2.40 New Automobile and Light-Duty Truck Surface Coating Operations

2.40.1 Applicability and Designation of Affected Facility

The affected facility to which the provisions of this source category apply is any of the following processes in an automobile or light-duty truck assembly plant: each prime coat operation, each guide coat operation, and each topcoat operation subject to Section 1.1 of the general provisions of this text.

Further, the provisions set forth in this section apply only to the above operations for which construction, reconstruction, or modification begins after October 5, 1979.

2.40.2 Test Methods and Procedures

(a) The reference methods in Appendix A to this text shall be used to conduct performance tests.

(1) Reference Method 24 or an equivalent or alternative method approved by the Director shall be used for the determination of the data used in the calculation of the VOC content of the coatings used for each affected facility. Manufacturers' formulation data is approved by the Director as an alternative method to Method 24. In the event of dispute, Reference Method 24 shall be the referee method.

(2) Reference Method 25 or an equivalent or alternative method approved by the Director shall be used for the determination of the VOC concentration in the effluent gas entering and leaving the emission control device for each stack equipped with an emission control device and in the effluent gas leaving each stack not equipped with a control device.

(3) The following methods shall be used to determine the volumetric flow rate in the effluent gas in a stack:

(i) Method 1 for sample and velocity traverses,

(ii) Method 2 for velocity and volumetric flow rate,

(iii) Method 3 for gas analysis, and

(iv) Method 4 for stack gas moisture.

(b) For Reference Method 24, the coating sample must be a 1-liter sample taken in a 1-liter container.

(c) For Reference Method 25, the sampling time for each of three runs must be at least one hour. The minimum sample volume must be 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. The Director will approve the sampling of representative stacks on a case-by-case basis if the owner or operator can demonstrate to the satisfaction of the Director that the testing of representative stacks would yield results comparable to those that would be obtained by testing all stacks.

2.40.3 Emission and Operation Monitoring

The owner or operator of an affected facility which uses an incinerator to comply with the emission limits specified under Section 1.1 shall install, calibrate, maintain, and operate temperature measurement devices as prescribed below:

(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 accepted practice and 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.

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

2.40.4 Nomenclature

The nomenclature used in this Section has the following meanings:

C_{aj} = concentration of VOC (as carbon) in the effluent gas flowing through stack (j) leaving the control device (parts per million by volume).

C_{bi} = concentration of VOC (as carbon) in the effluent gas flowing through stack (i) entering the control device (parts per million by volume).

C_{fk} = concentration of VOC (as carbon) in the effluent gas flowing through exhaust stack (k) not entering the control device (parts per million by volume).

D_{ci} = density of each coating (i) as received (kilograms per liter).

D_{dj} = density of each type VOC dilution solvent (j) added to the coatings, as received (kilograms per liter).

D_r = density of VOC recovered from an affected facility (kilograms per liter).

E = VOC destruction efficiency of the control device.

F = fraction of total VOC which is emitted by an affected facility that enters the control device.

G = volume weighted average mass of VOC per volume of applied solids (kilograms per liter).

L_{ci} = volume of each coating (i) consumed, as received (liters).

L_{cil} = volume of each coating (i) consumed by each application method (l), as received (liters).

L_{dj} = volume of each type VOC dilution solvent (j) added to the coatings, as received (liters).

L_r = volume of VOC recovered from an affected facility (liters).

L_s = volume of solids in coating consumed (liters).

M_d = total mass of VOC in dilution solvent (kilograms).

M_o = total mass of VOC in coatings as received (kilograms).

M_r = total mass of VOC recovered from an affected facility (kilograms).

N = volume weighted average mass of VOC per volume of applied coating solids after the control device:

$$\left(\frac{kilograms\ of\ VOC}{liter\ of\ applied\ solids} \right)$$

Q_{aj} = volumetric flow rate of the effluent gas flowing through stack (k) leaving the control device (dry standard cubic meters per hour).

Q_{bi} = volumetric flow rate of the effluent gas flowing through stack (i) entering the control device (dry standard cubic meters per hour).

Q_{fk} = volumetric flow rate of the effluent gas flowing through exhaust stack (k) not entering the control device (dry standard cubic meters per hour).

T = overall transfer efficiency.

T_l = transfer efficiency for application method (l).

V_{si} = proportion of solids by volume in each coating (i) as received: $\left(\frac{liter\ solids}{liter\ coating} \right)$, *and*

W_{oi} = proportion of VOC by weight in each coating (i), as received: $\left(\frac{kilograms\ VOC}{kilograms\ coating} \right)$.

