RULE 4605 AEROSPACE ASSEMBLY AND COMPONENT COATING OPERATIONS

(Adopted December 19, 1991; Amended May 21, 1992; Amended December 17, 1992; Amended March 31, 1993; Amended February 17, 1994; Amended December 19, 1996; Amended December 20, 2001; Amended September 20, 2007; Amended June 16, 2011)

1.0 Purpose

The purpose of this rule is to limit the emissions of volatile organic compounds (VOCs) from aerospace coatings and adhesives, from the organic solvent cleaning, and the storage and disposal of solvents and waste solvent materials associated with the use of aerospace coatings and adhesives and to provide the administrative requirements for recording and measuring the emissions.

2.0 Applicability

This rule shall apply to the manufacturing, assembling, coating, masking, bonding, paint stripping, surface cleaning, service, and maintenance of aerospace components, the cleanup of equipment, and the storage and disposal of solvents and waste solvent materials associated with these operations.

3.0 Definitions

3.1 Ablative Coating: a coating that chars when exposed to open flame or extreme temperatures, as would occur during the failure of an engine casing or during aerodynamic heating. The ablative char surface serves as an insulative barrier, protecting adjacent components from the heat or open flame.

3.2 Adhesion Promoter: a coating applied to a substrate in a monomolecular thickness to promote wetting and form a chemical bond with the subsequently applied material.

3.3 Adhesive: a substance that is used to bond one surface to another.

3.4 Adhesive Bonding Primer: a coating applied in a very thin film to aerospace adhesive bond detail components for corrosion inhibition and adhesion.

3.5 Aerosol Coating: a mixture of pigments, resins, and liquid and gaseous solvents and propellants packaged in a disposable container for hand-held application.

3.6 Aerospace Component: any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any aircraft, helicopter, missile, or space vehicle, including mockups and prototypes.

3.7 Aerospace Material: any coating, primer, adhesive, sealant, maskant, lubricant, stripper or hand-wipe cleaning or clean-up solvent used during the manufacturing, assembly, refinishing, maintenance or service of an aerospace component.

3.8 Antichafe Coating: a coating applied to areas of moving aerospace components which may rub during normal operation.

3.9 Anti-wicking Wire Coating: the outer coating of a wire which prevents fluid wicking into the insulation of the wire.

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

3.11 ARB: California Air Resources Board.

3.12 ASTM: American Society for Testing and Materials.

3.13 Barrier Coating: a coating applied in a thin film to fasteners to inhibit dissimilar metal corrosion and to prevent galling.

3.14 Bearing Coating: a coating applied to an antifriction bearing, a bearing housing, or the area adjacent to such a bearing in order to facilitate bearing function or to protect the base material from excessive wear. A material shall not be classified as a bearing coating if it can also be classified as a dry lubricative material or a solid film lubricant.

3.15 Brush Coating: manual application of coatings using brushes and rollers.

3.16 Caulking and Smoothing Compounds: a semi-solid materials which are applied by hand application methods and are used to aerodynamically smooth exterior vehicle surfaces or fill cavities such as bolt hole accesses. A material shall not be classified as a caulking and smoothing compound if it can also be classified as a sealant.

3.17 Chemical Agent-resistant Coating (CARC): an exterior topcoat designed to withstand exposure to chemical warfare agents or the decontaminants used on these agents.

3.18 Chemical Milling: the removal of metal by chemical action of acids or alkalis.

3.19 Clear Topcoat: a clear or semi-transparent coating applied over a primer for purposes such as appearance, identification, or protection.

3.20 Coating: a material applied onto or impregnated into a substrate for protective, decorative, or functional purposes. Such materials include, but are not limited to, paints, varnishes, sealers, and stains.

3.21 Commercial Exterior Aerodynamic Structure Primer: a primer utilized for the purpose of extended corrosion protection, which is only used on the exterior of passenger and cargo doors, supporting door structures, aerodynamic components, and structures of commercial aircraft which protrude from the fuselage, such as wings and attached components, control surfaces, horizontal stabilizer, vertical fins, wing-to-body fairings, antennae, landing gear and landing gear doors.

