The Engineering Society For Advancing Mobility Land Sea Air and Space®
INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

# SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J398

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Superseding J398 FEB88

Submitted for recognition as an American National Standard

## FUEL TANK FILLER CONDITIONS—PASSENGER CAR, MULTIPURPOSE PASSENGER VEHICLES, AND LIGHT-DUTY TRUCKS

***Foreword***—This reaffirmed document has been changed only to reflect the new SAE Technical Standards Board format.

***1. Scope***—This SAE Recommended Practice defines conditions for evaluating the compatibility of vehicle fuel tanks and filler pipes with fuel dispensing facilities equipped with standard (non-vapor recovery) configuration as well as vapor recovery type nozzles. It applies to passenger cars, multipurpose passenger vehicles, and light-duty trucks 4536 kg (10 000 lb) maximum GVW (Ref. J1100). It includes a technique for filling a tank full that can be used to establish a reference condition for other tests which require starting with a full tank.

***2. References***

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

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

SAE J285—Gasoline Dispenser Nozzle Spouts
SAE J703—Fuel Systems—Truck and Truck Tractors
SAE J1100—Motor Vehicle Dimensions
SAE J1140—Filler Pipes and Openings of Motor Vehicle Fuel Tanks

2.1.2 UL PUBLICATION—Available from Underwriters' Laboratories, Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.

UL 842—Standard for Valves for Flammable Fluids

***3. Fuel System Design Guidelines***

**3.1** Vehicles designed for use with non-vapor recovery fuel dispensing systems should provide vehicle body openings to permit suitable engagement of the nozzle retention spring in the filler pipe so that the sensing device will be retained below the filler pipe opening and below leaded fuel restrictors for vehicles so equipped during unattended operation.

**3.2** Vehicles designed for use with vapor recovery fuel dispensing systems should comply with the guidelines set forth in SAE J1140.





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**3.3** In attempting to avoid liquid losses during fueling, the designer should recognize the following service station conditions:

3.3.1 DRIVEWAY GRADE—The vehicle may be parked in any direction on grades up to 6%.

3.3.2 DISPENSER NOZZLES—Manual or automatic nozzles approved under UL 842 may be used.

*3.3.2.1* Nozzle spouts for gasoline will comply with SAE J285.

*3.3.2.2* Nozzle spouts for diesel fuel may have a nominal OD up to 30 mm (1-3/16 in).

3.3.3 DELIVERY RATES—Fuel may be dispensed at flow rates up to:

*3.3.3.1* 45 L/min (12 gal/min) for gasoline non-vapor recovery dispensing nozzles. Refer to SAE J703 for fuel tanks of 95 L (25 gal).

*3.3.3.2* 38 L/min (10 gal/min) for gasoline vapor recovery dispensing nozzles.

*3.3.3.3* 76 L/min (20 gal/min) for diesel fuel.

***4.*** ***Procedure for Obtaining a Full Tank—***The following procedure is intended to be used for providing a full tank when another test requires that condition as a starting point. It is not presented as a recommended practice for fueling a customer's vehicle at a service station.

**4.1** The surface on which the vehicle is parked shall be level within 2% grade.

**4.2** Remove fuel tank filler cap.

**4.3** Fill the tank as follows:

4.3.1 WITH NON-VAPOR RECOVERY DISPENSING NOZZLE—Recreational vehicles and special purpose vehicles (wreckers, airport service, electrical/phone service lift vehicles, etc.) are included in this scope as guide, but may achieve fill rates somewhat less than those in 4.3.1 and 4.3.2 due to length and attitude of fill pipe routings to accommodate the unique variety of body package constraints.

*4.3.1.1* Insert automatic shutoff dispensing nozzle to maximum penetration into the filler pipe.

*4.3.1.2* Set and latch dispensing nozzle lever in the maximum flow rate position of 45 L/min (12 gal/min) for gasoline or 76 L/min (20 gal/min) for diesel fuel and let run until nozzle shuts off automatically. The plane of the nozzle shall be as nearly vertical as boundaries of the body opening around the filler pipe permit.

*4.3.1.3* After 5 s, set and latch dispensing nozzle lever in minimum flow rate position of 15 to 19 L/min (4 to 5 gal/min) and let run until nozzle shuts off automatically.

NOTE—Minimum flow rate to cause automatic shutoff must be maintained.

*4.3.1.4* After 5 s, withdraw the nozzle until the tip extends 50 mm (2 in) into the filler pipe neck (sensing orifice must remain below the filler pipe opening), or if the filler neck is equipped with a leaded fuel restrictor, withdraw the nozzle until the sensing orifice is just on the fuel side of the leaded fuel restrictor. Set and hold at a minimum flow rate position of 15 to 19 L/min (4 to 5 gal/min) until nozzle shuts off automatically. Allow residual fuel to drain from the nozzle into the filler pipe to avoid spillage and remove the nozzle.

4.3.2 WITH REFUELING VAPOR RECOVERY DISPENSING NOZZLE

*4.3.2.1* Insert the refueling vapor recovery nozzle into the filler pipe in the normal resting position as defined in SAE J1140. Allow the retaining mechanism to engage on the lip of the filler tube.

*4.3.2.2* Set and latch dispensing nozzle lever in the maximum flow rate position of 38 L/min (10 gal/min) for gasoline and let run until nozzle shuts off automatically.

*4.3.2.3* Wait 10 s, then set and latch dispensing nozzle lever in minimum flow rate position of 15 to 19 L/min (4 to 5 gal/min) and let run until nozzle shuts off automatically.

NOTE—Minimum flow rate to cause automatic shutoff must be maintained.

*4.3.2.4* Repeat 4.3.2.3.

*4.3.2.5* Disengage the nozzle retaining mechanism, allow residual fuel to drain from the nozzle into the filler pipe to avoid spillage and remove the nozzle.

**4.4** Attach fuel tank filler cap securely.



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