

KES

Standard Test Method for
Vapor-Liquid Ratio of Gasoline

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1. Scope of application

This standard shall describe the method to measure vapor at normal pressure from the given volume of gasoline. The ratio of these volumes shall be expressed in terms of gasoline V/L (Vapor-Liquid) ratio at testing temperature.

2. Introduction of method

- (1) Measured volume of liquid fuel at 32 ~ 40 °F (0 °C ~ 4 °C) can be known through rubber septum in glycerin-filled burette. Mount filled burette on a temperature controlled water bath. Volume of gas, which balanced with liquid fuel, should always be measured at a specified temperature or specified pressure of 760mmHg. V/L ratio is calculated after that.
- (2) Because V/L ratio is determined by both various temperature and selected pressure and the result is shown in a graph, if the temperature is required, at which the given V/L match, the temperature can be read at a given V/L.

3. Significance

Generally, evaporative tendency of gasoline in a fuel equipment of vehicle can be known from V/L ratio of gasoline at important location of fuel equipment and precise condition.

4. Terminology

V/L ratio of gasoline: V/L ratio at a specified temperature and pressure is the ratio of temperature and pressure to volume of sample filled with liquid at 32 °F.

Remark : This ratio is different from absolute V/L ratio because (1) there are no expansion of sample due to temperature rising, (2) there are no volumetric loose of liquid sample due to evaporation, (3) there are calibration that cannot break down air.

5. Equipment

5.1 V/L burette

This follows the dimension as shown in figure 1, and made of borosilicate glass. Short tube on bottom is plugged up with rubber cover.

5.2 Pressure regulator

This includes the following items.

(1) 250 ml level pipe including dry glycerin

As shown in figure 2, this is attached to V/L burette by rubber tube. Upper part is filled with dry air.

(2) This is method to measure the difference of liquid level between V/L burette and pipe:

Mm scale is appropriate to measure height more than scale plate.

(3) Barometer

Exactly 0.5mmHg

(4) Mercury manometer with 1 mm unit

This is required only when the air pressure is just below or above normal pressure.

Refer to remark 8. Manometer has T-shape and rubber tube is linked to one of its branch. The other branch links upper part of glycerin pipe and cover or pinch clamp.

5.3 Water bath

This is made of glass. Depth is about 10.6in (266.7mm). This has mixing and temperature control features. The range of control temperature is from 100°F (33°C) to 160°F (71°C). This should keep the required temperature in the range of $\pm 2^\circ\text{F}$ (0.1°C).

5.4 Thermometer

Thermometers have range of 77 ~ 122°F and 122 ~ 176°F (25 ~ 55°C and 50 ~ 80°C), and should satisfy 64°F and 65°F thermometer specification in ASTM E1.

Thermometers have range of 94°F ~ 108°F, 120 ~ 134°F, and 134~148°F (34 ~

42 °C, 49~57 °C, and 57~65 °C).

5.5 Cooling bath

This includes ice and water at 32 ~ 36 °F (0 °C ~ 2 °C).

5.6 Hypodermic Syringe

Its capacity is from 0.5 to 0.1 mL.

5.7 Auxiliary device for calibration

This is scale with the accuracy of 1mg or 2mg. This contains cap of capillary tube and glass bottle for weighing. Calibration stopper for V/L burette cover has three outlets at its end. This is helpful during the calibration.

6. Material

Glycerin : Degree of purity should be at least 99%. (Maximum 1% of water is included.) To prevent water absorption, store it in screw-capped bottle.

7. Extraction of sample

- (1) Sample should be extracted according to 5.2 ~ 5.6 in ASTM D 323. Be careful to lose volatile sample. This is because the loss of V/L ratio sensitivity due to evaporation or slight change during preparation requires best carefulness and attention.
- (2) V/L ratio is the first test except Reid vapor pressure during processing samples.

8. Calibration

- (1) Select empirical difference from the calibration chart, which is the calibration result of V/L burette and hypodermic syringe.
- (2) Fill hypodermic syringe with gasless distilled water at 77 °F (25 °C), and push plunger exactly to the division of scale.

Discharge a composite on a bottom of plunger movement to a glass bottle for weighing.