3.22 Conformal Coating: a coating applied to electrical conductors and circuit boards to protect them against electrical discharge damage and/or corrosion.

3.23 Composite Partial Pressure: the sum of the partial pressures of the VOC compounds in a solvent. The VOC composite partial pressure is calculated as follows:

$$PP_c = \frac{\sum_{i=1}^{n} \frac{(W_i)(VP_i)}{MW_i}}{\frac{W_w}{MW_w} + \sum_{e=1}^{k} \frac{W_e}{MW_e} + \sum_{i=1}^{n} \frac{W_i}{MW_i}}$$

Where:

W_i = Weight of the "i"th VOC compound, in grams
W_w = Weight of water, in grams
W_e = Weight of exempt compound, in grams
MW_i = Molecular weight of the "i"th VOC compound, in grams per gram-mole
MW_w = Molecular weight of water, in grams per gram-mole
MW_e = Molecular weight of the "e"th exempt compound, in grams per gram-mole
PP_c = VOC composite partial pressure at 20°C (68°F), in mm Hg
VP_i = Vapor pressure of the "i"th VOC compound at 20°C (68°F), in mm Hg

3.24 Decorative Laminate Primer: an adhesive bonding primer which is applied to a substrate to enhance adhesion between the decorative laminate and the subsequently applied substrate, and is cured at a maximum temperature of 250°F.

3.25 Dip Coating: the process in which a substrate is immersed in a solution (or dispersion) containing the coating and then withdrawn.

3.26 Dry Lubricative Coating: a coating consisting of lauric acid, cetyl alcohol, waxes, or other non-cross linked or resin-bound materials which act as a dry lubricant or protective coat.

3.27 Electric-effect Coating: an electrically-conductive coating.

3.28 Electrodeposition: a dip coating application method where the paint solids are given an electrical charge which is then attracted to a substrate.

3.29 Electromagnetic Interference (EMI) Coating: a coating applied to space vehicles, missiles, aircraft radomes, and helicopter blades to disperse static energy or reduce electromagnetic interference.

3.30 Electronic Wire Coating: the outer electrical insulation coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.

3.31 Electrostatic Application: a sufficient charging or atomized paint droplets to cause deposition principally by electrostatic attraction. This application shall be operated at a minimum 60 KV power.

3.32 EPA: United States Environmental Protection Agency.

3.33 Epoxy Based Fuel Tank Coating: a coating which contains epoxy resin that is applied to integral fuel tank components of aircraft to protect the fuel tank from corrosion and the by-products of bacterial growth.

3.34 Fastener Sealant: a sealant applied to a device used to join two or more parts together.

3.35 Fire Resistant Coating - Civilian (interior): a cabin interior coating that passes Federal Aviation Administration standards using the Ohio State University Heat Release, Fire and Burn Tests.

3.36 Flight Test Coating: a coating applied to an aircraft prior to flight testing to protect the aircraft from corrosion and to provide required marking during flight test evaluation.

3.37 Flow Coating: a coating application system with no air supplied to the nozzle and where paint flows over the part and the excess coating drains back into a collection system.

3.38 Fuel Tank Adhesive: an adhesive used to bond components continuously exposed to fuel and which must be compatible with and used with fuel tank coatings.

3.39 Fuel Tank Coating: a coating applied to the interior of a fuel tank or areas of an aircraft that are continuously wetted by fuel to protect it from corrosion and/or bacterial growth.

