FUEL AND LUBRICANT TANKS FOR MOTORCYCLES—SAE J1241

SAE Recommended Practice

Report of Motorcycle Committee approved September 1978. Rationale statement available.

1. Purpose and Scope—This recommended practice establishes standards for containers and their associated fittings, filler caps, and plumbing separate from the engine and transmission, used to supply fuel and/or engine lubricant to a motorcycle.

1.1 Mandatory and Precatory Provisions—The use of the word *shall* is to be understood as imperative. The use of the word *should* is to be understood as advisory. The use of the word *may* is to be understood as permissive.

2. General Requirements—Every tank or container which supplies fuel and/or lubricant to the engine of the motorcycle upon which it is installed shall be constructed in accordance with the following general requirements:

2.1 Materials—Material used in construction of tanks and tank fittings shall be appropriate to the function intended.

2.1.1 Material shall be chemically resistant to and compatible with all commercial grades of gasoline and/or motorcycle oils, as appropriate, and all commercial gasoline and oil additives, in the concentrations normally encountered.

2.1.2 Materials shall have no significant effect on the appropriate contained fuel or lubricant.

2.2 Fittings—All petcocks, caps, tank badge attachments, hoses, and any other component attached directly to the tank shall be considered part of the tank for purposes of this recommended practice. Carburetors and associated fittings are excluded from this recommended practice.

2.2.1 Straight (non-pipe thread) threads may be used on fittings with integral flanges and sealing gaskets or sealing surfaces. Threads on all other conduit fittings shall be of the dry seal tapered pipe thread type.

2.3 Air Vents—Air vents shall be provided on every fuel tank. Air vents may be mounted separately or combined with the pressure relief vent or filler cap or plug. Vents shall allow no escape of vapor until the pressure relief set point pressure is achieved (see paragraph 2.4).

2.4 Pressure Relief—Fuel tanks shall be provided with means for relieving internal pressure. Tanks shall not be fitted with fuseable plugs. Pressure relief vents shall be self-sealing after the pressure has dropped 10% below the pressure relief set point (defined as the pressure at which the pressure relief valve first opens (see paragraph 3.2.3.2)).

2.5 Filler Cap—Fuel tank caps of the *quick release* hinged type shall be hinged at the rear.

2.6 Hoses—All hoses shall meet test requirements 1-10 of SAE J30c type SAE 30R1.

2.7 Labeling (Fuel tank only)—If a fuel tank label is to be incorporated the label should contain the following information. The label should be attached to the fuel tank and readable when the tank is installed on the motorcycle.

2.7.1 Manufacturer's name or trademark.

2.7.2 Fuel capacity in U. S. gallons and/or liters. (Fuel capacity is defined as the amount of fuel necessary to bring the level of fluid to the lowest part of the fillneck with the motorcycle in its normal level unladen condition.)

2.7.3 The words "Meets SAE J_____." were fully applicable.

2.8 Fuel Valves—All fuel tanks shall be equipped with a means of positively shutting off the fuel flow to the carburetor. Manually operated valves shall have positive detents in the open, closed, and reserve (if equipped with a reserve position) positions, and shall clearly and plainly indicate their opened, closed, and reserve position (if so equipped).

2.9 Fuel Strainers—If fitted, fuel strainers shall be rated by SAE J905 (see Appendix III). Fuel strainers should be accessible for cleaning without removing the fuel tank from the motorcycle.

3. Tests—At least three of each specific model fuel tank, randomly selected, shall be submitted to and not fail tests of paragraphs 3.1, 3.2, 3.3, 3.4, and 3.5. At least three of each specific engine lubricant tank, randomly selected shall be submitted to and not fail tests of paragraphs 3.4 and 3.5. All fittings as defined above shall be included in each test.

3.1 Impact Tests

3.1.1 Applicability—Only conventionally located motorcycle fuel tanks shall be subjected to the tests to paragraph 3.1. Conventionally located fuel tanks are those which satisfy the following conditions:

1. The tank is mounted between the seat and steering head.
2. The tank is not enlosed by the structure of the motorcycle.
3. The tank is positioned so the rider's knee is located within the region formed by projecting the tank outline in a horizontal direction perpendicular to the motorcycle's longitudinal axis.

