

# SAFETY ALERT



U.S. Department  
of Transportation

Pipeline and  
Hazardous Materials  
Safety Administration

## Responding to Incidents Involving Ethanol and Gasoline Fuel Mixtures

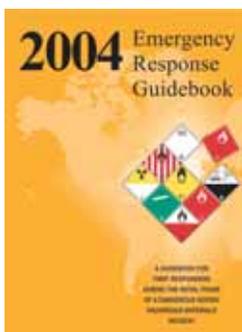
The Pipeline and Hazardous Materials Safety Administration (PHMSA) is alerting emergency responders to appropriate emergency response guidance for responding to incidents involving fuel mixtures composed of ethanol (or “ethyl alcohol”) and gasoline in various concentrations. The most common of these fuels, designated E85 (85% ethanol and 15% gasoline), recently has begun to be used in volume in the Midwest, primarily in the states of Illinois and Minnesota.

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, PHMSA recommends use of alcohol-resistant foam to fight fires involving these fuel mixtures. Properties of ethanol/gasoline fuels that may be of interest to emergency responders are provided in the chart below.

### Properties of Fuel Ethanol

Property	Comment
<b>Vapor density</b>	Ethanol vapor, like gasoline vapor, is denser than air and tends to settle in low areas. However, ethanol vapor disperses rapidly.
<b>Solubility in water</b>	Fuel ethanol will mix with water, but at high enough concentrations of water, the ethanol will separate from the gasoline.
<b>Flame visibility</b>	A fuel ethanol flame is less bright than a gasoline flame but is easily visible in daylight.
<b>Specific gravity</b>	Pure ethanol and ethanol blends are heavier than gasoline.
<b>Conductivity</b>	Ethanol and ethanol blends conduct electricity. Gasoline, by contrast, is an electrical insulator.
<b>Toxicity</b>	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.
<b>Flammability</b>	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 autoignition temperature of E85.

There are a number of shipping descriptions in the Hazardous Materials Regulations (Title 49, Code of Federal Regulations, Parts 171-180) for mixtures containing ethyl alcohol and gasoline. “Alcohols, n.o.s.” and “Denatured alcohol” may be used for mixtures containing up to 5% gasoline. The appropriate proper shipping name for E85 is “Flammable liquid, n.o.s. (ethanol, gasoline).”



PHMSA recommends First Responders refer to Guide 127 (Flammable Liquids Polar/Water-Miscible) of the 2004 Emergency Response Guidebook (ERG2004) when responding to incidents involving E85 and other fuel mixtures known to contain or

potentially contain more than 10% alcohol. Guide 127 (<http://hazmat.dot.gov/pubs/erg/g127.pdf>) specifies the use of alcohol resistant foam.

PHMSA is currently evaluating the need for changes to shipping descriptions or other hazard communication requirements for alcohol/gasoline fuel mixtures to ensure that these mixtures are readily identifiable and refer emergency responders to guidance specifying use of alcohol-resistant foam. In the interim, PHMSA recommends the use of alcohol-resistant foam to fight fires involving fuel mixtures known to contain or potentially containing more than 10% alcohol.

## Mixtures Containing Ethyl Alcohol and Gasoline

### **Alcohols, n.o.s., 3, UN1987**

[Special Provision 172 allows alcohol mixtures containing up to 5% gasoline under this description]

### **Denatured alcohol, 3, NA1987**

[Special Provision 172 allows alcohol mixtures containing up to 5% gasoline under this description]

### **Flammable liquid, n.o.s. (ethanol, gasoline), 3, UN1993**

[May include varying concentrations of ethanol/gasoline]

### **Gasohol, 3, NA1203**

[Authorized for gasoline mixed with not more than 20% ethanol – for U.S. shipments only]

*For comments or suggestions on improving the Emergency Response Guidebook for the 2008 edition, please e-mail us at [ERG2008@dot.gov](mailto:ERG2008@dot.gov). For more information concerning hazardous materials transportation safety or training, visit our web-site at <http://hazmat.dot.gov>*



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