3.40 Grams of VOC per Liter of Coating, Less Water and Exempt Compounds: the weight of VOC content per combined volume of VOC and coating solids and can be calculated by the following equation:

$$\text{Grams of VOC per liter of coating, less water and exempt compounds} = \frac{Ws - Ww - Wec}{Vm - Vw - Vec}$$

Where,

Ws = weight of volatile compounds (grams)
Ww = weight of water (grams)
Wec = weight of exempt compounds (grams)
Vm = volume of material (liters)
Vw = volume of water (liters)
Vec = volume of exempt compounds (liters)

3.41 Grams of VOC per Liter of Material: the weight of VOC per volume of material and can be calculated by the following equation:

$$\text{Grams of VOC per liter of material} = \frac{Ws - Ww - Wec}{Vm}$$

Where,

Ws = weight of volatile compounds (grams)
Ww = weight of water (grams)
Wec = weight of exempt compounds (grams)
Vm = volume of material (liters)

3.42 Hand Application Methods: the application of coatings, sealants, or adhesives, by non-mechanical hand-held equipment including but not limited to paint brushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, rags and sponges.

3.43 High Temperature Coating: a coating that is certified to withstand temperatures of more than 350°F.

3.44 High-Volume, Low-Pressure (HVLP) Spray Equipment: equipment used to apply materials by means of a spray gun which is designed and intended to be operated, and which is operated, between 0.1 and 10.0 psig of air atomizing pressure measured dynamically at the center of the air cap and at the air horns, measured dynamically at the center of the air cap and the air horns.

3.45 Impact Resistant Coating: a flexible coating that protects aerospace components, such as aircraft landing gear, and landing gear compartments, and other surfaces subject to abrasive impacts from runway debris.

3.46 Intermediate Release Coating: a thin coating applied beneath topcoats to assist in removing the topcoat in depainting operations and generally to allow the use of less hazardous depainting methods.

3.47 Lacquer: a clear or pigmented coating formulated with a nitrocellulose or synthetic resin to dry by evaporation without a chemical reaction. Lacquers are resoluble in their original solvent.

3.48 Liquid Leak: a visible solvent leak from a container at a rate of more than three drops per minute, or a visible liquid mist.

3.49 Long Term Adhesive Bonding Primer (Metal to Structural Core Bonding): an adhesive bonding primer that has met the aircraft manufacturers' required performance characteristics following 6000 hours testing, used for metal to structural core bonding, and with an adhesive that is specified to be cured at $350^{o}F \pm 10°F$.

3.50 Maskant for Chemical Milling: a coating applied directly to an aerospace component to protect surface areas when chemical milling such component.

3.51 Metalizing Epoxy Coating: a coating that contains relatively large quantities of metallic pigmentation for appearance and/or added protection.

3.52 Mold Release: a coating applied to a mold surface to prevent the molded piece from sticking to the mold as it is removed.

3.53 Non-Absorbent Container: a container made of non-porous material that does not allow the migration of solvents through it.

3.54 Non-Leaking Container: a container without liquid leak.

3.55 Non-Structural Adhesive: an adhesive that bonds non-load carrying aircraft component in non-critical applications.

3.56 Normal Business Hours: Monday through Friday, 8:00 am to 5:00 pm.

3.57 Optical Anti-Reflective Coating: a coating with a low reflectance in the infrared and visible wavelength range and is used for anti-reflection on or near optical and laser hardware.

3.58 Organic Solvent: the same as "Solvent."

3.59 Organic Solvent Cleaning: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).

3.60 Part Marking Coating: coatings or inks used to make identifying markings on materials, components, and/or assemblies. These markings may be either permanent or temporary.

3.61 Phosphate Ester Resistant Wire Ink Coating: a coating that is used for surface identification or mark on aerospace wire or cable and which inhibits the corrosion caused by contact with phosphate ester type hydraulic fluids.

3.62 Pretreatment Coating: a coating which contains no more than 12 percent solids by weight, and at least one-half (0.5) percent acid, by weight, to provide surface etching, and is applied directly to metal surfaces to provide corrosion resistance, adhesion and ease of stripping.

3.63 Primer: a coating applied directly to an aerospace component for purposes of corrosion prevention, protection from the environment, functional fluid resistance and adhesion of subsequent coatings, adhesives, or sealants.