3.1.2 Test Conditions

3.1.2.1 Metal fuel tanks shall be tested at room temperature, 70 ± 10°F (21 ± 6°C).

3.1.2.2 Non-metallic fuel tanks shall be mounted on the test platform and filled as specified below and conditioned at −20 ± 5°F (−29 ± 3°C) for at least 4 h, and tested within 5 min of removal from the conditioning chamber.

3.1.2.3 In addition, non-metallic fuel tanks shall be mounted on the test platform and filled as specified below and conditioned at 140 ± 10°F (60 ± 6°C) for at least 4 h, and tested within 5 min of removal from the conditioning chamber.

3.1.2.4 In addition, non-metallic fuel tanks shall be aged as specified in paragraph 3.5 below, and subjected to these tests.

3.1.2.5 These are considered destructive tests. Each test sample shall be subject to testing only once.

3.1.3 Longitudinal Acceleration

3.1.3.1 *General*—The purpose of this test is to ensure the integrity of the fuel system in frontal impacts. The test involves mounting the motorcycle tank on a test platform in the same way it would be on the motorcycle, and decelerating the test platform and tank from a specific velocity to test using a decelerator with specified force/deflection characteristics.

3.1.3.2 *Test Platform and Tank Mounting Requirements*—The test platform shall have provisions for mounting the fuel tank so that the tank is positioned as shown in Fig. 1. Reference Line *A* shall be parallel to the tank's plane of symmetry, and parallel to the tank bottom if it has a flat surface. If the tank bottom is not flat, *A* shall be determined as being in a horizontal plane when the tank is mounted on the motorcycle and the motorcycle is loaded with a 165 ± 10 lb (75 ± 5 kg) rider. Suspension settings shall be per manufacturer's recommendations for the stated load. In the absence of such recommendations, the suspension shall be set at the softest available position.

The tank shall be mounted so that all fittings in the actual motorcycle tank mounting system are duplicated in the test setup. These include nuts and bolts, straps, rubber bushings or pads, frame-mounted brackets, and so forth. If the motorcycle seat forms part of the tank mounting system it shall be included.

The test platform shall also be provided with fittings which simulate the fuel inlet fittings on the carburetors. The fittings shall be located in the same position relative to the fuel tank as they are on the actual motorcycle.

The weight of the test platform shall be adjusted so that it weighs 150 ± 5 lb (68.1 ± 2 kg), exclusive of tank and fuel, but including the tank mounting system.

The test platform shall be oriented so that the tank is in its normal upright position (Line *A* horizontal) or standing on end (Line *A* vertical) for a drop test.

3.1.3.3 *Decelerator*—The decelerator shall apply a decelerating force to the test platform in the direction indicated in Fig. 1. The nominal dynamic force/displacement characteristics of the decelerator are shown in Fig. 2.

