



Quick skill Vehicle Fires (Part 1) Hazards Associated with Vehicle Fires

Some of the known hazards facing firefighters when fighting vehicle fires are bumper struts, compressed-gas lifting struts, air bag inflators, plastic fuel tanks, magnesium, and alcohol-based fuels. In addition to these known hazards, there is little or no way for responding personnel to know what the vehicle may be transporting. Toxins released from burning vehicles can have serious long-term effects on the body, which is why full PPE and SCBA should always be worn.



This *Quick Skill* is Part One of a two-part series that identifies some of the potential hazards faced by firefighters when operating at vehicle fires. Part Two will address tactical concerns and approaches for extinguishing vehicle fires.

Possible Hazards Associated With Front End Vehicle Fires:

(“Front End” is defined as from the front bumper to the dashboard)

Front Bumper Struts – From the early 70’s to the late 90’s, energy-absorbing bumpers were attached with pistons on each side. When heated, these struts can explode throwing the bumper with great force in one direction or the other. The only variance depends on how secure the opposing side is attached to the vehicle. Today, these struts are being replaced by crushable bumpers on newer vehicles, but are still found on some late model foreign cars and many older vehicles.

Hood Lifting Struts – These compressed gas struts often explode violently and shoot out like projectiles when subjected to fire. This strut penetrated a FF’s bunker pants and calf after it exploded out of a burning car. Struts all seem to exit the vehicle straight out or at a 45° angle from their original mounting position.



Front Tires – Tires can blow explosively sending burning rubber in all directions.



12v Battery - The battery can explode with shrapnel and acid.

Air Bag Inflators - In the late 80’s manufacturers began using compressed-gas inflators instead of the pyrotechnic type in passenger and side impact air bags. Found in the



steering column, dashboard and the “A” posts, these containers can hold up to 4,500-psi of compressed argon gas. When sufficiently heated, these will deploy the air bag in the usual manner, and the bag will melt away. However, as with the pyrotechnic type, these have been reported to explode and throw shrapnel in all directions. In extreme cases, the inflator housing can even eject penetrating the roof of the vehicle and exploding into shrapnel.



Combustible Metals - Magnesium is a common metal used in transmission housings, radiator housing, wheels, suspension parts; and in some cars, it is used for up to 45% of the exterior engine parts. Sparks seen in the photo are much hotter than our bunker gear is designed to withstand, and can penetrate it.



Possible Hazards Associated With Passenger Compartment Fires:

(“Passenger Compartment” is defined as from the dashboard to the rear seat)

Air Bag Inflators – Air bag inflators can be found throughout the passenger compartment from inside the seats, to the “A”, “B”, and “C” posts and anywhere along the roof rail.



Air Bags – Depending on the vehicle, anywhere from 2 – 17 air bags can be found (Driver’s air bag, the passenger air bag, 2 knee air bags, up to 4 door-mounted air bags, up to 4 seat-mounted air bags, and up to 5 curtain air bags). When the air bag wires short-circuit, the air bags may deploy.

Seat-Belt Tensioners – Seatbelt pre-tensioners are used to tighten the seatbelt in a severe frontal accident. There are 3 types of seat belt pre-tensioners: electrical, mechanical, and pyrotechnic. They all tighten the seatbelt upon sensing a crash. The pyrotechnic types are found on the buckle or ratchet side of the seatbelt mechanism.

Seat Struts – As mentioned, these compressed gas cylinders explode violently and shoot out like rockets when heated by fire. These can be found on third-row seats on some SUVs.

Combustible Metals - Magnesium is commonly used for brackets behind the dashboard.

Possible Hazards Associated With Rear End Vehicle Fires:

(“Rear End” is defined as from the rear seat to the rear bumper)

Rear Bumper Struts – Same hazards as “Front Bumper Struts” above.

Rear Tires – Can blow explosively sending burning rubber in all directions.



Air Bag Inflators – Can be found in the “C” and/or “D” posts.

Trunk Lifting Struts – As mentioned above, these compressed gas cylinders explode violently and shoot out like rockets when heated by fire. They are used on trunk lids and hatchback doors and windows.

Plastic Fuel Tank - Many vehicles have some type of plastic fuel tank.

Pressurized fuel lines - Many vehicles are equipped with pressurized plastic fuel lines. These fuel lines can hold a pressure up to 95-psi. When subjected to fire, these lines can melt and spray burning fuel on firefighters.



Possible Hazards Associated With a Fully Involved Fire:

(“Fully Involved” is defined as from bumper to bumper, or a combination of any 2 of the above mentioned, i.e. front and passenger compartment)

In addition to the previously mentioned hazards above:

Driveshaft Explosions - Like compressed-gas cylinders, drive shafts can produce very violent explosions that produce large amounts of shrapnel.



Alternative Fuels – Nearly all gasoline sold today contains up to 10% alcohol (E10, 10% alcohol, 90% gasoline). Vehicles designed to run on ***flex-fuels*** can operate using ethanol (E85, 85% alcohol, 15% gasoline) or E10. Other sources of fuels include: diesel, propane, hydrogen, and electric battery.