3.64 Radiation-Effect Coating: a coating which helps in the prevention of radar detection.

3.65 Rain Erosion Resistant Coating: a coating that protects leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain during flight.

3.66 Remanufactured Aircraft Part: an aerospace component that is built as a spare part or replacement part subject to an existing commercial aircraft specification.

3.67 Rocket Motor Nozzle Coating: a catalyzed epoxy coating system used in elevated temperature applications on rocket motor nozzles.

3.68 Roll Coating: application of coatings from a paint trough to a flat surface by mechanical series of rollers.

3.69 Scale Inhibitor: a coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of tenacious scale.

3.70 SCAQMD: South Coast Air Quality Management District.

3.71 Screen Print Ink: an ink used in screen printing processes during fabrication of decorative laminates and decals.

3.72 Sealant: a viscous semisolid material that fills voids in order to seal out water, fuel, and other liquids and solids, and in some cases air movement, and is applied with a syringe, caulking gun, or spatula.

3.73 Silicone Insulation Material: an insulating material applied to exterior metal surfaces for protection from high temperatures caused by atmospheric friction or engine exhaust. These materials differ from ablative coatings in that they are not "sacrificial".

3.74 Short Term Adhesive Bonding Primer: an adhesive bonding primer that has met the manufacturers' required performance characteristics following 1000 hours testing, used for metal to metal and metal to structural core bonding, and with an adhesive which is specified to be cured at a temperature of 350°F ± 10°F.

3.75 Solid Film Lubricant: a very thin coating consisting of a binder system containing as its chief pigment material one (1) or more of the following: molybdenum disulfide, graphite, polytetrafluoroethylene (PTFE) or other solids that act as a dry lubricant between closely-fitting surfaces.

3.76 Solvent: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).

3.77 Sonic and Acoustic Applications: the use of aerospace materials on aerospace components that are subject to mechanical vibration and/or sound wave cavitation.

3.78 Space Vehicle Coating: a coating applied to vehicles designed to travel and operate beyond earth's atmosphere.

3.79 Specialized Function Coating: a coating that fulfills specific engineering requirements that are limited in application and are characterized by low volume usage. This category excludes coatings covered in other Specialty Coating categories.

3.80 Stripper: a volatile liquid applied to remove a maskant for chemical processing, cured or dried paint, cured or dried paint residue or temporary protective coating.

3.81 Structural Adhesive - Autoclavable: an adhesive used to bond load-carrying aircraft components and is cured by heat and pressure in an autoclave.

3.82 Structural Adhesive - Nonautoclavable: an adhesive cured under ambient conditions and is used to bond load-carrying aircraft components or other critical functions, such as nonstructural bonding near engines.

3.83 Surface Cleaning: any method of cleaning outside of a degreaser, including, but not limited to, wipe cleaning and equipment flushing.

3.84 Temporary Protective Coating: a coating applied to an aerospace component to protect it from mechanical and environmental damage during manufacturing or shipping.

3.85 Thermal Control Coating: a coating formulated with specific thermal conductive or radiative properties to permit temperature control of the substrate.

3.86 Topcoat: a coating applied over a primer for purposes such as appearance, identification, or protection.

3.87 Transfer Efficiency: the ratio of the weight or volume of coating solids adhering to the part being coated to the weight or volume of coating solids used in the application process, expressed as a percentage.

3.88 Unicoat: a coating that is applied directly to an aerospace component for purposes of corrosion protection, environmental protection and functional fluid resistance that is not subsequently topcoated. A unicoat is used in lieu of the application of a primer and a topcoat.

3.89 Volatile Organic Compounds (VOCs): as defined in Rule 1020 (Definitions).

3.90 Waste Solvent Material: any solvent which may contain dirt, oil, metal particles, sludge, and/or waste products, or wiping material containing VOCs including, but not limited to, paper, cloth, sponge, rag, or cotton swab used in organic solvent cleaning.

