GLOSSARY

**Azeotrope**—A specific composition of two or more substances which has a constant boiling point and does not change in composition during distillation.

**Azeotropic Boiling Point**—The boiling temperature of an azeotrope is often lower than the boiling point of each of the substances forming the mixture. For example, perchloroethylene-water azeotrope boils at 190°F (88°C).

**Azeotropic Degreasing Solvent**—A specific composition of two or more solvents, which does not change in the liquid and vapor phases; therefore, it behaves like a single solvent in a vapor degreaser and has a constant boiling point.

**Carbon Adsorption**—A recovery process that captures solvent vapors from air on activated carbon. The solvent is recovered (by desorption) from the carbon by injection of steam into the carbon bed and condensing the resultant solvent and water vapor.

**Condensate**—Liquid solvent resulting from cooling solvent vapors. It is the clean solvent that condenses on the cooling coils of a vapor degreaser or still.

**Desiccant Dryer**—A means of removing water from a solvent by adsorption with desiccant, such as a silica gel or molecular sieve.

**Desorption**—The process of regenerating a carbon adsorption unit by treating the carbon with steam to remove the absorbed solvent.

**Distillation**—A process of purifying a solvent by boiling, condensing the vapor, and collecting the condensate.

**Dragout**—Solvent that is carried out of a vapor degreasing operation as a liquid trapped in or on the parts being processed.

**Ecology**—The relation between living organisms and their environment.

**Freeboard**—Distance from the top of the vapor level to the top of the degreasing tank.

**Halogenated Solvents**—Liquid substances that contain carbon and halogen or carbon, hydrogen, and halogen (such as fluorine or chlorine) atoms. In this text, the term refers to the commercial solvents; methylene chloride, perchloroethylene, 1,1,1-trichloro-ethane, trichloroethylene, and Tichlorotrifluoroethane.

**Nonflammable**—A term used to describe those halogenated solvents that have no fire or flash point when tested by standard test methods. The Department of Transportation specifies ASTM Test Method for Flash Point by Tag Closed Tester (D 56) or ASTM Test Methods for Flash Point of Liquids by Setashflash-Closed-Cup Apparatus (D 3278) as acceptable test methods for determining flash points of liquids. Under unusual conditions, certain nonflammable solvents may exhibit some ability to burn.

**Refrigerated Freeboard Device**—A low-temperature heat exchange coil located in the degreaser freeboard zone, immediately above the water-cooled condensers. The device maintains a dense, cold-air mass above the solvent vapor, which reduces the loss of vapors from the unit.

**Shock Load**—A large part or load of parts, which cause the solvent vapor level to drop substantially below the normal operating level.

**Steam Distillation**—The practice of injecting steam directly into the still after normal distillation has ceased to recover more solvent from the residue.

**Still**—A unit employed to purify solvent by distillation.

**Vapor Line**—The line or level of the solvent vapor-air interface in the vapor degreasing unit.

**Vapor Safety Thermostat**—A device that senses the temperature of the solvent vapors and shuts off the heat supply by actuating a solenoid, spring-loaded valve or a switch if the hot solvent vapors rise too high in the degreaser.

**Water Separator**—A device designed to remove water from the solvent by flotation.

**Work Capacity**—The load a degreaser is designed to process efficiently while maintaining a steady vapor level.
SOLVENT NOMENCLATURE
(ALTERNATE CHEMICAL NAMES)

Methylene Chloride
Dichloromethane
Methylene Dichloride
MeC
DCM

Perchloroethylene
Perchlorethylene
Tetrachloroethylene
Per or Perc
PCE

Trichloroethylene
Trichlorethylene
Tri
TCE

1,1,1-Trichloroethane
Methyl Chloroform
TCA

Trichlorotrifluoroethane
Fluorocarbon 113
CFC-113
R-113

ABBREVIATIONS

General

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ft/min</td>
<td>feet per minute</td>
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<tr>
<td>g</td>
<td>gram</td>
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<tr>
<td>g/cm^3</td>
<td>grams per cubic centimeter</td>
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<tr>
<td>gal</td>
<td>gallon</td>
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<tr>
<td>h</td>
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<td>m</td>
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<td>ppm</td>
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<tr>
<td>s</td>
<td>second</td>
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<tr>
<td>W/in.²</td>
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<tr>
<td>W/cm²</td>
<td>Watts per square centimetre</td>
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Regulatory

