



SURFACE VEHICLE RECOMMENDED PRACTICE

J1241™

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Superseding J1241 NOV1999

(R) Fuel and Lubricant Tanks for Motorcycles

RATIONALE

SAE J1241 has been reaffirmed to comply with the SAE Five-Year Review policy.

1. **Scope**—This SAE Recommended Practice is applicable to two- or three-wheel motorcycles intended for highway use. Unless noted, requirements apply to both metallic and nonmetallic tanks. Accessory or aftermarket tanks as well as original equipment tanks are covered.

1.1 **Purpose**—This document establishes test procedures and performance criteria for the integrity of tanks, associated fittings, filler caps, and plumbing separate from the engine and transmission, used to supply fuel or engine lubricant to a motorcycle.

2. References

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

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J30—Fuel and Oil Hoses

SAE J826—Devices for Use in Defining and Measuring Vehicle Seating Accommodation

2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 1435-75—Outdoor Weathering of Plastics

ASTM E 437—Standard Specification for Industrial Wire Cloth and Screens

2.1.3 ISO PUBLICATION—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ISO 4639-1—Rubber tubing and hoses for fuel circuits for internal combustion engines—Part 1: Conventional liquid fuels

2.2 **Related Publications**—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J905—Fuel Filter Test Methods

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https://www.sae.org/standards/content/J1241_202404/

2.2.2 DOT PUBLICATION—Available from the NHTSA, web site: www.nhtsa.dot.gov.

Motorcycle Safety Improvement, Volume II-Technical Report, July 1976, DOT-HS-5-01181, National Highway Safety Administration

3. Definitions

3.1 **Rated Fuel Capacity**—The volumetric capacity of the tank after subtracting the expansion and venting volumes. A fill tube installed in the fuel tank filler opening is a typical method by which rated capacity fuel level is indicated (Figure 1). The rated fuel capacity is the volume of fuel required to bring the fluid level to the lower edge of the fill tube, when filling from an initially empty tank with the motorcycle in a level unladen condition.

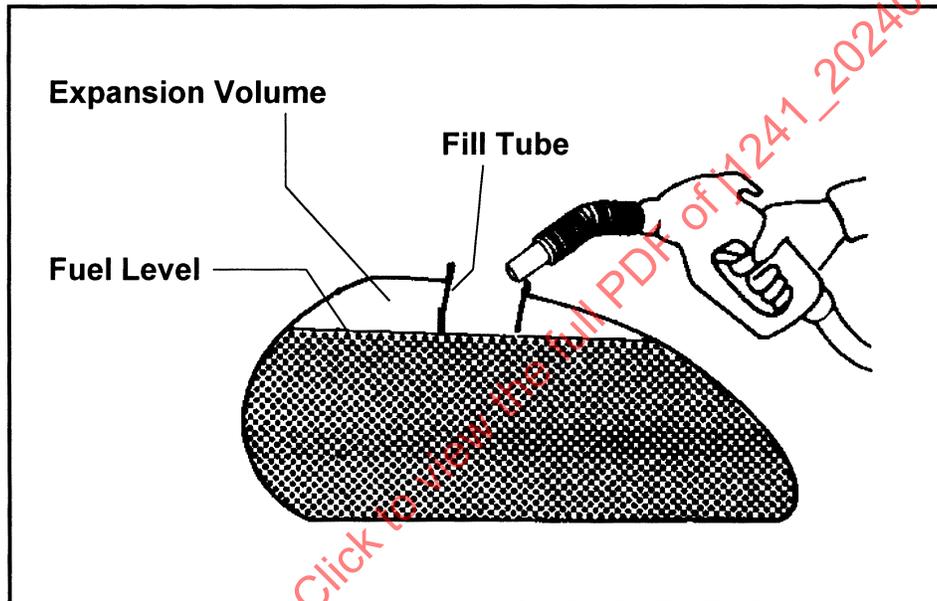


FIGURE 1—TYPICAL FUEL TANK FILL TUBE INSTALLATION

3.2 **Pressure Relief Set Point**—The pressure at which the pressure relief vent first opens.

