

**REGULATION III – CONTROL OF AIR CONTAMINANTS**

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**MARICOPA COUNTY  
AIR POLLUTION CONTROL REGULATIONS  
REGULATION III – CONTROL OF AIR CONTAMINANTS**

**RULE 358  
POLYSTYRENE FOAM OPERATIONS**

**SECTION 100 – GENERAL**

- 101 PURPOSE:** The purpose of this rule is to limit the emissions of volatile organic compounds (VOCs) from the manufacturing of expanded-polystyrene products.
- 102 APPLICABILITY:** This rule applies to any facility that expands, ages, or molds expandable polystyrene (EPS).

**SECTION 200 – DEFINITIONS:** For the purpose of this rule, the following definitions apply, in addition to those definitions found in Rule 100 (General Provisions and Definitions) of these rules. In the event of any inconsistency between any of the Maricopa County air pollution control rules, the definitions in this rule take precedence.

- 201 BEAD-LOT AND BEAD-LOT IDENTIFIER:** A specific selection of a specific quantity of expandable polystyrene material, all portions of which typically share similar properties. This selected material has been tested in accordance with standard quality-control procedures and is traceable to the time and date on which it was packaged. Traceability is enabled by a bead lot identifier or lot number, which is a unique numeric (or alphanumeric) string that is permanently coupled with the selected material. The lot number always appears on one or more formal transfer/receipt documents retained by both the seller and the buyer and identifies the material's plant of manufacture, as well as the date that it was packaged.
- 202 BLOCK (EPS FOAM BLOCK):** A block-shaped solid made of EPS foam that was molded as a unit. Typically, a block's depth and width each exceed 23 inches (0.6 m) and a length exceeding 95 inches (2.4 m).
- 203 BLOWING AGENT:** Any substance that, alone or in conjunction with other substances, is capable of producing a cellular (foam) structure in a polymeric material by inflation.
- 204 CUP MOLDING:** The process of making cups, bowls, and similar containers by molding expanded polystyrene globules (prepuff).
- 205 DAY:** Any 24-hour period beginning at 12:00 am–midnight.
- 206 EMISSION CONTROL SYSTEM (ECS):** A system for reducing emissions of volatile organic compounds, consisting of a capture system (e.g., enclosures, hoods,

and ductwork) and control device(s). An ECS may also include gas conditioning equipment such as condensers or prefilters.

- 207 EPS BEADS (EXPANDABLE POLYSTYRENE BEADS):** Polystyrene beads, particles, or granules, usually less than one-twelfth inch in diameter, that are formulated with a blowing agent (typically 3.5% to 7% of bead weight). When subjected to prescribed heating in an expansion system, the beads puff up, expanding many times their original volume into low density foam globules (called “prepuff” or “puff”) from which a variety of EPS foam products are molded.
- 208 EPS FOAM (EXPANDED POLYSTYRENE FOAM):** A lightweight, naturally white, foam material, made of polystyrene, from which a variety of common items are made, such as ice-chests, insulation board, protective packaging, and single-use cups.
- 209 LOOSE FILL:** Small, expanded polystyrene forms produced in a variety of shapes that are used as packing material or as stuffing in furnishings. These foam products typically have a density less than 0.6 pounds per cubic foot (pcf).
- 210 POLYSTYRENE:** Any grade, class, or type of thermoplastic polymer, alloy, or blend that is composed of at least 80% polymerized styrene by weight.
- 211 PREPUFF OR PUFF:** Expanded polystyrene globules, prior to molding, formed from EPS beads/granules that have been processed in an expander. No grind/regrind material (i.e., expanded EPS that has been through a grinder) or material within a grinding system is considered to be prepuff.
- 212 SHAPE:** An object made out of EPS that has been molded into a shape other than that of a block, cup, or bowl.
- 213 SPECIALTY BLOCK PRODUCTS:** For the purposes of this rule, a specialty block product is an EPS block or block-derivative (e.g., board, architectural form, etc.) that meets either of the following criteria:
- 213.1** Has a density of 2.0 pounds per cubic foot or greater, as determined by ASTM Method C303; or
- 213.2** Has a density less than 0.8 pounds per cubic foot, as determined by ASTM Method C303.
- 214 VOC CONTENT OF RAW EPS:** For the purposes of this rule, there are 3 different expressions for stating the VOC content of raw EPS beads/granules. Each of these expressions must be made in terms of either the number of pounds of VOC per 100 pounds of beads or the percentage of overall weight (including the VOC weight) that the incorporated VOC constitutes. The percent value shall be expressed with a precision of no less than the nearest tenth of one percent, which is equivalent to expressing the same number value in pounds VOC per 100 lbs. beads, to the nearest tenth of a pound. The acceptable expressions are:

