



Ethanol and Gasoline Fuel Mixture Concerns when responding to Vehicle Fires

Because of the greater production of Ethanol and Gasoline mixtures we as a Fire Service need to understand the differences in our operation at fires involving this fuel.

We will be responding to incidents involving fuel mixtures composed of ethanol (or ethyl alcohol) and gasoline in various concentrations.

The most common of these fuels is designated E85 (85% ethanol and 15% gasoline) which we are starting to see in our jurisdiction. The county has at least one County facility that dispenses E85.

Fires involving E85 and other ethanol/gasoline mixtures containing more than 10% ethanol should be treated differently than traditional gasoline fires because these mixtures are polar/water-miscible flammable liquids (i.e., they mix readily with water) and will degrade the effectiveness of fire-fighting foam which is not alcohol resistant.

For this reason, Pipeline and Hazardous Materials Safety Administration recommends use of alcohol-resistant foam to fight fires involving these fuel mixtures.

Properties of Fuel Ethanol:

Vapor density: Ethanol vapor, like gasoline vapor, is denser than air and tends to settle in

low areas. However, ethanol vapor disperses rapidly.

Solubility in water: Fuel ethanol will mix with water, but at high enough concentrations of water, the ethanol will separate from the gasoline.

Flame visibility: A fuel ethanol flame is less bright than a gasoline flame but is easily visible in daylight.

Specific gravity: Pure ethanol and ethanol blends are heavier than gasoline.

Conductivity: Ethanol and ethanol blends conduct electricity. Gasoline, by contrast, is an electrical insulator.

Toxicity: Ethanol is less toxic than gasoline or methanol. Carcinogenic compounds are not present in pure ethanol; however, because gasoline is used in the blend, E85 is considered to be potentially carcinogenic.

Flammability: At low temperature (32°), E85 vapor is more flammable than gasoline vapor. However at normal temperatures, E85 vapor is less flammable than gasoline, because of the higher auto ignition temperature of E85.

A helpful tool for the first responder is the Emergency Response Guide numbers 127 Flammable Liquids Polar/ Water-Miscible and Guide 128 Flammable Liquids Non-Polar/ Water-Immiscible.

This can be summarized with the facts that gasoline is more volatile than Ethanol Fires involving E85 and other ethanol/gasoline mixtures containing more than 10% ethanol should be treated differently than traditional gasoline fires because these mixtures are polar/water-miscible flammable liquids (i.e., they mix readily with water) and will degrade the effectiveness of fire-fighting foam which is not alcohol resistant.

Remember that the percentage of Ethanol always unknown. It's a Gasoline Fire when you use alcohol-resistant foam.

A special thanks to Lt Mike Adams for help with the research and information.

Sources for this article include:

[Pipeline and Hazardous Materials Safety Administration](#)

[National Foam- Manufacture of Universal Gold Foam](#)

[Ansul Incorporated](#)

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