

**RULE 465 POLYESTER RESIN OPERATIONS**

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**100 GENERAL**

- 101 **PURPOSE:** The purpose of this rule is to reduce emissions of volatile organic compounds from polyester resin operations at each stage of the polyester resin operation.
- 102 **APPLICABILITY:** This rule applies to persons who operate polyester resin operations within Sacramento County.
- 103 **EXEMPTION - LOW USAGE:** The provisions of this rule, other than the record keeping requirements of Section 501, shall not apply to any person operating a polyester resin operation where the volume of polyester resin materials used is less than 20 gallons per month.
- 104 **EXEMPTION - CLEANING MATERIAL REQUIREMENTS:** Prior to September 25, 2009, the provisions of Section 303 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 usage of cleaning materials does not exceed 16 gallons per month. This exemption expires on September 25, 2009.
- 105 **SEVERABILITY:** If any section, subsection, sentence, clause, phrase, or portion of this rule is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions thereof.

**200 DEFINITIONS**

- 201 **AIRLESS SPRAY EQUIPMENT:** Equipment for applying materials by use of fluid pressure without atomizing air, including heated airless spray.
- 202 **AIR-ASSISTED AIRLESS SPRAY EQUIPMENT:** Equipment for applying materials by use of fluid pressure to atomize coating and air pressure between 0.1 and 10 psig to adjust the spray pattern.
- 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 SYSTEM:** Includes a control device and a collection system.
- 208 **ELECTROSTATIC SPRAY EQUIPMENT:** Equipment used to apply materials by charging atomized particles that are deposited by electrostatic attraction.

- 209     **ENCLOSED GUN CLEANER:**  
209.1    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  
209.2    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.
- 210     **EXEMPT COMPOUND:** For the purposes of this rule, “exempt compound” has the same meaning as in Rule 101—GENERAL PROVISIONS AND DEFINITIONS.
- 211     **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 pigmented or may be clear.
- 212     **HIGH-VOLUME LOW-PRESSURE (HVLP) APPLICATION EQUIPMENT:** Equipment used to apply coatings by means of a gun which is designed to be operated and which is operated between 0.1 and 10.0 psig air pressure measured dynamically at the center of the air cap and at the air horns.
- 213     **LOW-VOLUME-LOW PRESSURE (LVLP) APPLICATION EQUIPMENT:** Spray coating application equipment with air pressure between 0.1 and 10.0 pounds per square inch gauge (psig) and air volume less than 15.5 cfm per spray gun and which operates at a maximum fluid delivery pressure of 50 psig.
- 214     **MONOMER:** An organic compound that combines with itself, or other similar compounds, to become a cured thermosetting resin.
- 215     **NON-COMPLIANT MATERIAL:** A material that does not comply pursuant to Rule 107, ALTERNATIVE COMPLIANCE or Section 301.2, and one of the following applies:  
215.1    The material exceeds the monomer content limits and vapor suppressant limits specified by Sections 301.1a and 301.1b and is not used in a closed mold system as specified by Section 301.1c, and the polyester resin operation is in excess of the allowable volume per Section 103; or  
215.2    The cleaning material exceeds the VOC content limit specified by Section 303 and is not used in an enclosed gun cleaner and the polyester resin operation is in excess of the allowable volume per Section 103 and the cleaning material is in excess of the allowable volume per Section 104.
- 216     **POLYESTER RESIN:** Unsaturated polyester resin such as isophthalic, orthophthalic, halogenated, bisphenol-A, vinyl-ester, or furan resin; cross-linking agent; catalyst, gel coat, inhibitor, accelerator, promoter, and any other VOC-containing material comprising a resin made from polyester. Inert filler and cleaning material are excluded from this definition.
- 217     **POLYESTER RESIN OPERATION:** 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.
- 218     **POLYMER:** A chemical compound comprised of a large number of chemical units and which is formed by the chemical linking of monomers.
- 219     **POLYMERIZATION:** to transform from a liquid to a solid or semi-solid state to achieve desired product physical properties, including hardness.