2.40.5 Performance Test and Compliance Provisions

(a) The provisions set forth in Section 1.2 of this text are to be followed in any performance testing done under the requirements of this section; they are incorporated by reference.

(1) The following exceptions may be observed:

(i) It is not necessary to provide 30 days notice of tests performed after the initial performance test.

(ii) Triplicate test runs are not required under the provisions set forth in Sections 2.40.5(b)(1) and (3) of this text.

(2) The owner or operator of an affected facility will perform an initial performance test, as required in Section 1.2 of this text, and thereafter each calendar month for each affected facility, as required in this section.

(b) The owner or operator shall use the following procedures for determining the monthly volume weighted average mass of VOC emitted per volume of applied coating solids.

(1) The owner or operator shall use the following procedures for each affected facility which does not use a capture system and a control device to comply with the applicable emission limit.

(i) Calculate the volume weighted average mass of VOC per volume of applied coating solids for each calendar month for each affected facility. The owner or operator shall determine the composition of the coatings by formulation data supplied by the manufacturer of the coating or from data determined by an analysis of each coating, as received, by Reference Method 24. The Director may require the owner or operator who uses formulation data supplied by the manufacturer of the coating to determine data used in the calculation of the VOC content of coatings by Reference Method 24 or and equivalent or alternative method. The owner or operator shall determine from company records on a monthly basis the volume of coating consumed, as received, and the mass of solvent used for thinning purposes. The volume weighted average of the total mass of VOC per volume of coating solids used each calendar month will be determined by the following procedures.

(A) Calculate the mass of VOC used in each calendar month for each affected facility by the following equation where "n" is the total number of coatings used and "m" is the total number of VOC solvents used:

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

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

(B) Calculate the total volume of coating solids used in each calendar month for each affected facility by the following equation where "n" is the total number of coatings used:

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

(C) Select the appropriate transfer efficiency (T) from the following tables for each surface coating operation:

Application Method	Transfer Efficiency
Air Atomized Spray (waterborne coating)	0.39
Air Atomized Spray (solvent-borne coating)	0.50
Manual Electrostatic Spray	0.75
Automatic Electrostatic Spray	0.95
Electrodeposition	1.00

The values in the table above represent an overall system efficiency which includes a total capture of purge. If a spray system uses line purging after each vehicle and does not collect any of the purge material, the following table shall be used:

Application Method	Transfer Efficiency
Air Atomized Spray (waterborne coating)	0.30
Air Atomized Spray (solvent-borne coating)	0.40
Manual Electrostatic Spray	0.62
Automatic Electrostatic Spray	0.75

If the owner or operator can justify to the Director's satisfaction that other values for transfer efficiencies are appropriate, the Director will approve their use on a case-by-case basis.

(1) When more than one application method (l) is used on an individual surface coating operation, the owner or operator shall perform an analysis to determine an average transfer efficiency by the following equation where "n" is the total number of coatings used and "p" is the total number of application methods:

$$T = \frac{\sum_{i=1}^{n} \sum_{l=1}^{p} T_l V_{si} L_{cil}}{L_s}$$

(D) Calculate the volume solids weighted average mass of VOC per volume of applied coating solids (G) for each calendar month for each affected facility by the following procedures:

(1) For prime coat operations, use the following procedure: G is equal to the sum of $[M_o + M_d]$ for 6 out of 7 most recent calendar months of normal operation divided by the respective sum of $[L_s T]$.

(2) For guide coat and topcoat operations, use the following

equation:

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

(ii) The volume weighted average mass of VOC per volume of applied coating solids (G), calculate on a calendar month basis, shall be used as the measure of the emission level of the affected facility for comparison to the applicable standard. Each monthly calculation is a performance test for the purpose of this section.

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

(i) Calculate the volume weighted average mass of VOC per volume of applied coating solids (G) during each calendar month for each affected facility as described under paragraph (b)(1)(i) above.

(ii) Calculate the volume weighted average mass of VOC per volume of applied solids emitted after the control device, by the following equation:

$$N = G\,(1 - FE)$$

(A) Determine the fraction of total VOC which is emitted by an affected facility that enters the control device by using the following equation where "n" is the total number of stacks entering the control device and "p" is the total number of stacks not connected to the control device:

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

If the owner can justify to the Director's satisfaction that another method will give comparable results, the Director will approve its use on a case-by-case basis.

