

# RULE 243 POLYESTER RESIN OPERATIONS

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## 100 GENERAL

**101 PURPOSE:** To reduce the emissions of Volatile Organic Compounds (VOC) from polyester resin operations at each stage of the polyester resin process.

### 102 APPLICABILITY

102.1 Geographic: The provisions of this rule apply to all commercial and industrial stationary facilities performing polyester resin operations, including pleasure craft refinishing, anywhere in Placer County.

102.2 Application: This rule applies to any person who:

102.2.1 Manufactures, sells, offers for sale or supplies polyester resins for use in the District; or

102.2.2 Uses polyester resins; or

102.2.3 Uses a surface preparation solvent, a cleanup solvent or a stripper; or

102.2.4 Solicits, requires the use of, or specifies the application of any polyester resins, surface preparation solvent, cleanup solvent, or stripper that does not comply with this rule.

102.3 Severability: If a court of competent jurisdiction issues an order that any provision of this rule is invalid, it is the intent of the Board of Directors of the District that the other provisions of this rule remain in full force and effect, to the extent allowed by law.

### 103 EXEMPTIONS

103.1 Partial Exemption, Touch-Up and Repair: The provisions of Section 300 of this rule, Standards, shall not apply to touch-up and repair operations.

103.2 Partial Exemption, Low Usage of Resin Materials: The provisions of this rule, except for Sections 501 and 502, shall not apply to any person operating a polyester operation where the volume of polyester resin materials used in any month is less than 20 gallons.

103.3 Partial Exemption, Low Usage of Cleaning Materials: The provisions of Section 304 of this rule shall not apply to the cleaning of 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 total volume of the cleaning materials used in any month does not exceed 16 gallons.

103.4 Pleasure Craft Exemption: The provisions of this rule shall not apply to pleasure craft repair and maintenance operations that do not involve polyester resin materials.

103.5 Exemption From Rule 219: The provisions of Rule 219, Organic Solvents, shall not apply to polyester resin operations as defined in Rule 243.

## 200 DEFINITIONS

**201 APCO:** Air Pollution Control Officer.

**202 CAPTURE EFFICIENCY:** Expressed in percent, capture efficiency is the ratio of the weight of the VOC in the effluent stream entering a control device to the weight of the VOC emitted from polyester resin operations, both measured simultaneously in accordance with Subsection 503.3, and calculated by the following equation:

$$\text{Capture Efficiency} = \frac{W_c}{W_e} \times 100$$

Where:  $W_c$  = Weight of VOC entering the control device

$W_e$  = Weight of VOC discharged from the coating operations

- 203 CATALYST:** A substance added to resin to initiate or promote polymerization.
- 204 CLEANING MATERIAL:** Any material containing a volatile organic compound (VOC) and used to clean hands, work areas, tools, molds, application equipment, and any other equipment related to a polyester resin operation.
- 205 CLOSED CONTAINER:** A container, which has a cover where the cover meets with the main body of the container without any visible gaps between the cover and the main body of the container.
- 206 CLOSED MOLD SYSTEM:** A method of forming objects from polyester resin material by placing the polyester resin material in a confining mold cavity and applying pressure and/or heat.
- 207 CONTROL DEVICE EFFICIENCY:** Expressed in percent, control device efficiency is the ratio of the weight of the VOC removed by the control device from the effluent stream entering the control device to the weight of VOC in the effluent stream entering the control device, both measured simultaneously in accordance with Subsection 503.4, and calculated by the following equation:

$$\text{Control Device Efficiency} = \frac{(W_c - W_a)}{W_c} \times 100$$

Where:  $W_c$  = Weight of VOC entering the control device

$W_a$  = Weight of VOC discharged from the control device

- 208 CROSS-LINKING:** The process of chemically bonding two or more polymer chains together.
- 209 CURE:** To polymerize, e.g., to transform from a liquid to a solid or semi-solid state to achieve desired product physical characteristics, including hardness.
- 210 ELECTROSTATIC SPRAY:** Equipment used to apply materials by charging atomized particles, which are deposited by electrostatic attraction.
- 211 EMISSION CONTROL SYSTEM:** A system for reducing emissions of VOC from polyester resin operations. It consists of (1) equipment, which captures the emissions from the polyester resin process and transports them to the control device, and (2) a VOC control device, which destroys the VOC or otherwise limits the emission of VOC to the atmosphere. The capture efficiency and the control device efficiency are calculated in accordance with Subsections 503.3 and 503.4, respectively.