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<td>ACGIH</td>
<td>American Conference of Governmental Industrial Hygienists</td>
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<td>CERCLA</td>
<td>Comprehensive Environmental Response, Compensation and Liability Act of 1980, commonly known as &quot;Superfund&quot;</td>
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<tr>
<td>CFSC</td>
<td>Consumer Product Safety Commission</td>
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<tr>
<td>CTG</td>
<td>Control Technology Guideline</td>
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<tr>
<td>DOT</td>
<td>Department of Transportation</td>
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<tr>
<td>EPA</td>
<td>Environmental Protection Agency</td>
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<td>MSHA</td>
<td>Mine Safety &amp; Health Administration</td>
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<td>NAAQS</td>
<td>National Ambient Air Quality Standards</td>
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<td>NFPA</td>
<td>National Fire Protection Association</td>
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<tr>
<td>NIOSH</td>
<td>National Institute of Safety &amp; Health</td>
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<tr>
<td>NSPS</td>
<td>New Source Performance Standard</td>
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<tr>
<td>OAQPS</td>
<td>Office of Air Quality Planning and Standards</td>
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<tr>
<td>OSHA</td>
<td>Occupational Safety and Health Act and Administration</td>
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<tr>
<td>PEL</td>
<td>Permissible Exposure Level</td>
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<tr>
<td>RACT</td>
<td>Reasonably Available Control Technology</td>
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<td>RCRA</td>
<td>Resource Conservation and Recovery Act</td>
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<td>SIP</td>
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<tr>
<td>TSCA</td>
<td>Toxic Substances Control Act</td>
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<td>TWA</td>
<td>Time Weighted Average</td>
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<tr>
<td>VOC</td>
<td>Volatile Organic Compound</td>
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APPENDIX

Federal EPA Guidelines* (RACT Document) (See Attached)

The U.S. EPA published guidelines for control of solvent metal cleaning operations to assist state and local regulatory agencies in the preparation of acceptable State Implementation Plans for the attainment of the National Ambient Air Quality Standard for Ozone. However, state and local agencies were not obligated to adopt these guidelines exactly and in detail. Thus, some variations occur in different state and local regulations, and these should be reviewed specifically to assure compliance.

Federal EPA Guidelines (RACT Document)

Complete Control Systems for Open Top Vapor Degreasers

Control System A

Control Equipment:

1. Cover that can be opened and closed easily without disturbing the vapor zone.

Operating Requirement:

1. Keep cover closed at all times except when processing workloads through the degreaser.

2. Minimize solvent carryout by the following measures:

   (a) Rack parts to allow full drainage.

   (b) Move parts in and out of the degreaser at less than 3.3 m/min (11 ft/min).

   (c) Degrease the workload in the vapor zone at least 30 s or until condensation ceases.

   (d) Tip out any pools of solvent on the cleaned parts before removal.

   (e) Allow parts to dry within the degreaser for at least 15 s or until visually dry.

3. Do not degrease porous or absorbent materials, such as cloth, leather, wood or rope.

4. Workloads should not occupy more than half of the degreaser’s open top area.

5. The vapor level should not drop more than 10 cm (4 in.) when the workload enters the vapor zone. (Rescinded by Federal EPA)

6. Never spray above the vapor level.

7. Repair solvent leaks immediately, or shut down the degreaser.

8. Do not dispose of waste solvent or transfer it to another party if more than 20% of the waste (by weight) can evaporate into the atmosphere. Store waste solvent only in closed containers.

