

RULE 1171

Solvent Cleaning Operations

(A) General

(1) Purpose

- (a) The purpose of this rule is to reduce emissions of volatile organic compounds (VOCs) and stratospheric ozone-depleting or global-warming compounds from Solvent Cleaning operations and activities, and from the storage and disposal of these materials used in Solvent Cleaning.

(2) Applicability

- (a) This rule applies to all Persons who use VOC-containing materials in Solvent Cleaning operations during the production, repair, maintenance, or servicing of parts, products, tools, machinery, equipment, or general work areas, and to all Persons who store and dispose of VOC-containing materials used in Solvent Cleaning.

(B) Definitions

For the purpose of this rule, the following definitions shall apply:

- (1) Aerosol Product: - a hand-held, nonrefillable container which expels pressurized product by means of a propellant-induced force.
- (2) Air Pollution Control Officer (APCO): - the person appointed to the position of Air Pollution Control Officer of the District pursuant to the provisions of the California Health & Safety Code §40750, and his or her designee.
- (3) Application Equipment: - a device used to apply adhesive, coating, ink, or polyester resin materials.
- (4) Cured Coatings, Cured Inks, and Cured Adhesives: - coatings, inks, and adhesives which are dry to the touch.
- (5) Electrical Apparatus Components: - all internal components such as wires, windings, stators, rotors, magnets, contacts, relays, energizers, and connections in apparatus that generates or transmits electrical energy including generators, transformers, and electric motors.

- (6) Electronic Components: - all portions of an assembly, including circuit card assemblies, printed wire assemblies, printed circuit boards, soldered joints, ground wires, bus bars, and other electrical fixtures, except for the actual cabinet in which the components are housed.
- (7) Exempt Compounds: - those compounds listed in 40 CFR 51.100(S)(1).
- (8) Facility: - a business or businesses engaged in solvent cleaning operations which are owned or operated by the same Person or Persons and are located on the same or contiguous parcels.
- (9) Flexographic Printing: - the method in which the image area is raised relative to the nonimage area and utilizes flexible rubber or other elastomeric plate and rapid drying liquid inks.
- (10) Grams Of Voc Per Liter Of Material: - the weight of VOC per volume of material and can be calculated by the following equation:

$$\text{Grams of VOC per liter of material} = \frac{W_s - W_w - W_{es}}{V_m}$$

Where:

Ws	=	Weight of volatile compounds in grams
Ww	=	Weight of water in grams
Wes	=	Weight of Exempt Compounds in grams
Vm	=	Volume of material in liters

- (11) Graphic Arts: - all Gravure, Letterpress, Flexographic, and Lithographic Printing processes.
- (12) Gravure Printing: - an intaglio process in which the ink is carried in minute etched or engraved wells on a roll or cylinder. The excess ink is removed from the surface by a doctor blade.
- (13) High Precision Optics: - optical elements used in electro-optical devices which are designed to sense, detect, or transmit light energy, including specific wavelengths of light energy and changes in light energy levels.
- (14) Institutional Cleaning: - cleaning activities conducted at organizations, societies, or corporations including, but not limited to schools, hospitals, sanitariums, and prisons.
- (15) Janitorial Cleaning: - the cleaning of building or Facility components, such as the floors, ceilings, walls, windows, doors, stairs, bathrooms, etc.

