



SURFACE VEHICLE STANDARD

J176™

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Fast Fill Fueling Installation for Off-Road Self-Propelled Work Machines

RATIONALE

Five-Year Review. Update from vehicle to machine in 5.4.

1. SCOPE

This SAE Standard applies to off-road self-propelled work machines as categorized in SAE J1116. Fast fill fueling typically applies to self-propelled machines with a fuel capacity over 380 L, although fast fill fueling can be used on machines with smaller fuel capacity.

1.1 Purpose

This document specifies the proper installation, position, protection, and size of a fueling receiver, nozzle, automatic shut-off vent connections, signal line, and inlet shut-off valve. This document applies to filling diesel fuel tanks or vessels at a flow rate of 570 L/min or less. Filling fuel tanks at higher flow rates requires adequately larger diameter components. This specification does not apply to gasoline.

2. REFERENCES

2.1 Applicable Documents

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.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J1116 Categories of Off-Road Self-Propelled Work Machines

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Full document details: SAE J176_202501

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Documents

Standard, visit Sharing Hub

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J371 Drain, Fill, and Level Plugs for Off-Road, Self-Propelled Work Machines

SAE J476 Dryseal Pipe Threads

2.2.2 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI B1.20.1 NPT Threads

3. GENERAL

3.1 Automatic Shut-Off - High-Pressure Systems

A pressurized fast fueling system requires internal tank pressures sufficient to achieve automatic shut-off, a nozzle connected to a fueling receiver through which fuel is conveyed to the fuel tank, and an automatic shut-off vent to provide automatic fill level control, normal venting, and emergency venting. Nozzles in pressurized systems require an internal automatic shut-off mechanism, which is pressure dependent. Shut-off of fuel into the fuel tank is achieved by the nozzle shutting off due to internal fuel tank pressure. Pressurized systems are not recommended on plastic fuel tanks due to the internal tank pressures over 0.5 bar required for shut-off, which can damage the fuel tank.

3.2 Automatic Shut-Off - Low-Pressure Systems

Low-pressure systems do not require internal tank pressure to obtain automatic shut-off but require an inlet shut-off valve and signal line in addition to the components in the pressurized system. A nozzle with an automatic shut-off mechanism is not required for fuel shut-off; a dry break may be used for connection to the fuel receiver instead of an automatic shut-off nozzle. Any tank pressures created during a fast fill operation using a low-pressure system are less than 0.5 bar.

4. INSTALLATION

4.1 Fuel Receiver Mounting Connection

For flow rates less than 570 L/min, the fuel receiver mounting connection may be 2 in NPTF, flanged, or other suitable connection having a 50-mm minimum inside diameter. Where the connection is made directly to the tank, it should be located as near the bottom of the tank as practical to provide submerged filling to limit foam formation. Where mounting the fuel receiver near the bottom of the tank is impractical, a 50-mm minimum inside diameter internal extension line to the bottom of the tank may be used. The receiver should be a dry-break-style coupling to reduce any fuel spillage during and after refueling.

4.2 Liquid Crossover Lines

Liquid crossover lines between multiple tanks should be a minimum 50-mm inside diameter. Extension fill lines between the tank and a remote fuel receiver shall have a 50-mm minimum inside diameter and shall enter the bottom of the tank so as to provide submerged filling. Remote fill lines should be run with a minimum number of bends; all bends shall have the largest possible bend radius to reduce pressure drop and not limit system performance. Total pressure buildup at the fuel receiver from fuel head plus friction loss should not exceed 0.3 bar at 9 L/s.