**214.1 Manufacturer Certified Bead Lot (MCBL) VOC Content:** A document such as a standard Certificate of Analysis that numerically presents an EPS bead-lot's VOC content and must contain all of the following elements:

- a. The VOC content printed or written on a paper document by the bead manufacturer, after the manufacturer has had the bead-lot tested to determine the lot's percent VOC, before shipping from the manufacturer; and
- b. The manufacturer's name and the bead-lot, identified on the paper document with the appropriate bead-lot identifier; and
- c. The signature of an officer of the manufacturing facility or the signature of an officer's designee, previously designated in writing by such an officer.

**214.2 Post-Manufacture Laboratory-Tested (PMLT) VOC Content:** The results of a laboratory test determining the VOC content of a representative sampling of an intermediate or finished expanded polystyrene product, or such a test of raw beads any time after their MCBL VOC content has been assigned.

**214.3 ISO-Certified Maximum Bead-Model (IMBM) VOC Content:** A numerical value that represents the upper limit of a particular bead model's VOC content, which has been:

- a. Initially stipulated by the bead-model's manufacturer in a document that gives the bead-model's unique identifier, and
- b. Subsequently certified for accuracy by the International Standards Organization (ISO).

## **SECTION 300 – STANDARDS:**

**301 BLOCK MAKERS:** An owner and/or operator of an EPS block-making facility shall comply with Section 301.1 and, if applicable, Section 301.2 of this rule.

**301.1** Limit the sum of both the VOC that escaped to atmosphere and the residual VOC in the resulting blocks at the time they are released from the molding machine to not more than 3.0 pounds for every 100 pounds of raw beads processed.

**301.2** Specialty Products Alternative Operating Scenario: When producing specialty block-products solely from raw EPS beads that exceed a VOC content of 5.5 percent by weight, an owner and/or operator may choose the standard in Section 301.2(a) by which to comply with this rule, but only if the requirements in Sections 301.2(b) and 301.2(c) are met.

- a. Limit the sum of both the VOC that escaped to atmosphere and the residual VOC in the resulting blocks at the time they are released from the molding machine to not more than 3.9 pounds for every 100 pounds of raw beads processed (3.9 lb/100 lbs), and
  - b. Taking into account the total weight of all beads processed every 12 months; limit the portion of that weight that is processed under the 3.9 lb/100 lb standard to 5 percent allowed per a 12-month rolling total.
  - c. The proportion of annual raw-material throughput that is produced under the Section 301.2(a) standard shall be calculated and recorded according to Section 502.1(d).
- 302 SHAPE MAKERS:** An owner and/or operator of an EPS shape-making facility shall limit the sum of the VOC that escaped to atmosphere and the residual VOC in the resulting shapes to 2.7 pounds for every 100 pounds of raw beads processed.
- 303 CUP MAKERS:** An owner and/or operator of an EPS cup-making facility shall limit the sum of the VOC that escaped to atmosphere and the residual VOC in the resulting cups to 3.2 pounds for every 100 pounds of raw beads processed.
- 304 LOOSE FILL MAKERS:** An owner and/or operator of a facility that makes expanded polystyrene loose fill shall limit the sum of both the VOC that escaped to atmosphere plus the residual VOC in the finished loose fill (measured right after the final curing process) to not more than 2.4 pounds for every 100 pounds of raw EPS materials processed into finished loose fill.
- 305 PERFORMANCE OF ECS CONTROLLING VOC EMISSIONS:** If an ECS is required by this rule, comply with Sections 305.1, 305.2, and 305.3 of this rule.
- 305.1** The control device (abatement subsystem) of such ECS shall comply with either Section 305.1(a) or Section 305.1(b) of this rule.
- a. Reduce the weight of VOC-as-carbon that enters the control device by at least 94%; or
  - b. Maintain an hourly average outlet concentration of VOC below 20 milligrams per dry standard cubic meter. Express mass loading of VOC as milligrams of non-methane organic carbon.
- 305.2** Each ECS that is operated in order to comply with this rule shall be equipped with monitoring devices capable of demonstrating that the ECS is operating in a manner that assures compliance with this rule.
- 305.3** Records shall be kept according to Section 502.3 of this rule.
- 306 AIR POLLUTION CONTROL EQUIPMENT AND APPROVED EMISSION CONTROL SYSTEM (ECS):** An owner, operator, or person subject

to this rule must provide, properly install and maintain in calibration, in good working order, and in operation air pollution control equipment required by this rule.

