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RULE 1124

Aerospace Assembly and Component Manufacturing Operations

(A) General

(1) Purpose

- (a) To reduce Volatile Organic Compounds (VOC) emissions from aerospace assembly and component manufacturing operations.

(2) Applicability

- (a) This rule applies to any operation associated with manufacturing and assembling products for Aircraft and Space Vehicles. The affected industries include commercial and military Aircraft, satellite, space shuttle and rocket manufacturers and their subcontractors.
- (b) This rule also applies to maskant applicators, Aircraft refinishers, Aircraft Fastener Manufacturers, Aircraft operators, and Aircraft maintenance and service facilities.

(B) Definitions

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

- (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.
- (2) Adhesion Promoter Coating – A Coating that is used to promote wetting and forms a chemical bond with a subsequently applied Sealant or other elastomer.
- (3) Adhesive – Any substance that is used to bond one surface to another surface by attachment.
- (4) Adhesive Bonding Primer – A Primer applied in a thin film to Aerospace Components for the purpose of corrosion inhibition and increased adhesive bond strength by attachment.

- (5) Aerosol Coating Product – A pressurized Coating product containing pigments or resins that is dispensed by means of a propellant, and is packaged in a disposable can for hand-held application.
- (6) Aerospace Component – The raw material, partial or completed fabricated part, assembly of parts, or completed unit of any Aircraft or Space Vehicle and includes integral equipment such as models, mock-ups, prototypes, molds, jigs, tooling, hardware jackets, and test coupons.
- (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.
- (8) Air Brush Operations – Application of Aerospace Material with equipment operating at air pressure between 25 psi and 116 psi and an air volume of 0.7 cfm and 1.75, respectively.
- (9) Aircraft – Any machine designed to travel through the air, without leaving the earth's atmosphere, whether heavier or lighter than air, including airplanes, balloons, dirigibles, helicopters, and missiles.
- (10) Air Pollution Control Officer (APCO) – The person appointed to the position of Air Pollution Control Officer of the District pursuant to the provisions of California Health & Safety Code §40750 and his or her designee.
- (11) Antichafe Coating – A Coating applied to areas of moving Aerospace Components which may rub during normal operation.
- (12) Anti-Wicking Wire Coating – The outer Coating of a wire which prevents fluid wicking into insulation of the wire.
- (13) Barrier Coating – A Coating applied in a thin film to Fasteners to inhibit dissimilar metal corrosion and to prevent galling.
- (14) Bearing Coating – A Coating applied to an antifriction bearing, a bearing housing, or the area adjacent to such bearing in order to facilitate bearing function or to protect be 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.
- (15) Bonding Maskant – A temporary Coating used to protect selected areas of aerospace parts from strong acid or alkaline solutions during processing for bonding.

- (16) Caulking and Smoothing Compound – 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.
- (17) Chemical Agent-Resistant Coating (CARC) – An exterior Topcoat designed to withstand exposure to chemical warfare agents or the decontaminants used on these agents.
- (18) Chemical Milling – The removal of metal by chemical action of acids or alkalis.
- (19) Chemical Milling Maskant – A Coating applied directly to aluminum components to protect surface areas when Chemical Milling the component with a Type I or Type II Etchant. Type I Chemical Milling Maskants are used with a Type I Etchant and Type II Chemical Milling Maskants are used with a Type II Etchant. This definition does not include Bonding Maskants, Critical Use and Line Sealant Maskants, and Seal Coat Maskants. Additionally, maskants that must be used with a combination of Type I or II Etchants and any of the above types of maskants (i.e., Bonding, Critical Use and Line Sealer, and Seal Coat) are not included. Maskants that are defined as Specialty Coatings are not included in this definition.
- (20) Chemical Processing Maskant – A Coating applied directly to an Aerospace Component to protect surface areas when anodizing, aging, bonding, plating, etching, and/or performing other chemical surface operations on the component.
- (21) Clear Topcoat – A Topcoat that contains no visible pigments and is uniformly transparent when applied.
- (22) Coating – A material that is applied to the surface of an aerospace vehicle or component to form a decorative, protective, or functional solid film, or the solid film itself.
- (23) Coating Application Equipment – Equipment used for applying Coating to a substrate. Coating Application Equipment includes Coating distribution lines, Coating hoses, pressure-pots, spray guns, and hand-application equipment, such as hand-rollers, brushes, daubers, spatulas, and trowels.
- (24) Commercial Exterior Aerodynamic Structure Primer – A Primer used on aerodynamic components and structures that protrude from the fuselage, such as wings and attached components, control surfaces, horizontal stabilizers, vertical fins, wing-to-body fairings, antennae, and landing gear and doors, for the purpose of extended corrosion protection and enhanced adhesion.
- (25) Commercial Interior Adhesive – Materials used in the bonding of passenger cabin interior components. These components must meet the Federal Aviation Administration (FAA) fireworthiness requirements.

