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**Shops warned about engine fires sparked by ethanol use- use of E85 cars in cars not equipped to handle this fuel could cause vehicle fires. Garages may not have extinguishers to put out small fires.**

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**Shops warned about engine fires sparked by ethanol use  
By James E. Guyette  
New extinguishers needed for ethanol-based fires**

A tanker truck carrying 8,000 gallons of ethanol caused this fire after it overturned near Baltimore. (Photo courtesy of International Association of Fire Chiefs)

Repairers are being urged to prepare themselves for a heightened risk of engine fires stoked by motorists filling up with ethanol-laced gasoline when their vehicle is not properly outfitted to safely burn this type of fuel.

An added hazard associated with ethanol's rising popularity as an environmentally correct alternative stems from a molecular makeup that differs from traditional gas. The grain-based additive is water-soluble while petroleum is not - oil and water don't mix - and many local fire departments still do not stock the special type of foam needed to extinguish an ethanol blaze.

Firefighting foam is tested on an ethanol fire. (Photo courtesy of David White)

Just as gas and ethanol don't behave the same when set afire, E-85 and other ethanol blends can seriously damage a car's key engine components unless the vehicle is specifically designed to be ethanol-friendly. Yet people with older, non-ethanol vehicles are nonetheless pulling up to E-85 pumps in an ill-advised attempt to abate airborne fuel pollutants.

While ecologically concerned drivers may feel they are doing the right thing, in reality this strategy is fraught with potential dangers - especially when these now-faulty engines are fired-up within the confines of a repair facility filled with other vehicles.

"You're going to have a lot of car fires in shops because of this," warns firefighting consultant Bob Lorenz, who teaches the topic at the College of DuPage in Illinois.

"Vehicles that are not equipped for E-85 do not have the proper o-rings and gaskets to handle the increased alcohol content of the fuel," explains Todd Hoffman, executive director of Scene of the Accident Inc. and ABRN's 2006 Leadership Award honoree. "This causes swelling of the o-rings and deterioration of the gaskets, which leads to fuel and oil leaks. It also causes overheating of the catalytic converter."

**Collision shop fire safety advice**

"It will eat the hoses and o-rings up and it will leak all over the place," concurs consultant David White, publisher of Industrial Fire World magazine. Firefighting experts are loudly sounding the alarm about ethanol, particularly in regard to public safety risks posed by overturned E-85 tankers and the foam issue; they are equally concerned over lesser blends now used in more than half of the U.S. automotive fleet.

"Actually, we are all using gasohol," says Hoffman. "All gas today has between 10 percent and 15

percent ethanol in it."

The ethanol problem is especially acute in Corn Belt states where E-85 is more readily available to consumers eager to aid the environment. First responders expect the wrong-fuel-in-the-wrong-vehicle situation to become more widespread as E-85 gains popularity.

A Kansas firefighter who has taken several of Hoffman's crash-site response training seminars filed these disturbing observations: "I sat across from a station here in Topeka that was selling E-85 and watched people; you would not believe the older cars that are filling up with it. I think we are going to start to see some of these older cars having fires."

"The public is totally unaware of the problems that will be created when they use E-85 in a vehicle that is not designed to run it," Hoffman says.

White encourages every repairer in the nation to start inspecting each vehicle coming into your bays. "Open the hood and look at the engine. If there's ethanol running all over the place you have a problem. The poor guy is going to pull a torch or saw out, cause some sparks, and then you'll have a fire."

Climatologists canning corn's environmental stewardship

If this brief pre-inspection procedure is too much trouble, says White, "Just call your insurance company because you're going to get a new shop."

Fulminating over foam

The ethanol vs. petroleum conundrum carries throughout the nation's fuel chain. Because of the chemical differences, ethanol is typically transported by rail or tanker truck because it can't be moved through regular petroleum pipelines. Ditto for the U.S. Coast Guard, which is working on developing alternative methods for containing ethanol spills; ethanol's water solubility means that a floating boom can't skim it off the surface of a lake or river as with regular gas and oil.

This point can be proven at your kitchen table. Sit down with a jug of fruit punch and your favorite brand of grain alcohol. Mix them together in a glass and you create a refreshing, albeit potent "hairy buffalo" cocktail. Plop a droplet of oil into another glass of punch, and watch it float on the surface; you can see how oil and water won't mix.