3.3 **Automatic Fuel Shutoff Valve**—A device that prevents fuel flow from the fuel tank to the fuel delivery system, except when the motorcycle engine is running.

3.4 **Normally Installed Position**—The attitude of the fuel tank when installed on a motorcycle which is loaded with a $75 \text{ kg} \pm 5 \text{ kg}$ ($165 \text{ lb} \pm 10 \text{ lb}$) rider. Suspension components shall be set to the manufacturer's recommended settings for the stated load. If no recommendations for suspension adjustment are provided by the manufacturer, the suspension shall be set at the midpoint, or if adjustment increments do not include a midpoint, at the next lower spring preload setting.

3.5 **Conventionally Located Fuel Tank**—Conventionally located fuel tanks (Figure 2), satisfy all of the following conditions:

- The tank is mounted between the seat and the steering head.
- The major portion of the tank is not enclosed by the structure of the motorcycle.
- The tank is positioned such that the operator's knee is located within the region formed by projecting the tank outline in a horizontal direction perpendicular to the motorcycle's vertical plane of symmetry.

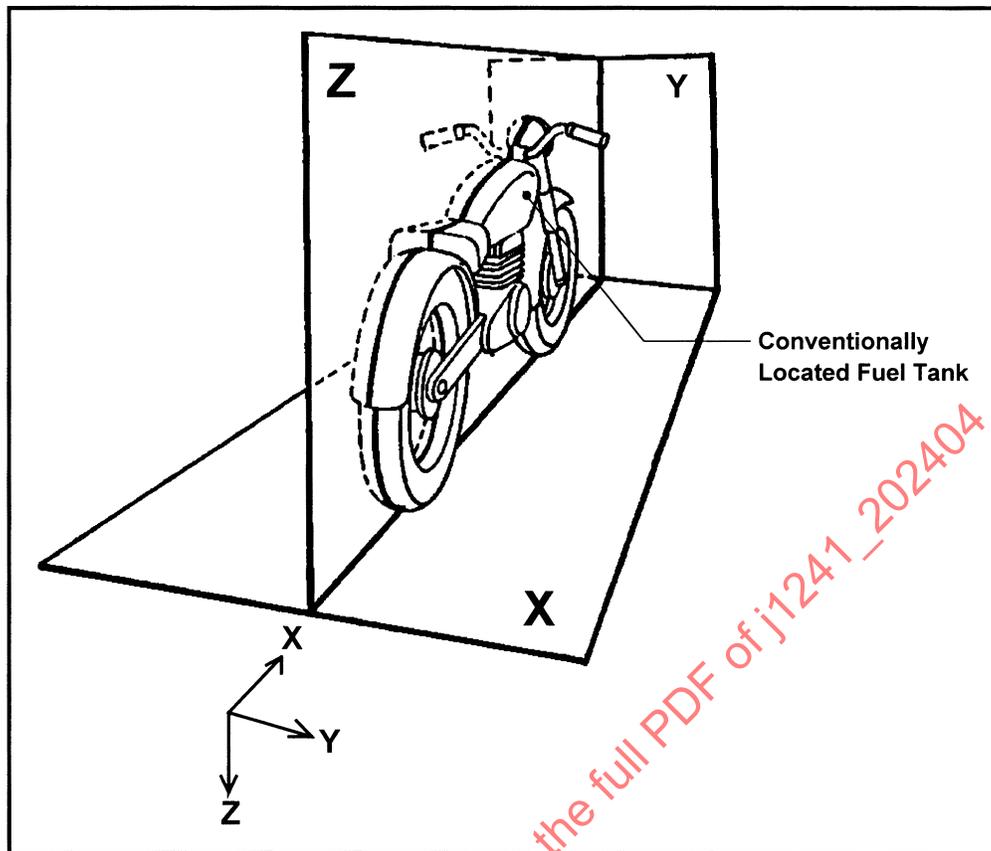


FIGURE 2—REFERENCE AXES

4. Design and Construction

4.1 General

- 4.1.1 Tanks shall pass the tests specified in Section 5. Any failure encountered during operational testing must be considered significant.
- 4.1.2 Fuel tanks should be sized such that actual volume exceeds rated volume (rated fuel capacity) by an amount calculated to provide for:
- Expansion of the contents due to a temperature increase appropriate for the intended use
 - The inclusion of venting above the liquid level
- 4.1.3 All fuel valves, caps, tank badge attachments, hoses, fuel quantity sending units, evaporative control system components (excluding remotely located evaporative canisters, pipes, and valves not directly mounted to the tank), and any other component attached directly to or installed within the tank shall be considered part of the tank. However, failure of a purely cosmetic tank component, e.g., a tank badge, shall not constitute failure of any test. Fuel delivery system components (carburetors, fuel injection systems, etc.) and associated fittings, external to the fuel tank, are excluded from this document.

- 4.1.4 The filler opening shall be of such size and be so located that the tank can be filled conveniently. All other openings shall be provided with closures or fittings that are liquid-tight and will not pass fuel or lubricant except as intended. Straight threads may be used on fittings with integral flanges and sealing gaskets or sealing surfaces. Threads on all other fittings shall be of the dry seal tapered pipe thread type.
- 4.1.5 All fuel tank filler caps should present a smooth contour, or shall be covered by a rear hinged access cover that presents such a contour. Hinged fuel tank filler caps shall be hinged at the rear.
