

RULE 4682 POLYSTYRENE, POLYETHYLENE, AND POLYPROPYLENE PRODUCTS  
MANUFACTURING (Adopted May 21, 1992; Amended December 17, 1992;  
Amended June 16, 1994; Amended September 20, 2007; Amended December  
15, 2011)

1.0 Purpose

The purpose of this rule is to limit emissions of VOC and trichlorofluoromethane (CFC-11) and dichlorofluoromethane (CFC-12) from manufacturing and processing of products composed of polystyrene, polyethylene, or polypropylene and from the storage of VOC blowing agents.

2.0 Applicability

The provisions of this rule shall apply to any manufacturing, processing, and storage of products composed of polystyrene, polyethylene, or polypropylene.

3.0 Definitions

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

3.1 APCO: as defined in Rule 1020 (Definitions).

3.2 Approved Emission Control System: any system used to reduce emissions and consists of a capture and a control device, which are approved, in writing, by the APCO. The control system must be maintained and operated in such a manner that meets the following requirements:

3.2.1 The emission capture system shall collect at least 90 percent by weight of the emissions; and

3.2.2 The control device shall reduce emissions from the emission capture system by at least 95 percent, by weight.

3.3 ARB: California Air Resource Board.

3.4 Blowing Agent: any liquid or gaseous material, including VOCs, that facilitates the formation of a cellular product from raw polymeric material.

3.5 Chlorofluorocarbon (CFC): any chlorinated fluorinated compound of carbon, excluding chlorodifluoromethane (HCFC-22), dichlorotrifluoromethane (HCFC-123), tetrafluoroethane (HFC-134a), dichlorofluoroethane (HCFC-141b), and chlorodifluoroethane (HCFC-142b).

- 3.6 Controllable VOC Emission Sources: fluff silos or bins, reclaim extruders, condenser devolatilizer vents, styrene recovery unit vents, and reclaim die hood exhausts in which materials manufactured with a VOC blowing agent are processed, or are stored, and from which emissions are vented to the atmosphere.
- 3.7 EPA: United States Environmental Protection Agency.
- 3.8 Expandable Polystyrene Molding: a series of processes where expandable polystyrene beads, which are polystyrene resin particles impregnated with blowing agent, undergo expansion, aging and then cup, shape or block molding to form a low-density foam product. During expansion, the beads are expanded to the appropriate desired density by exposure to steam or hot air in a pre-expander. During aging, the expanded beads (or pre-puff) are transferred to storage silos or mesh bags to stabilize and dry. During molding, the aged pre-puff is exposed to heat in a closed mold that causes the beads to soften, re-expand, and fuse together to form the shaped product.
- 3.9 Extrusion: the process in which a plastic resin is melted in an extruder and continuously forced through a die opening shaped like the finished product. As it leaves the die opening, the extruded plastic melt partially expands and is then drawn by a puller through forming equipment that sizes, cools, and cuts the product to length or winds it into a roll. With extruded foam products, blowing agent is injected under pressure directly into the extruder where it mixes with the plastic melt.
- 3.10 Fluff Silo or Bin: a container utilized for the storage of ground polystyrene foam for recycling.
- 3.11 Manufacturing Emissions: all emissions of VOC, CFC, or methylene chloride that occur during the manufacturing operation, quantified before any capture or control.
- 3.12 Manufacturing Operation: a production line or lines consisting of all steps in the processing of a polymer or resin, from the receipt of raw polymeric material by the manufacturing facility through the final step prior to shipment of the finished product from the manufacturing facility, and that results in VOC emissions to the atmosphere. Individual steps include, but are not limited to: expandable bead storage, finished product storage/aging, extrusion, expansion, softening or annealing, intermediate (pre-puff) storage/aging, decomposition, molding, grinding, and forming.
- 3.13 Operator: includes but is not limited to any person who owns, leases, supervises, or operates a facility and/or equipment.