- (26) Compatible Substrate Primer – Either compatible epoxy Primer or Adhesive Primer. Compatible epoxy Primer is a Primer that is compatible with the filled elastomeric Coating and is epoxy based. The Compatible Substrate Primer is an epoxypolyamide Primer used to promote adhesion of elastomeric Coatings such as Impact-Resistant Coatings. Adhesive Primer is a Coating that (1) inhibits corrosion and serves as a Primer applied to bare metal surfaces or prior to Adhesive application, or (2), is applied to surfaces that can be expected to contain fuel. Fuel-Tank Coatings are excluded from this category.
- (27) Conformal Coating – A Coating applied to electrical conductors and circuit boards to protect them against electrical discharge damage and/or corrosion.
- (28) Corrosion Prevention Compound System – A Coating system that provides corrosion protection by displacing water and penetrating mating surfaces, forming a protective barrier between the metal surface and moisture. Coatings containing oils or waxes are excluded from this category.
- (29) Critical Use and Line Sealer Maskant – A temporary Coating, not covered under other maskant categories, used to protect selected areas of aerospace parts from strong acid or alkaline solutions such as those used in anodizing, plating, Chemical Milling and processing of magnesium, titanium, or high-strength steel, high-precision aluminum Chemical Milling of deep cuts, and aluminum Chemical Milling of complex shapes. Materials used for repairs or to bridge gaps left by scribing operations (i.e., line sealer) are also included in this category.
- (30) Cryogenic Flexible Primer – A Primer designed to provide corrosion resistance, flexibility, and adhesion of subsequent Coating systems when exposed to loads up to and surpassing the yield point of the substrate at cryogenic temperatures (-275°F and below).
- (31) Cryoprotective Coating – A Coating that insulates cryogenic or subcooled surfaces to limit propellant boil-off, maintain structural integrity of metallic structures during ascent or re-entry, and prevent ice formation.
- (32) Cyanoacrylate Adhesive – A fast-setting, single component Adhesive that cures at room temperature. Also known as “super glue.”
- (33) District – The Antelope Valley Air Quality Management District, the geographical area of which is described in District Rule 103.
- (34) Dry Lubricative Material – Coatings 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.
- (35) Electric- or Radiation-Effect Coatings – Include electrically conductive Coatings and Radiation-Effect Coatings and Coating systems the uses of which may include prevention of radar detection.

- (36) Electronic Wire Coating – The outer electrical insulation Coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.
- (37) Electrostatic Discharge and Electromagnetic Interference (EMI) Coating – A Coating applied to Space-Vehicles, missiles, aircraft radomes, and helicopter blades to disperse static energy or reduce electromagnetic interference.
- (38) Elevated-Temperature Skydrol-Resistant Commercial Primer – Primer applied primarily to commercial Aircraft (or commercial Aircraft adapted for military use) that must withstand immersion in phosphate ester (PE) hydraulic fluid (Skydrol 500b or equivalent) at the elevated temperature of 150°F for 1,000 hours.
- (39) Epoxy Polyamide Topcoat – Coating used where harder films are required or in some areas where engraving is accomplished in camouflage colors.
- (40) Exempt Compounds – A compound identified as exempt in 40 CFR 51.100(s).
- (41) Facility – Any permit unit, group of permit units, non-permitted equipment or any combination thereof which emits or may emit an Air Pollutant; and belongs to a single major industrial group in the Standard Industrial Classification manual; and is located on a single parcel of land or on contiguous property within the District; and which is owned or operated by the same person or by persons under common control.
- (42) Fastener – Any of various devices, including but not limited to, pins, collars, blots, nuts, and rivets for holding together two (2) or more objects or parts.
- (43) Fastener Manufacturer – A Facility that coats Aircraft Fasteners, such as pins, collars, bolts, nuts, and rivets, with Solid-Film Lubricants for distribution to other Facilities.
- (44) Fire-Resistant (Interior) Coating
 - (a) For civilian Aircraft, Fire-Resistant Interior Coatings are used on passenger cabin interior parts that are subject to FAA fireworthiness requirements.
 - (b) For military Aircraft, Fire-Resistant Interior Coatings are used on parts that are subject to the flammability requirements of MIL-STD-1630A and MIL-A-87721.
 - (c) For space applications, Fire-Resistant Interior Coatings are used on parts that are subject to the flammability requirements of SE-R-0006 and SSP 30233.

