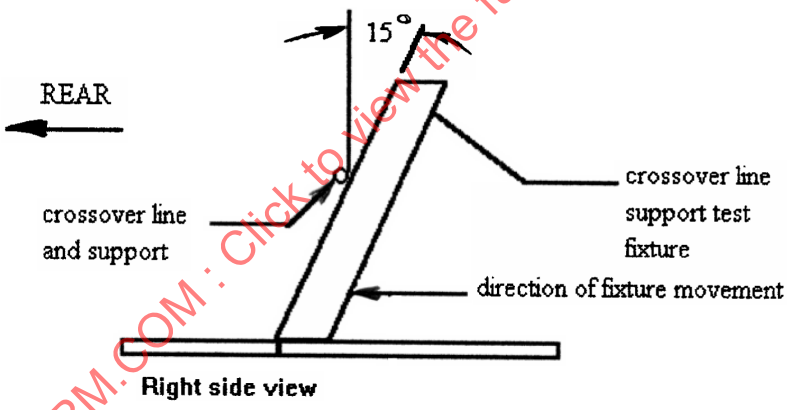

FIGURE 1—TEST FIXTURE ORIENTATION—CROSSOVER LINE SUPPORT TEST

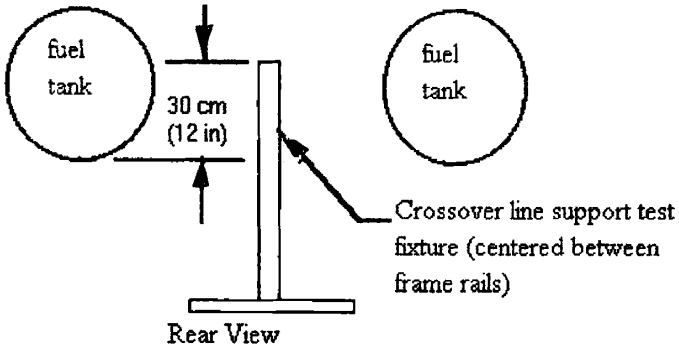

FIGURE 2—TEST FIXTURE ORIENTATION—CROSSOVER LINE SUPPORT TEST

4.2.1.2 Fuel System

4.2.1.2.1 All fuel tanks in the system will be filled to 75% or more of their nominal capacity by volume with water, water soluble oil, or Stoddard solvent.

4.2.1.2.2 Any shut off valves in the crossover line system will be fully open.

4.2.2 TEST PROCEDURE—The test fixture will be moved rearward at a rate of at least 25 mm/s (1 in/s) not more than 125 mm/s (5 in/s), parallel with and centered between the frame rails while the data enumerated in 4.1.4, is recorded. The test fixture will be moved rearward until either:

4.2.2.1 The crossover line fails to resist a load, or

4.2.2.2 The crossover line support withstands an applied load of 22 240 N (5000 lb), or

4.2.2.3 The test fixture no longer contacts the crossover line or the crossover line support.

4.2.3 REQUIRED PERFORMANCE

4.2.3.1 Except as allowed in 4.2.3.2, the fuel system may not leak more than 300 mL (10 fl oz) of liquid during the 10 min following the initiation of the load application.

4.2.3.2 The provisions of 4.3.2.1 will not apply if the amount of work done to the crossover line system determined from the area under the force - distance curve exceeds 4800 Joules (3540 lb-ft) prior to any fuel system leakage.

4.3 Unprotected End Test

4.3.1 APPLICATION—Any fuel system having an unprotected crossover line end as defined in 3.4 will be subjected to the test procedure in 4.3.

4.3.2 INITIAL CONDITIONS—At the start of each Unprotected End Test the following conditions will be observed:

4.3.2.1 Test Fixture Location—See Figures 3, 4, and 5. The test fixture as described in 4.1.3 will be:

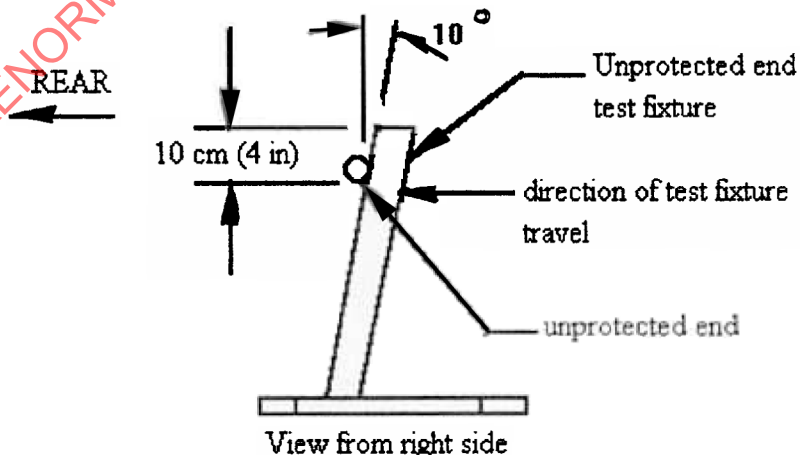

FIGURE 3—TEST FIXTURE ORIENTATION—UNPROTECTED END TEST