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Dispenser Nozzle Spouts for Liquid Fuels Intended for Use with Spark Ignition and Compression Ignition Engines			

RATIONALE

Document will be stabilized as no changes expected in the technology.

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1. SCOPE

This SAE recommended practice provides standard dimensions for liquid fuel dispenser nozzle spouts and a system for differentiating between nozzles that dispense liquid fuel into vehicles with Spark Ignition (SI) Engines and Compression Ignition (CI) Engines for land vehicles. Current legal definitions only distinguish between "UNLEADED Fuel" and "All Other Types of Fuel." These definitions are no longer valid. This document establishes a new set of definitions that have practical application to current automobile liquid fuel inlets and liquid fuel dispenser nozzle spouts.

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 version of SAE publications shall apply.

2.1.1 ISO Publication

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ISO 13331 Road vehicles—Filler pipes and openings of motor vehicle fuel tanks—Vapor recovery systems

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2.1.2 UL Publications

Available from Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096, Tel: 847-272-8800, www.ul.com.

UL 87 Power Operated Dispensing Devices

UL 842 Valves for Flammable Liquids

3. DEFINITIONS

3.1 Unleaded Fuel

Gasoline that contains no lead or other metal compounds that could poison tailpipe emission control devices.

3.2 Spark Ignition Liquid Fuel

Fuel intended for use with spark ignition (SI) engines. These fuels are mixtures of C4 through C10 hydrocarbons, have a flashpoint below the normal ambient temperatures where spark ignition engines are intended to operate ($\approx -45^{\circ}\text{C}$ for winter blend) and are compounded to burn rather than detonate inside SI engines. These fuels can also be blended with oxygenates, such as alcohols or ethers, up to 100% oxygenate. Examples of these types of fuels are:

- a. Gasoline (petrol)
- b. E10; gasoline plus up to 10% ethyl alcohol
- c. M15; gasoline plus up to 15% methyl alcohol
- d. Reformulated Gasoline; gasoline with reduced aromatic content, boiling range and volatility and containing up to 2 wt% oxygen (15% MTBE, 6% ethanol or 5% methanol)
- e. E22 (Brazil); gasoline containing 22% anhydrous ethyl alcohol
- f. E100 (Brazil); gasoline containing ethyl alcohol that has not been treated to remove the last traces of water (may contain up to 7% water).
- g. E85; gasoline plus approximately 85% ethyl alcohol
- h. M85; gasoline plus approximately 85% methyl alcohol

3.3 Compression Ignition Liquid Fuel

Fuel intended for use with compression ignition (CI) engines. These fuels are mixtures of C12 through C24 hydrocarbons, have a flashpoint above the normal ambient temperatures where compression ignition engine are intended to operate ($\approx 45^{\circ}\text{C}$) and are compounded to detonate when heated by compression inside CI engines. These fuels can also be blended with oxygenates, such as fatty acid methyl esters (FAME) up to 100% oxygenate. Examples of these types of fuels are:

- a. Diesel Fuel
- b. B5; diesel fuel containing up to 5% FAME
- c. B20; diesel fuel containing up to 20% FAME
- d. B100; Fuel consisting of 100% FAME

4. REQUIREMENTS

4.1 Nozzle Spout Diameter

This section established the diameter of the nozzle spout intended to enter a motor vehicle filler inlet port. Differences in diameter are to be used in design of vehicle fuel filler inlets for means to help prevent misfuelings.

4.1.1 Nozzle Spouts for Spark Ignition Fuel

Should be 20.50/21.34 mm (0.807/0.840 in) diameter. These spouts are capable of delivering fuel at flow rates up to 56 L/min (15 gal/min).

NOTE: Stage II Vapor Recovery nozzles are limited to 38 L/min (10 gal/min) and many countries have regulations restricting the flow rate to 38 L/min (10 gal/min) on conventional nozzles in order to reduce spillage and excessive vapor losses.

4.1.2 Nozzle Spouts for Compression Ignition Fuel

These fuels are used in vehicles ranging from passenger cars to heavy-duty trucks and off road motorized heavy equipment. Several different nozzles spout sizes are provided based on their intended use with these types of vehicles. Spout diameters range from 23.6 mm to 31.75 mm (.929 to 1.250 in) diameter depending on vehicle and flowrate.

4.1.2.1 Nozzle Spouts for Passenger Cars and Light Duty Trucks (< 8500 lbs GVW)

Should be 23.6/23.8 mm (0.929/.937 in) diameter. These spouts are capable of delivering fuel at flow rates up to 60 L/min (16 gal/min). There are spouts in the field that are 24.7/26.1 mm (0.972/1.028 in) diameter. These spouts exist but are not recommended.

4.1.2.2 Nozzle Spouts for Heavy-Duty Trucks (6001-14 000 lbs GVW) and Off Road Heavy Equipment

Should be 28.5/31.75 mm (1.122/1.250 in) diameter. These spouts are capable of delivering fuel at flow rates up to 135 L/min (35 gal/min).

