



# INFO

## Dry Cleaning & Air Quality Requirements

Dry cleaners are located throughout Spokane County, typically near residential areas for customer convenience. Solvents used in dry cleaning processes often contain hazardous substances that may be released to the air. To reduce public exposure, dry cleaning operators must comply with air quality requirements enforced by Spokane Regional Clean Air Agency (Spokane Clean Air).

### Dry Cleaning Solvents

Most of the air pollution from dry cleaning is from the evaporation of solvents used in the cleaning process.

**Perchloroethylene (PCE)** is a commonly used dry cleaning solvent. **Petroleum solvents** are also used, such as **Stoddard** solvent, and less volatile, petroleum **hydrocarbon cleaning solvents**, such as **DF2000**.

PCE is a hazardous air pollutant and a suspected cancer-causing chemical. Petroleum and petroleum-derived hydrocarbon solvents contain volatile organic compounds (VOCs) and are highly flammable.

Dry cleaning machines use solvents for cleaning garments. Solvent is removed from the cleaned garments during the drying cycle, where heated air is passed through the garments to evaporate the solvent. At the end of the drying cycle residual solvent, contained in the heated drying air, is routed through a refrigerated condenser, where it is reclaimed. The solvent is collected, filtered and returned to the work tanks.

With the use of refrigerated condensers, emissions from dry cleaning operations have decreased significantly. Emissions can still occur if the refrigerated condenser isn't operating properly, when machine doors are opened to remove clothing, when filters are changed, when clothing is removed prematurely and not fully dried, through leaks or spills from the machine, and when solvent containing materials are left in open containers.

### Air Quality Requirements for PCE Machines

Dry cleaning operations are subject to state air quality regulations; Washington Administrative Code (WAC) 173-400-075(8) PCE dry cleaners and 173-400-040(4) fugitive

emissions, administered in Spokane County by Spokane Clean Air. Regulations focus on equipment, operations, and practices that affect emissions, such as temperature monitoring of refrigerated condensers, leak checks, repairs, maintenance, and record-keeping activities. Below is a summary of the key requirements for PCE dry cleaning operations.

**Operation:** Dry cleaning system must be properly operated and maintained according to the manufacturer's specifications and recommendations. A copy of the design specifications and operating and maintenance manuals must be kept on site, and available for review at all times.

**Temperature Checks:** To monitor the effectiveness of recovering the cleaning solvents from the dryer exhaust, the inlet and outlet temperatures for the refrigerated condenser (RC) must be recorded weekly during the cool down phase of the dry cleaning cycle. Please record the difference between the inlet and outlet temperatures.

**Leak Checks:** The dry cleaning system must be checked for leaks while the machine is operating. Weekly checks must be done for perceptible leaks (using sight, smell, touch). Once a month the leak check must be performed with a hydrocarbon detector or PCE gas analyzer (see back page for where to check for leaks.)

**Repair:** Perceptible leaks must be repaired within 24 hours of detection. If repair parts are not available, parts must be ordered within two days of detection and installed within five days of receipt.

**Separator Water:** The collection bucket for separator water must be covered to prevent evaporation. The lid may have a small hole large enough for the drain hose. WA State Department of Ecology's dry cleaner manual identifies separator water as a dangerous waste to be sent to a proper dangerous waste facility (pub 01-04-018, 5/14). At this time, Ecology may allow separator water to be evaporated if PCE concentrations are below 0.7 ppm PCE (test method SW846 method 1311). Per Ecology's 1996 dry cleaner manual (publication 96-200, 4/96), a possible way to do this is: 1. Let the separator water stand long enough so that it is clear. 2. Separate the separator water from any PCE that may be in the bottom of the collection container. 3. Pass the separator water through two granular activated carbon units in series prior to evaporation. The activated carbon units must be operated and maintained so that the separator water is below 0.7 ppm PCE concentration.

**Dangerous Waste:** All waste that may come into contact with PCE must be treated as dangerous waste and stored in a closed, leak-free container. Dangerous waste from dry cleaning may include lint, items from button trap, still bottoms, cartridge filters, spin disk filter, used gaskets, couplings, valves, separator water, etc. Cartridge filters must be drained for 24-hrs prior to discarding in a dangerous waste container.

**Records:** All records must be kept up-to-date and on-site for five years. Records must be available for review at all times. PCE receipts and purchases records must be updated by the 1st of the following month and include a 12-month rolling total. Other records are required for perceptible leak and leak detector checks, refrigerated condenser temperature monitoring, maintenance and repair, pollution prevention activity, and dangerous waste disposal. In addition, a copy of the Notice of Construction must be kept on-site.