- (45) Flexible Primer – A Primer that meets flexibility requirements such as those needed for Adhesive Bond Primed Fastener heads or on surfaces expected to contain fuel. The flexible Coating is required because it provides a compatible, flexible substrate over bonded sheet rubber and rubber-type Coatings as well as a flexible bridge between the Fasteners, skin, and skin-to-skin joints on outer Aircraft skins. This flexible bridge allows more Topcoat flexibility around Fasteners and decreases the chance of the Topcoat cracking around the Fasteners. The result is better corrosion resistance.
- (46) 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.
- (47) Fuel-Tank Adhesive – An Adhesive used to bond components exposed to fuel that must be compatible with Fuel-Tank Coatings.
- (48) Fuel-Tank Coating, General – A Coating applied to a fuel tank of an Aircraft to protect it from corrosion and/or bacterial growth.
- (49) Fuel-Tank Coating, Rapid Cure – A Fuel-Tank Coating with shortened curing times and decreased sensitivity to low humidity during the curing process.
- (50) Hand Application Method – The application of Aerospace Materials by manually held, non-mechanically operated equipment. Such equipment includes paint brushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, rags, and sponges.
- (51) High-Temperature Coating – A Coating that must withstand temperatures of more than 350°F.
- (52) High-Volume, Low-Pressure (HVL) Spray – An Aerospace Materials application system which is operated with air pressure of between 0.1 and 10 pounds per square inch gauge (psig).
- (53) Impact-Resistant Coating – A flexible Coating that protects Aerospace Components, such as Aircraft landing gear, and landing gear compartments, and other surfaces subject to impact and abrasion from runway debris.
- (54) Insulation Covering – Material that is applied to foam insulation to protect the insulation from mechanical or environmental damage.
- (55) Intermediate Release Coating – A thin Coating applied beneath Topcoats to assist in removing the Topcoat in repainting operations and generally to allow the use of less hazardous repainting methods.
- (56) Lacquer Coating – A clear or pigmented Coating formulated with a nitrocellulose or synthetic resin to dry by evaporation without a chemical reaction. Lacquers are resolvable in their original solvent.

- (57) Low-Solids Adhesive Coating, Primer or Sealant - An Adhesive Coating, Primer or Sealant which has less than one pound of solids per gallon of material. Such solids are the non-volatiles remaining after a sample is heated at 230°F (110°C) for one hour.
- (58) Low-Solids Corrosion Resistant Primer – A corrosion resistant polyurethane compatible Primer with enhanced adhesion and rain erosion resistance which contains no more than 45 percent (45%) solids, by weight, as applied.
- (59) Metallized Epoxy Coating – A Coating that contains relatively large quantities of flake pigmentation for appearance and/or added protection.
- (60) Mold Release Coating – A Coating applied to the surface of a mold to prevent the molded component from sticking to the mold as it is removed.
- (61) Non-Structural Adhesive – An Adhesive that bonds non-load-carrying Aircraft components in non-critical applications and is not covered in any other specialty Adhesive categories.
- (62) Optical Anti-Reflection 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.
- (63) 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.
- (64) Phosphate Ester Resistant Ink – A Coating that is used for surface identification or marking which inhibits phosphate ester fluid corrosion.
- (65) Photolithographic Maskant – A Coating applied by Photoresist Operation(s) directly to printed circuit boards, and ceramic and similar substrates to protect surface areas from Chemical Milling or Chemical Processing.
- (66) Photoresist Operation – A process for the application or development of photoresist masking solution on a substrate, including preparation, soft bake, develop, hard bake, and stripping, and can be generally subdivided as follows:
 - (a) Negative Photoresist Operation is a process where the maskant hardens when exposed to light and the unhardened maskant is stripped, exposing the substrate surface for Chemical Milling or Chemical Processing.
 - (b) Positive Photoresist Operation is a process where the maskant softens when exposed to light and the softened maskant is stripped, exposing the substrate surface for Chemical Milling or Chemical Processing.

