



SURFACE VEHICLE STANDARD

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(R) Personal Watercraft Fuel Systems

RATIONALE

Alignment with Section 6 of ISO 13590:2022. Most changes in this document are verbiage and document layout for increased clarification. There are some minor technical changes to aligned with ISO standards. The following ASTM and SAE fuel hose related standards were converted to ISO standards for alignment with ISO 13590:2022.

Fuel Hose Topic	Removed Cited Standards from 2003 Version	Newly Adopted Standards
Tensile strength and elongation and heat resistance	ASTM D573	ISO 7840:2021
Oil resistance and fuel resistance	ASTM D471	ISO 1817:2015, Tables A.3 and A.1
Ozone resistance	ASTM D1149	ISO 7326:2016
Burst test	ASTM D380	ISO 1402
Cold flexibility	ASTM D380	ISO 7840:2021
Adhesion test	ASTM D413	ISO 7840:2021
Permeation	SAE J1527	ISO 7840:2021, Annex B

1. SCOPE

This SAE Standard establishes a uniform test procedure and performance requirements for permanently installed petrol fuel systems in personal watercraft.

This SAE Standard does not apply to outboard powered personal watercraft and jet powered surfboards.

1.1 Purpose

This document specifies guidelines for fuel systems of personal watercraft.

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 issue of SAE publications shall apply.

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Documents

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2.1.1 ISO Publications

Available from International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, Tel: +41 22 749 01 11, www.iso.org.

ISO 1402	Rubber and plastics hoses and hose assemblies - Hydrostatic testing
ISO 1817:2015	Rubber, vulcanized or thermoplastic - Determination of the effect of liquids
ISO 7326:2016	Rubber and plastics hoses - Assessment of ozone resistance under static conditions
ISO 7840:2021	Small craft - Fire-resistant fuel hoses
ISO 8469:2021	Small craft - Non-fire-resistant fuel hoses

3. DEFINITIONS

3.1 ACCESSIBLE

Capable of being reached for inspection, removal, or maintenance without removal of permanent craft structure.

3.2 FUEL SYSTEM

Entire assembly of the fuel fill, vent, tank, and distribution components including but not limited to pumps, valves, strainers, and filters.

3.3 STATIC FLOATING POSITION

Conditions in which a personal watercraft floats in calm water, with each fuel tank filled to its rated capacity, but with no person or items of portable equipment on board.

3.4 PERSONAL WATERCRAFT

Watercraft intended for sports and leisure purposes of less than 4 m in hull length which uses a propulsion engine having a water jet pump as its primary source of propulsion and is designed to be operated by a person or persons sitting, standing, or kneeling on, rather than within the confines of a hull.

4. GENERAL

4.1 Each fuel system fitting, joint, and connection shall be accessible.

4.2 The fuel system shall be designed not to leak liquid fuel into the personal watercraft when:

- a. The personal watercraft is overturned through 180 degrees of roll in either direction, and
- b. The personal watercraft is overturned through 90 degrees of pitch in either direction.

4.3 The fuel system shall be designed not to leak liquid fuel into the personal watercraft when subjected to the greater of the following two values: 20 kPa or 1.5 times the highest hydrostatic pressure to which the component can be subjected in service.

4.4 The fuel system shall be designed to supply fuel to the engine within 10 seconds of the engine being energized and automatically stop the supply of fuel within 10 seconds of the engine being de-energized.

5. FUEL TANKS

5.1 Materials Prohibited for Fuel Tanks

5.1.1 A fuel tank shall not be constructed of terneplate.

5.1.2 Unless it has an inorganic sacrificial galvanic coating on the inside and outside of the tank, a fuel tank shall not be constructed of black iron or steel.

5.1.3 A metallic fuel tank encased in cellular plastic or in fiber-reinforced plastic shall not be constructed from a ferrous alloy.

5.2 Fuel Level Indication

5.2.1 A means shall be provided to check the fuel level or a reserve fuel supply shall be provided.

5.3 Tank Pressure Limitation

5.3.1 With the personal watercraft in its static floating position, a fuel tank, when filled, shall have an air-expansion volume or be equipped with a system that prevents pressure in the tank from exceeding 80% of the fuel tank design pressure.

5.4 Fill and Vent Lines Openings

5.4.1 Fill and vent openings shall be at or above the liquid level when the tank is filled to its rated capacity with the personal watercraft in its static floating position.

5.4.2 The vent-line termination or a gooseneck in the vent-line routing shall be arranged at sufficient height to prevent spillage of fuel through the vent line during filling under normal operating conditions of the personal watercraft.

5.5 Fuel Tank Static Pressure Test

5.5.1 A representative fuel tank shall not leak if tested using the procedures specified in 5.5.2 and 5.5.3.

5.5.2 Fill the tank with air or inert gas to exceed 80% of the maximum test pressure of 21 kPa.

5.5.3 Tank fittings and seams shall be checked for leaks using a method other than the pressure drop test.

NOTE: Soapy test solutions must be non-corrosive and non-toxic. Ammonia, present in some soaps and detergents, creates a condition that attacks brass fittings like those used in fuel systems. Damage can be undetectable at first, and these fittings can develop cracks in a matter of months creating a very hazardous situation.

5.6 Fuel Tank Shock Test

A representative fuel tank shall not leak when shock tested using the procedures specified in 5.6.1 to 5.6.6.

5.6.1 Confirm that the tank does not leak when pressure tested according to 5.5.

5.6.2 If the tank is non-metallic, precondition the tank by filling it to capacity with petrol that has at least a 50% aromatic content. Keep the fuel in the tank at 21 °C or higher for at least 30 days prior to testing.

5.6.3 Mount the empty shock test tank on an impact-test machine platform in a manner similar to how the tank is installed in the personal watercraft.

5.6.4 Fill the tank to capacity with water.