

Control of volatile organic compound emissions from industrial solvent cleaning operations.

[Comment: For dates and availability of non-regulatory government publications, publications of recognized organizations and associations, federal rules, and federal statutory provisions referenced in this rule, see paragraph (HH) of rule 3745-21-01 of the Administrative Code titled "Referenced materials".]

(A) Applicability.

- (1) The requirements of paragraphs (B) to (I) of this rule shall apply to any facility that meets all of the following criteria:
 - (a) The facility is located in Ashtabula, Cuyahoga, Geauga, Lake, Lorain, Medina, Portage, or Summit county.
 - (b) The facility employs solvent materials in solvent cleaning operations during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or general work areas, and stores and/or disposes of these solvent materials.
 - (c) The total actual VOC emissions from all of the solvent cleaning operations are equal to or greater than 15.0 pounds of VOCs per day before the application of capture systems and control devices.
- (2) The provisions of this rule shall not apply to cleaning operations in the following source categories listed for regulation under Section 183(e) of the Clean Air Act:
 - (a) Aerospace coatings;
 - (b) Flexible package printing materials;
 - (c) Lithographic printing materials;
 - (d) Letterpress printing materials;
 - (e) Flat wood paneling coatings;
 - (f) Large appliance coatings;
 - (g) Metal furniture coatings;
 - (h) Paper film and foil coatings;
 - (i) Wood furniture coatings;

(j) Shipbuilding and repair coatings;

(k) Plastic parts coatings;

(l) Miscellaneous metals parts coatings;

(m) Fiberglass boat manufacturing materials;

(n) Miscellaneous industrial adhesives; or

(o) Auto and light-duty truck assembly coatings.

(B) Definitions.

The definitions applicable to this rule are contained in paragraph (EE) of rule 3745-21-01 of the Administrative Code.

(C) VOC emission control requirements.

(1) VOC-content limitations.

The owner or operator of a facility that is subject to this rule shall not use a solvent to perform solvent cleaning operations unless the solvent complies with the applicable VOC-content limitation specified in the following table:

-Table of standards-

| Solvent Cleaning Operation | VOC-Content Limitation [in pounds per gallon, as employed] |
|---|--|
| (A) Product cleaning during manufacturing process or surface preparation for coating, adhesive, or ink application: | |
| (1) General | 0.42 |
| (2) Electrical apparatus components and electronic components | 0.83 |
| (3) Medical devices and pharmaceuticals | 6.7 |
| (B) Repair and maintenance cleaning: | |
| (1) General | 0.42 |
| (2) Electrical apparatus components and electronic components | 0.83 |
| (3) Medical devices and pharmaceuticals | |
| (a) Tools, equipment and machinery | 6.7 |
| (b) General work surfaces | 5.0 |
| (C) Cleaning of coating or adhesive application equipment | 0.42 |

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| (D) Cleaning of ink application equipment: | |
| (1) General | 0.42 |
| (2) Flexographic printing | 0.42 |
| (3) Gravure printing: | |
| (a) Publication | 0.83 |
| (b) Packaging | 0.42 |
| (4) Screen printing | 4.2 |
| (5) Ultraviolet ink and electron beam ink application equipment, except screen printing | 4.2 |
| (6) Specialty flexographic printing | 0.83 |
| (E) Cleaning of polyester resin application equipment not subject to 40 CFR Part 63 Subpart WWWW | 0.42 |

(2) Cleaning devices and methods.