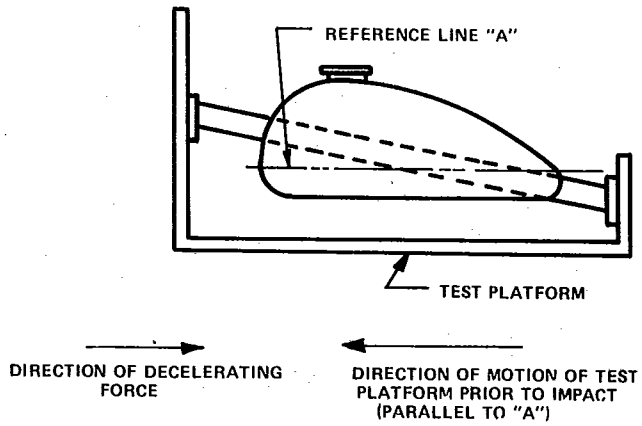

FIG. 1—FUEL TANK POSITION FOR LONGITUDINAL ACCELERATION TEST

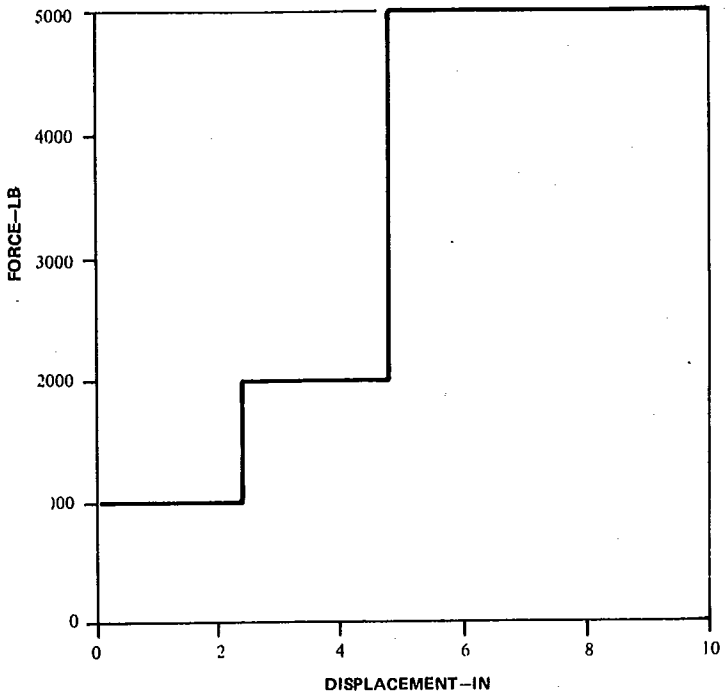

FIG. 2—NOMINAL DECELERATOR CHARACTERISTICS

Peak (F_{max}) and average (F) values of the dynamic force shall be within the following limits for the following displacement (x) intervals:

$0 \leq x \leq 2.4$ in (61 cm):	$F_{max} \leq 1500$ lb, $800 \leq F \leq 1200$ lb ($F_{max} \leq 680$ kg, 363 kg $\leq F \leq 544$ kg)
$2.4 \leq x \leq 4.8$ in (12.2 cm):	$F_{max} \leq 3000$ lb, $1800 \leq F \leq 2000$ lb ($F_{max} \leq 1361$ kg, 816 kg $\leq F \leq 988$ kg)
$4.8 \leq x \leq 10$ in (25.4 cm):	$F_{max} \leq 7500$ lb, $4500 \leq F \leq 5500$ lb ($F_{max} \leq 3402$ kg, 2041 kg $\leq F \leq 2495$ kg)

The fuel tank shall be installed on the test platform with the proper hardware petcocks, and fuel lines. The tank shall be filled to 75% of capacity with commercial gasoline, Stoddard solvent, or an equivalent weight of water. The fuel petcocks shall be open and fuel lines filled. The test platform shall be accelerated to a specific velocity (see Appendix III) and permitted to impact the decelerator at that velocity.

3.1.3.4–*Failure*—Causes for failure are:

3.1.3.4.1 Failure of the fuel filler cap to remain closed.

3.1.3.4.2 Cracking, splitting, seam separation, or other tank damage resulting in external leakage in excess of 1 oz/min (29.6 cc/min). Immediate discharge of liquid from the pressure relief mechanism shall not constitute failure if it does not continue for more than 30 s.

3.1.3.4.3 Failure of the fuel lines to remain intact and attached at both the tank and carburetor ends.

3.1.3.4.4 Failure of the tank attachment fittings allowing complete detachment of the tank from the test platform during the test. In addition, tank shall not become detached from the test platform when the platform is rotated 360 deg about a horizontal axis parallel to reference line A, after completion of the test.

3.1.4 Lateral Acceleration

3.1.4.1 *General*—The purpose of this test is to ensure the integrity of the fuel system in lateral impacts. The test involves mounting the motorcycle tank on a fixed test platform in the same way it would be on the motorcycle, and impacting the side of the tank with a pendulum of specified shape, with a specific kinetic energy. (See Appendix III.)

3.1.4.2 *Test Platform and Tank Mounting Requirements*—The test platform shall have provisions for mounting the fuel tank in its normal position in such a way that all fittings in the actual motorcycle tank mounting system are duplicated in the test setup. These include nuts and bolts, straps, rubber bushings or pads, frame-mounted brackets, and so forth.

The test platform shall also be provided with fittings which simulate the fuel inlet fittings on the carburetors. The fittings shall be located in the same position relative to the gas tank as they are on the actual motorcycle.

The test platform shall be mounted rigidly so that the energy of the impacting pendulum must be absorbed entirely by the tank and tank mounting system.

3.1.4.3 *Pendulum*—The pendulum used to impact the tank shall weigh between 80 lb (36 kg) and 160 lb (73 kg). The impacting surface shall be a 3.5 in (8.9 cm) diameter hemisphere. The pendulum shall be configured so that no part of it will impact the test platform.