**306.1 OPERATION AND MAINTENANCE (O&M) PLAN REQUIREMENTS FOR AN ECS:**

- a. An owner, operator, or person subject to this rule must submit to the Control Officer for review every O&M Plan(s) for any ECS including any ECS monitoring device that is used under this rule or required under an air pollution control permit.
- b. An owner, operator, or person subject to this rule must provide and maintain readily available on-site at all times (an) O&M Plan(s) for any ECS and any ECS monitoring devices that are used under this rule or an air pollution control permit.
- c. An owner, operator, or person subject to this rule operating an ECS must install, maintain, and accurately calibrate monitoring devices described in the O&M Plan(s) including, but not limited to, monitoring devices that measure pressure differentials and other operating conditions necessary to determine if control devices are functioning properly.
- d. An owner, operator, or person, who is required to have an O&M Plan for any ECS including any ECS monitoring devices must fully comply with all elements of an O&M Plan(s) including, but not limited to, every action, schedule, and condition identified in each O&M Plan.
- e. An O&M Plan for any ECS including any ECS monitoring devices must include all of the following information:
  - (1) ECS equipment manufacturer,
  - (2) ECS equipment model,
  - (3) ECS equipment identification number or identifier that owner, operator, or person subject to this rule assigns to such ECS equipment when manufacturer's equipment identification number is unknown,
  - (4) Information required by Section 502.3 of this rule,
  - (5) Procedures for collecting and recording required data and other information in a form approved by the Control Officer, which shall include data collected through the O&M Plan and through the monitoring of key system operating parameters; and,

(6) Procedures and schedules for preventive and corrective maintenance performed for the purpose of maintaining the ECS proper operating condition.

- f. The owner, operator, or person subject to this rule, who receives a written notice from the Control Officer that the O&M Plan is deficient or inadequate, must make written revisions to the O&M Plan for any ECS including any ECS monitoring devices and must submit such revised O&M Plan to the Control Officer within five working days of receipt of the Control Officer's written notice, unless such time period is extended by the Control Officer, upon written request, for good cause. During the time that such owner, operator, or person subject to this rule is preparing revisions to the O&M Plan, such owner, operator, or person must still comply with all requirements of this rule.

**307 VOC CONTAINMENT, IDENTIFICATION, AND DISPOSAL:**

**307.1 Containment of VOC-Emitting Material:**

- a. When they are not in use, store all fresh and used non-EPS VOC containing material in closed, leak-free containers that are labeled according to Section 307.4. Such materials include but are not limited to cleaning solvents, inks, coatings, thinners, and their residues including residues on rags; and
- b. Store raw EPS beads in closed, leak-free, labeled containers when not in use.

**307.2** Materials addressed in Section 307.1 of this rule may be placed in an enclosure ducted solely to an ECS that is approved by the Control Officer, instead of in closed containers.

**307.3** The owner and/or operator must implement procedures to minimize spills of VOC-containing materials described in Section 307.1(a) of this rule, during their handling and transfer to or from containers, vats, enclosed systems, waste receptacles, and other equipment, whether the material is fresh, used, or waste.

**307.4 Identification and Labeling:**

- a. Containers used for initial, intermediate, or final storage of VOC containing materials addressed in Section 307.1 of this rule shall be clearly labeled with their contents.
- b. Content-labeling done according to the requirements of federal hazardous waste (RCRA) or occupational safety (OSHA) statutes and codes meets the requirements in Section 307.4(a) of this rule.

**308 EXEMPTION:**

**308.1 Exemption from Section 301.1 through Section 306.1:** An owner and/or operator of a facility is exempt from the requirements of Section 301.1 through Section 306.1 of this rule, if the total VOC content of all raw EPS material processed by the facility is, in each calendar year, below 50 tons (100,000 lbs) and, in each calendar month, below 12,000 pounds.

**308.2 Burden of Proof:** A person claiming any exemption from this rule or from a provision of this rule shall provide adequate records to verify and maintain any exemption. These may include records of raw material used, laboratory analyses, technical data sheets, and/or performance test results.

## **SECTION 400 – ADMINISTRATIVE REQUIREMENTS (NOT APPLICABLE)**

## **SECTION 500 – MONITORING AND RECORDS**

### **501 RECORDS:**

**501.1 General:** Records shall be kept complete, up-to-date, and in a consistent and legible format.

**501.2 Retention:** Records required by this rule shall be retained for at least 5 years.

**501.3 Use of other Records:** Records that are kept by an EPS facility for other agencies or purposes may be submitted to the Control Officer to meet the record requirements of this rule, provided such records contain the necessary information according to Section 502 of this rule.

