



Exceeding Expectations

E stands for Existent Gum Content

The existent gum content is a property determined in gasoline, ethanol, and aviation fuel. To learn more about this test, let's apply the **AmSpec** approach.

A = Application

When testing the gum content of various products, a quantity of fuel is evaporated under controlled conditions of temperature and flow of air or steam. The resulting residue is weighed and reported as milligrams per 100 mL. For motor gasoline, the residue is weighed before and after extracting with heptane. This step is necessary since many motor gasolines are purposely blended with nonvolatile oils or additives. The heptane removes these additives from the evaporation residue so that the gum content of the gasoline may be determined.

The significance of gum content in motor gasoline has not been firmly established. It has been proven that a high gum content can cause deposit formation on the induction-system and sticking of intake valves. Therefore, in most instances, it can be assumed that low gum will provide an absence of induction-system difficulties. However, the test method is not correlative to induction-system deposits. In aviation turbine fuels, a large existent gum content shows contamination of the fuel.



Figure 1 - Unwashed (Left) and Washed (Right) Gum Content of Gasoline

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M = Methods

The most common method that AmSpec uses to determine the existent gum content of a product is:

D381 – Gum Content in Fuels by Jet Evaporation

* **D1655 - Specification for Aviation Turbine Fuels** allows the existent gum of aviation turbine fuels to be determined by either **D381** or **IP 540**, with **D381** as the referee method. **D381** specifically requires the use of steam for evaporating, whereas **IP 540** allows either air or steam for evaporating aviation turbine fuels.



Figure 2 - Typical Gum Bath Used for D381

S = Scope

Method	Products	Scope
D381	Gasoline, Ethanol, and Aviation Turbine Fuels	N/A

** Please note below, **Turnaround Time** is defined as the actual length of time, on average, it takes to perform a particular method once the sample has arrived and logged in the lab, and prepared for testing .

P = Procedure Notes

Product	Evaporation Method	Temperature	Reported	Turnaround Time
Ethanol	Air	150 – 160 °C	Unwashed Gum Content or Solvent Washed Gum Content	3.5 hours
Gasoline	Air	150 – 160 °C	Solvent Washed Gum Content	3.5 hours
Aviation Turbine Fuels	Steam	229 – 235 °C	Existent Gum Content	2 hours

Unwashed Gum Content - The evaporation residue of the product without any further treatment.

Solvent Washed Gum Content - The residue remaining when the evaporation residue has been washed with heptane and the washings discarded.

Existent Gum - The evaporation residue of aviation fuels without any further treatment.

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E = Equivalent

ASTM	IP	ISO	DIN	JIS	AFNOR
D381	131	6246	51784	K2261	MO7-004

C = Cause & Effect

Gum content is influenced by the age of the gasoline and its exposure to oxygen and certain metals such as copper. If gasoline is allowed to evaporate, the residue left can form gum and varnish. It is important for gasoline to contain as little gum residue as possible to prevent gum formation in the intake manifold, carburetor or fuel injectors, and on intake valve stems.

Some gasolines contain additives made up of aromatic amines and phenols to prevent formation of gum and varnish. During storage, harmful gum deposits may form due to the reaction of some fuel components with each other and with oxygen. Oxidation inhibitors are added to promote gasoline stability. They help control gum, deposit formation, and staleness, where the fuel becomes cloudy and smells like paint thinner.

In aviation turbine fuels, large quantities of gum show contamination of fuel by higher boiling oils or particulate matter. A high existent gum content generally reflects poor handling practices in distribution downstream of the refinery.

For any questions about these methods, please contact Jennifer Nesci at JNesci@amspecllc.com

Also, please download the new & improved AmSpec Smart Phone app for a number of useful conversion tools and information.

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