Dry Cleaning Exposures: Controlling Your Onsite Risks

Introduction

Dry cleaning establishments have specific hazards to their employees that can cause both injury and illness, some of which are severe. Specifically, there is a risk of fire, chemical poisoning, ventilation inadequacy and ergonomic risks. To keep your employees safe while performing dry cleaning duties, consider the following hazard recommendations outlined in this document.

Hazard: Perchloroethylene (PERC) is the most commonly used dry cleaning solvent and can enter the body through respiratory and skin exposure. As a result, depression of the central nervous system, damage to the liver and kidneys, impaired memory, confusion, dizziness, headache, drowsiness, and eye, nose and throat irritation can occur. In addition, repeated skin exposure can cause dermatitis.

To reduce exposure to dry cleaning solvents, a comprehensive control approach should be followed involving engineering controls, work practices and personal protection.

Material Substitution

- Use alternative cleaning media, such as wet cleaning and petroleum-based solvents and machine to reduce the occupational exposure to PERC.

Isolation

- Large dry cleaning facilities should use satellite stores that do not perform dry cleaning duties on the premises and new shops should be located in stand-alone buildings to reduce the risk of contaminating adjacent buildings and food stores.
- Within shops, dry cleaning machines should be isolated from other work areas. Since the majority of PERC emissions originate from the machine, isolating employees from machines will reduce exposures.

Machine Design

- Select modern dry cleaning machines with both a refrigerated condenser and carbon absorber to reduce exposures during machine loading and unloading. These processes are the greatest source of worker exposure.

Maintenance

- Maintenance of dry cleaning machines should be done properly to prevent the performance of the machines from degrading, which may result in solvent exposures. These include ensure vapor recovery systems are in good working order and checking for liquid and vapor leaks on equipment piping and ductwork. When available, follow the maintenance recommendations from the manufacturer.
- Employees should wear the proper personal protective equipment (PPE) to reduce their exposure to PERC during maintenance activities.

Ventilation

- Use General Ventilation (also known as Dilution Ventilation) to supply conditioned fresh air and to exhaust contaminated air from the general workroom area. This can provide temperature control and reduce background levels of PERC in the shop. Air changes in the work room should occur every **five minutes** with a minimum of 30 cfm of outside air per person. Supply and exhaust systems should move air from a clean area to a less clean area to reduce the movement of contaminated air into other parts of the establishment.
- Use exhaust fans to pull fresh air through the dry cleaning area, drawing vapors away from employees. Contact a qualified ventilation system contractor for more assistance.
- Use Local Exhaust Ventilation (LEV) to capture vapors at their nearest source of release. Dry cleaning machine that use LEV as a control should have an inward air velocity of 100 fpm through the loading and unloading door (known as the door's face velocity). This helps reduce solvent vapors from escaping into the shop by providing a draft of clean air passing over the items being removed from the machine. Exhaust from the machine should also be ducted to a point five feet above the roof to prevent re-entry into the working environment or entry to any adjacent establishments.
- If your shop uses older machines without built-in exhaust ventilation, retrofit an external ventilation hood outside the machine door. Airflow capacity in cfm through the retrofit hood should be less than 100 times the door opening area in square feet. The exhaust hood should be isolated away from cross drafts caused by general ventilation, floor or other shop fans and high personnel traffic areas.
- Emergency ventilation systems should be available to control solvent vapors in the event of a solvent spill or leak.

Work Practices:

- Employees should not open the door of the dry cleaning machine while it is running; it should be kept closed except during loading and unloading. Employees should also keep their heads out of the machine and should stay as far away from the door during loading and unloading as possible. A tool with a long handle could also be used to retrieve clothing at the back of the drum.

Hazard: Many hazardous chemicals are commonly used in dry cleaning shops to remove garment stains. Workers performing stain removal may be exposed to toxic chemicals through skin absorption, eye contact or by inhaling the vapors. The primary hazard is dermatitis, though, from chronic or acute exposure. In addition, dilute hydrofluoric acid, found in products used to remove rust stains, may cause several chemical burns with deep tissue destruction that may not be evident until several hours after prolonged contact.

To reduce exposures, the spotting process should be isolated from other employees.

Ventilation:

- Use an LEV system to reduce solvent exposures during the spotting process. An exhaust hood should be located near the source of the spotting chemicals to prevent vapors from entering the worker's breathing zone. A slot hood at table level or a downdraft table exhausting to the outside of the building provides solid protection for workers.
- Use a make-up air supply in conjunction with an exhaust system.

Work Practices:

- Spotters should be trained in selective pre-spotting and should know the proper techniques for stain removal. The spotter should recognize stains that will be removed in the dry cleaning process that do not require pre-spotting.
- Spotters who are trained to reduce the number of treated garments will reduce their personal exposures.

