

**2.123 VOC Emissions from Extruded Polystyrene Products Manufacturing Utilizing an Injected Blowing Agent**

2.123.1 Applicability and Designation of Affected Facility

The affected facility to which the provisions of this source category apply is extruded polystyrene manufacturing facility whose operations are subject to the Georgia Rules and Regulations for Air Quality Control Chapter 391-3-1-.02(2)(qqq), or as otherwise specified by the Director.

2.123.2 Definitions and Symbols

All symbols used in this source category not defined below are given the meaning in the Clean Air Act of 1970 (as amended) or the Georgia Air Quality Act (as amended) or in published regulations pertaining thereto.

- A = the mass of the VOC Blowing Agent Used in an averaging period (pounds)
- B = the mass of uncontrolled VOC Emissions from Primary Extrusion, Roll Storage, and Thermoforming for each control device in an averaging period (pounds)
- C = the mass of VOC in the Reclaim Material in an averaging period (pounds)
- C<sub>a</sub> = the VOC concentration in each gas stream leaving the control device and entering the atmosphere (parts per million by volume, as carbon)
- C<sub>b</sub> = the VOC concentration in each gas stream entering the control device (parts per million by volume, as carbon)
- C<sub>f</sub> = the VOC concentration in each gas stream emitted directly to the atmosphere (parts per million by volume, as carbon)
- D = the mass of the VOC in the Final Product in an averaging period (pounds)
- E = the mass of the uncontrolled VOC Emissions from Finished Good Warehouses in an averaging period (pounds)
- F = the mass of the Facility VOC Emissions released to the atmosphere in an averaging period (pounds)
- Q<sub>a</sub> = the volumetric flow rate of each gas stream leaving the control device and entering the atmosphere (dry standard cubic meters per hour)
- Q<sub>b</sub> = the volumetric flow rate of each gas stream entering the control device (dry standard cubic meters per hour)
- Q<sub>f</sub> = the volumetric flow rate of each gas stream emitted directly to the atmosphere (dry standard cubic meters per hour)

OCE	=	Overall Control Efficiency of a control device (percent)
CE	=	Capture Efficiency of a Control Device (percent VOC captured)
DE	=	Destruction Efficiency of a Control Device (percent VOC destruction)
UT	=	Percentage of operating time for the control device in an averaging period (percent)
n	=	Total number of control device systems associated with Primary Extrusion, Roll Storage, and Thermoforming
m	=	Total number of control device systems associated with the Reclaim system
p	=	Total number of control device systems associated with the Finished Goods Warehouses

For the purpose of this source category, a VOC containing material (VCM) is any material which contains volatile organic compounds used in an expanded polystyrene manufacturing process at an affected facility.

### 2.123.3 Performance Tests and Compliance Provisions

- (a) The provisions of paragraph 6 of Section 1.2 of this text do not apply to the required performance tests and the provisions of paragraph 8 of Section 1.2 of this text do not apply.
- (b) The owner or operator of an affected facility shall conduct the initial performance test as required under Section 1.2 according to procedures in this section; and, thereafter, procedures in this section shall be used to conduct any required periodic performance tests to demonstrate compliance with the applicable Georgia Regulations for Air Quality Control.
- (c) The owner or operator shall use the following procedures for determining mass emissions of VOCs in units of pounds VOC per mass of VOC containing raw material.
  - (1) An owner or operator shall determine the composition of the VCMs by formulation data supplied by the manufacturer of the VCM or analysis of each VCM by gas chromatography, or another method acceptable to the Director which provides equivalent results. The Director may require the owner or operator who uses formulation data supplied by the manufacturer of the material used to determine the VOC content of the VCM using gas chromatography, or another method acceptable to the Director which provides equivalent results. The owner or operator shall determine the mass of VCM from appropriate records on the same basis as the averaging period. If a common VCM distribution system serves more than one affected facility, the owner or operator shall estimate the volume of VCM used at each facility by using the average weight of VCM and the amount processed by each affected facility or by other procedures acceptable to the Director.