## Compliance Inspections for PCE Machines

During a typical on-site visit, inspectors will review:

### Operations:

- Is the equipment properly maintained and operated according to the manufacturer's recommendations?
- Is the machine door kept closed except when transferring articles to and from the machine?
- How is separator water stored and treated?
- Are there any leaks with the dry cleaning machine, solvent and dangerous waste containers, the surrounding space and tools? Inspectors may use their senses of smell, sight, and touch, or a detector, to find leaks.

- If leaks are detected, have repairs been made within 24 hours of detection? If repair parts were not available, were parts ordered within two days of detection and installed within five days of receipt?
- Do monitored RC inlet and outlet temperatures indicate adequate condensation of solvents and removal from the exhaust vapor stream during the "cool down" cycle? Is the RC outlet temperature always 45° F (7° C) or less during the "cool down" cycle? Is the difference between the RC inlet and outlet temperatures 20° F (11° C) or more?
- Are PCE and related dangerous wastes stored in closed containers with no perceptible leaks?

### Records:

- Are PCE receipts kept, including monthly and rolling 12-month totals?
- Are leak check records adequate?
- Have repairs occurred within 24 hours of detection?
- Have weekly temperatures been recorded to demonstrate proper operation of the RC?
- Have pollution prevention activities been documented?
- Are dangerous waste manifests maintained?
- Is a copy of the manufacturer's operation and maintenance manual on-site for review?

**Other:** Your facility may have additional requirements per the Notice of Construction (NOC) permit conditions issued by Spokane Clean Air. A copy of your NOC is required to be kept on-site and available for review.

**Pollution Prevention:** Washington state requires dry cleaners who use PCE to keep track of pollution prevention (P2) activities that have been implemented at the facility.

Examples include: secondary containment for solvent and dangerous waste storage, PCE spotting alternatives and alternative dry cleaning solvents.

Benefits of P2 may include reduced emissions, paperwork, and regulation requirements, as well as savings in dangerous waste disposal costs. As a business owner/ operator, it is important to research what P2 options may work best for your facility.

## Compliance Assistance

A record keeping calendar and a 12-Month PCE Rolling Total Excel Spreadsheet is available by calling 477-4727.

Ecology has staff available to help businesses manage, reduce or eliminate dangerous waste. Call (509) 329-3400 and ask to speak with a toxic reduction specialist.

## Air Quality Requirements for Petroleum Machines

Dry cleaning operations that use petroleum-based solvents, such as DF-2000, are not as heavily regulated as machines using PCE. Air quality regulations focus on minimizing emissions through proper operation, maintenance and storage of solvent. Below is a summary of the key requirements:

- **Operation:** Dry cleaning system must be properly operated and maintained according to the manufacturer's specifications and recommendations. A copy of the O & M manuals must be kept on site.
- **Repair:** Track repair and maintenance.
- **Separator Water:** The collection bucket for separator water must be covered to prevent evaporation. The lid may have a small hole just large enough for the drain hose.
- **Dangerous Waste:** Depending on products used, waste that that may come into contact with the solvent or spotting agents may or may not be dangerous waste. Waste from dry cleaning include, lint, items from button trap, still bottoms, cartridge fi lters, water from water separator, spin disk fi lter, used gaskets, couplings, valves, etc.
- **Records:** All records must be kept up-to-date and on-site for five years. Records must be available for review at all times. Records may be required for: maintenance and repair, load weight, solvent purchase and dangerous waste disposal.

## Inspections for Petroleum Machines

During a typical on-site visit, inspectors will review:

- Is the equipment properly maintained and operated according to the manufacturer's recommendations?
- Are dangerous wastes stored in closed containers with no perceptible leaks?
- Record review; solvent purchase, load weight, dangerous waste manifests, etc.

## Alternatives to PCE Solvents

**\*Spotting** - Traditional spotting agents may contain PCE or other HOCs. Use spotting products that do not contain those products. Two safer alternatives may be: Cold Plus, and Nature's Choice. The alternatives generally sell for \$10-\$20 less per gallon than traditional spotting agents.

**\*Alternatives to PCE Solvent** - A variety of dry cleaning solvents and processes are PCE-free. Research to find the best solvent/process for your facility.

**Hydrocarbon solvent (i.e. DF2000, EcoSolve)** - Widely used. Not high in toxicity. Can retrofit some PCE machines for this solvent. Has regulatory requirements. Machines generally have nitrogen to prevent fire.

**Tonsil Filter** - Use in hydrocarbon machine, spin fi lter contains Tonsil and diatomaceous earth. Prevents bleeding of garments in machine. Don't need to use detergent in machine. Filter needs proper care or all benefits could be reversed. May have regulatory requirements.

**Pure Dry & Gen-X solvents** - A variation of hydrocarbon with PFC and HFC or aliphatic glycol ethers. See hydrocarbon summary.