- 4.1.6 All hoses shall meet the applicable performance requirements of SAE J30 DEC93 or ISO 4639-1.
- 4.1.7 If fitted, fuel strainers should have openings not larger than 600 μm . ASTM E 437 provides standard specifications for Industrial Wire Cloth and Screens.
- 4.1.8 Manually operated valves shall have a positive indication of each position, e.g., open, closed, and reserve, if applicable.
- 4.2 Materials**—Materials used in the construction of tanks and tank fittings shall be appropriate for the function intended at temperatures ranging from -20 to $+60$ $^{\circ}\text{C}$ (-4 to $+140$ $^{\circ}\text{F}$).
- 4.2.1 Materials shall be chemically resistant to and compatible with commercial grades of fuel or lubricants, as appropriate and commercial fuel and lubricant additives, in the concentrations normally encountered.
- 4.3 Venting**—Air pressure equalization vents shall be provided on every fuel tank to maintain fuel flow from the tank as the fuel is consumed by the engine. Air vents may be mounted separately or combined with the pressure relief vent or filler cap. If pressure equalization is combined with pressure relief, vents shall allow no escape of vapor until the pressure relief set point pressure is reached (see 4.4).
- 4.4 Pressure Relief**—Fuel tanks shall be provided with appropriate devices for automatically releasing excess internal pressure. Tanks shall not be fitted with fusible plugs. Pressure relief vents shall be self-sealing after the pressure has dropped 10% below the pressure relief set point.
- 4.5 Fuel Valves/Pumps**—All motorcycles shall be equipped with a means of positively shutting off the fuel flow to the fuel delivery system. Fuel valves may be manual or automatic in operation, and may be either attached directly to the tank, or remotely located. Remotely located fuel valves and the hoses/tubing connecting them to the tank shall be included as a part of the tank assembly being tested.
- 5. Tests**
- 5.1 General**
- 5.1.1 At least three randomly selected samples of each specific model fuel tank shall pass all applicable tests of Section 5. Tanks subjected to and passing tests of 5.2 to 5.6, as applicable, may be utilized for tests of 5.7 (nonmetallic tanks only) and 5.8. Tests of 5.8 are considered destructive tests; each sample fuel tank shall be subject to testing only once (a minimum of three sample fuel tanks are required for 5.8.4 and three additional tanks for 5.8.5). Nonmetallic fuel tanks shall be aged as specified in 5.7 prior to being submitted to the tests of 5.8.
- 5.1.2 At least three randomly selected samples of each specific engine lubricant tank shall be submitted to and pass appropriate tests of 5.2 to 5.4, and 5.7.
- 5.1.3 All fittings as described in 4.1.3, shall be included for each test. Tests are to be conducted at a temperature of 21 $^{\circ}\text{C} \pm 6$ $^{\circ}\text{C}$ (70 $^{\circ}\text{F} \pm 10$ $^{\circ}\text{F}$) unless otherwise specified.

