

## Waste and Emission Reduction Alternatives for Dry Cleaners

Perchloroethylene (perc) is a commonly used solvent in the dry cleaning industry. It is released into the environment from clothes transfer, waste removal, and fugitive or uncontrolled emissions. Many opportunities exist to reduce perc use, including:

- Improved operating and maintenance procedures
- More efficient equipment
- Incorporation of substitute cleaning products and methods

A number of benefits can be gained by taking steps to reduce perc from dry cleaning operations. These include:

- Saving money on perc purchase and disposal
- Reducing employee exposure to perc
- Providing greater environmental protection
- Reducing regulatory requirements
- Reducing liability

Perc purchasing costs continue to rise. This is partly due to taxes and fees levied in several states to support perc cleanup funds. In addition, reducing perc use and its release to the environment helps meet many regulatory requirements. These requirements include:

- The Occupational Safety and Health Administration (OSHA) 25 parts per million (ppm) limit during an eight hour period for employee exposure (100 ppm at the Federal level)
- The Clean Air Act National Emission Standards for Hazardous Air Pollutants (NESHAP) for perc dry cleaning facilities
- Hazardous waste requirements

### Operating and Maintenance Practice

The first step in using products, or existing equipment, more efficiently is to gain an understanding of their use through employee training on equipment operation and maintenance. Whether a dry cleaner has transfer or dry-to-dry equipment, both run more efficiently when operated and maintained according to manufacturer specifications. There are four categories of operating and maintenance practices:

1. The machine itself
2. Auxiliary equipment
3. Control devices
4. General housekeeping



This waste and emission reduction guide for dry cleaners provides an overview of improved operating techniques, upgraded equipment, and substitute or alternative cleaning products to help cut costs by reducing perc use.

The following section of this guide provides general recommended operating and maintenance practices. Dry cleaners should always consult equipment operating manuals from manufacturers and service companies for specific recommendations on the machine and control device that they operate.

## Machine Maintenance

Regular machine maintenance procedures involve checking for leaks around door seatings and gaskets, hose connections, pipe fittings, exhaust dampers, ductwork, lint trap lids, and water separators. In addition, certain component parts should be cleaned regularly, including condensing coils, strainers and the lint bag.

## Auxiliary Equipment

Auxiliary equipment includes filters, water separator, distillation units, and muck cookers.

- Regularly clean and change filters. Clean the perc/water separator tank and steam/condensation coils (if necessary).
- Adjust perc/water separator correctly, and check seals, gaskets and vents for leaks.
- Solvent containment troughs are a safety measure for new or existing machines. The machine sits in the trough which is designed to capture solvent that might be spilled while adding solvent, cleaning the still, or from a broken fitting or leaking tank on the machine.

## Control Devices

Control devices may include external refrigerated condensers and carbon adsorbers.

- For either of these devices, lint filters should be cleaned daily, and lint should be removed monthly from refrigerated condenser coils.
- Check for leaks regularly around gaskets, seals, valves and ductwork.
- Carbon adsorbers should be desorbed daily and perc concentrations in exhaust air measured weekly.
- For units equipped with refrigerated condensers, temperature measurements

should be recorded weekly at both the inlet and outlet to the condenser for transfer machines and at only the outlet for dry-to-dry machines.

- Logs to record perc concentration readings for units equipped with carbon adsorbers and temperature readings for units equipped with refrigerated condensers are provided on our website.

## General Housekeeping

General housekeeping practices include:

- keeping lids on all containers,
- properly labeling all perc and waste containers,
- keeping machine doors and traps closed,
- sizing garment loads correctly,
- using spigots, pumps and funnels when transferring perc and waste materials.

Many of these practices are also required under the perc dry cleaning NESHAP.

## Equipment Upgrades

The price of perc continues to rise. Dry cleaners that use perc may want to consider upgrading to more efficient equipment to reduce perc loss, which will in turn reduce the amount of perc that must be purchased.

## Dry-to-Dry Machines

Switching from traditional transfer machines to a more efficient refrigerated dry-to-dry machine eliminates garment transfer, and can reduce perc use and purchase in a given year by as much as 90 percent.

- The newest dry-to-dry machines are equipped with a refrigerated condenser, which is very efficient at recovering perc and recycling it back through the machine.
- The new, tighter machine design also significantly reduces fugitive emissions. Perc recovery from waste is increased with the new spin-filter design or disc filtration, resulting in less waste generated, lower perc emissions from waste removal, reduced operator exposure to perc, and lower overall perc loss and cost for disposal.