- (67) Pre-Bonding Etchant – An acid or basic substance that is used to increase the strength of an adhesive bond by chemically altering the substrate surface morphology to increase the bonding surface area of aerospace wire Coatings to the underlying insulation layer.
- (68) Pretreatment Coating – A Coating which contains no more than 12 percent (12%) solids, by weight and at least 0.5 percent (0.5%) acid by weight, to provide surface etching and is applied directly to metal surfaces to provide corrosion resistance, adhesion, and ease of stripping.
- (69) Primer – A Coating applied directly to an Aerospace Component for purposes of corrosion prevention, protection from the environment, functional fluid resistance and/or adhesion of subsequent Coatings, Adhesives, or Sealants.
- (70) Primer Compatible with Rain Erosion-Resistant Coating – A Primer to which Rain Erosion-Resistant Coating is applied.
- (71) Rain Erosion-Resistant Coating – A Coating that protects leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain impact during flight.
- (72) Repair Coating – A Coating used to recoat portions of a product which has sustained mechanical damage to the Coating following normal painting operations.
- (73) Rework – The inspection, repair, and reconditioning of Aerospace Components subject to this rule.
- (74) Rocket Motor Bonding Adhesive – Adhesive used in rocket motor bonding applications.
- (75) Rocket Motor Nozzle Coating – A catalyzed epoxy Coating system used in elevated temperature applications on rocket motor nozzles.
- (76) Rollable, Brushable or Extrudable Sealant – A single or multi-component polymeric material used to seal many types of joints, gaps, removable panels, and windows where moderate movement is expected. Such material may be applied by rolling brushing extruding or daubing.
- (77) Rubber-Based Adhesive – A quick setting contact cement that provides a strong, yet flexible bond between two mating surfaces that may be of dissimilar materials.
- (78) Scale Inhibitor Coating – A Coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of tenacious scale.
- (79) Screen Print Ink – An ink used in screen printing processes during fabrication of decorative laminates and decals.

- (80) Sealant – Viscous semisolid materials that fill voids in order to seal out water, fuel, and other liquids and solids, and in some cases, air movement.
- (81) Seal Coat Maskant – An overcoat applied over a maskant to improve abrasion and chemical resistance during production operations.
- (82) 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.”
- (83) Solid-Film Lubricant – A very thin Coating consisting of a binder system containing as its chief pigment material one or more of the following: molybdenum disulfide, graphite, polytetrafluoroethylene (PTFE), or other solids that act as a dry lubricant between faying surfaces.
- (84) South Coast Air Quality Management District (SCAQMD) – The air quality district created pursuant to Division 26, Part 3, Chapter 5.5 of the California Health & Safety Code (commencing with §40400).
- (85) Space Vehicle – A vehicle designed to travel beyond the earth's atmosphere.
- (86) Specialized Function Coating – A Coating that fulfills extremely 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.
- (87) Specialty Coating – A Coating that, even though it meets the definition of a Primer, Topcoat, or self-priming Topcoat, has additional performance criteria beyond those of Primers, Topcoats, and self-priming Topcoats for specific applications. These performance criteria may include, but are not limited to, temperature or fire resistance, substrate compatibility, antireflection, temporary protection or marking, sealing, adhesively joining substrates, or enhanced corrosion protection.
- (88) Stencil Coating – An ink or Coating that is rolled, sprayed with an airbrush or touch-up gun, or brushed while using a template to add identifying letters and or numbers to Aerospace Components.
- (89) Stripper – A volatile liquid applied to remove cured Aerospace Material or their residues.
- (90) Structural Adhesive – Autoclavable – An Adhesive used to bond load-carrying Aircraft components and is cured by heat and pressure in an autoclave.
- (91) Structural Adhesive, High Temperature – Autoclavable – An Adhesive used to bond load-carrying Aircraft Components which is cured by heat and pressure in an autoclave, and can withstand service temperatures above 450° F (232° C).