5.1.4 REFERENCE AXES—Longitudinal motion (refer to Figure 2) is along the X-axis and lateral motion is along the Y-axis of the motorcycle. The X-Z plane is the vertical plane of symmetry.

5.2 Low Temperature Test

5.2.1 PREPARATION—Fill the tank to 50% of rated capacity with commercial gasoline, or with a nonflammable solvent with a specific gravity similar to that of commercial gasoline (fuel tanks) or recommended lubricant (lubricant tanks).

5.2.2 TEST—Soak at $-20\text{ °C} \pm 5\text{ °C}$ ($-4\text{ °F} \pm 9\text{ °F}$) for at least 120 h. At the end of the storage period, soak the tank and the contents at $21\text{ °C} \pm 6\text{ °C}$ ($70\text{ °F} \pm 10\text{ °F}$) for at least 4 h. Rotate the tank about its longitudinal axis to positions 90 degrees, 180 degrees (inverted), and 270 degrees from the normally installed position. Allow to stand for 5 min at each position.

5.2.3 FAILURE CRITERIA—Any significant effect on the liquid or tank. Leakage or seepage of more than 30 cc (1 fl oz) of liquid from a fuel or lubricant tank (including filler cap) at each position during the test.

5.3 High Temperature Test

5.3.1 PREPARATION—Prepare as per 5.2.1.

5.3.2 TEST—Soak at $60\text{ °C} \pm 3\text{ °C}$ ($140\text{ °F} \pm 5\text{ °F}$) for at least 120 h. At the end of the storage period, soak the tank and contents at $21\text{ °C} \pm 6\text{ °C}$ ($70\text{ °F} \pm 10\text{ °F}$) for at least 4 h. Rotate the tank about its longitudinal axis to positions 90 degrees, 180 degrees (inverted), and 270 degrees from the normally installed position. Allow to stand for 5 min at each position.

5.3.3 FAILURE CRITERIA—Any significant effect on the liquid or tank. Leakage or seepage of more than 30 cc (1 fl oz) of liquid from a fuel or lubricant tank (including filler cap) at each position during the test.

5.4 Internal Pressure Test

5.4.1 PREPARATION—Empty tank, seal relief valve, vents, and all other tank openings except one. Through this opening, install a fitting to facilitate pressurization of the tank.

5.4.2 TEST—For fuel tanks, pressurize the tank to 150% of the pressure relief set point or to at least 35 kPa (5 lb/in²) gage. Use a pressure of 35 kPa (5 lb/in²) gage for lubricant tanks. Immerse in water for a minimum of 30 s and inspect for leaks.

5.4.3 FAILURE CRITERION—Any leakage from tank.

5.5 Pressure Relief Test

5.5.1 EXCEPTION FOR LUBRICANT TANKS—Only fuel tanks incorporating a pressure relief system shall be submitted to this test.

5.5.2 PREPARATION—Empty tank and seal the filler opening with the normally used cap. Seal all remaining tank openings except one. Mount tank in the normal installed position.

5.5.3 TEST—Gradually pressurize the tank through the remaining opening up to 150% of the pressure relief set point or at least 35 kPa (5 lb/in²) gage. Release the pressure.

5.5.4 FAILURE CRITERION—Failure of the pressure relief to vent pressure in excess of the pressure relief set point.

5.6 Cap Leakage Test

- 5.6.1 EXCEPTION FOR LUBRICANT TANKS—Only fuel tanks shall be submitted to this test.
- 5.6.2 PREPARATION—Empty tank and seal all the tank openings except the filler opening. Fill the tank to rated capacity with commercial gasoline, or with a nonflammable solvent with a specific gravity similar to that of commercial gasoline. Install the normally used cap in the filler opening.
- 5.6.3 TEST—Rotate the tank about its longitudinal axis to positions 90 degrees, 180 degrees (inverted), and 270 degrees from the normally installed position and allow to stand for 5 min at each position.
- 5.6.4 FAILURE CRITERION—Leakage or seepage from the cap in excess of 30 cc (1 fl oz) at each position.