- 3.14 Polyethylene (High and Low Density): linear thermoplastic polymers of ethylene with densities from 0.94 gram per cubic centimeter or higher.
- 3.15 Polymeric Material: a multi-molecular compound or mixture of compounds formed by polymerization and consisting essentially of repeating structural units.
- 3.16 Polypropylene: a high molecular weight thermoplastic crystalline polymer of propylene.
- 3.17 Polystyrene: a thermoplastic material which is a polymer of styrene.
- 3.18 Raw Material: all polystyrene, polyethylene and polypropylene, and blowing agent used in the manufacturing operation, including virgin and recycled polymeric materials.
- 3.19 Reclaim Die Hood Exhaust: an exhaust hood above reclaim extruder die intended to remove VOCs which escape from the extruder die.
- 3.20 Reclaim Extruder: equipment used to reprocess ground polystyrene foam into polystyrene pellets.
- 3.21 Reclaim Extruder Vent: the vent or opening through which emissions are expelled from the reclaim extruder.
- 3.22 Total Product Emissions: includes emissions from the manufacturing operation, after controls, plus the residual blowing agent in the finished product.
- 3.23 Volatile Organic Compound (VOC): defined in Rule 1020 (Definitions).

#### 4.0 Exemptions

The provisions of Sections 5.1 and 5.2 shall not apply to manufacturing and processing operations using polymeric materials containing less than 1 percent volatile organic compounds by weight, and not using a blowing agent in their process.

#### 5.0 Requirements

5.1 No operator shall place, hold, or store any VOC blowing agent in any stationary tank, reservoir or container having a capacity greater than 200 gallons unless one (1) of the following emission control systems is provided:

5.1.1 The container is a pressure vessel maintaining a working pressure at all times sufficient to prevent release of VOC emissions to the atmosphere under normal operating conditions; or

- 5.1.2 The container is equipped with an emission control device or system which collects and disposes of VOC emissions, and which achieves and maintains a vapor recovery/control efficiency of at least 95 percent by weight.
- 5.2 The operator shall not conduct any manufacturing operations, as defined in Section 3.0, unless one of the following emission reduction methods is met:
  - 5.2.1 Effective until December 31, 2012, the operator demonstrates, to the satisfaction of the APCO, that the total product emissions do not exceed 2.4 pounds of VOC per 100 pounds of total material processed, calculated over a monthly period.
  - 5.2.2 Effective on and after January 1, 2013, the operator of an extrusion facility shall demonstrate, to the satisfaction of the APCO, that the total product emissions do not exceed 2.4 pounds of VOC per 100 pounds of total material processed, calculated over a monthly period.
  - 5.2.3 Effective on and after January 1, 2013, the operator of an expandable polystyrene molding facility shall demonstrate, to the satisfaction of the APCO, that the total product emissions do not exceed the following:
    - 5.2.3.1 3.4 pounds of VOC per 100 pounds of total material processed, calculated daily, and
    - 5.2.3.2 2.4 pounds of VOC per 100 pounds of total material processed, calculated over a monthly period.
  - 5.2.4 A blowing agent other than a VOC or trichlorofluoromethane (CFC-11) or dichlorofluoromethane (CFC-12) is exclusively used.
  - 5.2.5 An approved emission control system is installed and operating with manufacturing emissions vented only to the approved emission control system; and emissions from the final manufactured product are to be vented only to the approved emission control system for at least:
    - 5.2.5.1 48 hours, in the case of expandable polystyrene molding operations that process more than 800,000 pounds per calendar year of raw material; or
    - 5.2.5.2 24 hours, in the case of all other manufacturing operations.

- 5.2.5.3 The provision of Section 5.2.5.1 or 5.2.5.2 are not required for any facility that only manufactures polystyrene products and the highest concentration of the blowing agent in the product is 1.8 percent or less by weight, within 15 minutes after the completion of the final processing step, prior to any finished product storage. Verification of the concentration shall be demonstrated annually, pursuant to a protocol submitted to the District and subject to approval by the APCO.
- 5.2.6 The operator demonstrates to the satisfaction of the APCO that the manufacturing emissions are no greater than the facility emissions which would occur under Section 5.2.5, as calculated according to Section 5.4, and which does not include the use of trichlorofluoromethane (CFC-11) or dichlorodifluoromethane (CFC-12).
- 5.2.7 A control system that meets all of the following requirements shall be deemed as meeting the requirements of Section 5.2.6, unless the APCO determines that additional controls are required.
- 5.2.7.1 The beads used in manufacturing have an annual-average VOC content of less than 4.2% per weight; and
- 5.2.7.2 The manufacturing emissions (not including finished product storage emissions) are controlled with an overall capture and control efficiency of at least 93% by weight.
- 5.3 Operators subject to the provisions of Section 5.2.1, 5.2.2, or 5.2.3 who exceed the limit based on the monthly calculation, shall be considered to have been in violation for each day of that monthly period.
- 5.4 Facility emissions that would occur under 5.2.5 shall be calculated using the following formula, or other formula approved by the APCO and EPA:

$$FE = [1 - (0.90 \times 0.95)] \times [(P1 + AS - P2) + (P2 - P3)]$$

where

FE = Facility Emissions for Section 5.2.5

P1 = Amount of VOC in the received material

AS = Amount of VOC added to the material

P2 = Amount of VOC in the finished product, measured within 15 minutes after the final processing step, prior to finished product storage.