- 220 **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.
- 221 **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.
- 222 **VOLATILE ORGANIC COMPOUND (VOC):** For the purposes of this rule, "volatile organic compound" has the same meaning as in Rule 101- GENERAL PROVISIONS AND DEFINITIONS.
- 223 **VAPOR SUPPRESSANT:** A substance added to resin to minimize the outward diffusion of monomer vapor into the atmosphere.
- 224 **WASTE MATERIAL:** Includes, but is not limited to, any paper or cloth used for cleaning operations, waste resins, or any spent cleaning materials.

### 300 STANDARDS

#### 301 PROCESS AND CONTROL REQUIREMENTS:

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

- a. Use low-VOC polyester resins with the following monomer content:
  1. Resins, except for specialty resins and gel coats, which contain no more than 35% by weight as applied, as determined by Section 502.3.
  2. Pigmented gel coats which contain no more than 45% by weight as applied, as determined by Section 502.3.
  3. Specialty resins and clear gel coats which contain no more than 50% by weight as applied, as determined by Section 502.3.
- b. A polyester resin material containing a vapor suppressant, such that weight loss from VOC emissions does not exceed 60 grams per square meter of exposed surface area during resin polymerization, as determined by Section 502.1.
- c. Use of a closed-mold system.

301.2 As an alternative to Section 301.1, a source may install and operate an emissions control system that:

- a. Has been permitted by the Air Pollution Control Officer, pursuant to Rule 201, GENERAL PERMITTING REQUIREMENTS, and
- b. Provides an overall system efficiency, as determined by Section 404, of not less than 90%, and
- c. Complies with the requirements of Section 405.

302 **SPRAY APPLICATION REQUIREMENTS:** Spray application of polyester resin materials shall only be performed using one or more of the following application methods:

- 302.1 airless,
- 302.2 air-assisted airless,
- 302.3 high-volume low-pressure (HVLP),
- 302.4 low-volume/low-pressure (LVLP),
- 302.5 electrostatic spray equipment or
- 302.6 Any other equivalent method which has been approved in writing by the Air Pollution Control Officer and the U.S. Environmental Protection Agency.

**303 CLEANING MATERIAL REQUIREMENTS:**

- 303.1 Prior to September 25, 2009, a person shall not use cleaning materials containing more than 1.7 pounds of VOC per gallon (204 g/l) as applied and as determined by Section 502.2, unless the material is used in an enclosed gun cleaner.
- 303.2 Effective September 25, 2009, a person shall not use cleaning materials containing more than 0.21 pounds of VOC per gallon (25 g/l) as applied and as determined by Section 502.2.

**304 STORAGE AND DISPOSAL REQUIREMENTS:**

- 304.1 Each polyester resin operation shall use closed containers to store all polyester resin materials, cleaning materials, and any unused VOC-containing materials, except when accessed for use.
- 304.2 Each polyester resin operation shall use closed containers for the disposal of all uncured polyester resin materials, cleaning materials, waste materials, and any unused VOC-containing materials.

**400 ADMINISTRATIVE REQUIREMENTS****401 CALCULATION FOR DETERMINING VOC WEIGHT PER VOLUME OF MATERIAL:**

The weight of VOC per volume of material shall be calculated by the following equation:

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

Where:  $W_s$  = weight of all volatile compounds in grams  
 $W_w$  = weight of water in grams  
 $W_{ec}$  = weight of exempt compounds in grams  
 $V_m$  = volume of the material in liters

- 402 CALCULATION FOR DETERMINING PERCENT MONOMER (STYRENE) CONTENT AS APPLIED:** The percent monomer content of a resin as applied shall be calculated by the following equations. Batch weight and styrene weight calculation shall be completed to provide inputs into percent monomer equation.

$$\text{Batch Weight} = R + F + P + O$$

Where: R = Resin Weight  
 F = Filler Weight  
 P = Pigment Weight  
 O = Other Additives Weight

$$\text{Styrene Weight} = R \times \frac{SP}{100}$$

Where: R = Resin Weight  
 SP = % Styrene in Resin (from Manufacturer)

$$\text{Percent Monomer} = \frac{\text{Styrene Weight}}{\text{Batch Weight}} \times 100$$