3.91 Wet Fastener Installation Coating: a primer or sealant applied by dipping, brushing, or daubing to fasteners that are installed before the coating is cured.

3.92 Wing Coating: a coating that is corrosion resistant and is resilient enough to withstand the flexing of wings.

3.93 Wire Prebonding Etchant: a non-additive surface treatment process to provide bondability of aerospace wire coatings to the underlying insulation layer.

4.0 Exemptions

4.1 Jet engine or rocket engine flushing operations using any solvent other than trichloroethylene are exempt from this rule.

4.2 Except for the recordkeeping provisions of Sections 6.1.1 and 6.1.4, the requirements of Section 5.0 shall not apply to aerospace assembly and component coating operations using not more than four (4) gallons of products containing VOCs per day. Solvent-containing materials used in operations subject to Rule 4662 (Organic Solvent Degreasing Operations), shall not be included in this determination.

4.3 Except for the provisions of Section 6.0, Section 5.0 shall not apply to laboratories which apply coatings, solvents, and adhesives to test specimens for purpose of research, development, quality control, and testing for production-related operations. Any person claiming this exemption shall provide operational records, data and calculations, as determined by the APCO to be necessary, to substantiate this claim.

4.4 The provisions of Section 5.1 of this rule shall not apply to:

4.4.1 Coatings or aerosols with separate formulations that are used in volumes of less than one (1) gallon on any day or 20 gallons in any calendar year at an aerospace assembly and component coating stationary source, or

4.4.2 Adhesives with separate formulations that are used in volumes of less than one half (0.5) gallon on any day or ten (10) gallons in any calendar year at an aerospace assembly and component coating stationary source.

Any operator seeking to claim the exemption in Section 4.4 shall notify the APCO in writing that substitute compliant coatings are not available.

4.5 The provisions of Section 5.5 shall not apply to the application of coatings that:

4.5.1 Contain less than 20 grams of VOC per liter of coating less water and exempt compounds, or

4.5.2 Are dispensed from hand-held aerosol cans.

5.0 Requirements

5.1 Aerospace Coatings and Adhesives: After the applicable effective date indicated in Table 1, an operator shall not apply to any aerospace component any coating, aerosol or adhesive with a VOC content, less water and exempt compounds, as applied, in excess of the limits in Table 1.

Table 1 – VOC Content Limits (Grams of VOC Per Liter of Coating [g/l], Less Water and Exempt Compounds)		
Product (VOC Containing Material)	Before January 1, 2013	On and After January 1, 2013
1. Ablative	n/a	600[1]
2. Adhesion Promoter	850	850
3. Adhesives		
a. Non-Structural	250	250
b. Structural		
i. Autoclavable	50	50
ii. Nonautoclavable	850	850
4. Adhesive Bonding Primers		
a. New Commercial Aircraft	250	250
b. All Military Aircraft	805	805
c. Remanufactured Commercial Aircraft Parts	805	805
d. Sonic and Acoustic Applications	805	805
e. Long Term	250	250
f. Short Term	250	250
5. Antichafe Coatings	600	600
6. Barrier Topcoat	420	420
7. Bearing Coating	n/a	620[1]
8. Caulking and Smoothing Compounds	n/a	850[1]
9. Chemical Agent Resistant Coating	n/a	550[1]
10. Clear Topcoat	520	520
11. Conformal Coating	750	750
12. Dry Lubricative Materials		
a. Fastener Manufacturing	120	120
b. Nonfastener Manufacturing	675	675
13. Electric/Radiation Effect Coatings	800	800
14. Electromagnetic Interference Coating	n/a	800[1]
15. Fastener Sealants	675	600[2]
16. Fire Resistant Coatings		
a. Civilian (Interior)	650	650