- (16) Letterpress Printing - the method in which the image area is raised relative to the nonimage area and the ink is transferred to the paper directly from the image surface.
- (17) Liquid Leak: - the visible liquid solvent leak from the container at a rate of more than three (3) drops per minute, or a visible liquid mist.
- (18) Liquid-Tight Food Container: - a paperboard container that can hold liquid food and food products without leaking even when it is held upside-down.
- (19) Lithographic Printing: - a plane-o-graphic method in which the image and nonimage areas are on the same plane.
- (20) Maintenance Cleaning: - a Solvent Cleaning operation or activity carried out to keep tools, machinery, equipment excluding Application Equipment, or general work areas in clean and good operational condition.
- (21) Manufacturing Process: - the process of making goods or articles by hand or by machinery.
- (22) Medical Device: - an instrument, apparatus, implement, machine, contrivance, implant, in vitro reagent or other similar article, including any component or accessory, that meets one of the following conditions:
 - (a) it is intended for use in the diagnosis of disease or other conditions, or in the cure, mitigation, treatment, or prevention of disease; or
 - (b) it is intended to affect the structure or any function of the body; or
 - (c) it is defined in the National Formulary or the United States Pharmacopeia, or any supplement to them.
- (23) Non-Absorbent Containers: - containers made of nonporous material which do not allow the migration of the liquid Solvent through them.
- (24) Non-Atomized Solvent Flow: - the use of a solvent in the form of a liquid stream without atomization to remove uncured adhesives, uncured inks, uncured coatings, and contaminants from an article.
- (25) Non-Leaking Containers: - containers without Liquid Leaks.
- (26) Person: - any firm, business establishment, association, partnership, corporation or individual, whether acting as principal, agent, employee, or other capacity including any governmental entity or charitable organization.
- (27) Printing: - in the Graphic Arts is any operation that imparts color, design, alphabet, or numerals on a substrate.

- (28) Remote Reservoir Cleaner: - a cleaning device in which liquid solvent is pumped from a solvent container to a sink-like work area and the solvent from the sink-like area drains into an enclosed solvent container while parts are being cleaned.
- (29) Repair Cleaning: - a Solvent Cleaning operation or activity carried out during a Repair Process.
- (30) Repair Process: - the process of returning a damaged object or an object not operating properly to good condition.
- (31) Scientific Instruments: - instruments (including the components, assemblies, and subassemblies used in their manufacture) and associated accessories and reagents which are used for the detection, measurement, analysis, separation, synthesis, or sequencing of various compounds.
- (32) Screen Printing: - a process in which the Printing ink passes through a web or a fabric to which a refined form of stencil has been applied. The stencil openings determine the form and dimensions of the imprint.
- (33) Solvent: - a VOC-containing liquid used to perform Solvent Cleaning.
- (34) Solvent Cleaning: - the removal of loosely held uncured adhesives, uncured inks, uncured coatings, and contaminants which include, but are not limited to, dirt, soil, and grease from parts, products, tools, machinery, equipment, and general work areas. Each distinct method of cleaning in a cleaning process which consists of a series of cleaning methods, shall constitute a separate Solvent Cleaning operation.
- (35) Solvent Flushing: - the use of a Solvent to remove uncured adhesives, uncured inks, uncured coatings, or contaminants from the internal surfaces and passages of the equipment by flushing Solvent through the equipment.
- (36) Specialty Flexographic Printing: - Flexographic Printing on polyethylene or polypropylene food packaging, fertilizer bags, or Liquid-Tight Food Containers.
- (37) Sterilization Indicating Inks: - inks that change color to indicate that sterilization has occurred. Such inks are used to monitor the sterilization of medical instruments, autoclave efficiency, and the thermal processing of foods for prevention of spoilage.
- (38) Stripping: - the removal of Cured Coatings, Cured Inks, and Cured Adhesives.
- (39) Surface Preparation: - the removal of contaminants such as dust, soil, oil, grease, etc., prior to coating, adhesive, or ink applications.
- (40) Ultraviolet Inks: - inks which dry by polymerization reaction induced by ultraviolet energy.

- (41) United States Environmental Protection Agency (USEPA): the United States Environmental Protection Agency, the Administrator of the USEPA and his or her authorized representative.
- (42) VOC Composite Partial Pressure: - the sum of the partial pressures of the compounds defined as VOCs. VOC Composite Partial Pressure is calculated as follows:

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

- Where:
- W_i = Weight of the "i"th VOC compound, in grams
 - W_w = Weight of water in grams
 - W_e = Weight of exempt compound, in grams
 - MW_i = Molecular weight of the "i"th VOC compound, in grams per gram-mole
 - MW_w = Molecular weight of water, in grams per gram-mole
 - MW_e = Molecular weight of exempt compound, in grams per gram-mole
 - PP_c = VOC Composite Partial Pressure at 20°C, in mm Hg
 - VP_i = Vapor pressure of the "i"th VOC compound at 20°C, in mm Hg

- (43) Volatile Organic Compound (VOC): - any volatile compound of carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and Exempt Compounds.
- (44) Wipe Cleaning: - the method of cleaning a surface by physically rubbing it with a material such as a rag, paper, sponge or a cotton swab moistened with a Solvent.