- (92) Structural Adhesive – Non-Autoclavable – An Adhesive cured under ambient conditions and is used to bond load-carrying Aircraft components or other critical functions, such as nonstructural bonding in the proximity of engines.
- (93) Temporary Protective Coating – A Coating applied to an Aerospace Component to protect it from mechanical and environmental damage during manufacturing.
- (94) Thermal Control Coating – A Coating formulated with specific thermal conductive or radiative properties to permit temperature control of the substrate.
- (95) Topcoat – A Coating applied over a Primer or other Coating on an aerospace vehicle or component for purposes such as appearance, identification, camouflage, or protection. Topcoats that are defined as Specialty Coatings are not included in this definition.
- (96) Touch-Up Operation – The application of Aerospace Materials by brush, air brush, detail HVLP spray equipment outside of a permitted paint enclosure to repair minor surface damage and imperfections after the main Coating process.
- (97) Transfer Efficiency – The ratio of the weight or volume of Coating solids adhering to an object to the total weight or volume, respectively, of Coating solids used in the application process, expressed as a percentage.
- (98) Type I Etchant – A Chemical Milling etchant that contains varying amounts of dissolved sulfur and does not contain amines.
- (99) Type II Etchant – A Chemical Milling etchant that is a strong sodium hydroxide solution containing amines.
- (100) Unicoat – A Coating which is applied directly to an Aerospace Component for purposes of corrosion protection, environmental protection, and functional fluid resistance that is not subsequently Topcoated.
- (101) United States Environmental Protection Agency (USEPA) – The United States Environmental Protection Agency, the Administrator of the USEPA and his or her authorized representative.
- (102) Volatile Organic Compound (VOC) – Any volatile compound containing the element carbon, excluding methane, carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, ammonium carbonate, and Exempt Compounds as listed in 40 CFR 51.100(s).
- (103) Wet Fastener Installation Coating – A Primer or Sealant applied by dipping, brushing, or daubing to Fasteners that are installed before the Coating is cured.
- (104) Wing Coating – A corrosion-resistant Coating that is resilient enough to withstand the flexing of the wings.

(C) Requirements

(1) VOC Content of Coatings

- (a) A person shall not apply to Aerospace Components any Aerospace Materials, including any VOC-containing materials added to the original Aerospace Materials supplied by the manufacturer, which contain VOC in excess of the limits specified below:

SPECIALTY COATING VOC LIMITS

Grams Per Liter of Coating Less Water and Less Exempt Compounds	
AEROSPACE MATERIALS	VOC Limit
PRIMERS	--
General	350
Adhesive Bonding Primers	--
Commercial Aircraft	250
Military Aircraft	805
Commercial Exterior Aerodynamic Structure Primer	650
Compatible Substrate Primer	780
Cryogenic Flexible Primer	645
Elevated-Temperature Skydrol-Resistant Commercial Primer	740
Flexible Primer	640
Low-Solids Corrosion Resistant Primer	350
Primer Compatible with Rain Erosion-Resistant Coating	850
COATINGS	--
Ablative Coating	600
Adhesion Promoter Coating	850
Antichafe Coating	420
Bearing Coating	620
Chemical Agent-Resistant Coating	550
Conformal Coating	750
Cryoprotective Coating	600
Electric- or Radiation-Effect Coating	800
Electrostatic Discharge and Electromagnetic Interference (EMI) Coating	800
Fire-Resistant (Interior) Coating	--
Civilian	650
Military	800
Space	800
Flight-Test Coating	--
Used on Missiles or Single Use Aircraft	420
All Other	840
Fuel-Tank Coating	--
General	420
Rapid Cure	720

High-Temperature Coating	850
Impact-Resistant Coating	420
Intermediate Release Coating	750
Lacquer Coating	830
Metallized Epoxy Coating	700
Mold Release Coatings	780
Optical Anti-Reflection Coating	700
Part Marking Coating	850
Pretreatment Coating	780
Rain Erosion-Resistant Coating	800
Rocket Motor Nozzle Coating	660
Scale Inhibitor Coating	880
Space-Vehicle Coatings, Other: does not include Electric Discharge and EMI Protection Coating or Fire-Resistant (Interior) Coating	1000
Specialized Function Coating	890
Temporary Protective Coating	250
Thermal Control Coating	800
Topcoat	--
Clear	520
Epoxy Polyamide	660
Other	420
Unicoat Coating	420
Wet Fastener Installation Coating	675
Wing Coating	750
Wire Coatings	
Electronic Wire Coating	420
Anti-Wicking	420
Pre-Bonding Etchant	420
Phosphate Ester Resistant Ink	925
ADHESIVES	--
Commercial Interior Adhesive	760
Cyanoacrylate Adhesive	1020
Fuel-Tank Adhesive	620
Non-Structural Adhesive	250
Rocket Motor Bonding Adhesive	890
Rubber-Based Adhesive	850
Space Vehicle Adhesive	800
Structural Adhesive	--
Autoclavable	50
High Temperature - Autoclavable	650
Non-Autoclavable	850
SEALANTS	--
Rollable, Brushable or Extrudable Sealant	280
Fastener Sealant	675

