

RULE 4684 -- POLYESTER RESIN OPERATIONS

(Adopted May 19, 1994; Amended December 20, 2001)

1.0 Purpose

The purpose of this rule is to reduce emissions of volatile organic compounds (VOCs) from polyester resin operations, the organic solvent cleaning, and the storage and disposal of solvents and waste solvent materials associated with such operations.

2.0 Applicability

The provisions of this rule apply to commercial and industrial polyester resin operations, and to the organic solvent cleaning, and the storage and disposal of all solvents and waste solvent materials associated with such operations.

3.0 Definitions

The following definitions apply for the purpose of this rule.

3.1 Application Equipment: a device, including, but not limited to, a spray gun, brush, and roller, used to apply adhesives, coatings, or inks.

3.2 Catalyst: a substance that is added to resin to initiate or promote polymerization.

3.3 Cleaning Materials: materials including, but not limited to, materials used for cleaning hands, tools, molds, application equipment, and work areas.

3.4 Closed Mold System: a method of forming objects from polyester resin materials in a confining mold cavity by applying heat and/or pressure.

3.5 Coating: a material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains.

3.6 Control System: a control device and a collection system.

3.7 Cure: to polymerize, i.e., to transform from a liquid to a solid state or semi-solid state to achieve desired physical properties for the product, including hardness.

3.8 Cured Coating: a coating that is dry to the touch.

3.9 Degreaser: a tank, tray, drum or other container in which objects to be cleaned are exposed to a solvent or solvent vapor in order to remove contaminants. The objects to be cleaned include, but are not limited to, parts, products, tools, machinery, and equipment. An enclosed spray application equipment cleaning system is not a degreaser.

- 3.10 Dissolver: an organic solvent that is added to an adhesive, coating, or ink in order to melt or to liquefy solid particles.
- 3.11 Gel Coat: a polyester resin topcoat that provides a cosmetic enhancement and improves resistance to degradation from environmental exposure.
- 3.12 Grams of VOC per liter of material: grams VOC per liter of material is determined as follows:

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

Where:

- W_s = weight of all volatile compounds, in grams
 W_w = weight of water, in grams
 W_{es} = weight of exempt solvents, in grams
 V_m = volume of the material, in liters

- 3.13 High-Volume, Low-Pressure (HVLP) Spray Equipment: equipment used to apply materials by means of a spray gun which is designed and intended to be operated, and which is operated, between 0.1 and 10.0 psig of air atomizing pressure.
- 3.14 Liquid Leak: a visible solvent leak from a container at a rate of more than three drops per minute, or a visible liquid mist.
- 3.15 Maintenance Cleaning: the cleaning of tools, forms, molds, jigs, machinery, and equipment, and the cleaning of work areas where maintenance or manufacturing occurs.
- 3.16 Manufacturing Process: the process of making goods or articles by hand or by machine.
- 3.17 Monomer: an organic compound, such as styrene, that reacts with unsaturated polyester resins to form a cured polyester resin.
- 3.18 Non-Absorbent Container: a container made of non-porous material that does not allow the migration of solvents through it.
- 3.19 Non-Atomized Solvent Flow: solvents in the form of a liquid stream without the introduction of any propellant.
- 3.20 Non-Leaking Container: a container without liquid leak.
- 3.21 Organic Solvent: the same as "Solvent."
- 3.22 Organic Solvent Cleaning: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).

- 3.23 Polyester Resin Materials: materials including, but not limited to: unsaturated polyester resins such as isophthalic, orthophthalic, halogenated, Bisphenol-A, vinyl-ester, or furan resins; cross-linking agents; catalysts, gel coats, inhibitors, accelerators, promoters, and any other VOC containing materials used in polyester resin operations.
- 3.24 Polyester Resin Operations: methods used for the production or rework of products by mixing, pouring, hand layup, impregnating, injecting, forming, winding, spraying, and/or curing with fiberglass, fillers, or any other reinforcement materials and associated cleanup.
- 3.25 Polymer: a chemical compound comprised of a large number of chemical units and which is formed by chemical linking of monomers.
- 3.26 Propellant: any gas, including air, in a pressure container for expelling the contents when the pressure is released.
- 3.27 Repair Cleaning: a solvent cleaning operation or activity carried out during a repair process.
- 3.28 Repair Process: the process of returning a damaged object or an object not operating properly to good condition.
- 3.29 Resin: any of a class of organic polymers of natural or synthetic origin used in reinforced products to surround and hold fibers or filler particles, and is solid or semisolid in the cured state.
- 3.30 Solvent: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).
- 3.31 Specialty Resin: any halogenated, furan, bisphenol A, vinyl-ester, or isophthalic resin used to make products for exposure to one or more of the following extreme environmental conditions: acute or chronic exposure to corrosive agents, caustic agents, acidic agents, or flame.
- 3.32 Stationary Source: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.33 Volatile Organic Compound (VOC): as defined in Rule 1020 (Definitions).
- 3.34 Vapor suppressant: a substance added to resin to minimize the transfer of monomer vapor into the atmosphere.
- 3.35 Waste Materials: materials including but not limited to paper or cloth used for cleaning operations, waste resins, or spent cleaning materials.