- (i) Calculate the mass of VOCs emitted from Primary Extrusion, Roll Storage, and Thermoforming (B) by the following equation during each averaging period specified by the Director\* for each affected facility. Each calculation is considered a performance test. The mass of VOCs emitted from Primary Extrusion, Roll Storage, and Thermoforming (B) each averaging period will be determined by the following procedures:
- (A) Determine the mass of VOCs retained in the Reclaim Material (C) and in the Final Product (D) during each averaging period for each affected facility.
  - (B) Determine the mass of VOCs emitted from the Finished Good Warehouses (E) during each averaging period for each affected facility.
  - (C) Determine the total mass of VOC Blowing Agent Used (A) in each averaging period for each affected facility.
  - (D) Calculate the mass of VOCs emitted from Primary Extrusion, Roll Storage, and Thermoforming (B) by the following equation:

$$B = A - C - D$$

- (2) Determine the Overall Control Efficiency (OCE) for a control device. For the initial performance test the Overall Control Efficiency (OCE) shall be determined as prescribed in (c)(2)(A), (B), and (C) of this section. In subsequent averaging periods, the owner or operator may use the most recently determined Overall Control Efficiency (OCE) for the performance test providing control device and capture system operating conditions have not changed. The following procedure to determine the Overall Control Efficiency (OCE) shall be repeated when directed by the Director or when the owner or operator elects to operate the control device or capture system at conditions different from the initial performance test.

- (A) Determine the Capture Efficiency (CE) of the control device using the following equation or as provided in Appendix G of this text:

$$CE = \frac{\sum_{i=1}^x C_{bi} Q_{bi}}{\sum_{i=1}^x C_{bi} Q_{bi} + \sum_{j=1}^y C_{fj} Q_{fj}}$$

Where:

**x** is the number of gas streams entering the control device, and

**y** is the number of gas streams emitted directly to the atmosphere.

- (B) Determine the destruction efficiency of the control device (DE) using values of the volumetric flow rate of each of the gas streams and the VOC content (as carbon) of each of the gas streams in and out of the device by the following equation:

$$DE = \frac{\sum_{i=1}^x Q_{bi} C_{bi} - \sum_{j=1}^y Q_{aj} C_{aj}}{\sum_{i=1}^x Q_{bi} C_{bi}}$$

Where:

**x** is the number of gas streams entering the control device, and

**y** is the number of gas streams leaving the control device and entering the atmosphere.

- (C) Determine the Overall Control Efficiency (OCE) using the following equation:

$$OCE = \left[ \left( \frac{CE}{100} \right) \left( \frac{DE}{100} \right) \left( \frac{UT}{100} \right) \right]$$

- (3) Calculate the Facility VOC Emissions (F) to the atmosphere during each averaging period by the following equation:

$$F = \sum_{i=1}^m B_i (1 - OCE_i) + \sum_{i=1}^n C_i (1 - OCE_i) + \sum_{i=1}^p E_i (1 - OCE_i)$$

#### 2.123.4 Monitoring of Emissions and Operations

The owner or operator of an affected facility which uses a capture system and an incinerator to comply with the emission limits shall install, calibrate, maintain, and operate temperature measurement devices according to the following procedures:

- (a) Where thermal incineration is used, a temperature measurement device shall be installed in the firebox. Where catalytic incineration is used, a temperature measurement device shall be installed in the gas stream immediately before and after the catalyst bed.
- (b) Each temperature measurement device shall be installed, calibrated, and maintained according to the manufacturer's specifications. The device shall have an accuracy of the greater of 0.75 percent of the temperature being measured expressed in degrees Celsius or  $\pm 2.5^\circ\text{C}$ .

- (c) Each temperature measurement device shall be equipped with a recording device so that a permanent continuous record is produced.

2.123.5 Test Methods and Procedures

- (a) The test methods in Appendix A to this part, except as provided under Section 1.2, shall be used to determine compliance with the applicable standards as follows:
  - (1) Method 24, or manufacturer's formulations data, for use in the determination of VOC content of each batch of VOC containing material. In case of an inconsistency between the analytical results and the formulation data, the analytical results will govern.
  - (2) Method 25, 25A, or 18, as applicable, for the measurement of VOC concentration.
  - (3) Method 1 for sample and velocity traverses.
  - (4) Method 2 for velocity and volumetric flow rate.
  - (5) Method 3 for gas analysis.
  - (6) Method 4 for stack gas moisture.
  - (7) Method 204 and Methods 204A – 204F for the criteria and verification of a permanent or temporary total enclosure.
- (b) For Method 24, the VCM sample must be at least a 1 liter sample in a 1 liter container taken at a point where the sample will be representative of the material as applied.
- (c) For Method 25, the minimum sampling time for each of the 3 runs is 60 minutes and the minimum sample volume is 0.003 dry standard cubic meters, except that shorter sampling times or smaller volumes, when necessitated by process variables or other factors, may be approved by the Director.
- (d) The Director will approve testing of representative stacks on a case-by-case basis if the owner or operator can demonstrate to the satisfaction of the Director that testing of representative stacks yields results comparable to those that would be obtained by testing all stacks.
- (e) The protocols and methods of Appendix G shall be used to determine the capture efficiency and the amount of VOC retained in the final product.

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\* The averaging period for an affected facility shall be on a three-month rolling basis, unless otherwise specified or approved by the Director.