The owner or operator of a facility that is subject to this rule shall employ only the following cleaning devices and methods:

- (a) Wipe cleaning.
- (b) Closed containers or hand held spray bottles from which solvents are applied without a propellant-induced force.
- (c) Cleaning equipment which has a solvent container that can be, and is closed during cleaning operations, except when depositing and removing objects to be cleaned, and is closed during non-operation with the exception of maintenance and repair to the cleaning equipment itself.
- (d) Remote reservoir cleaner, if the operator of the cleaner complies with all of the following:
 - (i) Prevents solvent vapors from escaping from the solvent container by using such devices as a cover or a valve when the remote reservoir is not being used, cleaned, or repaired.
 - (ii) Directs solvent flow in a manner that will prevent liquid solvent from splashing outside of the remote reservoir cleaner.
 - (iii) Does not clean porous or absorbent materials, such as cloth, leather, wood, or rope.
 - (iv) Uses only solvent containers free of all liquid leaks. Auxiliary equipment, such as pumps, pipelines, or flanges, shall not have any

liquid leaks, visible tears, or cracks. Any liquid leak, visible tear, or crack detected shall be repaired within one calendar day, or the leaking section of the remote reservoir cold cleaner shall be drained of all solvent and shut down until it is replaced or repaired.

- (e) Non-atomized solvent flow method where the cleaning solvent is collected in a container or a collection system which is closed except for solvent collection openings and, if necessary, openings to avoid excessive pressure build-up inside the container.
 - (f) Solvent flushing method where the cleaning solvent is discharged into a container which is closed except for solvent collection openings and, if necessary, openings to avoid excessive pressure build-up inside the container. The discharged solvent from the equipment must be collected into containers without atomizing into the open air. The solvent may be flushed through the system by air or hydraulic pressure, or by pumping.
- (3) The owner or operator of a facility that is subject to this rule is prohibited from atomizing any solvent unless the emissions are vented to VOC emission control equipment that meet the requirements of paragraph (C)(5) of this rule.
- (4) Storage and disposal.

All VOC-containing solvents used in solvent cleaning operations shall be stored in non-absorbent, non-leaking containers which shall be kept closed at all times except when filling or emptying. It is recommended that cloth and paper moistened with VOC-containing solvents be stored in closed, non-absorbent, non-leaking containers.

(5) Control equipment.

In lieu of complying with the requirements of paragraphs (C)(1) and (C)(2) of this rule for a solvent cleaning operation, the owner or operator of a facility that is subject to this rule may comply with this rule by installing and operating VOC emission control equipment for the solvent cleaning operation. The VOC emission control equipment shall comply with all of the following requirements:

- (a) A capture efficiency of at least ninety per cent, by weight, for the VOC emissions.
 - (b) Either a destruction efficiency of at least ninety-five per cent, by weight, for the VOC emissions or an outlet concentration of less than fifty parts per million, by volume, dry basis, for the VOC emissions.
- (6) Alternate compliance option.

In lieu of complying with the requirements in paragraph (C)(1) of this rule, the owner or operator of a facility may use solvents or solvent solutions for industrial cleaning operations which have a VOC composite partial vapor pressure of less than or equal to eight mm of Hg at twenty degrees Celsius.

(D) Exemptions.

- (1) The following solvent cleaning operations are exempt from all the requirements of this rule:
 - (a) Any solvent cleaning operation that is subject to paragraph (O) of rule 3745-21-09 of the Administrative Code.
 - (b) Janitorial cleaning, including graffiti removal.
 - (c) Stripping of cured coatings, cured ink, or cured adhesives.
 - (d) Cleaning operations in printing pre-press or graphic arts pre-press areas, including the cleaning of film processors, color scanners, plate processors, film cleaning, and plate cleaning.
- (2) The following solvent cleaning operations are exempt from the VOC-content limitations specified in paragraph (C)(1) of this rule:
 - (a) Cleaning of solar cells, laser hardware, scientific instruments, and high-precision optics.
 - (b) Cleaning conducted as part of the following: performance laboratory tests on coatings, adhesives, or inks; research and development programs; and laboratory tests in quality assurance laboratories.
 - (c) Cleaning of paper-based gaskets and clutch assemblies where rubber is bonded to metal by means of an adhesive.
 - (d) Cleaning of cotton swabs to remove cottonseed oil before cleaning of high-precision optics.
 - (e) Medical device and pharmaceutical facilities using up to 1.5 gallons per day of solvents.
 - (f) Cleaning of adhesive application equipment used for thin metal laminating.
 - (g) Cleaning of electronic or electrical cables.

