2.50　　　　　　**Industrial Surface Coating of Large Appliances**

2.50.1　　　　　Applicability and Designation of Affected Facility

(a)　　　　The provisions of this source category apply to each surface coating operation in a large appliance surface coating line.

(b)　　　　The provisions of this source category apply to each affected facility identified in paragraph (a) that commences construction modification or reconstruction after December 24, 1980. For affected facilities constructed prior to that date, applicable provisions shall apply to any performance tests required by the Director.

2.50.2　　　　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.

B_w　　=　　the proportion of the coating which is water (fraction by volume)

C_a　　=　　the VOC concentration in each gas stream leaving the control device and entering the atmosphere (parts per million by volume, as carbon)

C_b　　=　　the VOC concentration in each gas stream entering the control device (parts per million by volume, as carbon)

C_f　　=　　the VOC concentration in each gas stream emitted directly to the atmosphere (parts per million by volume, as carbon)

D_c　　=　　density of coating (or input stream), as received (kilograms per liter)

D_d　　=　　density of a VOC-solvent added to coatings (kilograms per liter)

D_r　　=　　density of a VOC-solvent recovered by an emission control device (kilograms per liter)

E　　=　　the VOC destruction efficiency of the control device (fraction)

F　　=　　the proportion of total VOC's emitted by an affected facility that enters the control device (fraction)

G　　=　　the volume-weighted average mass of VOC's in coatings consumed in a calendar month per unit volume of coating solids applied (kilograms per liter)

G_{c-w}　　=　　The volume-weighted average mass of VOC's consumed per unit volume of coating excluding water (kilograms per liter)

L_c　　=　　the volume of coating consumed, as received (liters)

L_{c-w}　　=　　the volume of coating consumed less water (liters)

L_d　　=　　the volume of VOC-solvent added to coatings (liters)

L_r　　=　　the volume of VOC-solvent recovered by an emission control device (liters)

L_s　　=　　the volume of coating solids consumed (liters)

M_d　　=　　the mass of VOC-solvent added to coatings (kilograms)

M_o　　=　　the mass of VOC's in coatings consumed, as received (kilograms)

M_r　　=　　the mass of VOC's recovered by an emission control device (kilograms)

N　　=　　the volume-weighted average mass of VOC's emitted to the atmosphere per unit applied coating solids (kilograms per liter)

Q_a = the volumetric flow rate of a gas stream leaving the control device and entering the atmosphere (dry standard cubic meters per hour)

Q_b = the volumetric flow rate of a gas stream entering a control device (dry standard cubic meters per hour)

Q_f = the volumetric flow rate of a gas stream emitted directly to the atmosphere (dry standard cubic meters per hour)

R = the overall VOC emission reduction achieved for an affected facility (fraction)

T = the transfer efficiency (fraction)

V_s = the proportion of solids in each coating (or input stream), as received (fraction by volume)

W_o = the proportion of VOC's in each coating (or input stream), as received (fraction by weight)

2.50.3   Performance Tests and Compliance Provisions

(a)   The provisions of paragraph 6 and 8 of Section 1.2 of this text do not apply to the required performance tests.

(b)   The owner or operator of an affected facility shall conduct an 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 the required periodic (e.g., daily, monthly, etc.) performance tests to demonstrate compliance with the applicable Georgia Regulations for Air Quality Control or Federal New Source Performance Standards.

(c)   The owner or operator shall use the following procedures for determining monthly volume-weighted average emissions of VOC's in kilograms per liter (kg/l) of coating solids applied (G).

(1)   An owner or operator shall use the following procedures for any affected facility that does not use a capture system and control device to comply with the applicable emission limit. The owner or operator shall determine the composition of the coatings by formulation data supplied by the manufacturer of the coating or by an analysis of each coating, as received, using Method 24. The Director may require the owner or operator who uses formulation data supplied by the manufacturer of the coating to determine the VOC content of coatings using Reference Method 24 or an equivalent or alternate method. The owner or operator shall determine the volume of coating and the mass of VOC-solvent added to the coatings from company records on a monthly basis. If a common coating distribution system serves more than one affected facility, the owner or operator shall estimate the volume of coating used at each affected facility by using the average dry weight of coating and the surface area coated by each affected facility or by other procedures acceptable to the Director.

(i)   The weighted average of the total mass of VOC's consumed per unit volume of coating solids applied each calendar month will be determined as follows:

(A)   Calculate the mass of VOC's consumed (M_o+M_d) during each calendar month for each affected facility by the following equation:

$$M_o + M_d = \sum_{i=1}^{n} L_{ci} D_{ci} W_{oi} + \sum_{i=1}^{n} L_{dj} D_{dj}$$

(1)

($L_{dj}D_{dj}$) will be 0 if **no** VOC solvent is added to the coatings, as received.)