4.0 Exemptions

The provisions of this rule, other than the recordkeeping requirements of section 6.1, shall not apply to any polyester resin operation provided the volume of polyester resin materials used is less than 20 gallons per month.

5.0 Requirements

5.1 Process and Control Requirements

5.1.1 Each polyester resin operation shall comply with one of the following process or control requirements:

5.1.1.1 Use low-VOC polyester resins with the following monomer content: Low VOC resins, except for specialty resins and gel coats, contain no more than 35% monomer by weight. Low VOC pigmented gel coats contain no more than 45% monomer by weight. Low VOC specialty resins and clear gel coats, contain no more than 50% monomer by weight; or

5.1.1.2 Use resin containing a vapor suppressant, such that the weight loss from the VOC emissions does not exceed 60 grams per square meter of exposed surface during resin polymerization; or

5.1.1.3 Use a closed-mold system; or

5.1.1.4 Install and operate an emissions control system which is approved by the District, designed and operated for maximum collection of fugitive emissions from polyester resin materials and cleaning materials, with a capture and control efficiency of 85% or greater on a mass basis.

5.1.2 Spray application of polyester resin shall only be performed using airless, air assisted airless, high-volume, low-pressure (HVLP) spray equipment, or electrostatic spray equipment.

5.1.2.1 High-Volume, Low-Pressure (HVLP) spray equipment shall be operated in accordance with the manufacturer's recommendations.

5.1.2.2 For HVLP spray guns manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.

5.1.2.3 A person shall not sell or offer for sale for use within the District any HVLP spray gun without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in section 3.0;

5.1.2.4 Sections 5.1.2.1, 5.1.2.2 and 5.1.2.3 shall be effective on and after November 15, 2002.

5.2 Cleaning Materials Requirements.

5.2.1 Cleaning materials containing more than 1.7 pounds of VOC per gallon shall not be used in polyester resin operations except:

5.2.1.1 in enclosed equipment cleaners; or

5.2.1.2 to clean molds, spray equipment or other dispensing equipment tools used in gel coat or specialty resin operations that come in direct contact with polyester resin products, provided that the usage of cleaning materials does not exceed 4 gallons per day.

5.2.2 Section 5.2 shall remain in effect until November 14, 2002.

5.3 Storage and Disposal Requirements

5.3.1 Use closed containers to store all polyester resin materials, cleaning materials, or other VOC containing materials except when accessed for use.

5.3.2 Use self-closing containers for the disposal of all uncured polyester resin materials, cleaning materials, or any unused VOC containing materials in such a manner as to effectively control VOC emissions.

5.3.3 Section 5.3 shall remain in effect until November 14, 2002.

5.4 Organic Solvent Cleaning, Storage, and Disposal Requirements

5.4.1 Section 5.4 shall be effective on and after November 15, 2002, unless otherwise indicated.

5.4.2 From November 15, 2002, through November 14, 2003, an owner or operator shall not use organic solvents for cleaning operations that exceed the VOC content limits specified as being "Effective November 15, 2002 through November 14, 2003" in Table 1.

5.4.3 On and after November 15, 2003, an owner or operator shall not use organic solvents for cleaning operations that exceed the VOC content limits specified as being "Effective November 15, 2003" in Table 1.

