



Asphalt

Safety Training Program

Introduction

Asphalt is a strong adhesive used for road paving, roofing tar, roll-roofing, roofing felt, shingles, pipe covering, floor tile, waterproofing, and many other products and processes.

Asphalt is a dark brown or black substance derived from crude oil. It may be a solid, a semi-solid, or a liquid. Other names for asphalt include road tar, road binder, mineral pitch, petroleum pitch, petroleum asphalt, and seal-coating material.

Asphalt is often mistakenly confused with tar, coal tar, or pitch because the appearance is similar and the substances may be used interchangeably in many industrial processes. Tar and pitch are derived from coal products that are chemically and physically different.

There are two main types of asphalt: straight-run asphalt (asphalt cement) and air-blown asphalt (oxidized asphalt). Straight-run asphalt is used for paving roads, airport runways, and parking lots. Because of its solid to semi-solid nature, it must first be cut with a solvent to bring it to a more liquid state. This is known as cut-back asphalt. Highway workers are most likely to use straight-run asphalt. Air-blown asphalt has a high softening point and is used primarily in roofing, pipe covering, and similar situations.

Millions of tons of asphalt are produced and used every year in the paving and roofing industries. Over a half-million workers are exposed to fumes from asphalt. Health effects from exposure to



asphalt fumes can include headache, skin rash, sensitization, fatigue, reduced appetite, throat and eye irritation, cough, and skin cancer.

There are currently no specific Occupational Safety and Health Administration (OSHA) standards or directives for asphalt fumes. However, exposures to various chemical components of asphalt fumes are addressed in specific standards for general industry, such as the use of personal protective equipment (PPE).

Hazards

There are two main hazards associated with asphalt:

- fire and explosion hazards; and
- health hazards associated with skin contact, eye contact, and inhalation of fumes and vapors.

Fire Prevention and Control

Since asphalt products are often stored and handled at elevated temperatures, fire prevention is extremely important.

One of the greatest hazards in handling hot asphalt is exposing it to a source of ignition. Sparks, electricity, open flames, incandescent material (a lit cigarette), or other possible ignition sources should be prohibited or otherwise strictly controlled in the vicinity of asphalt operations.

Distributors

Asphalt that is applied at temperatures above flash point is especially vulnerable to combustion. For example, applying a prime coat with a distributor involves using cutback asphalt heated above its flash point. If a fire starts at the spray bar it may spread through asphalt deposits on the distributor chassis and destroy the vehicle. Therefore, asphalt distributors should be kept clean and free from asphalt build up.

Before spraying begins, the burners must be shut off. If practical, the hot parts of the burner should be permitted to cool.

Exterior parts of the distributor truck exhaust systems should be kept clean by wire brushing to remove debris that could catch fire and fall in the path of the spray bar.

When spraying is in progress, there is always the danger of a fire starting from a cigarette or match thrown down by a passerby. Posting a warning sign with the traffic signs when spraying is underway is advised. As an example: "Please do not throw cigarettes. Spraying operations are underway."

A distributor spray bar fire can be put out quickly if dealt with in the early stages. The spray bar must be shut off at the earliest possible moment by closing the spray valve, or, if necessary, by stopping the pump.

To help ensure success, the distributor crew should be trained to put out this kind of fire. Store

dry chemical or carbon dioxide extinguishers in the cleanest place on the vehicle. Keep a second extinguisher available in case the first fails to operate.

Asphalt is flammable if overheated when oxygen is present. Some asphalt cements and air-blown asphalts are not combustible until heated above 450 °F (232 °C).

The ability of asphalt to catch fire varies with the type and amount of solvent. Therefore, rapid-curing cut-backs are the most likely to catch fire because the solvents have flash points near those of gasoline and naphtha. Medium-curing cutbacks contain solvents with a flash point near that of kerosene. Slow-curing cut-backs contain oil of lower volatility and higher flash point as a solvent, and therefore these cut-backs are the least flammable.

Asphalt cements and oxidized asphalts require heating to high temperatures for transfer and application. The resultant high temperature materials can cause severe burns. Precautions are necessary to prevent injury. Emulsified and cut-back asphalts may also be heated enough to cause severe burns on contact.

Personal Protective Equipment

OSHA requires employers to use personal protective equipment (PPE) to reduce employee exposure to hazards when engineering and administrative controls are not feasible or effective. Employers are required to identify all exposures to hazards in the workplace and determine if PPE is required to protect their workers.

If PPE is used to reduce the exposure of employees to hazards, according to 29 Code of Federal Regulations (CFR) 1910.132, a written PPE program must be developed and maintained. This program should:

- identify and evaluate hazards in the workplace;

- determine if PPE is an appropriate control measure;
- determine how PPE is selected, maintained, and evaluated;
- establish types of training for employees using the PPE; and
- evaluate the effectiveness of PPE in preventing employee injury or illness.

PPE is necessary to protect workers from asphalt burns and irritation. Many of the solvents used to cut asphalt can be absorbed through unprotected skin into the bloodstream. The solvents can then travel throughout the body causing damage to different organs.

The types of PPE recommended for use when filling pouring pots and handling or pouring heated asphalt include:

- an 8-inch (200-millimeter) minimum-sized face shield;
- loose clothing in good condition with collars closed and cuffs buttoned at the wrist;
- thermally-insulated gloves with gauntlets that extend up the arm and are worn loosely for easy removal if covered with hot asphalt;
- safety boots with laced tops at least 6 inches (150 millimeters) high;
- pants without cuffs that extend over the tops of the boots;
- barrier creams and lotions to protect against skin irritation caused by protective clothing; and
- long-handled sprayers with flexible hoses when hand-applying emulsified asphalts for tack coats or cut-back asphalts for prime coats.

