

SAFETY WITH HOT LIQUID ASPHALT

For properly maintained roads, streets, and highways, hot liquid asphalt material must be applied at one point or another. Although methods will vary, the procedures for applying asphalt have one thing in common: the asphalt products must be heated to a prescribed temperature to perform well. Because transferring, heating, and applying these products can be dangerous, caution and awareness of safety must be kept foremost in an applicator's mind.

Most applications of hot liquid asphalts involve either distributor trucks or crack-seal machines. Safety tips for both will be covered in this tech sheet. Keep in mind that your greatest allies when it comes to ensuring safety are a deliberate approach to operating the equipment and an awareness of what those around you are doing.

Personnel Safety

The high temperatures at which asphalt products must be applied demand that equipment operators and crew members wear personal protective equipment (PPE).

The driver of a distributor truck is unlikely to come in contact with hot asphalt during the application process when he is seated safely behind the wheel. However, a driver faces a greater risk to be burned when refilling the truck or unclogging plugged nozzles. At a minimum, the driver should wear a hardhat, face shield, leather gloves, and a long-sleeved shirt.

During crack-sealing operations, the operator of the wand, squeegee operators, and anyone else working in close proximity to the hot asphalt should wear the PPE as outlined in the following chart.

- **Wand Operators** — must wear head protection with face shield attached, apron, long-sleeved shirt, safety glasses, and leather gloves.
- **Squeegee Operators** — must wear head protection with solid face shield attached, long-sleeved shirt, safety glasses, and leather gloves.
- **Loading Operator** — must wear head protection with face shield attached, apron, long-sleeved shirt, safety glasses, and leather gloves.
- **Operating or Working on the Tar Kettle** — must wear head protection with solid face shield attached, apron, long-sleeved shirt, safety glasses, and leather gloves where danger of spraying or splashing of hot liquid could cause injury from burns.

Operators must observe all “caution” and “warning” signs and placards on the equipment. The warnings are there for a reason: to keep you from getting burned.

Know both the application and safe heating temperatures for all the products your municipality uses. Overheating asphalt products will not only destroy their desirable properties, but the results can be extremely hazardous.

Material Safety

- Identify the safe heating temperature range and “flash point” of the materials. safe heating temperature is the temperature range in which the material can be properly applied to the roadway. Flash point is the temperature at which the material will ignite if oxygen and an ignition source are present.

The flash point of a given material is determined by performing a test, called the Cleveland Open Cup method, in which the material is heated to the temperature at which it will produce a flash

when an ignition source is passed over it. Material safe heating temperatures and flash points can be found on the Safety Data Sheet (SDS) that accompany the materials shipped from the manufacturer. Additionally, this information is printed on the boxes the material is shipped in.



- Avoid allowing any water to enter the machines and equipment. Water will expand rapidly once in contact with hot asphalt products and can cause the products to overflow their tanks and spill onto the workers. Spills are not only a burn hazard to workers, but a potential source for fire or explosion.

Equipment Safety

- Read and fully understand the operator's manuals before operating any equipment that carries, heats, or dispenses liquid asphalt. Keep copies of the manuals on the jobsite for reference. The operator's manual provides valuable information for the safe operation of equipment, as well as for its proper startup, shutdown, and routine maintenance.

- Never substitute "after-market" parts for original equipment-manufactured parts without first consulting the manufacturer. Going to the local auto parts store for rubber hoses for the crack-seal machine could be a costly and dangerous practice. Not all rubber hoses are compatible with the unique ingredients or high application temperatures of some asphalt material. A rupture of a hose under pressure of hot asphalt is hazardous to the operator and to anyone near or passing by the equipment.



- Know the proper procedure for adding more material to the equipment. Before opening access lids, determine whether or not circulation pumps should be on, burners and engines should be shut down, and auger systems should be turned off. All of these and more are important to safe operation.

- Keep a fully charged fire extinguisher rated for burning oil readily available at the worksite.