The Emission Control System Efficiency is calculated by the following equation:

$$\text{Efficiency, \%} = \frac{\text{Capture Efficiency, \%} \times \text{Control Device Efficiency, \%}}{100}$$

**212 ENCLOSED GUN CLEANER:**

212.1 A device that is used for the cleaning of spray guns, pots, cups and hoses, that has an enclosed solvent container, is not open to the ambient air when in use and has a mechanism to force the cleanup material through the gun while the cleaner is in operation:

or

212.2 A device that is used for the cleaning of spray guns, pots, cups and hoses, that has a remote reservoir, uses non-atomized solvent flow to flush the spray equipment and collects and returns the discharged solvent to the remote reservoir.

**213 EXEMPT COMPOUND:** Any organic compound, which is exempt from the category of Volatile Organic Compounds (VOC), and is listed in District Rule 102, Definitions.

**214 FIBERGLASS:** A glass fiber, similar in appearance to wool or cotton fiber.

**215 GEL COAT:** A polyester resin topcoat that provides a cosmetic enhancement and improves resistance to degradation from exposure to the environment. A gel coat may be either pigmented or clear.

**216 GRAMS OF VOC PER LITER OF MATERIAL:** The weight (in grams) of VOC per liter of material shall be calculated using the following:

$$\text{Weight of VOC per volume of material} = \frac{(W_V - W_W - W_{EC})}{W_M}$$

Where:  $W_V$  = Weight of all volatile compounds, in grams  
 $W_W$  = Weight of water, in grams  
 $W_{EC}$  = Weight of compounds listed as exempt from the definition of VOC, per Section 237, in grams  
 $W_M$  = Volume of material, in liters

**217 HIGH VOLUME-LOW PRESSURE (HVLP) EQUIPMENT:** Spray equipment used to apply coatings by means of a gun which operates between 0.1 and 10.0 psig air pressure, measured dynamically at the center of the air cap and at the air horns.

**218 INHIBITOR:** A substance used to slow down or prevent a chemical reaction.

**219 LAY-UP:** A hand application technique of composite materials using a bucket and a paint brush, a paint roller or other hand-held method of application.

**220 LOW VOC EMISSIONS RESIN SYSTEMS:** Polyester resin materials, which contain vapor suppressants to reduce monomer evaporation loss.

**221 LOW VOLUME-LOW PRESSURE (LVLP) EQUIPMENT:** Spray equipment used to apply coatings by means of a gun which operates between 0.1 and 10.0 psig air pressure, and air volume less than 15.5 cfm per spray gun and which operates at a maximum fluid delivery pressure of 50 psig.

**222 MATERIAL:** Any material containing VOC, including but not limited to, resin, pigmented gel coat, catalyst, stripper or cleaning solvent.

**223 MONOMER:** A relatively low-molecular-weight organic compound that combines with itself, or other similar compounds, to become a cured thermosetting resin.

**224 MONOMER CONTENT:** The amount of monomer in a batch of polyester resin material, expressed as a percentage of the total weight of the batch. It shall be calculated by using the following three equations:

$$224.1 \text{ Batch weight } W_B = W_R + W_F + W_P + W_O$$

Where:  $W_R$  = Resin weight  
 $W_F$  = Filler weight  
 $W_P$  = Pigment weight  
 $W_O$  = Other additives weight

$$224.2 \text{ Monomer weight, } W_M = W_R \times \frac{W_{SP}}{100}$$

Where:  $W_R$  = Resin weight in batch  
 $W_{SP}$  = % Monomer in resin, per mfg'r's. specification.

$$224.3 \text{ Monomer content, \% } = \frac{W_M}{W_B} \times 100$$

**225 NON-ATOMIZING APPLICATOR:** Equipment used to apply materials by use of fluid pressure without forming an atomized spray.

**226 PLEASURE CRAFT:** Boats or other water vessels, which are manufactured or operated primarily for recreational purposes, or leased, rented or chartered to a person or business for recreational purposes.

**227 PLEASURE CRAFT COATING:** Any unsaturated polyester resin material applied by brush, spray, roller or other means to a pleasure craft.

**228 POLYESTER RESIN MATERIALS:** Include but are 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 in polyester operations.

**229 POLYESTER RESIN OPERATIONS:** The production or rework of products by mixing, pouring, hand lay-up, impregnating, injecting, forming, winding, spraying, and/or curing unsaturated polyester resin materials with fiberglass, fillers, or any other reinforcement materials, and associated cleanup.

**230 POLYMER:** A chemical compound comprised of a large number of chemical units, which is formed by the chemical linking of monomers.