- (h) Touch-up cleaning performed on printed circuit boards where surface mounted devices have already been attached.
 - (i) Cleaning of coating and adhesive application processes utilized to manufacture transdermal drug delivery product using less than three gallons per day of ethyl acetate.
 - (j) Cleaning of application equipment used to apply coatings on satellites and radiation effect coatings.
 - (k) Cleaning of application equipment used to apply solvent-borne fluoropolymer coatings.
 - (l) Cleaning of ultraviolet or electron beam adhesive application.
 - (m) Cleaning of sterilization indicating ink application equipment if the facility employs less than 1.5 gallons per day of solvents for such cleaning.
 - (n) Cleaning of metering rollers, dampening rollers and printing plates.
 - (o) Cleaning of polyester resin application equipment for sources subject to 40 CFR Part 63, Subpart WWWW.
- (3) The following solvent cleaning operations are exempt from the requirements of paragraph (C)(3) of this rule:
- (a) Cleaning of the nozzle tips of automated spray equipment systems, except for robotic systems.
 - (b) Cleaning with spray bottles or containers described in paragraph(C)(2)(b) of this rule.
 - (c) Printing operations where the roller or blanket wash is applied automatically.
- (4) Cleaning with aerosol products shall be exempt from the requirements of paragraphs (C)(1) and (C)(3) of this rule if the facility employs 1.25 gallons (one hundred sixty fluid ounces) or less of the aerosol products per day.

(E) Compliance dates.

- (1) The owner or operator of a facility that is subject to this rule shall comply with the requirements of this rule no later than the following dates:
 - (a) For any solvent cleaning operation which commenced operation before the effective date of this rule, the compliance date for the operation is the initial

startup date of the operation or twelve months from the effective date of this rule, whichever is later.

- (b) For any solvent cleaning operation which commenced operation on or after the effective date of this rule, the compliance date for the operation is the initial startup date of the operation.
- (2) If an owner or operator of a solvent cleaning operation that is subject to this rule employs VOC emission control equipment to comply with this rule, pursuant to paragraph (C)(5) of this rule, the owner or operator shall demonstrate compliance with paragraph (C)(5) of this rule by testing the VOC emission control equipment in accordance with paragraph (F)(2) of this rule within ninety days after the compliance date for the solvent cleaning operation.
- (3) Additional testing of the VOC emission control equipment for a solvent cleaning operation in accordance with paragraph (F)(2) of this rule may be required by the director to ensure continued compliance.

(F) Compliance test methods.

- (1) For any solvent cleaning operation that is subject to the requirements of paragraph (C)(1) of this rule, USEPA method 24 shall be used to determine the VOC content of the solvent material employed in the solvent cleaning operation.
- (2) For any solvent cleaning operation that is subject to the requirements of paragraph (C)(5) of this rule, compliance shall be determined by performing emission tests in accordance with the following:
 - (a) The general provisions specified under paragraphs (A)(2) to (A)(5) of rule 3745-21-10 of the Administrative Code shall apply to the compliance testing.
 - (b) The test methods and procedures of paragraph (C) of rule 3745-21-10 of the Administrative Code shall be followed.
- (3) Determination of vapor pressure.

The composite partial pressure of solvents shall be determined by:

- (a) Determining the identity and quantity of each compound in a blended organic solvent by using ASTM D2306, or by using ASTM E260 for organics and ASTM D3792 for water content, if applicable, or the manufacturer's product formulation data; and
- (b) Determining the vapor pressure of each pure VOC component by using ASTM D2879 or from publications such as "Perry's Chemical Engineer's

Handbook, CRC Handbook of Chemistry and Physics, or Lange's Handbook of Chemistry;" and

- (c) Calculating the composite partial pressure of the solvent by using the formula for composite partial pressure. For the purpose of this calculation, the blended solvent shall be assumed to be an ideal solution where "Raoult's Law" applies. The partial pressures of each compound at twenty degrees Celsius (sixty-eight degrees Fahrenheit) shall be used in the formula.