### **502 RECORDKEEPING SPECIFICS:**

**502.1 Tracking EPS Beads:** A person subject to this rule shall comply with the following requirements, as applicable.

**a. Lot ID and VOC Content:** Prior to expanding any part of a bead-lot, an owner and/or operator shall obtain and retain an original or copy of the VOC-content, as defined in Section 216 of this rule, for each separate lot-number/identifier of beads received.

**b. Total Expanded by Lot and Date:** Each day that raw EPS material is expanded in a facility's expander, an owner and/or operator shall record the amount of each bead-lot expanded and its corresponding lot number/identifier.

**c. Block Makers:** Each day that blocks are made, record the approximate weight of each newly molded block, measured to the nearest 2 pounds.

**d. Specialty Products Subject to Section 301.2(a):** An EPS-block facility owner and/or operator making specialty products under Section 301.2(a) of this rule shall:

- (1) Maintain a log indicating when the facility is operating under the specialty-products alternative operating scenario; and
- (2) Each month calculate the percent of total EPS raw material used during the previous 12 months that specialty products, made under Section 301.2(a) of this rule, constitute; enter the calculations and results in the log.

**502.2 Lists of Non-EPS VOC-Containing Materials:** Non-EPS materials may include, but are not limited to, the following categories: inks, coatings, adhesives, reducers, thinners, solvents, cleaning materials, additives, spray-cans, sprayed lubricants, and any other VOC-containing materials that are not EPS.

- a. An owner and/or operator shall maintain a current list of non-EPS materials, containing VOC, used at the facility. A complete and ordered assemblage of the required data meets the requirements for a list.
- b. An owner and/or operator shall express VOC content of non-EPS material in one of the following three forms:
  - (1) Pounds VOC per gallon (or grams VOC per liter), or
  - (2) Fractional pounds of VOC per lb. material (or grams per kilogram),  
or
  - (3) The percent VOC by weight along with the specific gravity or density (two numbers are required for each entry).
- c. By the end of the following month, an owner and/or operator shall record the amount and type of each non-EPS material, containing VOC that was used during each month.

**502.3 Records of ECS Operation and Monitoring:** On a daily basis, the owner and/or operator of a facility that operates an ECS to comply with this rule shall record key system operating parameters documented in the O&M plan, such as temperature, flow rate, pressure, and/or VOC-concentration, etc.

**503 TEST PROCEDURES:** An owner and/or operator of an EPS facility will be in violation of this rule if the VOC emissions, measured by any of the referenced test methods specified in Section 503 of this rule and listed in Section 504 of this rule, do not comply with the applicable standards included in Section 301 through Section 305 of this rule.

**503.1** An owner and/or operator shall conduct a performance test on each ECS used to meet a standard in this rule at least once every five years.

**503.2** Performance tests shall be conducted between June 1 and August 31.

- 503.3** An owner and/or operator shall conduct performance tests using the test methods designated by Section 503.4 through Section 503.9 of this rule and incorporated by reference in Section 504 of this rule.
- 503.4** An owner and/or operator shall perform the measurement of airflow and gas flow into and out of the ECS by performing EPA Method 2, referenced in Section 504.1 of this rule.
- 503.5** An owner and/or operator shall determine the concentration of methane and ethane emissions by performing EPA Method 18, referenced in Section 504.1 of this rule or Method 25 (and its submethods) referenced in Section 504.1 of this rule.
- 503.6** An owner and/or operator shall determine the control efficiency of the VOC control device (abatement subsystem) of an ECS by performing EPA Method 25 (and its submethods), referenced in Section 504.1 of this rule.
- 503.7** An owner and/or operator shall determine the efficiency of a capture system according to both EPA Method 204 (and its submethods) referenced in Section 504.2 of this rule and the EPA guidance document referenced in Section 504.3 of this rule.
- 503.8** An owner and/or operator shall determine the concentration of total volatile organic carbon content in polymeric materials by performing Bay Area Air Quality Management District (BAAQMD) Method 45 as referenced in Section 504.5 of this rule or by performing South Coast Air Quality Management District (SCAQMD) Method 306-91, 1993 revision, as referenced in Section 504.6 of this rule.