3.1.4.4 *Test Conditions*—The fuel tank shall be installed on the test platform with the proper hardware, petcocks, and fuel lines. The tank shall be filled to 75% of the capacity with commercial gasoline, Stoddard solvent, or an equivalent weight of water. The fuel petcocks shall be open and fuel lines filled.

The pendulum shall be released from a height sufficient to give the specified kinetic energy at impact. (See Appendix III). The direction of motion of the pendulum at impact shall be perpendicular to a vertical plane parallel to the tank's longitudinal axis. The impact point shall be determined by making a layout as shown in Fig. 3, using a 50th percentile male manikin per SAE J963.

3.1.4.5 *Failure*—Causes for failure are as listed under paragraph 3.1.3.4.

3.2 Pressure Relief and Cap Leakage Test

3.2.1 Preparation—Seal all tank feed openings except one. (The filler opening shall be sealed with the normally used cap.) Through this opening pressurize the tank to the pressure relief set-point. Depressurize the tank.

3.2.2 Test—Fill the tank to capacity with commercial gasoline or Stoddard solvent. Install the filler cap used during preparation. Invert the tank for 5 min. Return the tank to its normal position and allow it to stand for 5 min.

3.2.3 Failure—Causes for failure are:

3.2.3.1 Leakage or seepage from the tank in any position in excess of 1 oz (29.6 cc) total.

3.2.3.2 Failure of the pressure relief to vent a pressure equal to that necessary to force fuel past the carburetor fuel inlet valve with the carburetor float bowl full. If this figure is not known, then at 4 psi (0.27 atm).

3.2.4 Exception for Lubricant Tanks—Only fuel tanks shall be submitted to this test.

3.3 Internal Pressure Test

3.3.1 Preparation—Seal all openings and prepare tank as in paragraph 3.2.1. Seal the pressure relief vent. Pressurize the tank to 1.5 times the pressure relief set-point. Release the pressure.

3.3.2 Test—Fill the tank to capacity with commercial gasoline or Stoddard solvent. Install the filler cap used during preparation. Invert the tank for 5 min. Return the tank to its normal position and allow to stand for 5 min.

3.3.3 Failure—Causes for failure are:

3.3.3.1 Leakage or seepage from the tank in any position in excess of 1 oz (29.6 cc) total.

3.3.4 Exception for Lubricant Tanks—Only fuel tanks shall be submitted to this test.

3.4 Temperature Extreme Test

3.4.1 Low Temperature

3.4.1.1 *Preparation*—Fill the tank half full of commercial gasoline or motorcycle oil, as appropriate, and soak at -40 ± 5°F (-40 ± 3°C) for at least 120 h.

3.4.1.2 *Test*—At the end of the storage period, soak the tank and contents at 70 ± 10°F (21 ± 6°C) for at least 4 h.

3.4.1.3 *Failure*—Causes for failure are:

3.4.1.3.1 Leakage or seepage of more than 1 oz (29.6 cc) of liquid from a fuel tank in any position, or from an oil tank in its normal position on the motorcycle.

3.4.1.3.2 Any significant effect on the liquid or tank.

3.4.2 High Temperature Test

3.4.2.1 *Preparation*—Fill the tank half full of commercial gasoline or motorcycle oil, as appropriate, and soak at 140 ± 5°F (60 ± 3°C) for at least 120 h.

3.4.2.2 *Test*—At the end of the storage period, soak the tank and contents at 70 ± 10°F (21 ± 6°C) for at least 4 h.

3.4.2.3 *Failure*—Causes for failure are:

3.4.2.3.1 Leakage or seepage of more than 1 oz (29.6 cc) of liquid from a fuel tank in any position, or from an oil tank in its normal position on the motorcycle.

3.4.2.3.2 Any significant effect on the liquid or tank.

3.5 Outdoor Exposure Test

3.5.1 General—This test is applicable only to non-metallic tanks. Conduct this test in accordance with ASTM D 1435-69 or latest revision, recommended practice for Outdoor Weathering of Plastics, on an equivalent accelerated procedure.

3.5.2 Test Conditions—Fulfill the following specific test conditions. All condition designators are as specified in ASTM D 1435-69.

1. Angle of exposure—45 deg, facing south.
2. Duration of exposure—1 year.
3. Location—Arizona desert or equivalent.

3.5.3–Test—After exposure per paragraph 3.5.2, or equivalent accelerated