(C) Requirements

(1) Solvent Requirements

- (a) A Person shall not use a Solvent to perform Solvent Cleaning unless the Solvent complies with the applicable requirements set forth below:

SOLVENT CLEANING ACTIVITY	CURRENT LIMITS		Effective 1/1/1997		Effective 1/1/1999	
	VOC g/l (lb/gal)	VOC Composite Partial Pressure mm Hg @ 20°C (68°F)	VOC g/l (lb/gal)	VOC Composite Partial Pressure mm Hg @ 20°C (68°F)	VOC g/l (lb/gal)	VOC Composite Partial Pressure mm Hg @ 20°C (68°F)
(i) Product Cleaning During Manufacturing Process Or Surface Preparation For Coating, Adhesive, Or Ink Application						
1. General	70 (0.58)					
2. Electronic Components or Medical Devices	900 (7.5)	33				
(ii) Repair and Maintenance Cleaning						
1. General	900 (7.5)	20				
2. Electrical Apparatus Components	900 (7.5)	20				
3. Medical Devices	900 (7.5)	33				
(iii) Cleaning of Coatings, or Adhesives Application Equipment	950 (7.9)	35				
(iv) Cleaning of Ink Application Equipment						
1. General	100 (0.83)	3				
2. Flexographic or Gravure Printing	100 (0.83)	3				
3. Lithographic or Letter Press Printing	900 (7.5)	25				10
4. Screen Printing	1070 (8.9)	5				
5. Ultraviolet Inks (except Screen Printing)	800 (6.7)	33				
6. Specialty Flexographic Printing	810 (6.8)	21				
(v) Cleaning of Polyester Resin Application Equipment	200 (1.7)		50 (0.42)			
or		1				

(2) Cleaning Devices and Methods Requirements

- (a) A Person shall not perform Solvent Cleaning unless one of the following cleaning devices or methods is used:
- (i) Wipe Cleaning;
 - (ii) Closed containers or hand held spray bottles from which Solvents are applied without a propellant-induced force;
 - (iii) 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 nonoperation with the exception of maintenance and repair to the cleaning equipment itself;
 - (iv) Remote Reservoir Cleaner used pursuant to the provisions of subsection (C)(3);
 - (v) 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; or
 - (vi) 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) Remote Reservoir Cleaners

- (a) Regardless of Rule 1122 requirements, any Person owning or operating a Remote Reservoir Cleaner shall comply with all of the following requirements in addition to the VOC limits for Repair and Maintenance Cleaning specified in clause (C)(1)(a)(ii):
- (i) Prevent 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) Direct Solvent flow in a manner that will prevent liquid Solvent from splashing outside of the Remote Reservoir Cleaner;
 - (iii) Do not clean porous or absorbent materials, such as cloth, leather, wood, or rope; and

- (iv) Use 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 (1) 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.
- (4) Storage and Disposal
- (a) 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
- (a) In lieu of complying with the requirements in paragraphs (C)(1)(a) or (c)(2), a Person may comply by using a VOC emission collection and control system in association with the Solvent Cleaning operation provided:
 - (i) the emission control system shall collect at least ninety percent (90%), by weight, of the emissions generated by the Solvent Cleaning operation; and
 - 1. have a destruction efficiency of at least 95 percent, by weight, or
 - 2. have an output of less than 50 parts per million (PPM) calculated as carbon with no dilution; or
 - (ii) the emission control system meets the requirements of the applicable source specific rule of the District's Regulation XI. The collection system for cleaning in Graphic Arts and Screen Printing and cleaning of Application Equipment used for Graphic Arts materials and Screen Printing materials, shall collect at least 70 percent, by weight, of the emissions generated. This control system shall reduce emissions from the emission collection system by at least 95 percent.
- (6) Recordkeeping Requirements
- (a) Records shall be maintained pursuant to Rule 109 for all applications subject to this rule, including those exempted under section (G), except the following:

- (i) Facilities not subject to recordkeeping requirements from any other Regulation XI rules.
- (ii) Cleaning performed with a Solvent which has a water content of 98 percent or more, by weight, or a VOC Composite Partial Pressure of 0.1 mm Hg or less at 20°C (68°F), or contains VOC consisting of more than 12 carbon atoms.