- 403 CALCULATION FOR DETERMINING PERCENT CONTROL EFFICIENCY AND VOC MASS EMISSION RATE:** The VOC mass emission rate shall be calculated both upstream and downstream of the emissions control device based on the respective VOC mass concentration and volumetric flowrate, pursuant to Section 502.6 and the following equation:

$$M = (Q)(C)(60 \text{ min/hr}) \quad [\text{Calculated upstream and downstream}]$$

Where: M = VOC mass emission rate (upstream/downstream), in lb/hr.  
 Q = the volumetric flowrate at the inlet (upstream) or exhaust stack outlet (downstream), in scfm.  
 C = the VOC mass concentration at the inlet (upstream) or outlet (downstream), in lb/scf, as measured pursuant to Section 502.6.

The percent control efficiency is calculated as follows:

$$\%CE = \frac{(M_u - M_D)}{M_u} \times 100$$

Where: CE = control efficiency.  
 M<sub>U</sub> = the upstream VOC mass emission rate, in lb/hr.  
 M<sub>D</sub> = the downstream VOC mass emission rate, in lb/hr.

404 **CALCULATION FOR DETERMINING OVERALL SYSTEM EFFICIENCY:** To verify compliance with Section 301.2, the overall system efficiency is calculated as follows:

$$\%SE = [\%CLE \times \%CE] / 100$$

Where: SE = system efficiency.  
 CLE = collection efficiency, as determined by Section 502.5.  
 CE = control efficiency, as determined by Sections 403 and 502.6.

405 **OPERATION AND MAINTENANCE PLAN:** Any person using emissions control equipment pursuant to Section 301.2 shall submit an Operation and Maintenance Plan for the emissions control equipment to the Air Pollution Control Officer for approval. The Plan shall specify operation and maintenance procedures which will demonstrate continuous operation and compliance of the emissions control equipment during periods of emissions-producing operations. The Plan shall also specify which daily records must be kept to document these operations and maintenance procedures. These records shall comply with the requirements of Section 501. The Plan shall be implemented upon approval by the Air Pollution Control Officer.

406 **PROCEDURE FOR PROCESSING OPERATION AND MAINTENANCE PLAN:**

406.1 **APPROVAL OF PLAN:** The Air Pollution Control Officer shall determine whether the Operation and Maintenance Plan meets the requirements of Section 405 not later than 30 days after receipt of the Plan, or within a longer period of time agreed upon by the parties. The Air Pollution Control Officer shall approve an Operation and Maintenance Plan unless it fails to demonstrate continuous operations of the emissions control equipment during periods of emissions producing operations, according to the standards set forth in Section 301.2, and/or it fails to specify which daily records, in accordance with the requirements of Section 501, are to be kept to document the operation and maintenance procedures set forth in the Plan.

406.2 **REVISION OF PLAN:** If the Air Pollution Control Officer does not approve an Operation and Maintenance Plan, the source shall receive written notice of the deficiency, and shall have an additional 30 days from the date of the notification of the deficiency to correct and resubmit the Operation and Maintenance Plan. The decision of the Air Pollution Control Officer regarding the resubmitted Operation and Maintenance Plan shall be final. Failure to correct the deficiency in an Operation and Maintenance Plan upon resubmittal shall constitute a violation of this rule that is subject to the penalties set forth in Health and Safety Code section 42400 et seq.