Where: **n** is the number of different coatings used during the calendar month and **m** is the number of different VOC-solvents added to coatings used during the calendar month.

(B)   Calculate the total volume of coating solids used (L_s) in each calendar month for each affected facility by the following equation:

$$L_s = \sum_{i=1}^{n} L_{ci} V_{si}$$

(2)

Where: **n** is the number of different coatings used during the calendar month.

(C)   Select the appropriate transfer efficiency from Table 1. If the owner or operator can demonstrate to the satisfaction of the Director that transfer efficiencies other than those shown are appropriate, the Director will approve their use on a case-by-case basis. Transfer efficiencies for application methods not listed shall be determined by the Director on a case-by-case basis. An owner or operator must submit sufficient data for the Director to judge the accuracy of the transfer efficiency claims.

TABLE 1. TRANSFER EFFICIENCIES

Application Method	Transfer Efficiency (T_k)
Air-atomized spray.........	0.40
Airless spray.................	0.45
Manual electrostatic spray	0.60
Flow coat.....................	0.85
Dip coat.......................	0.85
Nonrotational automatic electrostatic spray.......	0.85
Rotating head automatic electrostatic spray.......	0.90
Electrodeposition...........	0.95

Where more than one application method is used within a single surface coating operation, the owner or operator shall determine the composition and volume of each coating applied by each method through a means acceptable to the Director and compute the weighted average transfer efficiency by the following equation:

$$T = \frac{\sum_{i=1}^{n} \sum_{k=1}^{m} L_{cjk} V_{sjk} T_k}{L_s}$$

(3)

Where: **n** is the number of coatings (or input streams) used, and **m** is the number of application methods used.

(D) Calculate the volume-weighted average mass of VOC's consumed per unit volume of coating solids applied (G) during the calendar month for each affected facility by the following equation:

$$G = \frac{M_o + M_d}{L_s T}$$

(4)

(ii) Calculate the volume-weighted average of VOC emissions to the atmosphere (N) during the calendar month for each affected facility by the following equation:

$$N = G$$

(5)

(2) An owner or operator shall use the following procedures for any affected facility that uses a capture system and a control device that destroys VOC's (e.g., incinerator) to comply with the applicable emission limit.

(i) Determine the overall reduction efficiency (R) for the capture system and control device. For the initial performance test the overall reduction efficiency (R) shall be determined as prescribed in (A), (B), and (C) below. In subsequent months, the owner or operator may use the most recently determined overall reduction efficiency (R) for the performance test providing control device and capture system operating conditions have not changed. The procedure in paragraphs (A), (B), and (C) below 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 fraction (F) of total VOC's emitted by an affected facility that enters the control device using the following equation or as provided in Appendix G of this text:

$$F = \frac{\sum_{i=1}^{n} C_{bi} Q_{bi}}{\sum_{i=1}^{n} C_{bi} Q_{bi} + \sum_{i=1}^{p} C_{fi} Q_{fi}}$$

(6)

Where: **n** is the number of gas streams entering the control device and **p** is the number of gas streams emitted directly to the atmosphere.

(B) Determine the destruction efficiency of the control device (E) 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:

$$E = \frac{\sum_{i=1}^{n} Q_{bi} C_{bi} - \sum_{j=1}^{m} Q_{aj} C_{aj}}{\sum_{i=1}^{n} Q_{bi} C_{bi}}$$

(7)

Where: **n** is the number of gas streams entering the control device, and **m** is the number of gas streams leaving the control device and entering the atmosphere.

(C)   Determine overall reduction efficiency (R) using the following equation:

$$R = EF$$

(8)

(ii)   Calculate the volume-weighted average of the total mass of VOC's per unit volume of applied coating solids (G) during each calendar month for each affected facility using equations (1), (2), (3), if applicable, and (4).

(iii)   Calculate the volume-weighted average of VOC emissions to the atmosphere (N) during each calendar month by the following equation:

$$N = G(1-R)$$

(9)

(3)   An owner or operator shall use the following procedure for any affected facility that uses a control device for VOC recovery (e.g., carbon absorber) to comply with the applicable emission limit.

(i)   Calculate the total mass of VOC's consumed ($M_o + M_d$) and the volume-weighted average of the total mass of VOC's per unit volume of applied coating solids during each calendar month for each affected facility using equations (1), (2), (3), if applicable, and (4).