Safety Around Distributor Trucks

- Always verify the type of material in the truck and the type of material added to the truck. Mixing a cationic (positively charged) emulsion, such as E-3 in PennDOT's specification book, with an anionic (negatively charged) emulsion, such as E-2, will not initially result in an explosion or fire, but the two oils will congeal (glob together) into one large, sticky mess and will not spray out of the nozzles. If the operator then heats the material to get it to spray, a fire or explosion could result from overheating.

Likewise, adding an emulsion to a distributor truck that contains residual cutback or asphalt cement will cause the water in the emulsion to boil and material to spew out the lid like a spout from a surfacing whale. Any workers in the vicinity could be burned.

- Know the proper temperature range of the asphalt products you plan to apply prior to heating them. Proper heating is determined with a working thermometer on the distributor truck. Overheating the asphalt not only endangers workers, but it destroys the good properties of the asphalt, and the product will not perform satisfactorily.

- Never try to unplug a nozzle with the system pressurized. Even if you're successful, you are risking one or more workers getting burned when the plugged material comes out of the nozzle under pressure at somewhere between 30 and 70 pounds per square inch.

- Always wear eye, ear, and face protection and protective clothing for the body when doing any maintenance on the plumbing system of the equipment. Ideally, the material it contains

will be cold and not at operating temperature, but in real life this will not always be the case. The personal protective equipment should be designed to protect the wearer from getting burned.

SAFETY WITH CRACK-SEAL MACHINES

Another piece of equipment commonly used in the application of hot asphalt is the crack-seal machine. A number of manufacturers produce this equipment, but most machines fall into one of two basic design types: direct-heat and double-wall with heat-transfer oil.

Direct-heat units use a flame to heat a metal plate at the bottom of the tank. The other design, a double-wall unit, consists of an inner tank surrounded by heat-transferring oil, which is used to heat the asphalt for crack sealant that is in the inner tank.

Here are some safety practices while working with crack-seal machines:

- Make sure the operator is familiar with the equipment and fully trained in its operation.
- Never heat the material in an enclosed area. Always park the equipment outside before lighting.
 - Be aware of pinch points, and keep hands, feet, and clothing away from all moving parts.
 - Follow the instructions for startup and shutdown of burners and pilot lights.
 - Replace any hoses that show excessive wear, are fraying, or feel as if they may split. Be sure all fittings and joints are tight.
 - Make sure all auger and agitator systems have stopped completely before opening the lid to the material compartment to add new material.
 - In the event of material overflow or spillage, immediately shut off burners and other flame sources to prevent a fire.
 - Do not mix different ISO grades of heat-transfer oil. Different heat-transfer oils expand at different temperatures.
 - Do not mix different crack-sealing materials without first checking with the supplier.
 - Do not add kerosene or diesel fuel to crack-sealing materials.
 - Never exceed the manufacturer's heating and application temperatures for the crack-sealing material.
 - Follow the equipment manufacturer's recommendation for cleaning and flushing of equipment, hoses, etc.
 - Do not apply heat (for example, from a torch) directly to any wand, hose, or other part except where authorized by the manufacturer.
 - Make sure operators of the sealant wand are wearing a heavy-duty face shield.
 - Remove a clogged hose or wand from service until cleared by boiling or other manufacturer-approved method.

- Have a qualified mechanic check all equipment prior to placing it in service as well as prior to the beginning of crack-sealing season.

FIRST AID TIPS

- Have an adequate supply of cold water and first-aid kits



on or near the crack-seal machine.

- If a worker is burned with hot asphalt, seek medical attention immediately. The National Asphalt Pavement Association suggests applying cold water, not ice, to the burned area. **Do not remove** the asphalt from the burn victim; let medical personnel do it.

This information is intended to increase your awareness of the hazards of working with hot asphalts and provide precautions that you can take to reduce or eliminate the chances that you or one of your co-workers will become a burn victim.



Have cold water nearby in case you need to apply it to an asphalt burn.

This document is a revised tech info sheet developed by John Hopkins in 2001.

