



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:

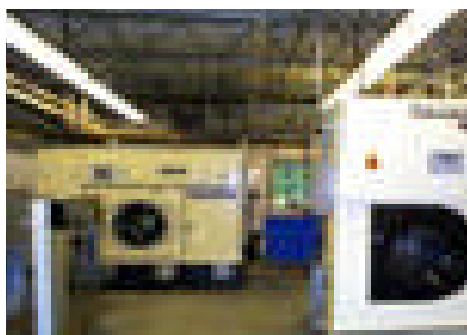
- Saving money on perc purchase and disposal
- Reducing employee exposure to perc
- Providing greater environmental protection
- Reducing regulatory requirements
- Reducing liability

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 Standard for Hazardous Air Pollutants (NESHAP) for perc dry cleaning facilities
- Hazardous waste requirements

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.

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

The following section of this guide provides general recommended operating and maintenance practices. Dry cleaners should always consult equipment- operating manuals from manufacturer 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. These include: 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. Also 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 or 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.
- Temperature measurements should be done daily on refrigerated condenser units on exhaust for dry-to-dry and for transfer dryer/reclaimer units and on inlet and exhaust streams for transfer washers to ensure that these units are operating optimally.

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

Dry cleaners that use perc may want to consider upgrading to more efficient equipment that significantly reduces perc loss, thus cutting back on perc purchase. Perc costs continue to rise (just under \$10.00 per gallon in 1997) due to taxes and fees, some of which are designed as an incentive to discourage perc use.

Dry-to-Dry Machines

Switching from the more 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. In addition, 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 the 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 nonrefrigerated dry-to-dry or transfer machine and may be required to meet the perc dry cleaner NESHAP. Refrigerated condensers cost \$7,000-8,000 installed, compared to a new dry-to-dry machine that starts at \$28,000 installed for a 30-pound capacity machine.

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 for 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 make them effective at removing 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 exist and 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. By using them in combination, reliance on perc can be cut back, thereby minimizing perc use.

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
- Closely monitor heat and moisture content during the drying process.
- Wet cleaning may be preceded by spotting, steaming or handwashing 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," a carbon dioxide technology. It does not use solvents and may be more effective than water-based technologies in the future.
- Ultrasonic cleaning 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 to prepare for the examination from the Professional Testing Corporation.

Sources For More Information

Oklahoma Department of Environmental Quality

Pollution Prevention Program & Small Business Assistance Program

Customer Service Division

(405) 702-9100

(800) 869-1400

www.deq.state.ok.us

International Fabricare Institute

12251 Tech Road

Silver Spring, MD 20904

Phone: 301-622-1900

Fax: 301-236-9320

www.ifi.org

Contact Person: David J. Uchic, Vice President/Communications

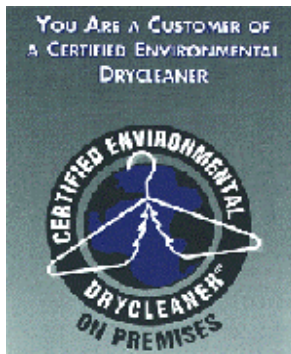
E-mail Address: communications@ifi.org

- International membership and program information
- Certification and training

Professional Testing Corporation

(212) 356-0660

- Dry cleaner environmental certification handbook



This publication is issued by the Oklahoma Department of Environmental Quality as authorized by Mark S. Coleman, Executive Director. 300 copies have been printed at a cost of \$0.014 each. Copies have been deposited with the Publications Clearinghouse of the Oklahoma Department of Libraries.