The VOC composite partial pressure is calculated as follows:

$$PP_c = \sum_{i=1}^n \frac{(W_i)(VP_i) / MW_i}{\frac{W_w}{MW_w} + \frac{W_e}{MW_e} + \sum_{i=1}^n \frac{W_i}{MW_i}}$$

Where:

Wi = Weight of the "i"th VOC compound, in grams.

Ww = Weight of water, in grams.

We = Weight of exempt compound, in grams.

MWi = Molecular weight of the "i"th VOC compound, in grams per gram-mole.

MWw = Molecular weight of water, in grams per gram-mole.

MWe = Molecular weight of the "e"th exempt compound, in grams per gram-mole.

PPc= VOC composite partial pressure at twenty degrees Celsius (sixty-eight degrees Fahrenheit), in mm Hg.

VPi = Vapor pressure of the "i"th VOC compound at twenty degrees Celsius (sixty-eight degrees Fahrenheit), in mm Hg.

(G) Monitoring and record keeping requirements.

- (1) The owner or operator of a solvent cleaning operation that is subject to one or more of the VOC-content limitations specified in paragraph (C)(1) of this rule shall collect and record the following information each month for each cleaning material subject to a VOC-content limitation and shall maintain the information at the facility for a period of five years:

- (a) The name and identification of each cleaning material and the associated solvent cleaning activity.
 - (b) The VOC content, based upon USEPA method 24, of each cleaning material, in pounds per gallon of material, as employed or the VOC composite partial vapor pressures of the solvents or solvent solutions used in the industrial cleaning operations.
- (2) If an owner or operator of a solvent cleaning operation is subject to paragraph (C)(5) of this rule and employs a thermal incinerator or catalytic incinerator to achieve and maintain compliance, the owner or operator shall comply with the following requirements:
- (a) Continuous temperature monitoring and continuous temperature recording equipment shall be installed and operated to accurately measure the operating temperature(s) for the control device.
 - (b) The following information shall be collected and recorded each day of operation of the solvent cleaning operation and the control device, and the information shall be maintained at the facility for a period of five years:
 - (i) A log or record of the operating time for the control device, monitoring equipment, and the associated solvent cleaning operation.
 - (ii) For thermal incinerators, all three-hour periods of operation during which the average combustion temperature was more than fifty degrees Fahrenheit below the average combustion temperature during the most recent emission test that demonstrated that the solvent cleaning operation was in compliance.
 - (iii) For catalytic incinerators, all three-hour periods of operation during which the average temperature of the dryer exhaust gases immediately before the catalyst bed was more than fifty degrees Fahrenheit below the average temperature of the dryer exhaust gases during the most recent emission test that demonstrated that the solvent cleaning operation was in compliance, and all three-hour periods during which the average temperature difference across the catalyst bed was less than eighty per cent of the average temperature difference during the most recent emission test that demonstrated that the solvent cleaning operation was in compliance.
- (3) If an owner or operator of a solvent cleaning operation is subject to paragraph (C)(5) of this rule and employs a carbon adsorption system to achieve and maintain compliance, the owner or operator shall comply with the following requirements:

- (a) One of the following types of monitoring and recording equipment shall be installed and operated for the carbon adsorption system:
 - (i) A continuous emission monitoring and recording system that is capable of accurately measuring and recording the concentration of organic compounds in the exhaust gases from the carbon adsorption system.
 - (ii) Monitoring and recording equipment that are capable of accurately measuring and recording the total mass steam flow rate for each regeneration cycle of each carbon bed.
 - (iii) Monitoring and recording equipment that are capable of accurately measuring and recording the temperature of each carbon bed after regeneration (and after completion of any cooling cycle(s)).
- (b) The following information shall be collected and recorded each day of operation of the solvent cleaning operation and the carbon adsorption system, and the information shall be maintained at the facility for a period of five years:
 - (i) A log or record of the operating time for the carbon adsorption system, monitoring equipment, and the associated solvent cleaning operation.
 - (ii) For a carbon adsorption system that employs a continuous emission monitoring and recording system to measure and record the concentration of organic compounds in the exhaust gases, all three-hour periods of operation during which the average concentration level or reading in the exhaust gases is more than twenty per cent greater than the exhaust gas organic compound concentration level or reading measured by the most recent performance test that demonstrated that the solvent cleaning operation was in compliance.
 - (iii) For a carbon adsorption system that employs monitoring and recording equipment to measure and record the total mass steam flow rate for each regeneration cycle of each carbon bed, all carbon bed regeneration cycles during which the total mass steam flow rate was more than ten per cent below the total mass steam flow rate during the most recent performance test that demonstrated that the solvent cleaning operation was in compliance.
 - (iv) For a carbon adsorption system that employs monitoring and recording equipment to measure and record the temperature of each carbon bed after regeneration (and after completion of any cooling cycle(s)), all carbon bed regeneration cycles during which the temperature of the carbon bed after regeneration (and after completion of any cooling

cycle(s)) was more than ten per cent greater than the carbon bed temperature during the most recent performance test that demonstrated that the solvent cleaning operation was in compliance.

- (4) Any owner or operator of a solvent cleaning operation that is exempt from the VOC-content limitation specified in paragraph (C)(1) of this rule, pursuant to paragraph (D)(2)(e) or (D)(2)(m) of this rule, shall collect and record the following information each day for each such solvent cleaning operation and shall maintain the information at the facility for a period of five years:
 - (a) The name and identification number of each solvent employed in the solvent cleaning operation.
 - (b) The volume, in gallons, of each solvent employed in the solvent cleaning operation.
 - (c) The total volume, in gallons, of all of the solvents employed in the solvent cleaning operation.
 - (5) Any owner or operator of a solvent cleaning operation that is exempt from the requirements of paragraphs (C)(1) and (C)(3) of this rule, pursuant to paragraph (D)(4) of this rule, shall collect and record the following information each day for each such solvent cleaning operation and shall maintain the information at the facility for a period of five years:
 - (a) The name and identification number of each aerosol product employed in the solvent cleaning operation.
 - (b) The volume, in gallons, of each aerosol product employed in the solvent cleaning operation.
 - (c) The total volume, in gallons, of all of the aerosol products employed in the solvent cleaning operation.
 - (6) Any owner or operator of a solvent cleaning operation that is exempt from the VOC-content limitation specified in paragraph (C)(1) of this rule, pursuant to paragraph (D)(2)(i) of this rule, shall record each day the total volume of ethyl acetate employed in such solvent cleaning operation and shall maintain the information at the facility for a period of five years.
- (H) Reporting requirements for the monitoring and record keeping information.
- (1) Any owner or operator of a solvent cleaning operation that is subject to one or more of the VOC-content limitations specified in paragraph (C)(1) of this rule shall notify the director of any record maintained in accordance with paragraph (G)(1) of this rule showing the use of noncomplying solvents. A copy of such

record shall be sent to the director within thirty days following the end of the month in which the use of noncomplying solvents occurs.