P3 = Amount of VOC in the finished product after warehousing for 48 hours (for facilities subject to Section 5.2.5.1) or 24 hours (for all others). (P2 - P3) = 0 for products with residual VOC amounts of 1.8 percent or less by weight.

## 5.5 Compliance Plan

No later than March 20, 2009, operators complying with Section 5.2.1, 5.2.6, or 5.2.7 shall submit to the APCO a Compliance Plan which includes all necessary information to show the proposed method of compliance with the applicable section. No later than January 1, 2013, operators complying with Section 5.2.3 shall submit to the APCO a Compliance Plan which includes all necessary information to show the proposed method of compliance with the applicable section. Such information shall include, but not be limited to:

- 5.5.1 Potential VOC emissions,
- 5.5.2 Overall VOC capture and control efficiency of VOC emission control system,
- 5.5.3 Material VOC content at relevant manufacturing points. The amount of VOC in the material shall be determined using the test method in Section 6.2.4, or other method approved by the APCO and EPA.
- 5.5.4 VOC emission calculation formula which will be used to show compliance, and
- 5.5.5 Operational characteristics of the VOC emission control systems which will be monitored to show continued compliance with the applicable limits.
- 5.5.6 Any operational or equipment limitations that are necessary to make the demonstration enforceable and which will be included as a condition on the appropriate Permit to Operate.

## 6.0 Administrative Requirements

### 6.1 Recordkeeping

- 6.1.1 Any person subject to the provisions of this rule, including exempt facilities, shall maintain records of operation, including but not limited to the amount of material processed, the equipment used, and the type of the blowing agent used. Records shall be maintained with a minimum monthly totals with the ability to calculate daily averages in any given month.
- 6.1.2 Any person using an emissions control system as a means of complying with this rule, shall maintain daily records of key system operating and maintenance procedures which will demonstrate continuous operation and compliance of the emission control device. Key system operating parameters are those necessary to ensure compliance with VOC emission requirements such as temperature, pressures, and flow rates.
- 6.1.3 Operators complying with Section 5.2.1, 5.2.2, or 5.2.3 shall maintain records necessary to show compliance with that section and shall, once every month, calculate the daily average VOC emissions, based on the records for the preceding monthly period, according to the approved VOC emission calculation formula.
- 6.1.4 Operators complying with Section 5.2.3 shall maintain records necessary to show compliance with that section and shall, once every day, calculate the daily VOC emissions, according to the approved VOC emission calculation formula.
- 6.1.5 The operator shall keep in the facility all records required to demonstrate compliance with the requirements of this rule for a minimum of five years. The records shall be made available at the facility during normal business hours to the APCO, ARB, or EPA. The records shall be submitted to the APCO, ARB, or EPA upon request.

### 6.2 Test Methods

Alternative test methods, that are equivalent to those specified in Sections 6.2.1 through 6.2.4, may be used, provided that those test methods have been approved in writing by the APCO and EPA.

- 6.2.1 The control efficiency of the emission control system shall be determined using EPA Methods 2, 2A, or 2D for measuring flow rates, and EPA Methods 25, 25A, or 25B for measuring total gaseous organic concentrations at the inlet and outlet of the control device.
- 6.2.2 The capture efficiency of an emission capture control system shall be determined according to EPA's "Guidelines for Determining Capture Efficiency," January 9, 1995 and 40 CFR 51, Appendix M, Methods 204-204F, as applicable.
- 6.2.3 EPA Method 18 or ARB Test Method 422 for determination of exempt compounds and halogenated blowing agents.
- 6.2.4 The VOC blowing agent contained in polymeric materials shall be determined using South Coast Air Quality Management District (SCAQMD) Method 306 (Analysis of Pentanes in Expandable Styrene Polymers) or Bay Area Air Quality Management District (BAAQMD) Method 45 (Determination of Butanes and Pentanes in Polymeric Materials).
- 6.2.5 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.