4.2 Nozzle Spout Design

Recommended design details for nozzle spouts for spark ignition fuel are shown in Table 1 and Figure 1. Recommended design details for nozzle spouts for compression ignition fuel are shown in Table 2 and Figure 1.

4.3 Identification

Identification is optional. If desired nozzle spouts intended for spark ignition fuels should be marked with the letter "G" and nozzle spouts intended for compression ignition fuels should be marked with the letter "D." These markings should be stamped or rolled into the OD of the spout on its top surface at any position except the first 63.5 mm (2.5 in) from the outlet end.

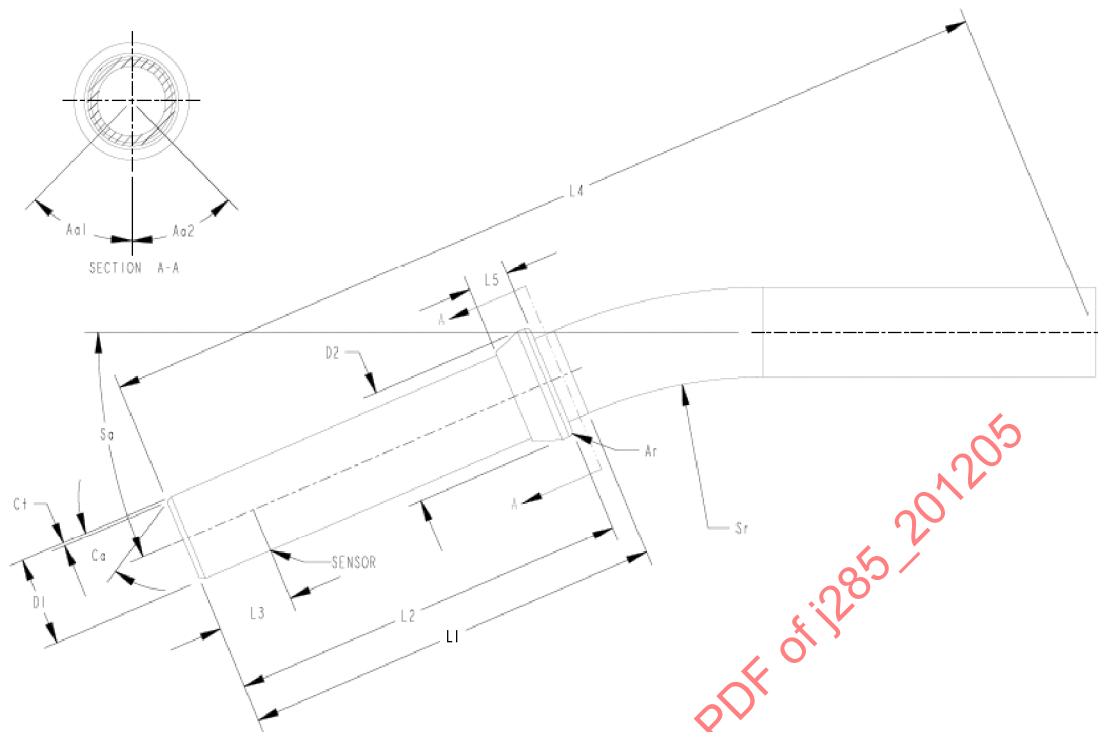


FIGURE 1 - NOZZLE SPOUT DIMENSIONS

TABLE 1 - SPOUTS FOR SPARK IGNITION ENGINES - UNLEADED GASOLINE

Symbol	Description	Unleaded Gasoline
D_1	Spout Outside Diameter	20.50/21.34 mm (0.807/0.840 in)
	Minimum Length of D_1	L_1
	Roundness of D_1	Within Dia. Limits
D_2	Nozzle Anchor Device Outside Diameter	25.4/30.0 mm. (1.00/1.18 in)
C_t	Spout Tip Chamfer	0.5/0.75 mm (0.20/0.030 in)
C_α	Spout Tip Chamfer Angle	30° to 45°
A_r	Anchor Radius	0.5/1.5 mm (.020/.060 in)
A_α	Anchor minimum angle	45°
S_r	Nozzle Spout Bend Radius	90/120 mm (3.54/4.72 in)
S_α	Bend Angle of Nozzle Spout	22.0°/26.0 °
L_1	Length of Straight Part of Nozzle Spout	$L_2 + 5.0\text{mm}$
L_2	Distance Between Nozzle End and First Anchor Position	93/95 mm (3.66/3.74 in)
L_3	Distance Between Nozzle End and Sensor Centerline	18.0 mm Max. (0.709 in)
L_4	Clearance from Fuel Dispensing End and Any Part of Nozzle Body	Consistent with ISO 13331 and UL Regulations
L_5	Length of Anchor	9.8/12.5 mm (.375/.500 in)