9. Exhaust ventilation should not exceed 20 m³/min per m² (65 cfm per ft²) of degreaser open area, unless necessary to meet OSHA requirements. Ventilation fans should not be used near the degreaser opening.

10. Water should not be visually detectable in solvent exiting the water separator.

Control System B

Control Equipment:

1. Cover (same as in System A).

2. Safety switches:

   (a) Condenser flow switch and thermostat (shuts off sump heat if condenser coolant is either not circulating or too warm).

   (b) Spray safety switch—shuts off spray pump if the vapor level drops excessively, about 10 cm (4 inches).

3. Major control device:

   Either:

   (a) Freeboard ratio greater than or equal to 0.75 and if the degreaser opening is > 1 m² (10 ft²), the cover must be powered;

   (b) Refrigerated chiller (freeboard);

   (c) Enclosed design (cover or door opens only when the dry part is actually entering or exiting the degreaser);

   (d) Carbon adsorption system, with ventilation ≥ 15 cm/m² (50 cfm/ft²) of air/vapor area (when cover is open), and

*Control of Volatile Organic Emissions from Solvent Metal Cleaning, EPA, 450/2-77-022, Nov. 1977.
exhausting <25 ppm solvent averaged over one complete adsorption cycle; or 
(e) control system, demonstrated to have control efficiency, equivalent to or 
better than any of the above.

4. Permanent, conspicuous label, summarizing operating Procedures 1 to 6.

Operating requirement is the same as in System A.

Federal EPA Guidelines (RACT Document)

Control System for Conveyorized Derrasers

Control System A
Control Equipment: none.

Operating Requirements:

1. Exhaust ventilation should not exceed 20 m³/min per m² (65 cfm per ft²) 
of degreaser opening, unless necessary to meet OSHA requirement. Work place fans 
should not be used near the degreaser opening.

2. Minimize carry-out emissions by
   (a) racking parts for best drainage or
   (b) maintaining vertical conveyor speed at <3.3 m/min (11 ft/min).

3. Do not dispose of waste solvent or transfer it to another party if more than 
20% of the waste (by weight) can evaporate into the atmosphere. Store waste 
solvent only in covered containers.

4. Repair solvent leaks immediately, or shut down the degreaser.

5. Water should not be visibly detectable in the solvent exiting the water 
separator.

Control System B
Control Equipment:

1. Major control devices: The degreaser must be controlled by either:
   (a) refrigerated chiller (free-board);
   (b) carbon adsorption system, 
      with ventilation ≥ 15 m³/min per m² (50 
cfm/ft²) of air/vapor area (when down-
time covers are open), and exhausting 
<25 ppm of solvent by volume, aver-
aged over a complete adsorption cycle; or
   (c) system demonstrated to have 
      control efficiency equivalent to or bet-
ter than either of the above.

2. Either a drying tunnel, or another 
means such as rotating (tumbling) basket, 
sufficient to prevent cleaned parts from 
carrying out solvent liquid or vapor.

3. Safety switches:
   (a) Condenser flow switch and 
      thermostat—shuts off sump heat if 
      coolant is either not circulating or too 
      warm.
   (b) Spray safety switch—shuts 
      off spray pump or conveyor if the vapor 
      level drops excessively, for example, 
      >10 cm (4 in.).
   (c) Vapor level control thermo-
      stat—shuts off sump heat when vapor 
      level rises too high.

4. Minimized openings: entrances and exits should silhouette workloads so that 
the average clearance between part and the edge of the degreaser opening is either 
<10 cm (4 in.) or <10% of the width of the opening.

5. Downtime covers: Covers should be provided for closing off the entrance 
and exit during shutdown hours.

Operating Requirements: 1 to 5, same as for System A.

6. Downtime cover must be placed 
over entrances and exits of conveyorized degreasers immediately after the con-
voyor and exhaust are shut down and re-
moved just before they are started up.