**231 POLYMERIZATION:** A chemical process where liquid materials are transformed into a solid or semi-solid state to achieve desired product physical properties, including hardness.

**232 REPAIR:** The part of the fabrication process that requires the addition of polyester resin material to one or more portions of a previously fabricated product in order to mend structural damage.

**233 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 semi-solid in the cured state.

- 234 **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.
- 235 **TOUCH-UP:** The part of the fabrication process that is necessary to cover minor imperfections.
- 236 **VAPOR SUPPRESSANT:** A substance added to resin to minimize the outward diffusion of monomer vapor into the atmosphere.
- 237 **VOLATILE ORGANIC COMPOUND (VOC):** Any chemical compound, which meets the definition of VOC described in District Rule 102, Definitions.
- 238 **WASTE MATERIAL:** Material including, but not limited to, scraps resulting from cutting or grinding operations, any paper or cloth used for cleaning operations, waste resins and any other spent cleaning materials.

### 300 STANDARDS

- 301 **SPRAY APPLICATION REQUIREMENTS:** Spray application of polyester resin materials shall be performed using one or more of the following application methods:
- 301.1 Non-Atomizing Applicator;
  - 301.2 High volume-low pressure (HVLP) spray gun;
  - 301.3 Low volume-low pressure (LVLP) spray gun;
  - 301.5 Electrostatic spray;
  - 301.6 Any other equivalent method, which has been approved in writing by the APCO and the U. S. Environmental Protection Agency.
- 302 **PROCESS AND CONTROL REQUIREMENTS:** Each polyester resin operation shall comply with one of the following process or control requirements:
- 302.1 Low VOC Polyester Resin Materials: Use only materials with the following not-to-exceed monomer content: (Monomer content is as applied, based upon the manufacturer's specifications and is calculated per Section 224).
    - 302.1.1 Resins (except for specialty resins and gel coats): Not to exceed monomer content of 35% by weight, as applied.
    - 302.1.2 Pigmented Gel Coats: Not to exceed monomer content of 45% by weight, as applied.
    - 302.1.3 Specialty Resins and Clear Gel Coats: Not to exceed monomer content of 50% by weight, as applied.
  - 302.2 Vapor Suppressant: Use polyester resin material containing a vapor suppressant which limits weight loss from VOC emissions to no more than 60 grams per square meter.
  - 302.3 Closed Mold: Use a closed mold system.
- 303 **EMISSION CONTROL SYSTEM:** As an alternative to Section 302, the owner/operator of a polyester resin operations facility may install and operate an emission control system. The emission control system shall be an acceptable alternative if it meets all of the following requirements:

- 303.1 Permit: Owner or Operator shall apply for and receive a Permit-to-Operate from the APCO, pursuant to Rule 501, General Permitting Requirements.
- 303.2 Efficiency: Owner or operator shall provide an overall system efficiency of not less than 85% by weight, as determined per Subsections 503.3 and 503.4, and calculated per Section 211.
- 303.3 Operation and Maintenance Plan: Plan shall comply with the provisions of Section 404.

**304 CLEANING MATERIAL REQUIREMENT:** Unless used in an enclosed gun cleaner, the maximum allowable usage of cleaning materials that either exceed 1.7 pounds VOC per gallon, or have an initial boiling point less than 190°C, is four gallons per day. If the usage of these materials exceeds four gallons per day, a cleaning material reclamation system shall be used. Such a system shall operate at a minimum of 80% recovery efficiency. Solvent residues from on-site reclamation systems shall not contain more than 20 % VOC by weight, as determined per Subsection 503.7.

**305 STORAGE AND DISPOSAL REQUIREMENTS**

- 305.1 Closed Containers: Closed containers shall be used for the storage of all polyester resin materials, cleaning materials, freshly-cured resin scraps and any other unused VOC-containing materials except when being accessed for use.
- 305.2 Self-Closing Containers: Self-closing containers shall be used in such a manner to effectively control VOC emissions to the atmosphere for the disposal of all polyester resin materials, cleaning materials, waste materials and any unused VOC-containing materials.

**306 COMPLIANCE DATES**

- 306.1 Any person subject to the requirements of this rule shall be in compliance by October 13, 2003.
- 306.2 Facilities operating prior to the date of adoption of this rule, and electing to install and operate an emission control system pursuant to the requirements of Section 303, shall have the control system installed and operating by October 13, 2004.