(1) In subsequent months, the owner or operator shall use the most recently determined capture fraction for the performance test.

(B) Determine the destruction efficiency of the control device using values of the volumetric flow rate 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 where "N" is the total number of stacks entering the control device and "m" is the total number of stacks leaving the control device:

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

(1) In subsequent months, the owner or operator shall use the most recently determined VOC destruction

efficiency for the performance test.

(C) If an emission control device controls the emissions from more than one affected facility, the owner or operator shall measure the VOC concentration (C_{bi}) in the effluent gas entering the control device (in parts per million by volume) and the volumetric flow rate (Q_{bi}) of the effluent gas (in dry standard cubic meters per hour) entering the device through each stack. The destruction or removal efficiency determined using these data shall be applied to each affected facility served by the control device.

(iii) The volume weighted average mass of VOC per volume of applied coating solids emitted after the control device (N), calculated on a calendar month basis, shall be used as the measure of the emission level of the affected facility for the comparison to the applicable standard. Each monthly calculation is a performance test for the purpose of this section.

(3) The owner or operator shall use the following procedures for each affected facility which uses a capture system and a control device that recovers the VOC (e.g., carbon adsorber) to comply with the applicable emission limit.

(i) Calculate the mass of VOC (M_o + M_d) used during each calendar month for each affected facility as described under paragraph (b)(1)(i) above.

(ii) Calculated the total volume of coating solids (L_s) used in each calendar month for each affected facility as described under paragraph (b)(1)(i) above.

(iii) Calculate the mass of VOC recovered (M_r) each calendar month for each affected facility by the following equation:

$$M_r = L_r D_r$$

(iv) Calculate the volume weighted average mass of VOC per volume of applied coating solids emitted after the control device during a calendar month by the following equation:

$$N = \frac{M_o + M_d - M_r}{L_s T}$$

(v) The volume weighted average mass of VOC per volume of applied coating solids emitted after the control device (N), calculated on a calendar month basis, shall be used as the measure of the emission level of the affected facility for comparison to the applicable standard. Each monthly calculation is a performance test for the purpose of this section.

2.40.6 Reporting and Recordkeeping Requirements

(a) Each owner or operator of an affected facility shall include the data outlined in subparagraphs (1) and (2) in the initial performance test reports.

(1) The owner or operator shall report the volume weighted average mass of VOC per volume of applied coating solids for each affected facility.

(2) Where abatement is achieved through the use of incineration, the owner or operator shall include the following additional data in the control device initial performance test or subsequent performance tests at which destruction efficiency is determined: the combustion temperature (or the gas temperature upstream and downstream of the catalyst bed), the total mass of VOC per volume of applied coating solids before and after the incinerator, capture efficiency, the destruction efficiency of the incinerator

used to reduce emissions, and a description of the method used to establish the fraction of VOC captured and sent to the control device.

(b) Following the initial report, each owner or operator shall report the volume weighted average mass of VOC per volume of applied coating solids for each affected facility during each calendar month in which the affected facility exceeds the applicable emission limit. This report shall be postmarked not later than ten days after the end of the calendar month that the excess emission occurred. Where abatement is achieved through the use of a capture system and control device, the volume weighted average after the control device should be reported.

(c) Where abatement is achieved through the use of incineration, the owner or operator shall continuously record the incinerator combustion temperature during coating operations for thermal incineration or the gas temperature upstream and downstream of the incinerator catalyst bed during coating operations for catalytic incineration. The owner or operator shall report quarterly as defined below.

(1) For thermal incinerators, every three-hour period shall be reported during which the average temperature measured is more than 28°C less than the average temperature during the most recent control device performance test at which the destruction efficiency was determined.

(2) For catalytic incinerators, every three-hour period shall be reported during which the average temperature immediately before the catalyst bed, when the coating system is operational, is more than 28°C less than the average temperature immediately before the catalyst bed during the most recent control device performance test at which destruction efficiency was determined. In addition, every three-hour period shall be reported each quarter during which the average temperature difference across the catalyst bed when the coating system is operational is less than 80 percent of the average temperature difference of the device during the most recent control device performance test at which destruction efficiency was determined.

(3) For thermal and catalytic incinerators, if no such periods occur, the owner or operator shall submit a negative report.

(d) The owner or operator shall notify the Director 30 days in advance of any test by Reference Method 25.