CHESS, Inc.
33 E. Wentworth Ave., Suite 320
West St. Paul, MN 55118
Ph: 651-481-9787
Complete Health Environmental and Safety Services www.chess-safety.com

Staying Grounded

By Janet L. Keyes, CIH, CHESS, Inc.

Do you read the warnings on gas pumps? The ones that say "Static Electricity Spark Explosion Hazard?" Gasoline isn't the only liquid that can create a spark hazard. It can be from transferring or pouring nearly any liquid with a flashpoint close to or less than the temperature of the liquid. If you're using brake cleaner or lacquer thinner in your shop, the liquid is probably at about 70°F. The flash points of those are close to 0°F. Pour some brake cleaner onto a floor to clean up an oil spill, and there's a good chance you'll have a fire.

The flash point is the temperature at which a liquid gives off enough vapors that it can form an ignitable mixture in air. If you take a pan of gasoline outside when it's 0°F and hold a match above the liquid's surface, the vapors will flash. The flash point of gasoline: about -45°F. If you try to do the same with diesel fuel at 0° F, nothing will happen, because the flash point of diesel is around 140 – 160 °F. Because the temperature around us is usually under 100°F, chemicals with flash points below that are particular fire hazards.

All automotive repair shops have gasoline, of course. That's one of the most flammable liquids you deal with routinely. The paints thinned or cleaned up with lacquer thinner have flash points under 100°F. So do many degreasers and brake cleaners.

When these materials are stirred up in any way (pouring, filtering, stirring), they build up electrical charges. How much of a charge depends on the amount of liquid and how much it is agitated. If it's enough of a charge, it could spark. Combine flammable vapors with a spark, and you'll have a fire.

Petroleum products are quite good at building up a charge. Solvents that readily mix with water, such as methanol in windshield washer fluid, aren't as good. Those solvents are more conductive, so they don't keep on accumulating electrical charges.

You've heard of the parlor trick of putting out a lit match in a container of gasoline. It works if you're fast, because what actually ignites is the gasoline vapors, not the liquid. The gasoline evaporates and dissipates, resulting in a range of concentrations, from very high to low, in the air above the container. When the concentration is between about 1% and 7%, a tiny spark will readily ignite the vapors. At higher concentrations, the air/gasoline mixture is too rich to burn. At lower concentrations, it's too lean. Different solvents have different flammable limits.

When you pour that brake cleaner or lacquer thinner into another container, you're agitating it, building up its electrical charge. And it's evaporating, so you're creating a flammable atmosphere just above the container. Those are perfect conditions for fire.

You can control the amount of evaporation by keeping containers closed when they aren't in use. But it's obviously difficult to control that when you're pouring out the product. So, instead, control the electrical charge.

Controlling the buildup of an electrical charge is done by bonding and grounding equipment. Bonding is done to equalize the charges between the two containers. To do it, the metal container from which the liquid is dispensed is physically connected to the receiving container. That can be done by using a bonding wire or even, if you're lucky, by making sure the two containers touch each other. But if you rely on the containers touching, you can't be sure you have a good consistent bond. Plus, you can create a spark when you move the containers so they touch. Using a bonding wire is much more reliable.

Grounding is done by connecting the container to something that goes to earth (to ground). That gives the electrical charge some place safe to go. The best grounds are usually metal rods driven into the ground or cold water pipes. Don't ground to gas lines or to your sprinkler system. Grounding to the sprinkler system is prohibited by the Fire Code, because of the potential for damage to the system from stray electrical currents or galvanic corrosion. And don't connect to just anything made of metal, assuming it's a ground – it has to actually go to earth. We once saw a grounding wire from a drum of flammable liquid connected to a portable wire shelving unit. That's not grounded.

All you need to ground containers is a wire and two clamps that can conduct electricity. The wire doesn't have to be heavy-duty, because it won't be carrying much current. An uninsulated wire allows you to readily check for damage. Scrape enough paint and dirt off your container, or use a clamp that will poke through any coatings, to ensure a good metal to metal connection.

If you dispense from drums kept in a flammable liquids cabinet, ground the drum to the cabinet, and then ground the cabinet. Those cabinets are usually equipped with grounding lugs for just that purpose.

Small containers, such as the five-gallon drums we often see used for thinner, can and should be grounded. There's no cutoff for the size at which grounding isn't needed. Although the static electricity risk from small containers is much less than from large ones, the fire rules do not make an exception for small containers.

Plastic drums can't be grounded, although they can build up static charges. It would be uncommon to see petroleum solvents in plastic drums. More often, those are used for the water-mixed solvents such as methanol, which are not as much of a static charge hazard. Even though you can't really ground those containers, be sure to bond to the receiving container when you dispense, to equalize the charge.

Automotive shops aren't likely to get away from using flammable liquids. But we can reduce the risk. Use them only for their intended purpose. Use with good ventilation. Keep them away from things that spark. Bond and ground.

If you have questions about fire hazards, the use of flammable liquids, OSHA grants, or other safety or environmental issues, contact CHESS at 651-481-9787; toll free at 877-482-4377, or carkey@chess-safety.com. CHESS specializes in helping small to medium sized business with occupational health and safety issues. We have been providing services to the automotive industry for over 20 years.

This article is intended to provide general information (not advice) about current safety topics. To discuss your specific concerns and how CHESS may help, please contact CHESS at 651-481-9787 or chess@chess-safety.com

This article originally appeared in *AASP News* (February 2014).