**503.9 Determination of ECS Effectiveness:** ECS effectiveness shall be determined from the results of a testing protocol based on mass balance, calculated according to the following formulas:

$$\% \text{ Capture} = \frac{VOC_{ECS}}{VOC_I - VOC_P} \times 100$$

$$\% \text{ Control} = \frac{VOC_{ECS} - VOC_{St}}{VOC_{ECS}} \times 100$$

$$\% \text{ Emitted} = \frac{VOC_I + VOC_{St} - VOC_P - VOC_{ECS}}{VOC_I - VOC_P} \times 100$$

*% Overall (Capture + Control)*

$$= \frac{VOC_{ECS}}{VOC_I - VOC_P} \times \frac{VOC_{ECS} - VOC_{St}}{VOC_{ECS}} \times 100$$

Where:

- $VOC_I$  = the VOC input in the form of the VOC content of a weighed mass of raw beads
- $VOC_P$  = the VOC content of the products made from the weighed raw beads
- $VOC_{ECS}$  = the VOC measured in the air entering the ECS
- $VOC_{St}$  = the VOC remaining in the gas stream(s) emerging from the ECS during production

**503.10 Determination of Product Density:** The ASTM Method C303-10 referenced in Section 504.4 of this rule shall be used to determine the density of EPS foam blocks and block-derivatives.

**503.11 Conforming Testing to Desired Production Characteristics:** The owner and/or operator of an EPS facility must, through performance testing, demonstrate compliance with each alternative operating scenario chosen.

**504 COMPLIANCE DETERMINATION – TEST METHODS:** An exceedance of the limits established in this rule determined by any of the applicable test methods constitutes a violation of this rule. The EPA test methods, ASTM International (ASTM) standards and other documents as they exist in the Code of Federal Regulations (CFR) as listed below, are adopted and incorporated by reference in Appendix G of the Maricopa County Air Pollution Control Regulations. These documents are available at the Maricopa County Air Quality Department, 1001 N. Central Ave., Phoenix, AZ 85004. ASTM standards are also available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428, or from its website at [www.astm.org](http://www.astm.org). Bay Area Air Quality Management District test methods are available from Bay Area Air Quality Management District, 939 Ellis Street, San Francisco, CA 94109, or from its website at [www.baaqmd.gov](http://www.baaqmd.gov). South Coast Air Quality Management test methods are available from South Coast Air Quality Management, 21865 Copley Drive, Diamond Bar, CA 91765, or from its website at: [www.aqmd.gov](http://www.aqmd.gov).

**504.1 EPA Test Methods as incorporated by reference in 40 CFR 60, Appendix A-7:**

- a. Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube).
- b. Method 2A: Direct Measurement of Gas Volume through Pipes and Small Ducts.

- c. Method 2C: Determination of Gas Velocity and Volumetric Flow Rate in Small Stacks or Ducts (Standard Pitot Tube).
- d. Method 2D: Measurement of Gas Volume Flow Rates in Small Pipes and Ducts.
- e. Method 18: Measurement of Gaseous Organic Compound Emissions by Gas Chromatography.
- f. Method 25: Determination of Total Gaseous Nonmethane Organic Emissions as Carbon.
- g. Method 25A: Determination of Total Gaseous Nonmethane Organic Concentration Using a Flame Ionization Analyzer.

**504.2 EPA Test Methods as Incorporated by Reference in 40 CFR 51, Appendix M:**

- a. Method 204: Criteria for and Verification of a Permanent or Temporary Total Enclosure.
- b. Method 204a: Volatile Organic Compounds Content In Liquid Input Stream.
- c. Method 204b: Volatile Organic Compounds Emissions In Captured Stream.
- d. Method 204c: Volatile Organic Compounds Emissions In Captured Stream (Dilution Technique).
- e. Method 204d: Volatile Organic Compounds Emissions In Uncaptured Stream From Temporary Total Enclosure.
- f. Method 204e: Volatile Organic Compounds Emissions In Uncaptured Stream From Building Enclosure.
- g. Method 204f: Volatile Organic Compounds Content In Liquid Input Stream (Distillation Approach).

**504.3** EPA Guidance document *Guidelines for Determining Capture Efficiency*, January 9, 1995.

**504.4** ASTM C303–10 Standard Test Method for Dimensions and Density of Preformed Block and Board-Type Thermal Insulation.

**504.5** Bay Area Air Quality Management District Method 45 *Determination of Butanes and Pentanes in Polymeric Materials*, as amended May 18, 2005.

**504.6** South Coast Air Quality Management District Method 306-91 *Analysis of Pentanes in Expandable Styrene Polymers*, as revised February 1993.