5.7 Outdoor Exposure Test

- 5.7.1 EXCEPTION FOR METALLIC TANKS—This test is applicable only to nonmetallic tanks.
- 5.7.2 GENERAL—Conduct test in accordance with ASTM D 1435-75 (or the latest revision), or equivalent accelerated weathering procedure.
- 5.7.3 TEST CONDITIONS—Fulfill the following specific test conditions. All condition designators are as specified in ASTM D 1435-75.
- Angle of Exposure—45 degrees, facing South
 - Duration of Exposure—1 year
 - Location—Arizona desert or equivalent
- 5.7.4 TEST—After exposure per 5.7.2, or equivalent accelerated weathering test, clean test tanks thoroughly and examine each tank for structural integrity. Submit tanks to the tests of 5.8, if applicable.
- 5.7.5 FAILURE CRITERIA—Structural deficiencies which impair the intended function of the tank. Failure of the tests of 5.8.

5.8 Impact/Deceleration Tests

- 5.8.1 APPLICABILITY—Only conventionally located fuel tanks shall be submitted to these tests.
- 5.8.2 TEST PLATFORM AND TANK MOUNTING REQUIREMENTS—Provide a test platform with provisions for mounting the fuel tank in the normally installed position. Install the tank 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. Include the motorcycle seat if it forms part of the tank mounting system. Include any frame members or fairing panels that surround the tank. Provide the test platform with fittings to simulate the fuel inlet fittings for the fuel delivery system. Locate these fittings in the same position relative to the fuel tank as they are on the actual motorcycle.
- 5.8.3 PREPARATION
- 5.8.3.1 Empty the tanks, mount on the test platform, and refill to 75% of rated capacity with a nonflammable solvent with a specific gravity similar to commercial gasoline. Metallic tanks may be tested using an equivalent weight of water.
- 5.8.3.2 After filling, condition metallic tanks at a temperature of $21\text{ }^{\circ}\text{C} \pm 6\text{ }^{\circ}\text{C}$ ($70\text{ }^{\circ}\text{F} \pm 10\text{ }^{\circ}\text{F}$) for a period adequate to ensure the tank and contents have attained that temperature.

- 5.8.3.3 Prior to preparation as specified in 5.8.3.1, age nonmetallic fuel tanks as specified in 5.7. Nonmetallic tanks are to be tested at both low and high temperatures as specified in 5.8.3.4 and 5.8.3.5.
- 5.8.3.4 After aging, prepare nonmetallic tanks as specified in 5.8.3.1, condition at $-20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F} \pm 9\text{ }^{\circ}\text{F}$) for at least 4 h, and test within 5 min of removal from the conditioning environment.
- 5.8.3.5 After aging, prepare nonmetallic fuel tanks as specified in 5.8.3.1, condition at $60\text{ }^{\circ}\text{C} \pm 6\text{ }^{\circ}\text{C}$ ($140\text{ }^{\circ}\text{F} \pm 10\text{ }^{\circ}\text{F}$) for at least 4 h, and test within 5 min of removal from the conditioning environment.

5.8.4 LONGITUDINAL DECELERATION TEST

- 5.8.4.1 *General*—The purpose of this test is to ensure the integrity of the fuel system in frontal impacts. The test involves installing the tank on a test platform and decelerating the combined test platform and the tank from a specified velocity to rest using a decelerator with specified force/deflection characteristics. See Table 1.