First Aid

Whenever a person is injured from exposure to asphalt fumes, cold asphalt, or hot asphalt, get medical attention immediately. To prevent the possibility of future medical complications, have a physician examine the employee even if the injury does not appear to be serious. Use the following procedures:

Asphalt Fumes

- move the employee to fresh air;
- if breathing is difficult, call 911;
- if breathing stops, start artificial respiration and call 911; and
- have all injured employees examined by a physician.

Cold Asphalt

- remove cold asphalt from the skin, preferably with waterless hand cleaner or warm mineral oil heated to 110 °F (43 °C);
- wash skin thoroughly with soap and water;
- remove contaminated clothing and shower employee at once;
- flush out contaminants from eyes for at least five minutes with water, lifting upper and lower eyelids occasionally; and
- have the injured employee examined by a physician.

Hot Asphalt

- apply cold water or an ice pack to asphalt skin burns;
- if burns cover more than 10 percent of body (about equal to the surface of one arm or half of a leg) apply lukewarm water to alleviate pain and to remove the heat in the asphalt as rapidly as possible;
- do not remove asphalt from the skin;
- do not bandage the burn; and
- have the injured employee examined by a physician.



Training

Train all workers who are exposed to asphalt fumes about the hazards and safe procedures. This training should include specific information about the solvents used in mixing the asphalt.

Make Safety Data Sheets (SDS) available to all employees assigned to work with or near asphalt processes. The SDS should include information on the solvents in the asphalt mix and information on:

- the flash point;
- the boiling point;
- the acute and chronic effects of the chemicals;
- the recommended PPE; and
- fire and emergency cleanup information.

Engineering Controls

The following engineering controls can help eliminate or reduce employees' exposure to chemicals and physical hazards through the use or substitution of engineered machinery or equipment.

Substitution

The best method of controlling exposure to asphalt fumes and solvent vapors is to substitute a safer asphalt mix. If explosion hazards are a problem in a paving operation, MC-250 may be substituted for RC-250. The flash point of the mix is nearly doubled, which means that the mix is less likely to ignite.

If the toxicity of the chemical is a problem, the employer may be able to order an asphalt mixture which contains a less toxic solvent, such as using toluene instead of benzene.

Enclosure

Enclosing the process where the asphalt is used is not possible in road paving and roofing operations. It may, however, be possible for smaller operations such as pipe covering processes.

Mechanization and Automation

Certain parts of asphalt processes may be mechanized. For example, stirring asphalt in a tar kettle exposes the worker to asphalt fumes, solvent vapors, and potentially severe burns. Mechanical devices can accomplish this task without exposing the employee to such risks.

Local Exhaust Ventilation

Local exhaust ventilation can often control worker's exposure to fumes and vapors, particularly when it is impossible to enclose the operation.

General Dilution Ventilation

General dilution ventilation involves blowing uncontaminated air into a work area in an attempt to remove contaminants from the worker's breathing zone. However, the use of fans and blowers is often not adequate to remove the contaminants. This is generally not the most effective way of removing contaminants but may serve to supplement local exhaust ventilation.

Respiratory Protection

Engineering controls are the preferred method for controlling worker's exposure to fumes and vapors. However, if engineering controls are not possible, respirators should be worn. In selecting the proper respirator, knowing all the hazards workers are exposed to is important. A NIOSH-approved dust respirator controls exposure to asphalt fumes, but will not protect the worker against toxic vapors given off by the solvent in the mix. In situations where vapors are the concern, the minimum requirement is a full-face mask respirator with organic vapor and particulate cartridges. The possibility of eye irritation makes a half-face mask respirator inadequate.

Written Respirator Program

Improper use of respirators is dangerous. The employer should have a written respirator program that looks at workplace conditions, worker training requirements, respirator fit testing, and medical exams, as described in OSHA standard 29 CFR 1910.134.

Asphalt Safety Reminders

The following eight reminders are important to include in an effective asphalt safety training program:

1. When working with any asphalt material, avoid prolonged contact of the material with skin.
2. Excessive breathing of asphalt materials should be avoided.
3. Wear PPE (heavy work gloves, old clothing, protective shoes, etc.) to protect against asphalt spatters.
4. When chipping or chiseling old blacktop, wear eye protection. Do not chisel with a carpenter's hammer. It is not designed for this type of job and may chip. Use a hand-drilling hammer or machinist's hammer.
5. Keep all asphalt materials away from high heat. Keep solvent-thinned materials away from open flames.
6. Close containers after each use.
7. Always follow the manufacturer's instructions for the product used.
8. Remember to practice safety. Don't learn it by accident.

Review Questions

1. What are some of the health risks from exposure to asphalt fumes?
2. What are the two main hazards associated with asphalt?
3. Why is it important to wear protective clothing when working with asphalt?
4. What information must the MSDS contain to protect the worker?

Answers

1. Health effects from exposure to asphalt fumes can include headache, skin rash, sensitization, fatigue, reduced appetite, throat and eye irritation, cough, and skin cancer.
2. The two main hazards associated with asphalt are fire and explosion hazards, and health hazards associated with skin contact, eye contact, or inhalation of fumes and vapors.
3. Protective clothing is necessary to protect workers from asphalt burns and irritation. In addition, many of the solvents used to cut asphalt are readily absorbed through unprotected skin into the bloodstream, where they can travel throughout the body and cause damage to many different organs.
4. The SDS should include specific information on the solvents present in the asphalt mix and should list all pertinent information including flash point, boiling point, acute and chronic effects of all chemical ingredients in the solution, recommended PPE, and other fire and emergency cleanup information.



Safety Violations Hotline

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Division of Workers' Compensation (DWC)
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