Metallic and Nonmetallic Nonpressure Integral Fuel Tank —Snowmobile—SAE J288a

SAE Recommended Practice
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LAND SEA AIR SPACE

PREPRINT

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SAE Recommended Practice

Report of Snowmobile and All-Terrain Vehicle Committee approved October 1972 and last revised September 1976.
Rationale statement available.

1. Purpose—The purpose of this specification is to provide an accepted standard of quality for snowmobile gas tanks.

2. Scope—To provide a specification of performance of fuel tanks either manufactured or purchased by a snowmobile manufacturer.

This specification includes details of the basic fuel tank without fittings, cap, or other attachments, as well as of completely assembled fuel tanks which include fittings and attachments.

Both metallic and nonmetalic fuel tanks are covered. Unless otherwise noted, requirements apply to both metallic and nonmetallic fuel tanks.

3. Materials

3.1 Materials used for the construction of fuel tanks shall be satisfactory for that purpose at temperatures ranging from -51 to +60°C (-60 to +140°F) and they shall meet the following requirements:

3.1.1 As defined by paragraphs 4.8 and 5.3.7, they must withstand gasoline, lubricating oils, antifreeze, and such other additives as may be used to improve engine performance.

3.1.2 They must have no deleterious effects on the fuel, that is, fuel taken from the tank upon completion of the permeability test (paragraph 4.7) must exhibit no significant change in foreign material or gum content.

3.1.3 To protect both a plastic tank and the fuel against degradation by sunlight, the plastic material from which it is fabricated must be rendered essentially opaque by at least 0.5% of suitable pigments that will not affect or be affected by the fuel. However, pigmented material is not required if the tank is so mounted or stored that it is not exposed to sunlight.

Note: Carbon black imparts maximum resistance to weathering; but if other colors are desired, cadmium pigments have also been found effective.

3.1.4 Plastic materials used shall have a maximum allowable burning rate of 0.64 mm/s (1.5 in/min) when tested in accordance with paragraph 5.3.2.

3.1.5 Vicat softening point of the plastic materials used must be no less than 110°C (230°F) and brittleness temperature must be no higher than -34°C (-30°F) when tested in accordance with paragraphs 5.3.3 and 5.3.4.

4. Design and Construction

4.1 The fuel tank shall be designed in accordance with practices followed by the industry regarding shape, radii, fabrication, and material.

Note: Stress concentrations are to be minimized in both the tank and its mounting. Sharp corners, abrupt changes in contour, and inserts of improper design must be avoided. Ribs may be introduced to provide greater rigidity and areas subject to stress may be reinforced.

4.2 Fuel tanks shall be capable of withstanding the tests as specified herein. Further tests shall be run under actual operating conditions to insure that stresses imposed by the mounting, by temperature changes, or by other environmental conditions do not adversely affect the ability of the tank to withstand those tests.

4.3 The tank should be so sized that its actual capacity exceeds its rated capacity by 10% minimum.

4.4 The filler opening shall be of such size and be so located that the tank can be filled conveniently. Any spillage from this opening should be led away from hot parts or electrical components. The tank must be vented above the full or liquid level; this may be accomplished at the filler opening. All other openings shall be provided with closures or fittings which are liquid-tight, are not subject to accidental opening, and which are accessible and so located as to minimize the possibility of damage to connections and fuel lines.

4.5 Plastic

4.5.1 Impact Strength—The tank shall be made of a material which is resistant to impact and so constructed that it can withstand the test described in paragraph 5.3.5 without fracture or any permanent deformation impairing its serviceability. After being tested in that matter, the tank shall show no sign of leakage.

4.5.2 Thermal Stress Cracking—The tank shall be free of cracks after being tested as described in paragraphs 5.3.6 and 5.3.7.

4.6 Metal

4.6.1 Contact joints between dissimilar materials shall be avoided. Except for threaded caps, contact between aluminum, magnesium, or their alloys and copper or copper bearing alloys is prohibited. Self-tapping screws or sheet metal screws shall not be used.

4.6.2 Joints and intersections may be welded or soldered as applicable. Joining methods shall not be detrimental to internal or external final coatings. All joints shall not leak when exposed to a gage pressure of 35 kPa (5 psi).

4.6.3 All parts of metal tanks shall be clean and free from sand, dirt, fins, pits, scale, flux, and other harmful extraneous material. Material with eroded surfaces shall not be used. Forming shall be performed so that it will not adversely affect the metal. External surfaces shall be free of burrs, sharp edges, and corners.

4.6.4 Tank exteriors and interiors shall be protected to prevent oxidation or rusting, both during use and while in inventory or storage.

4.7 Permeability—Weight loss from the tank shall not exceed 3% when tested in accordance with paragraph 5.3.6.

ϕ **4.8 Fuel Resistance**—After weight loss from the tank has been determined according to paragraph 5.3.6, the exterior surfaces are examined and shall show no evidence of attack by the fuel. Gum content of the fuel removed from the tanks shall not have increased more than 10 mg/100 ml over the condition of the gasoline before the test. Upon completion of the thermal stress cracking test (paragraph 5.3.6) and the subsequent examination of the exterior surfaces of the tanks, their interior surfaces are examined as directed by paragraph 5.3.8 and must show no pitting, crazing, softening, gaps, porosity, blisters, bubbling, cracking, tackiness, decomposition, or other defects.

4.9 Internal Pressure—After testing per paragraphs 5.3.1 or 5.3.7, the tank shall not leak, have burst, or have ruptured.

5. Inspection and Testing

5.1 Sampling—From a lot of fuel tanks of the same size and design, select at random the number needed to determine compliance with the requirements of this specification.

5.2 Inspection—The sample tanks first are inspected to establish that they conform with the material, design, construction, and workmanship requirements of this specification.

5.3 Tests—The following tests are to be performed on the sample tanks unless otherwise specified. These tests must demonstrate that the tanks meet the requirements given in paragraph 4. Unless other instructions are given in the methods, three new containers are to be used for each test and the tests are to be conducted at a standard temperature of 23 ± 2.2°C (73 ± 4°F).

5.3.1 Tank with cap shall withstand a minimum gage pressure of 35 kPa (5 psi) with no leakage when immersed in water for a minimum of 30 s.

5.3.2 For nonmetallic fuel tanks only, flammability is determined in accordance with ASTM D 635, Flammability of Self-Supporting Plastics. At least 10 test specimens 127 mm (5 in) long and 12.7 mm (0.5 in) wide shall be cut directly from a representative fuel tank, unless it is so shaped that this cannot be done. In that event, a portion of the tank must be molded into a plaque 3 mm (1/8 in) thick, having an area sufficient to yield the required test specimens.

ϕ *5.3.3* For nonmetallic fuel tanks only, the Vicat softening point is measured in accordance with ASTM D 1525, Vicat Softening Point of Plastics. Either rate A or rate B may be used, except that for reference tests only rate A is used. At least two measurements should be made on specimens cut from a representative tank.

5.3.4 For nonmetallic fuel tanks only, brittleness temperature is determined in accordance with ASTM D 746, Brittleness Temperature of Plastic and Elastomers by Impact. At least 10 specimens having the required dimensions shall be cut directly from a representative tank. Otherwise, a portion of the tank must be molded into a plaque 1.90 ± 0.25 mm (0.075 ± 0.010 in) thick and with sufficient area to yield 10 specimens at least 32 mm (1¼ in) long and 6.35 ± 0.50 mm (0.25 ± 0.02 in) wide.

ϕ *5.3.5* Impact strength is determined in the following manner. Three tanks are first conditioned by filling them with fuel and storing them for