(D) General Prohibitions

- (1) A Person shall not atomize any Solvent unless it is vented to air pollution control equipment which meets the requirements of subsection (C)(5).
- (2) A Person shall not specify or require any Person to use Solvent or equipment subject to the provisions of this rule that does not meet the requirements of this rule.
- (3) On and after January 1, 1997, a Person shall not perform Solvent Cleaning activities or operations subject to the provisions of this rule with any material which contains any of the following compounds: 1,1,1-trichloroethane (methyl chloroform); trichlorofluoromethane (CFC-11); dichlorodifluoromethane (CFC-12); 1,1,2-trichloro-1,2,2-trifluoroethane (CFC-113); 1,2-dichloro-1,1,2,2-tetrafluoroethane (CFC-114); chloropentafluoroethane (CFC-115); ethylfluoride (HFC-161); 1,1,1,3,3,3-hexafluoropropane (HFC-236fa); 1,1,2,2,3-pentafluoropropane (HFC-245ca); 1,1,2,3,3-pentafluoropropane (HFC-245ea); 1,1,1,2,3-pentafluoropropane (HFC-245eb); 1,1,1,3,3-pentafluoropropane (HFC-245fa); 1,1,1,2,3,3-hexafluoropropane (HFC-236ea); 1,1,1,3,3-pentafluorobutane (HFC-365mfc); chlorofluoromethane (HCFC-31); 1-chloro-1-fluoroethane (HCFC-151a); or 1,2-dichloro-1,1,2-trifluoroethane (HCFC-123a).

(E) Test Methods

- (1) For the purpose of this rule, the following test methods shall be used. Other test methods determined to be equivalent after review by the staffs of the District, the Air Resources Board, and the USEPA, and approved in writing by the APCO may also be used.
 - (a) The VOC content of materials subject to the provisions of this rule shall be determined by the following methods:

- (i) USEPA Reference Method 24 (Code of Federal Regulations, Title 40, Part 60, Appendix A). The Exempt Compounds' content shall be determined by the South Coast Air Quality Management District's (SCAQMD) Method 303 (Determination of Exempt Compounds) contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual; or,
 - (ii) SCAQMD Method 304 [Determination of Volatile Organic Compounds (VOC) in Various Materials] contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual.
- (b) Exempt Perfluorocarbon Compounds
- (i) The following classes of compounds will be analyzed as Exempt Compounds for compliance with Section (C), only when manufacturers specify which individual compounds are used in the Solvent formulation and identify the USEPA, California Air Resources Board, and other USEPA-approved test methods used to quantify the amount of each exempt compound:
 - 1. cyclic, branched, or linear, completely fluorinated alkanes;
 - 2. cyclic, branched, or linear, completely fluorinated ethers with no unsaturations;
 - 3. cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and
 - 4. sulfur-containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.
- (c) Determination of VOC Composite Partial Pressure
- (i) The identity and quantity of components in Solvents shall be determined by ASTM Method D323-94. The VOC Composite Partial Pressure is calculated using the equation in subsection (B)(42) of this rule.
- (d) Determination of Presence of VOC in Cleaning Materials
- (i) The presence of VOC in liquid cleaning materials shall be determined by SCAQMD Method 308 (Quantitation of Compounds by Gas Chromatography) contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual.