Other	600
MASKANTS	--
Bonding Maskant	1230
Critical Use and Line Sealer Maskant	750
Chemical Milling Maskant	
For use with Type I Etchant	250
For use with Type II Etchant	160
For Chemical Processing *Less water, Exempt Compounds and perchloroethylene (PERC)	250*
Photolithographic Maskant	850
Seal Coat Maskant	1230
LUBRICANTS	--
Fastener Installation Lubricant (applied at time of Aircraft/component assembly)	--
Solid-Film Lubricant	880
Dry Lubricative Material	675
Fastener Lubricative Coating (applied at time of Fastener Manufacture)	--
Solid-Film Lubricant	250
Dry Lubricative Material	120
Barrier Coating	420
Non-Fastener Lubricative Coatings (applied at time of non-Fastener Manufacture)	--
Solid-Film Lubricant	880
Dry Lubricative Materials	675
OTHER	--
Caulking and Smoothing Compound	850
Corrosion Prevention Compound System	710
Insulation Covering	740
Screen Print Ink	840
Silicone Insulation Material	850

- (b) Documents shall be provided to the APCO demonstrating that the Unicoat is being used in lieu of the application of a Primer and Topcoat, and the applicant must receive written approval for the use of the Unicoat specifying the conditions of application from the APCO.
- (c) For Low-Solids Adhesives, Coatings, Primers or Sealants, the appropriate limits in subparagraph (C)(1)(a) shall be expressed in grams of VOC per liter of material.
- (2) Solvent Use, Clean Up, and Stripping
- (a) A person shall not use VOC-containing materials for cleaning or clean up, excluding Coating stripping and equipment cleaning unless:

- (i) The VOC composite partial pressure is 45 mm Hg or less at a temperature of 20°C (68°F); or
 - (ii) The material contains 200 grams or less of VOC per liter of material.
- (b) A person shall not use Stripper on Aerospace Components unless:
 - (i) It contains less than 300 grams of VOC per liter of material; or
 - (ii) The VOC composite partial pressure is 9.5 mm Hg (0.18 psia) or less at 20°C (68°F).
- (c) A person shall not atomize any solvent into open air.

(3) Equipment Cleaning Operations

Cleaning of Coating Application Equipment shall comply with provisions of Rule 1171 – *Solvent Cleaning Operations*.

(4) Storage of VOC-Containing Materials

All VOC containing material, used or unused, including but not limited to surface Coatings, thinners, cleanup solvents, or surface preparation materials, and all solvent laden cloth and paper, shall be stored in non-absorbent, non-leaking containers which shall be kept closed at all times except during extraction or introduction of material for mixing, use or storage.

(5) Transfer Efficiency

No person or Facility shall apply Aerospace Material unless it is applied with properly operating equipment or controlled, according to operating procedure specified by the equipment manufacturer or the APCO, and by the use of one of the following methods:

- (a) Electrostatic application;
- (b) Flow coater;
- (c) Roll coater;
- (d) Dip coater;
- (e) High-Volume, Low-Pressure (HVLP) Spray;
- (f) Hand Application Methods;
- (g) Such other alternative application methods as are demonstrated to the APCO, using District-approved procedures, to be capable of achieving at least an equivalent Transfer Efficiency to method (C)(5)(e) and for which written approval of the APCO has been obtained; or

(h) Approved air pollution control equipment under paragraph (C)(6).

(6) Control Equipment

Owners and/or operators may comply with provisions of paragraphs (C)(1), (C)(2), and (C)(5) by using approved air pollution control equipment provided that the VOC emissions from such operations and/or materials are reduced in accordance with provisions of (a) and (b) below.

(a) The control device shall reduce emissions from an emission collection system by at least 95 percent (95%), by weight, or by reducing the output of the air pollution control device to less than 50 ppm calculated for carbon with no dilution.