Table 1 – VOC Content Limits (Grams of VOC Per Liter of Coating [g/l], Less Water and Exempt Compounds) continued		
Product (VOC Containing Material)	Before January 1, 2013	On and After January 1, 2013
17. Flight Test Coatings Used on		
a. Missiles or Single-Use Target Craft	420	420
b. All others	600	600
18. Fuel Tank Coatings		
a. General	420	420
b. Epoxy	420	420
19. Fuel Tank Adhesives	620	620
20. High Temperature Coating	850	850
21. Impact Resistant Coating	420	420
22. Intermediate Release Coating	n/a	750[1]
23. Lacquer	n/a	830[1]
24. Maskants - Chemical Milling	250	250
25. Metalized Epoxy Coating	n/a	740[1]
26. Mold Release	n/a	780[1]
27. Optical Anti-Reflective Coating	700	700
28. Part Marking Coating	n/a	850[1]
29. Pretreatment Coatings	780	780
30. Primers		
a. General	350	350
b. Commercial Exterior Aerodynamic Structure	350	350
31. Rain Erosion Resistant Coating	800	800
32. Rocket Motor Nozzle Coating	n/a	660[1]
33. Scale Inhibitor	880	880
34. Screen Prink Ink	840	840
35. Sealant (Extrudable/Rollable/Brushable)	600	280[3]
36. Silicone Insulation Material	n/a	850[1]
37. Solid Film Lubricants		
a. Fastener Manufacturing	250	250
b. Fastener Installation	880	880
c. Nonfastener Manufacturing	880	880
38. Space Vehicle Coatings		
a. Electrostatic Discharge Protection	800	800

Table 1 – VOC Content Limits (Grams of VOC Per Liter of Coating [g/l], Less Water and Exempt Compounds) continued		
Product (VOC Containing Material)	Before January 1, 2013	On and After January 1, 2013
b. Other Space Vehicle Coatings	1000	1000
c. Adhesives	800	800
39. Specialized Function Coating	n/a	890[1]
40. Temporary Protective Coatings	250	250
41. Thermal Control Coating	n/a	800[1]
42. Topcoats	420	420
43. Epoxy Polyamide	n/a	660[1]
44. Unicoats (Self Priming Topcoats)	420	420
45. Wet Fastener Installation Coating	n/a	675[1]
46. Wing Coating	750	750
47. Wire Coatings		
a. Electronic	420	420
b. Anti-Wicking	420	420
c. Pre-Bonding Etching	420	420
d. Phosphate Ester Resistant Ink	925	925

[1] Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from these coating limits.
[2] Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from the 600 g/l limit, but must comply with a 675 g/l limit.
[3] Coatings that have been designated as "classified" by the Department of Defense or coatings that are used on space vehicles are exempt from the 280 g/l limit, but must comply with a 600 g/l limit.

5.2 Evaporative Loss Minimization

5.2.1 Surface Cleaning: No operator shall use a solvent for surface cleaning, clean-up, or jet engine or rocket engine gas path cleaning or flushing, not exempt under Section 4.0 of this rule, excluding stripping coatings or cleaning coating application equipment, unless:

5.2.1.1 the solvent contains less than 200 grams of VOC per liter (1.67 lb/gal) of material, as applied; or

5.2.1.2 the VOC composite vapor pressure of the solvent is less than or equal to 45 mm Hg (0.87 psia) at a temperature of 68°F.

5.2.2 Coating Application Equipment Cleaning

An operator shall not use VOC-containing materials to clean spray equipment used for the application of coatings, adhesives, or ink, unless an enclosed system or equipment that is proven to be equally effective at controlling emissions is used for cleaning. If an enclosed system is used, it must totally enclose spray guns, cups, nozzles, bowls, and other parts during washing, rinsing and draining procedures, and it must be used according to the manufacturer's recommendations and must be closed when not in use.

5.2.3 In lieu of compliance with Sections 5.2.1 or 5.2.2, an operator may control VOC emissions from surface cleaning operations or from cleaning coating application equipment with a VOC emission control system that meets the requirements of Section 5.6.