- (e) Determination of Efficiency of Emission Control System
 - (i) The efficiency of the collection device of the emission control system as specified in subsection (C)(5)(a)(i) shall be determined by the USEPA method cited in USEPA's publication entitled "Guidelines for Determining Capture Efficiency", January 9, 1995, in conjunction with USEPA Method 204, 204A, 204B, 204C, 204D, 204E or 204F, as appropriate, or any other alternative method approved by USEPA, the California Air Resources Board, and the District.
 - (ii) The efficiency of the control device of the emission control system as specified in subsection (C)(5)(a)(i) and the VOC content in the control device exhaust gases, measured and calculated as carbon, shall be determined by USEPA Test Method 25 or 25A, as applicable. USEPA Test Method 18, or ARB Method 422 shall be used to determine emissions of Exempt Compounds.
- (f) Multiple Test Methods
 - (i) When more than one test method or set of test methods is specified for any testing, a violation of any requirement of this rule established by any one of the specified test methods or set of test methods shall constitute a violation of this rule.
- (g) Unless otherwise specified, all test methods referenced in this section shall be the most recently approved version.

(F) Rule 442 Applicability

Any Solvent, Solvent Cleaning activity, Solvent Cleaning unit operation, or Person, which is exempt from all or a portion of this rule except subsection (C)(6), shall be subject to the applicable requirements of the applicable Regulation XI source specific rule or Rule 442 - Usage of Solvent.

(G) Exemptions

- (1) The following Solvent Cleaning operations or activities are not subject to any provision of this rule:
 - (a) Cleaning carried out in batch-loaded cold cleaners, open-top vapor degreasers, conveyORIZED degreasers, or film cleaning machines which are regulated under Rule 1122 - Solvent Degreasers.

- (b) Cleaning operations subject to Rules 1102 - Petroleum Solvent Dry Cleaners, and 1421 - Control of Perchloroethylene Emissions from Dry Cleaning Operations.
 - (c) Cleaning operations subject to Rule 1164 - Semiconductor Manufacturing.
 - (d) Cleaning operations subject to Rule 1124 - Aerospace Assembly and Component Manufacturing Operations, except coating Application Equipment cleaning, and storage and disposal of VOC-containing materials used in Solvent Cleaning operations.
 - (e) Cleaning operations subject to Rule 1141 - Control of Volatile Organic Compound Emissions from Resin Manufacturing, and Rule 1141.1 - Coatings and Ink Manufacturing.
 - (f) Janitorial and Institutional cleaning, including graffiti removal.
 - (g) Stripping of Cured Coatings, Cured Adhesives, and Cured Inks.
 - (h) Cleaning operations using Solvents with a water content of 98% or more, by weight.
- (2) The provisions of subsection (C)(1)(a) shall not apply when carried out for any of the following applications:
- (a) Cleaning of solar cells, laser hardware, Scientific Instruments, and High Precision Optics.
 - (b) Cleaning for: conducting performance laboratory tests on coatings, adhesives, or inks; research and development programs; and laboratory tests in quality assurance laboratories.
 - (c) Cleaning of polycarbonate plastics.
- (3) Cleaning of the nozzle tips of automated spray equipment systems, except for robotic systems, and cleaning with spray bottles or containers described in subsection (C)(2)(a)(ii), are not subject to the provisions of subsection (D)(1).
- (4) Cleaning with Aerosol Products shall not be subject to the provisions of subsections (C)(1)(a) and (D)(1) if 160 fluid ounces or less of Aerosol Product are used per day, per Facility.
- (5) Cleaning of cotton swabs to remove cottonseed oil before cleaning of high-precision optics shall not be subject to subsection (C)(1)(a).
- (6) Medical Device and pharmaceutical facilities may use up to 1.5 gallons per day of Solvents that are not in compliance with subsection (C)(1)(a).

- (7) The provisions of subsection (C)(1)(a)(iii) shall not apply to cleaning of coating and adhesive application processes utilized to manufacture transdermal drug delivery product using less than 3 gallons per day of ethyl acetate averaged over a 30 calendar day period.
- (8) The provisions of subsection (C)(1)(a)(iv) shall not apply to Persons or Facilities using less than 1.5 gallons per day of solvents to clean Sterilization Indicating Ink Application Equipment.

[SIP: Submitted as amended 11/17/98 on _____; Submitted as amended 06/13/97 on _____; Approved 5/24/01, 66 FR 28666, 40 CFR 52.220(c)(262)(i)(e)(2); Approved 07/14/95, 60 FR 36230, 40 CFR 52.220(c)(222)(i)(A)(1); Approved 12/20/93, 58 FR 66285, 40 CFR 52.220(c)(188)(i)(c)(1)]

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