**D5 (decamethylcyclopentasiloxane) solvent (i.e. Green Earth)** - Higher flash point than hydrocarbons, can run in hydrocarbon machines. Currently no known regulatory requirements. Caused cancer in lab animals.

**Dibutoxymethane/Butylal solvent (i.e. Solvon K-4)** - Higher flash point than hydrocarbons, good solvent mileage, strong solvent odor, no known regulatory requirements.

**Glycol Ether solvent (i.e. Rynex)** - Very aggressive cleaner, no need to spot clothes. Cycle time is long, water separation is difficult, some regulatory requirements. Toxicity not clear.

**Carbon Dioxide solvent** - Uses carbon dioxide and detergent for cleaning. Short cycle time, currently no known environmental regulations. Special equipment required.

**Traditional Wet Cleaning process** - Use water, detergent to clean garments. No known environmental regulations. Need humidity controlled dryer and tensioning equipment.

**Icy Water process** - Similar to wet cleaning except garments are washed in cold water and dried with cold air.

**Green Jet process** - Spray water and detergent rather than immersion. Finishing much easier than wet cleaning. Currently no known regulatory requirements. May be better as supplementary technology.

# Leak Detectors

State regulations require PCE dry cleaners to conduct monthly inspections for PCE vapor leaks using a halogenated hydrocarbon (HH) detector or PCE gas analyzer, such as a photo ionization detector (PID).

When using the leak detectors:

- Perform a leak check with the detector at least once per month,
- Place the probe inlet near the surface of each component where leaks could occur, and move the probe slowly around each component without touching the surface, and
- Record the date and result of each leak inspection at the time of the inspection.

# Dry Cleaning & Solvent Leaks

Dry cleaners using the solvent PCE are required to check for leaks. The dry cleaning system must be checked (using sight, smell, touch) weekly for perceptible leaks, and once per month using a leak detector. Leak check results must be recorded. The basic diagram below highlights the main components of a typical PCE dry cleaning machine and where to look for possible leaks.\*

Manufacturer's of PCE dry cleaning machines follow a very similar design as the illustrations to the right.

1. Button Trap (during wash cycle)
2. Lint Trap (during dry cycle)
3. Pump (during wash cycle)
4. Cartridge Filter (during wash cycle)
5. Still (during distillation cycle)
6. Water Separator (during dry/distillation cycles)
7. Wastewater Evaporator
8. Refrigerated Condenser Outlet Temperature Gauge & Pressure Gauge (during cool down)
9. Vapor Adsorber (during dry cycle)
10. Spin Disk Filter (during wash cycle)
11. Loading Door Gasket & Seating (during wash/dry cycle)
12. Storage Tanks

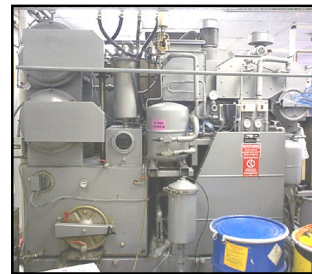
\*Other areas to inspect not shown on illustration: hose connections, unions, couplings, valves, air and exhaust duct work, solvent container, and dangerous waste container.

Leak Detectors - PCE dry cleaners may use any brand of leak detectors as long as it meets requirements: detects vapor concentrations of PCE of 25 parts per million (ppm) and indicates a concentration of 25 ppm or greater by emitting an audible or visual signal that varies as concentration changes.

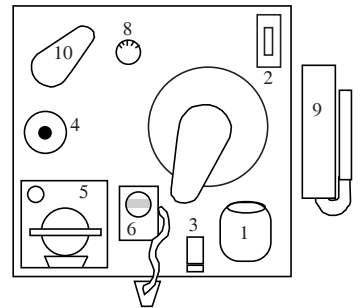
The detectors listed below are based on information provided by leak detector manufacturers and tests conducted by other states or groups. The following units are expected to meet requirements. This is not an endorsement. This is not an extensive list. Further research is recommended to find the best detector for your facility. Prices subject to change.

Manufacturer	Type	Model	Sensitivity	Price
Nova Systems Products	HH	BOLO Green	5 ppm	\$110.00
Inficon Inc.	HH	Tek-Mate	<25 ppm	\$130.00
Inficon Inc.	HH	The Compass	<25 ppm	\$290.00
Aeroqual	HH	Aeroqual 200	1 ppm	\$780.00
RAE Systems	PID	MiniRAE Lite	0 - 5,000 ppm	\$1,900.00
Photo Vac 2020	PID	Cambo Pro Sale	0.1 - 10,000 ppm	\$2,500.00
Ion Science	PID	PhoCheck 1000	0.1 - 4,000 ppm	\$3,000.00
RAE Systems	PID	MiniRAE 3000	0 - 15,000 ppm	\$3,500.00

Rear Photo of Machine



Rear Illustration of Machine



Front Photo of Machine



Front Illustration of Machine