"E-85 is what is called a 'polar solvent,' so it will mix with water," Hoffman says. "We did some testing and found that when we diluted E-85 by 500 percent with water it still burned. So now you will have shops that wash out tanks, wash out spills and wash them down the drain. Even heavily diluted E-85 is flammable and even explosive in the right environment. So when you spill one gallon of E-85 and wash it down with five gallons of water you've created six gallons of flammable liquid."

The same solubility situation afflicts the firefighting foams that have long been used to subdue petroleum-fueled fires. The alcohol content of ethanol essentially eats through the bubbles contained within the foams. This reaction snuffs out the foam's crucial oxygen-smothering capabilities and it can allow the wafting vapor to ignite in a ball of flame.

You definitely don't want this phenomenon unfolding inside a repair shop.

Aqueous film-forming foam (A-FFF) was developed by the U.S. Navy in the mid-1950s to combat jet fuel fires on aircraft carriers. Since then it has been the foam of choice among fire departments for battling blazes related to petroleum-based products.

Unfortunately, A-FFF doesn't work on burning alcohol-based liquids, such as ethanol.

"You can put A-FFF on a fire until doomsday and it won't go out," says Lorenz, the instructor at DuPage. "A straight foam will not put out that fire, and we're going to get someone killed" if the problem is not addressed on a nationwide scale.

Alcohol-resistant aqueous film-forming foam (AR-AFFF) was created in the mid 1970s. As the name implies, it does a bang-up job on ethanol fires - yet it remains in comparatively short supply among the firefighting community because up until now there hasn't been a whole lot of need and it costs 30 percent more than A-FFF. A lot of budget-minded local fire departments don't have it readily available, according to Lorenz and publisher White, who also consults with the Navy on fire-safety issues.

In addition, White is heavily involved with the Ethanol Emergency Response Coalition (EERC) comprised of major organizations dealing with alternative fuels, scientific testing, bulk fuel distribution and storage along with first responders and key fire service organizations. A blind test conducted by the EERC reviewed the various foams on the market, confirming the virtues of AR-AFFF and illuminating shortfalls of A-FFF and other firefighting foam products.

"Many of the local fire departments are waking up to the need for AR-AFFF," White reports. Still, not all of them are aware of ethanol's potential danger.

"The collision shop (and mechanical repair center) is going to be at the tail-end of the food chain" as a high-profile area of public safety readiness, says Lorenz. He suggests that you contact your local fire department: "Tell them, 'I'm working with ethanol in here,'" and that AR-AFFF is a necessary response material to have on hand. "Make sure the department is prepared."

Mindful of the risk sparked by large-scale roadside tanker fires, the EERC is striving to change the federal hazardous material placarding rules, which currently call for a single overall category for gasoline rather than a desired "E" designation for ethanol.

#### Fire in the shop

Should an ethanol blaze break out in your shop, "An ABC fire extinguisher will put the fire out, but these dry chemical extinguishers do not stop vapors from being released - so there is a greater chance of the fire re-igniting when the vapors reach an ignition source or hot metal," Hoffman cautions. "E-85 has a wider flammability range than gasoline and a lower ignition temperature; it will ignite faster and catch fire in a wider range of concentrations in the air."

The experts advise that vapors from regular gasoline also can re-ignite with similar vigor. By all accounts, it is extremely unwise to assume a fire of any origin - be it gas, ethanol or whatever - is fully extinguished and thus safe to instruct everyone to get back to work once the excitement has died down.

"The guy who turns his back on it is going to get bit," warns Lorenz. It is imperative to immediately call 911 and clear the building, even if you think you have a full compliment of fire extinguishers. "You need to get the fire department rolling," he stresses. "Make the assumption that all gas contains ethanol."

AR-AFFF fire extinguishers, although found in other countries that have a higher ethanol presence, have not yet hit the U.S. market, according to Lorenz.

Until they become available, an ABC/dry chemical model will have to do. Lorenz recommends that every shop should have at least one 30-pound ABC extinguisher properly positioned for an emergency. A wheeled 100-pound (or bigger) apparatus is a must for a larger operation, he said. These units are more expensive, but "it's a lot cheaper than burning down your shop," Lorenz

says. A 30-pounder provides only 30 seconds of discharge; you get about a minute-and-a-half with 100- to 150-pounds of material.

Don't forget, "you can't flood it out with water," says Lorenz, describing how he knocked down vehicle fires prior to the advent of ethanol. When serving as the first firefighter in, he would use his water hose to blast away at the upholstery and other flammables. "Then I look down, and I'm standing in a pool of burning liquid," Lorenz recounts. The second firefighter on the scene is dragging in the foam line to safely finish the job. And that is why having the correct firefighting foam is so important.