5.3 Coating Strippers

5.3.1 No operator shall use or specify for use within the District a coating stripper unless it contains less than 300 grams of VOC per liter (2.5 lb/gal), as applied, or unless it has a VOC composite vapor pressure of 9.5 mm Hg (0.18 psia) or less at 68°F.

5.3.2 In lieu of compliance with Section 5.3.1, an operator may control emissions from coating stripper operations with a VOC emission control system that meets the requirements of Section 5.6.

5.4 Storage and Disposal of VOC Containing Materials: An operator shall store or dispose of fresh or spent solvents, waste solvent cleaning materials such as cloth, paper, etc., coatings, adhesives, catalysts, and thinners in closed, non-absorbent and non-leaking containers. The containers shall remain closed at all times except when depositing or removing the contents of the containers or when the container is empty.

5.5 Application Equipment Requirements: No operator shall apply coatings subject to the provisions of this rule unless one (1) of the following methods is used:

5.5.1 Electrostatic application;

5.5.2 Electrodeposition;

5.5.3 High-Volume, Low- Pressure (HVLP) spray,

5.5.3.1 High-Volume, Low-Pressure (HVLP) spray equipment shall be operated in accordance with the manufacturer's recommendations.

5.5.3.2 For HVLP spray guns manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.

5.5.3.3 A person shall not sell or offer for sale for use within the District any HVLP spray gun without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Section 3.0.

5.5.4 Flow coating;

5.5.5 Roll coating;

5.5.6 Dip coating;

5.5.7 Brush coating.

5.5.8 In lieu of compliance with Sections 5.5.1 through 5.5.7, an operator may control VOC emissions from application equipment with a VOC emission control system that meets the requirements of Section 5.6.

5.6 VOC Emission Control System

As an alternative to meeting the requirements of Sections 5.1, 5.2, 5.3, or 5.5, an operator may install a VOC emission control system provided that the VOC emission control system meets all of the following requirements:

5.6.1 The VOC emission control system shall be approved by the APCO.

5.6.2 The VOC emission control system shall comply with the requirements of Sections 5.6.3 through 5.6.5 during periods of emission-producing activities.

5.6.3 The VOC control system’s VOC control device shall have a control efficiency of at least 95 percent, by weight.

5.6.4 The VOC emission control system’s VOC collection device(s) shall have a capture efficiency of at least 90 percent by weight.

5.6.5 In no case shall compliance through the use of a VOC emission control system result in VOC emissions in excess of the VOC emissions which would result from compliance with applicable provisions of Sections 5.1, 5.2, 5.3, or 5.5.

5.6.6 The minimum required overall capture and control efficiency of an emission control system at which an equivalent or greater level of VOC reduction will be achieved shall be calculated by using the following equation:

$$CE = \left[1 - \left(\frac{VOC_{LWc}}{VOC_{LWn,Max}} \, x \, \frac{1 - (VOC_{LWn,Max} / D_{n,Max})}{1 - (VOC_{LWc} / D_c)} \right) \right] x \, 100$$

Where:

CE	=	Minimum Required Overall Capture and Control Efficiency, percent
VOC_{LWc}	=	VOC Limit, less water and exempt compounds
$VOC_{LWn,Max}$	=	Maximum VOC content of noncompliant coating used in conjunction with a control device, less water and exempt compounds
$D_{n,Max}$	=	Density of solvent, reducer, or thinner contained in the noncompliant coating, containing the maximum VOC content of the multi-component coating
D_c	=	Density of corresponding solvent, reducer, or thinner used in the compliant coating system.

5.7 Prohibition of Solicitation: No person shall solicit, specify, or require an operator to use any coating, solvent, spray equipment, or VOC emission control system that does not meet the limits or requirements of this rule.