PPE:

- Spotters should use PPE such as chemical resistant gloves and goggles to reduce dermal exposure.
- Gloves should be made of solvent-resistant materials.
- Barrier creams may also be used in addition to gloves.
- Place an easily accessible eye wash station near the spotting area. If chemical contamination occurs, prompt eye flushing for at least 15 minutes can help limit the extent of the damage.

Hazard: Dry cleaning shops contain many elements necessary for uncontrolled fires, such as fuels, ignition sources and oxygen. There are also potential combustible materials including furniture, garments, lint and portions of the building. The greatest risk of fire and explosion exists if the shop uses a petroleum-based solvent in the machines. In addition, ignition can be triggered by a burning cigarette, heated equipment (press or frictional spark inside the solvent re-claimer cage) or from static electricity within the re-claimer.

To reduce exposures, follow fire codes and standards that address company occupancy limits, building egress and appropriate fire extinguishers, smoke detectors, fire suppression systems and related fire issues. Code compliance will reduce the risk of loss from fire and may also reduce your property insurance premiums.

Solvents and Machines

- Use new petroleum-based solvents that have higher flashpoints (above 131° F).

Building Features

- Enforce a “No Smoking” policy and post “No Smoking” signage for employees and patrons.
- Identify at least two exits in the event of a fire in the general area and two exists from the dry cleaning rooms. Keep fire exit routes clear of clutter.
- Separate the dry cleaning room from the rest of the facility by a partition with a two-hour fire resistance rating.
- Construct the floors and ceilings with fire-resistant material.
- Equip dry cleaning rooms containing petroleum-based solvents with an emergency drainage system that directs solvent leaks and fire protection water to a safer location.

Fire Safety Alarms

- Install an approved wet-pipe sprinkler in the dry cleaning room.
- Provide at least two approved 10-BC portable fire extinguishers inside the dry cleaning room and other suitable fire extinguishers throughout the shop, according to appropriate codes.
- Perform routine maintenance to prevent accumulation of fluff, lint or waste that could ignite or cause a fire to spread rapidly.

Handling Combustible Liquids

- Place tank storage rooms and dry cleaning rooms at the lowest level above the grade.
- Close containers with flammable or combustible petroleum-based solvents to prevent evaporation. Do not transport solvents in open containers. Instead, pump them through rigid iron or steel pipes to prevent ignition.
- Pay particular attention to static electricity. If garments are transferred from a washer using solvents to a dryer, bond these machines together electrically and ground the equipment.

Hazard: Ergonomic risk factors increase the threat of injury to the musculoskeletal system of employees. Musculoskeletal disorders are caused by repetitive motions, awkward postures, excessive reaching and precision gripping. In the dry cleaning industry, ergonomic risks occur during garment transfer, pressing and bagging. These activities, combined with high work rate and frequency, may cause physical discomfort and problems for workers. Injuries can include damage to tendons, muscles, nerves and ligaments of the hand, wrist, arm, shoulder, neck and back.

By utilizing engineering controls and work practices, you can control ergonomic hazards during garment transfer, pressing and bagging activities.

Work Station Design and Work Organization:

- Redesign workstations to eliminate the need to excessively reach and use awkward postures. Some dry cleaning equipment manufacturers also market adjustable height workstations.
- Employees should take frequent breaks and should rotate amongst stations to control the hazards of repetitive tasks when engineering changes are not technically feasible.

Garment Transfer:

- Use dry-to-dry cleaning machines that eliminate garment transfer. If you must use transfer machines, train workers to modify their work techniques by handling no more than 15 to 20 pounds of clothing at a time.
- Modify the workplace to reduce the amount of bending and reaching required by employees. For instance, place the bottom of clothing carts at least 16 inches off the ground. Or, use clothing carts with spring-loaded bottoms to raise the clothes to 16 inches as the cart is unloaded. Position the cart to reduce reaching distances and, consequently, place less stress on the back and shoulders.

Multi-Press Stations:

- Use utility presses that permit vertical and horizontal adjustment at the point(s) of operation.
- Place hand iron platforms near employees to reduce excessive reaching. Attach the iron to a suspension or counterbalancing device to reduce the amount of weight lifting by the presser.
- Use proximity sensors instead of two-hand controls to reduce stress on the fingers.
- Use thick, closed-cell silicone floor mats with a beveled edge to reduce leg fatigue and minimize tripping hazards.

Shirt Pressing Stations:

- Position the height of the cabinet bag sleever hand controls close the point of operation to reduce excessive reaching.
- Use proximity sensors instead of dual-hand activation buttons to reduce stress on the worker's fingers.
- Use a "button pulling" device to aid the worker in pulling the collar button through the button hole. This will reduce the repetitive pinch postures necessary during manual pulling.

Garment Bagging

- Use vertically adjustable bagging poles with a hydraulic pedal control system. Maintain the bagging poles by ensure that they are straight and lightly lubricated with a non-staining oil.

For more information on dry cleaning hazards and risk control solutions, call

Irving Weber Associates or visit www.cdc.gov/niosh/topics/dryclean/.

Source: NIOSH