**TABLE 1—PEAK (F_{\max}) & AVERAGE (F_{avg}) DYNAMIC FORCE VALUES
VERSUS DISPLACEMENT INTERVALS (X)**

Displacement	Force
$0 \leq x \leq 6.1\text{ cm}$ (2.4 in):	$F_{\max} \leq 680\text{ kg}$, $360\text{ kg} \leq F_{\text{avg}} \leq 540\text{ kg}$ ($F_{\max} \leq 1500\text{ lb}$, $800 \leq F_{\text{avg}} \leq 1200\text{ lb}$)
$6.1 \leq x \leq 12.2\text{ cm}$ (4.8 in):	$F_{\max} \leq 1360\text{ kg}$, $820\text{ kg} \leq F_{\text{avg}} \leq 990\text{ kg}$ ($F_{\max} \leq 3000\text{ lb}$, $1800 \leq F_{\text{avg}} \leq 2000\text{ lb}$)
$12.2 \leq x \leq 25.4\text{ cm}$ (10 in):	$F_{\max} \leq 3400\text{ kg}$, $2040\text{ kg} \leq F_{\text{avg}} \leq 2500\text{ kg}$ ($F_{\max} \leq 7500\text{ lb}$, $4500 \leq F_{\text{avg}} \leq 5500\text{ lb}$)

- 5.8.4.2 *Test Platform*—The test platform shall weigh $68\text{ kg} \pm 2\text{ kg}$ ($150\text{ lb} \pm 4\text{ lb}$), exclusive of tank and fuel, but including the tank mounting system.
- 5.8.4.3 *Decelerator*—The decelerator shall apply a decelerating force to the test platform in the direction indicated in Figure 3, with nominal peak and average values of the dynamic force within the limits shown in Table 1.

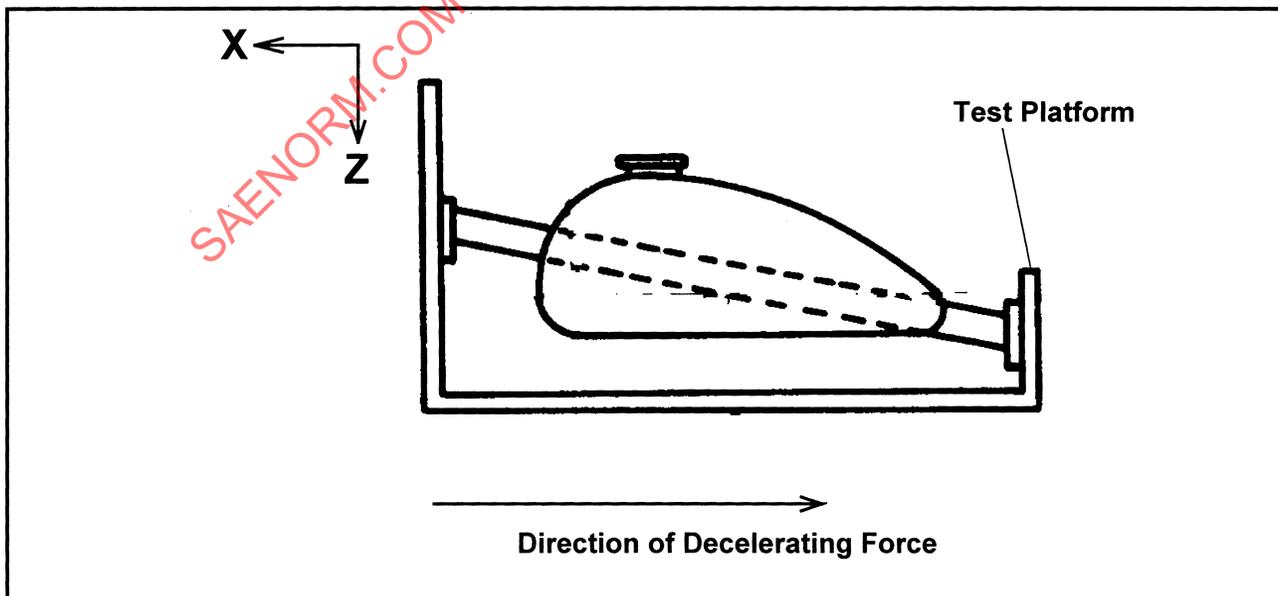


FIGURE 3—FUEL TANK AND TEST PLATFORM POSITION FOR LONGITUDINAL DECELERATION TEST