6.0 Administrative Requirements

6.1 Recordkeeping

6.1.1 An operator subject to the requirements of this rule shall have coating manufacturer's specifications, either listed on the coating container, product data sheet, or on Material Safety Data Sheets (MSDS), available for review and shall maintain daily records which show the following information as applicable:

6.1.1.1 manufacturer name and type for each coating, solvent, thinner, reducer or stripper used,

6.1.1.2 mix ratio, by volume, of components added to the original material prior to application,

6.1.1.3 grams of VOC per liter of each coating, solvent, thinner, reducer or stripper, less water and exempt compounds, as applied,

6.1.1.4 grams of VOC per liter of each solvent, thinner, reducer, or stripper,

6.1.1.5 volume and method of application of each coating, solvent, thinner, reducer or stripper applied, and

6.1.1.6 vapor pressure of solvents used.

6.1.2 An operator shall maintain records to support that the following coatings have been specified for their intended application.

6.1.2.1 adhesion promoter.
6.1.2.2 antichafe coating.
6.1.2.3 electric/radiation effect.
6.1.2.4 fuel tank adhesive.
6.1.2.5 high temperature coating.
6.1.2.6 impact resistant coating.
6.1.2.7 optical anti-reflective coating.
6.1.2.8 rain erosion resistant wing coating.

6.1.3 An operator using a VOC emission control system pursuant to Section 5.6 as a means of complying with this rule shall maintain daily records of key system operating parameters and maintenance procedures which will demonstrate continuous operation and compliance of the VOC emission control system during periods of emission-producing activities. Key system operating parameters are those necessary to ensure compliance with VOC limits. The parameters may include, but are not limited to, temperatures, pressures, and flow rates.

6.1.4 An operator shall retain records for a minimum of five (5) years, make the records available on site during normal business hours to the APCO, ARB, or EPA, and submit the records to the APCO, ARB, or EPA upon request.

6.2 Test Methods

6.2.1 Coating VOC content and solvent VOC content shall be determined using EPA Method 24 or its constituent methods. The VOC content of coatings

containing exempt halogenated VOCs shall be determined by using the ARB Method 432 or SCAQMD Method 303 (Determination of Exempt Compounds).

6.2.2 The solid content of pretreatment coatings shall be determined using EPA Method 24. The acid content of pretreatment coatings shall be determined using ASTM Method D1613 06 (Standard Test for Acidity of Volatile Solvents and Chemical Intermediates used in Paint, Varnish, Lacquer and Related Products).

6.2.3 The test method for determining the fire resistance of an interior coating shall be Federal Aviation Administration-required Ohio State University Heat Release, Fire and Burn Tests.

6.2.4 The VOC composite vapor pressure of a blended solvent shall be determined by quantifying the amount of each organic compound in the blend using gas chromatographic analysis SCAQMD Test Method 308 (Quantitation of Compounds by Gas Chromatography) and by calculating the VOC composite vapor pressure of the solvent by summing the product of the vapor pressure of each pure component and its molar fraction. For the purpose of this calculation, the blend shall be assumed to be an ideal solution where Raoult's Law applies. The vapor pressure of each pure component shall be obtained from published reference manuals or handbooks.

6.2.5 The VOC emissions from enclosed systems used to clean coating application equipment shall be determined by the manufacturer using the SCAQMD General Test Method for Determining Solvent Losses from Spray Gun Cleaning Systems.

6.2.6 The control efficiency of a VOC emission control system's control device(s) shall be determined using EPA Methods 2, 2A, 2C, or 2D for measuring flow rates and EPA Methods 25, 25A, or 25B for measuring the total gaseous organic concentrations at the inlet and outlet of the control device. EPA Method 18 or ARB Method 422 shall be used to determine the emissions of exempt compounds.

6.2.7 The capture efficiency of a VOC emission control system's collection device(s) 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, or any other method approved by EPA, ARB, and the APCO.

6.2.8 When more than one test method or set of test methods are specified for any emissions testing, a violation of any test established in Section 6.2 shall constitute a violation of the rule.

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