**400 ADMINISTRATIVE REQUIREMENTS**

**401 PROHIBITION OF SPECIFICATION:** No person shall require for use or specify the application of any gel coat or polyester resin subject to the provisions of this rule that does not meet the limits and requirements of this rule, where such applications result in a violation of this rule. The requirements of this Section shall apply to all written or oral contracts.

**402 PROHIBITION OF SALE:** No person shall sell or offer for sale, any gel coat or polyester resin material subject to the provisions of this rule, that does not meet the limits and requirements of this rule where such applications result in a violation of this rule.

**403 SALE OF SOLVENTS:** Any person who sells any solvent subject to this rule shall make available to the purchaser at the time of sale, the following information:

- 403.1 The solvent type by name, code and manufacturer.
- 403.2 The maximum VOC content of the cleanup solvent, as applied, expressed as grams VOC per liter of material as determined pursuant to Section 216.
- 403.3 Recommendations regarding thinning, reducing or mixing with any solvent, as applicable.



**404 OPERATION AND MAINTENANCE PLAN:** A person using an emission control system pursuant to Section 303, as a means of alternate compliance with this rule, shall submit an Operation and Maintenance Plan for the emission control system to the APCO for approval. A person proposing to install a new emission control system as a means of alternate compliance with this rule shall submit in addition to an Operation and Maintenance Plan, an application for Authority to Construct, pursuant to Rule 501, General Permit Requirements. The Plan shall specify operating and maintenance procedures, which will demonstrate continuous operation of the emission control system during periods of emission-producing operations. The Plan shall also specify which records must be kept to document these operating and maintenance procedures. These records shall comply with the requirements of Sections 501 and 502. The Plan shall be implemented upon approval of the APCO. Non-approval by the APCO, with the deficiency noted, shall be sent to the applicant, in writing within thirty (30) days of receipt of the Plan. The applicant shall have thirty (30) additional days to correct and resubmit the Plan.

## **500 MONITORING AND RECORDS**

**501 RECORDKEEPING:** Any person subject to this rule shall comply with the following requirements.

501.1 Maintain current records, which provide all of the data necessary to demonstrate compliance with this rule, including the following information:

501.1.1 List of all polyester resins, catalysts, solvents and cleaning materials in use.

501.1.2 Daily usage quantities of the above materials.

501.1.3 Weight percent of monomer (VOC) in each of the polyester resin materials.

501.1.4 VOC content (grams/liter) for solvents and cleaning materials used.

501.1.5 For approved vapor-suppressed resins, the weight loss (grams per square meter) during resin polymerization, the monomer weight percent and the gel time for each resin.

501.1.6 The amount of each of the polyester resin materials and cleaning materials used during each day of operation.

501.1.7 The volume of polyester resin materials and cleaning materials used for touch-up and repair each day of operation.

501.1.8 Records of hours of operation and key operating parameters as per Section 404 for any emission control system.

**502 RECORD RETENTION:** All records required by this rule shall be retained and made available for inspection by the APCO for the previous 24 month period.

## **503 TEST METHODS**

503.1 VOC Content: Volatile Organic Compound content shall be determined in accordance with EPA Method 24 and calculated per Section 216 of this rule, as applicable.

503.2 Resin VOC (Monomer) Weight Loss: The "Static Method for Determination of Volatile Emissions from Polyester and Vinyl Ester Resins" (Air Resources Board RACT/BARCT Guidance, 1991, which is based upon South Coast AQMD Rule 1162 as amended and published 7/17/90) shall be used for determining VOC emissions for resins as received from the manufacturer. Other applicable test methods may be used if they are approved by the APCO, California Air Resources Board and the U.S. Environmental Protection Agency.

503.3 Emission Capture System Efficiency

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503.3.1 EPA Methods 204, 204A, 204B, 204C, 204D, 204E, and/or 204F, as appropriate.

503.3.2 40 CFR 52.741, "VOC Measurement Techniques for Capture Efficiency".

503.4 Emission Control System Efficiency

503.4.1 EPA Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer".

503.4.2 EPA Method 18, "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography".

503.4.3 EPA Method 2 or 2C, as appropriate.

503.5 VOC Content, Other

503.5.1 ASTM D 3960-81 - "VOC in Paints and Coatings".

503.5.2 ASTM D 1078-86 - "Liquid VOC Boiling Range".

503.6 Exempt Solvents

503.6.1 ASTM D 4457-85 (GC) or ARB 432

503.7 VOC Content of Waste Materials

503.7.1 EPA Method 8240, "GC/MS Method for Volatile Organics" for liquid wastes.

503.7.2 Air Resources Board Method 401, "Gravimetric Purge and Trap"