(ii)   Calculate the total mass of VOC's recovered (M_r) during each calendar month using the following equation:

$$M_r = L_r D_r$$

(10)

(iii) Calculate overall reduction efficiency of the control device (R) for each calendar month for each affected facility using the following equation:

$$R = \frac{M_r}{M_o + M_d}$$

(11)

(iv) Calculate the volume-weighted average mass of VOC's emitted to the atmosphere (N) for each calendar month for each affected facility using equation (9).

(4) [Reserved]

(d) The owner or operator shall use the following procedures for determining daily volume-weighted average emissions of VOC's in units of pounds VOC per gallon of coating excluding water.

(1) An owner or operator shall use the following procedures for any affected facility which does not use a capture system and control device to comply with the applicable emission limit. The owner or operator shall determine the composition of the coatings by formulation data supplied by the manufacturer of the coating or by an analysis of each coating, as received, using Method 24. The Director may require the owner or operator who uses formulation data supplied by the manufacturer of the coating to determine the VOC content of the coatings using Method 24. The owner or operator shall determine the volume of coating records on a daily basis. If a common coating distribution system serves more than one affected facility, the owner or operator shall estimate the volume of coating used at each facility by using the average dry weight of coating and the surface area coated by each affected facility or by other procedures acceptable to the Director.

(i) Calculate the volume-weighted average of the total mass of VOC's consumed per unit volume of coating excluding water during each calendar day for each affected facility, except as provided under paragraph (d)(2). Each daily calculation is considered a performance test. The volume-weighted average of the total mass of VOC's consumed per unit volume of coating excluding water for each calendar day will be determined by the following procedures.

(A) Calculate the mass of VOC's used $(M_o + M_d)$ during each calendar day for each affected facility by the following equation:

$$M_o + M_d = \sum_{i=1}^{n} L_{ci} D_{ci} W_{oi} + \sum_{j=1}^{m} L_{dj} D_{dj}$$

(12)

($L_{dj}D_{dj}$ will be **0** if no VOC is added to the coatings, as received.)

Where **n** is the number of different coatings used during the calendar day and **m** is the number of different diluent VOC-solvents used during the calendar day.

(B) Calculate the total volume of coating used excluding water, L_{c-w}, in each calendar day for each affected facility by the following equation:

$$L_{c-w} = \sum_{i=1}^{n} L_{ci} (1 - B_{wi})$$

(13)

Calculate the daily volume-weighted average emissions of VOC's per volume of coating as follows:

Metric Units--

$$G_{c\text{-}w} = \frac{M_o + M_d}{L_{c\text{-}w}}$$

English Units--

(2) Follow the procedure of paragraph (c)(2) and (c)(3) of this

$$G_{c\text{-}w}(english) = G_{c\text{-}w}(metric) \times 1.717$$

section for any affected facility which uses a control device which either destroys (e.g., incinerator) or recovers (e.g., carbon adsorption) the VOc to comply with the applicable emission limit, except sbustitute $G_{c\text{-}w}$ as calculated in paragraph (d)(1) for G wherever it occurs, and use the averaging period specified instead of the monthly averaging period.

2.50.4   Monitoring of Emissions and Operations

(a)   The owner or operator of an affected facility that uses a capture system and an incinerator to comply with the emission limits shall install, calibrate, maintain, and operate temperature measurement devices as prescribed below:

(1)   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.

(2)   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 $\pm 2.5^\circ$C.

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

2.50.5   Test Methods and Procedures

(a)   The reference methods in Appendix A of this text, except as provided under Section 1.2, shall be used to determine compliance with the applicable standards as follows:

(1)   Method 24, or formulation data supplied by the coating manufacturer to determine the VOC content of a coating for determining compliance only. In the event of a dispute, Method 24 shall be the reference method. Results of the Method 24 analysis of waterborne coatings shall be adjusted as described in Section 4.4 of Method 24. Procedures to determine VOC emissions are provided in §2.50.3;

(2)   Method 25, for the measurement of the VOC concentration in the gas stream vent;

(3)   Method 1 for sample and velocity traverses;

(4)   Method 2 for velocity and volumetric flow rate;

(5)   Method 3 for gas analysis; and

(6)   Method 4 for stack gas moisture.

(b)   For Method 24, the coating sample must be at least a 1-liter sample taken into a 1-liter container at a point where the sample will be representative of the coating material.

(c)   For Method 25, the sampling time for each of three runs is to be at least 60 minutes, and the minimum sampling volume is to be at least 0.003 dscm, 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 would yield 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.