(b) The owner/operator demonstrates that the system collects at least 90 percent (90%), by weight, of the emissions generated by the sources of emissions.

(7) Prohibition of Solicitation of Violations

(a) A person shall not solicit or require any other person to use, in the District, any Aerospace Material or combination of Aerospace Materials to be applied to any Aircraft Component subject to the provisions of this rule that does not meet the limits and requirements of this rule, or of an Alternative Emission Control Plan (AECPP) approved pursuant to the provisions of (C)(8).

(b) The requirements of this paragraph shall apply to all written or oral agreements executed or entered into after April 3, 1987.

(8) Alternative Emission Control Plans

(a) An owner/operator may comply with the provisions of paragraph (C)(1) by means of an Alternative Emission Control Plan pursuant to Rule 108 – *Alternative Emission Control Plans*.

(D) Recordkeeping and Reporting Requirements

(1) Recordkeeping

(a) Records shall be maintained pursuant to the requirements of Rule 109 – *Recordkeeping for Volatile Organic Compound Emissions*.

(2) Reporting

(a) Persons who perform qualification acceptance testing on Aerospace Materials with a future compliance date for use in the District shall, on January 1 and July 1 of each year, submit a status report describing the

progress toward the development of Aerospace Materials which satisfy future compliance dates. These reports shall contain, at a minimum:

- (i) Manufacturer, product number, VOC content, and applicable Coating category for each of the test candidates;
 - (ii) Test expenditures for the period;
 - (iii) Progress on candidates tested during this period;
 - (iv) Approvals received for Coatings which comply with future compliance dates; and,
 - (v) Volume of Coatings used in each Coating category for which there is a future compliance date.
- (b) Facilities testing Coatings in the same Coating category may submit joint status reports. Once compliance with future compliance dates is achieved and a status report is submitted documenting such, no further status reports need be submitted.

(E) Compliance Procedures and Test Methods

(1) Calculations

- (a) For the purpose of determining compliance with VOC content limits specified in section (C), grams of VOC per liter of Aerospace Material shall be determined by using the following formulas as applicable:
- (i) For Aerospace Materials not containing reactive diluents, grams of VOC per liter of Coating, less water and less Exempt Compounds shall be determined as follows:

$$G_{VOC/LoC} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:

- $G_{VOC/LoC}$ = Grams of VOC per liter of Coating, less water and less Exempt Compounds.
- W_s = Weight of volatile compounds, in grams.
- W_w = Weight of water, in grams.
- W_{es} = Weight of Exempt Compounds, in grams.
- V_m = Volume of material, in liters.
- V_w = Volume of water, in liters.
- V_{es} = Volume of Exempt Compounds, in liters.

- (ii) For Aerospace Materials that contain reactive diluents, grams of VOC per liter of coating, less water and less Exempt Compounds shall be determined as follows:

$$G_{VOC/LoC} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:

- $G_{VOC/LoC}$ = Grams of VOC per liter of Coating, less Water and less Exempt Compounds.
- W_s = Weight of volatile compounds evolved during curing and analysis, in grams.
- W_w = Weight of water evolved during curing and analysis, in grams.
- W_{es} = Weight of Exempt Compounds evolved during curing and analysis, in grams.
- V_m = Volume of material prior to reaction, in liters.
- V_w = Volume of water evolved during curing and analysis, in liters.
- V_{es} = Volume of Exempt Compounds evolved during curing and analysis, in liters.

- (b) Total grams of VOC per liter of Aerospace Material shall be determined using the following formula:

$$G_{VOC/LoC} = \frac{W_s - W_w - W_{es}}{V_m}$$

Where:

- $G_{VOC/LoC}$ = Grams of VOC per liter of Coating
- W_s = Weight of volatile compounds, in grams.
- W_w = Weight of water, in grams.
- W_{es} = Weight of Exempt Compounds, in grams.
- V_m = Volume of material, in liters.

- (c) The VOC composite partial pressure shall be determined as follows:

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

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_e = Molecular weight of Exempt Compound, in grams per gram-mole.
- PP_c = VOC composite partial pressure at 20°C, in mm Hg.
- VP_i = Vapor pressure of the “i”th VOC compound at 20°C,

in mm Hg.