- (2) Any owner or operator of a solvent cleaning operation that employs control equipment and is subject to paragraph (C)(5) of this rule shall submit to the director quarterly summaries of the records required by paragraphs (G)(2)(b) and (G)(3)(b) of this rule. These quarterly reports shall be submitted no later than April thirtieth, July thirty-first, October thirty-first, and January thirty-first, and shall cover the records for the previous calendar quarters.
 - (3) Any owner or operator of a solvent cleaning operation that is exempt from the VOC-content limitation specified in paragraph (C)(1) of this rule, pursuant to paragraph (D)(2)(e) or (D)(2)(o) of this rule, shall notify the director of any record maintained in accordance with paragraph (G)(4) of this rule showing that the solvent cleaning operation employs more than the applicable maximum daily solvent usage limit. A copy of such record shall be sent to the director within thirty days following the end of the month in which the exceedance occurs.
 - (4) Any owner or operator of a solvent cleaning operation that is exempt from the requirements of paragraphs (C)(1) and (C)(3) of this rule, pursuant to paragraph (D)(4) of this rule, shall notify the director of any record maintained in accordance with paragraph (G)(5) of this rule showing that the solvent cleaning operation employs more than the maximum daily usage limit for aerosol products. A copy of such record shall be sent to the director within thirty days following the end of the month in which the exceedance occurs.
 - (5) Any owner or operator of a solvent cleaning operation that is exempt from the VOC-content limitation specified in paragraph (C)(1) of this rule, pursuant to paragraph (D)(2)(i) of this rule, shall notify the director of any record maintained in accordance with paragraph (G)(6) of this rule showing that the solvent cleaning operation employs more than the maximum daily usage limit for ethyl acetate. A copy of such record shall be sent to the director within thirty days following the end of the month in which the exceedance occurs.
- (I) Requirements on applicability notification, compliance certification, and permit application.
- (1) The owner or operator of a facility that is subject to this rule and that has a solvent cleaning operation with an initial startup date before the effective date of this rule shall notify the Ohio environmental protection agency district office or local air agency in writing that the solvent cleaning operation is subject to this rule. The notification, which shall be submitted not later than sixty days after the effective date of this rule (or within sixty days after the solvent cleaning operation becomes subject to this rule), shall provide the following information:
 - (a) Name and address of the owner or operator.

- (b) Address (i.e., physical location) of the affected facility.
 - (c) Description of the solvent cleaning operation and Ohio environmental protection agency emissions unit number, if assigned.
 - (d) Identification of the VOC emission requirement, the means of compliance and the compliance date for the solvent cleaning operation.
 - (e) Regarding an air pollution permit for the solvent cleaning operation, whichever of the following is applicable;
 - (i) Submission of an application for an operating permit, a permit modification, or an operating permit renewal in accordance with rule 3745-31-02 of the Administrative Code; or
 - (ii) Submission of a statement of intent to submit an application for a Title V permit or modification of a Title V permit in accordance with paragraph (B) of rule 3745-77-02 or rule 3745-77-06 of the Administrative Code, respectively.
- (2) The owner or operator of a facility that is subject to this rule and that has a solvent cleaning operation with an initial startup date on or after the effective date of this rule shall notify the Ohio environmental protection agency district office or local air agency in writing that the solvent cleaning operation is subject to this rule. The notification, which shall be submitted not later than either the date of initial startup of the solvent cleaning operation or sixty days after the effective date of this rule, whichever is later, and shall provide the information listed under paragraph (I)(1) of this rule. The application for an installation permit under rule 3745-31-02 of the Administrative Code may be used to fulfill the notification requirements of this paragraph.
- (3) Compliance certification.
- (a) The owner or operator of a facility that is subject to this rule shall notify the Ohio environmental protection agency district office or local air agency in writing within thirty days following the completion of any of the following requirements:
 - (i) For a solvent cleaning operation subject to the VOC emission requirements in paragraphs (C)(1) to (C)(4) of this rule, the first documented achievement of compliance with the requirements; or
 - (ii) For a solvent cleaning operation subject to the VOC emission control requirement in paragraph (C)(5) of this rule:

- (a) The completion of installation and initial use of a VOC emission control system for the solvent cleaning operation;
 - (b) The completion of installation and initial use of any monitoring devices required under paragraph (G) of this rule for the solvent cleaning operation; and
 - (c) The completion of any compliance testing conducted in accordance with paragraph (E) of this rule to demonstrate compliance with the applicable control requirement.
- (b) The compliance certification under paragraph (I)(3)(a) of this rule shall provide the following, where applicable:
 - (i) A description of the requirements.
 - (ii) A description of the VOC emission control system.
 - (iii) A description of the monitoring devices.
 - (iv) A description of the records that document continuing compliance.
 - (v) The results of any compliance tests, including documentation of test data.
 - (vi) The results of any records that document continuing compliance, including calculations.
 - (vii) A statement by the owner or operator of the affected facility as to whether the solvent cleaning operation has complied with the requirement(s).

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