Table 1 VOC Limits for Organic Solvents Used in Cleaning Operations

Type of Solvent Cleaning Operation	Effective November 15, 2002 through November 14, 2003	Effective November 15, 2003
	VOC Content Limit Grams of VOC/liter of material (lb/gal)	VOC Content Limit Grams of VOC/liter of material (lb/gal)
A. Product Cleaning During Manufacturing Process or Surface Preparation for Coating Application	70 (0.58)	50 (0.42)
B. Repair and Maintenance Cleaning	50 (0.42)	50 (0.42)
C. Cleaning of Polyester Resin Application Equipment	50 (0.42)	50 (0.42)

- 5.4.4 The provisions of Table 1 shall not apply to the following applications:
- 5.4.4.1 Cleaning of solar cells, laser hardware, scientific instruments, or high precision optics.
 - 5.4.4.2 Cleaning in laboratory tests and analyses, or bench scale or research and development projects.
 - 5.4.4.3 Until June 30, 2005, the cleaning of ultraviolet lamps used for the curing of ultraviolet coatings.
- 5.4.5 The provisions of Sections 5.4.6 through 5.4.8 of this rule shall only apply to an owner or operator that uses any solvent containing more than 50 grams of VOC per liter of material for organic solvent cleaning.
- 5.4.6 Cleaning activities that use solvents shall be performed by one or more of the following methods:
- 5.4.6.1 Wipe cleaning; or
 - 5.4.6.2 Application of solvent from hand-held spray bottles from which solvents are dispensed without a propellant-induced force; or
 - 5.4.6.3 Non-atomized solvent flow method in which 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

- 5.4.6.4 Solvent flushing method in which the cleaning solvent is discharged into a container that 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.
- 5.4.7 Solvent shall not be atomized into the open air unless it is vented to a VOC emission control system that complies with Section 5.1.1.4. This provision shall not apply to the cleaning of nozzle tips of automated spray equipment systems, except for robotic systems, and cleaning with spray bottles or containers described in Section 5.4.6.2.
- 5.4.8 An owner or operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings unless an enclosed system or equipment that is proven to be equally effective at controlling emissions is used for cleaning. If an enclosed system is used, it must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures, and it must be used according to the manufacturer's recommendations and must be closed when not in use.
- 5.4.9 An owner or operator shall store or dispose of all uncured polyester resin materials, fresh or spent solvents, waste solvent cleaning materials such as cloth, paper, etc., coatings, adhesives, catalysts, and thinners in self-closing, non-absorbent and non-leaking containers. The containers shall remain closed at all times except when depositing or removing the contents of the containers or when the container is empty.

6.0 Administrative Requirements

6.1 Recordkeeping

- 6.1.1 Any person subject to this rule shall maintain the following records:
 - 6.1.1.1 Daily records of the type and quantity of all resins, catalysts, and cleaning materials used in each operation.
 - 6.1.1.2 Records of the VOC content, in weight percent, of all polyester resin materials used or stored at the stationary source.
 - 6.1.1.3 Records of the VOC content of all cleaning materials used and stored at the stationary source as specified in Section 5.2 and/or 5.4.

6.1.1.4 Records showing the weight loss per square meter during resin polymerization for each vapor-suppressed resin.

6.1.1.5 Records of hours of operation and key operating parameters for any add-on control equipment.

6.1.2 Records required by this section shall be retained at the stationary source for a period of at least two years and be made available to the District upon request.

6.1.3 Effective on and after November 15, 2002, records shall be retained at the stationary source for a period of at least five years and be made available to the District upon request.

6.2 Test Methods

The analysis of cleaning materials, polyester resin materials and control efficiency shall be determined by the following methods:

6.2.1 The emission rate per square meter of exposed surface during polymerization of Polyester Resins is to be determined using: SCAQMD Method 309 (Static Method for Determination of Volatile Emissions from Polyester and Vinyl Resins Operations), Attachment A, 1/8/91.

6.2.2 The capture efficiency determinations for add-on control devices shall be in accordance with 40 CFR 52.741, and the control efficiency of add-on control devices is to be determined using EPA Method 25 (Determination of Total Gaseous Non Methane Organic Emissions as Carbon) or EPA Method 25A (Determination of Total Gaseous Organic Concentration using a Flame Ionization Analyzer).

6.2.3 The monomer content of uncatalyzed resin materials is to be determined using ASTM D2369-87 (Standard Test Method for Volatile Content of Coatings) or SCAQMD Test Method 312.

6.2.4 The VOC content of cleaning materials shall be determined using EPA Method 24 (40 CFR Part 60, Appendix A).

6.2.5 Multiple Test Methods

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.

6.2.6 Version of Test Methods

All ASTM test methods referenced in Section 6.0 are the most recently EPA-approved version that appears in the Code of Federal Regulations as Materials Approved for Incorporation by Reference.

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