**500 MONITORING AND RECORDS**

- 501 **RECORD KEEPING:** In addition to any applicable record keeping requirements of either Rule 202, NEW SOURCE REVIEW, Rule 207, TITLE V - FEDERAL OPERATING PERMIT PROGRAM, and Rule 209, LIMITING POTENTIAL TO EMIT, or any other District rule which may be applicable, any person subject to this rule shall maintain the following records in order to evaluate compliance:
- 501.1 **LIST OF MATERIALS:** A list shall be maintained of currently used resins, catalysts, filler materials, pigment materials, additives, cleanup materials and other VOC containing materials. The list shall contain all such materials that are currently used and stored on-site and shall include the following information:
- a. The material type by name/code/manufacturer.
  - b. For resin materials, the monomer content, as applied, as determined by Section 403.
  - c. For vapor-suppressed resins, the weight loss per square meter during resin polymerization, as determined pursuant to Section 502.1.
  - d. For cleaning materials and any other VOC containing materials, the VOC content of the material, as applied, as determined pursuant to Section 502.2.
  - e. Identification of each material type exceeding the monomer content and vapor suppressant limits specified in Section 301.1a and 301.1b.
- 501.2 **USAGE RECORDS:** Any person within the District using materials regulated by this rule shall update and maintain the records as follows:
- a. For sources which have total facility VOC emissions greater than 5 tons per year, records shall be maintained on a monthly basis, showing the type and total applied volume of resins, catalysts, filler materials, pigment materials, additives, cleanup materials and other VOC containing materials.
  - b. For sources which have total facility VOC emissions less than or equal to 5 tons per year, records shall be maintained on an annual basis, showing the type and total applied volume of resins, catalysts, filler materials, pigment materials, additives, cleanup materials and other VOC containing materials.
  - c. For non-compliant materials, as defined in Section 215, daily records regarding the use, including the lack of use, of each material type by name/code/manufacturer and the total applied volume of each material.
  - d. For persons using a control system pursuant to Section 301.2, records shall be maintained on a daily basis, showing the type and volume of each material used.
- 501.3 Any person using a control system pursuant to Section 301.2, shall maintain daily records of key system operating and maintenance procedures which will demonstrate continuous operation and compliance of the control system during periods of emission-producing activities.
- 501.4 **DURATION OF RECORDS:**
- a. Prior to September 25, 2010, all records required by this rule shall be maintained on-site for at least three years, and shall be made available to the Air Pollution Control Officer upon request.
  - b. Effective September 25, 2010, all records required by this rule shall be maintained on-site for at least five years, and shall be made available to the Air Pollution Control Officer upon request.
- 502 **TEST METHODS:** The analysis of polyester resin materials, cleaning materials, and collection/control efficiency shall be conducted using the following testing procedures:
- 502.1 **RESIN VOC WEIGHT LOSS:** "Static Method for Determination of Volatile Emissions from Polyester and Vinyl Ester Resins" (RACT/BARCT Guidance, 1991) shall be used for determining VOC emissions from polyester and vinyl ester resins as received from the manufacturer.



- 502.2 **DETERMINATION OF VOC CONTENT:** VOC content of coatings shall be determined in accordance with EPA Method 24 and Section 401 of this rule as applicable.
- 502.3 **DETERMINATION OF PERCENT MONOMER CONTENT OF RESINS AS APPLIED:** Percent monomer content as applied shall be determined in accordance with Section 402.
- 502.4 **DETERMINATION OF COMPOUNDS EXEMPT FROM VOC DEFINITION:** Compounds exempted from the VOC definition, as listed in Section 210 of this rule, shall be determined in accordance with ASTM D 4457-02 (2008) or ARB Method 432. If any of the perfluorocarbons or volatile cyclic and linear methyl siloxanes are being claimed as exempt compounds, the person making the claim must state in advance which compounds are present, and the EPA-approved test method used to make the determination of these compounds.
- 502.5 **DETERMINATION OF COLLECTION EFFICIENCY:** Collection efficiency shall be determined in accordance with the U.S. EPA technical guideline document, "Guidelines for Determining Capture Efficiency," dated January 9, 1995. Individual capture efficiency test runs subject to U.S. EPA technical guidelines shall be determined by:
- a. Applicable U.S. EPA Methods 204, 204A, 204B, 204C, 204D, 204E, and/or 204F; or
  - b. Any other method approved by the U.S.EPA, the California Air Resources Board, and the Air Pollution Control Officer.
- 502.6 **DETERMINATION OF CONTROL EFFICIENCY:** Efficiency of control equipment shall be determined in accordance with EPA Method 18, 25, 25A, EPA Method 2 or 2C (whichever is applicable), and Section 403.
- 502.7 **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.

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