Emission-free still sludge is another feature of new machines that dramatically reduces perc in sludge and lowers operator exposure to perc fumes. With this system, the sludge is pumped from the still to a waste barrel with fumes vented back into the cleaning machine. Finally, new machines are equipped with a perc drying sensor which runs through a microprocessor and monitors perc concentrations in the clothes by sensing perc returning from the condenser during drying. When properly programmed, it prevents operators from short cycling loads with the inherent loss of perc to the atmosphere and exposure of operators to excess vapors.

## Refrigerated Condensers

If purchasing a new refrigerated dry-to-dry machine is not cost effective for a dry cleaner, a refrigerated condenser could be added to a non-refrigerated, dry-to-dry or transfer machine. Furthermore, such modification may be necessary to ensure compliance with the perc dry-cleaner NESHAP.

## Carbon Adsorption Units

Carbon adsorption units may be added to refrigerated dry-to-dry machines to achieve greater perc recovery. However, machines with refrigerated condensers work so well at recovering perc that adding a carbon adsorber to a newer machine may not be cost effective. Additionally, traditional carbon adsorbers require a high level of maintenance, and the carbon should be desorbed daily to ensure effective removal of perc from the vent stream.

Once the carbon adsorption sites are filled, perc is not captured efficiently if the units are not maintained. Also, over time, the carbon does not desorb as effectively and eventually it would need to be replaced in the unit. New carbon units that desorb with heat are not as costly to operate, and do not produce large quantities of contact water from steam usage.

## Alternative Cleaning Systems

In any industrial application, minimizing solvent use is a desired goal to cut costs, reduce employee exposure, protect the environment and reduce the burden of environmental

regulations. Alternatives to solvent cleaning are rapidly gaining acceptance in many different types of cleaning applications.

Minimizing perc use in solvent cleaning of garments is also a desired goal for the above reasons. Some alternatives are gaining acceptance slowly, such as aqueous cleaning. Alternative garment-cleaning systems are generally used in combination with one another. They are not necessarily a total replacement of perc dry cleaning; but, by using them in combination, reliance on perc can be cut back, thereby minimizing perc use.

Many dry cleaning facilities are using petroleum-based cleaners, which are much less toxic than perc, require much less monitoring, and are cheaper to operate. Depending on the total dryer capacity of facilities using petroleum cleaners, the requirements of New Source Performance Standards (NSPS) Subpart JJJ may apply.

## Aqueous Cleaning

Aqueous, or wet, cleaning may have the potential to replace perc cleaning for 30-100 percent of garments. This process uses water and detergents in temperature and agitation computer-controlled washing and drying machines.

These machines can accommodate most dry-clean-only garments because:

- They reduce agitation during washing
- Increase extraction of water prior to drying
- Use specifically formulated wet-cleaning soaps and spotting agents
- Heat and moisture content are closely monitored during the drying process.
- Wet cleaning may be preceded by spotting, steaming or hand-washing techniques.

The wet cleaning system may be operated in tandem with a perc cleaning unit to meet cleaning needs and to help operators gain confidence in the wet system's cleaning abilities. A wide range of garments can be run in the wet-cleaning unit, including:

wedding gowns, wool suits, silks, cottons, leather and bead-trimmed garments, comforters, and some rayon-acetates. Customers and shop owners report good cleaning, brightness and fresh-smelling clothes, with few customer complaints.

A number of shops are also opening up across the country as dedicated wet cleaning shops. Most dry cleaning industry analysts agree that wet cleaning is a key part of the future of professional garment cleaning.

## Horizon Technologies

Even more revolutionary cleaning systems are on the horizon, such as:

- dry wash, which is a carbon dioxide technology that does not use solvents and may be more effective than water-based technologies in the future, or
- ultrasonic cleaning, which is also being tested as an innovative cleaning method with many applications. Early testing on fabric swatches has shown that adequate cleaning is achieved for most soils, without redeposits occurring.

## Environmental Certification

Dry cleaners who wish to become a Certified Environmental Dry Cleaner must pay a fee and pass an examination. The certification covers equipment operating procedures, environmental regulations and proper waste handling, and is offered through the International Fabricare Institute. A self-study guide is available from the Professional Testing Corporation to prepare for the examination.

## Sources For More Information

### Oklahoma Department of Environmental Quality

Pollution Prevention and Small Business Assistance, Office of External Affairs  
Phone: (405) 702-7197, (405) 702- 8179, or (800) 869-1400  
Website: [www.deq.ok.gov](http://www.deq.ok.gov)

### Professional Testing Corporation

Phone: (212) 356-0660  
Dry cleaner environmental certification handbook

### Drycleaning & Laundry Institute

14700 Sweitzer Lane  
Laurel, MD 20707  
Phone: 301-622-1900 (or) 800-638-2627  
Fax: 240-295-4200  
Website: [www.dlionline.org](http://www.dlionline.org)  
E-mail Address: [techline@dlionline.org](mailto:techline@dlionline.org)  
International membership and program information  
Certification and training