(2) VOC Content of Aerospace Materials

- (a) To determine the physical properties of an Aerospace Material in order to perform the calculations in subsection (E)(1), the following reference methods shall be used:
- (i) EPA Reference Method 24 (Determination of Volatile Matter Content, Water Content, Density Volume Solids, and Weight Solids of Surface Coatings, Code of Federal Regulations Title 40, Part 60, Appendix A).
 - a. Analysis done according to EPA Method 24 shall utilize ASTM Method D-2369-95 (Standard Test Method for Volatile Content of Coatings), referenced in EPA Method 24.
 - b. The exempt solvent content shall be determined using SCAQMD Test Methods 302-91 (Distillation of Solvents from Paints, Coatings and Inks, February 1993) and 303-91 (Determination of Exempt Compounds, August 1996) (SCAQMD “Laboratory Methods of Analysis for Enforcement Samples” manual) or;
 - (ii) SCAQMD Test Methods 302, 303, and 304 (SCAQMD “Laboratory Methods of Analysis for Enforcement Samples” manual).
- (b) The following classes of compounds listed below will be analyzed as Exempt Compounds for compliance with subdivision (C), only at such time as manufacturers specify which individual compounds are used in the Coating formulations and identify the test methods, which, prior to such analysis, have been approved by the USEPA and the SCAQMD, that can be used to quantify the amounts of each Exempt Compound.
- (i) Cyclic, branched, or linear, completely fluorinated alkanes; cyclic, branched, or linear, completely fluorinated ethers with no unsaturations; cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations; and sulfur-containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine.

(3) Test Methods

- (a) Efficiency of the control device shall be determined according to EPA Method 25, 25A, or SCAQMD Test Method 25.1 (Total Gaseous Non-Methane Emissions, February 1991) or SCAQMD Test Method 25.3 (Clean-Fueled Combustion Sources, March 2000). Emissions determined to exceed any limits established by this rule through the use of either of the above-referenced test methods shall constitute a violation of this rule.

- (b) The capture efficiency of the emissions collection system shall be determined by the USEPA method 204A-F and the most recent version of USEPA's *Guidelines for Determining Capture Efficiency* or any other method approved by the USEPA, the California Air Resources Board, and the SCAQMD.
- (c) The Transfer Efficiency of alternative Coating application methods shall be determined in accordance with the SCAQMD method "Spray Equipment Transfer Efficiency Test Procedure for Equipment User, May 24, 1989."
- (d) The identity and quantity of components in solvents shall be determined in accordance with SCAQMD test method 308-91 (Quantitation of Compounds by Gas Chromatography, February 1993) contained in the SCAQMD "Laboratory Methods of Analysis for Enforcement Samples" manual. The VOC composite partial pressure is calculated using the equation in paragraph (E)(1)(c).
- (e) Multiple Test Methods
 - (i) When more than one test method or set of test methods are 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 the rule.
- (f) Any applicable alternative test method may be used so long as such method has been approved by USEPA, CARB and the APCO.

(F) Administrative Requirements

(1) Rule 442 Applicability

- (a) Any Aerospace Material or Facility which is exempt from all or a portion of this rule, shall comply with the provisions of Rule 442 – *Usage of Solvents*.

(G) Exemptions

- (1) The provisions of paragraph (C)(1) of this rule shall not apply to Aerospace Materials with separate formulations that are used in volumes of less than 20 gallons per year provided that the total of all such formulations applied annually at a Facility is less than 200 gallons.
- (2) The provisions of subdivision (C) of this rule shall not apply to a Facility which uses a total of less than three (3) gallons of VOC-containing Aerospace Materials on each and every day of operation.

- (3) The provisions of paragraphs (C)(1) and (C)(5) of this rule shall not apply to incidental corrosion maintenance Repair Coating operations at military Facilities, provided that the Coating use at any maintenance repair location within the Facility does not exceed 1.5 gallons per day, and the total Coating usage for such operations at the Facility does not exceed five (5) gallons per day.
- (4) The provisions of subparagraph (C)(2)(a) shall not apply to Space Vehicle manufacturing.
- (5) The provisions of paragraph (C)(1) shall not apply to clear or translucent Coatings applied on clear or transparent substrates.
- (6) The provisions of paragraph (C)(5) shall not apply to Touch-up Operations and Stencil Coatings provided that the Touch-up Operations and Stencil Coatings do not exceed 25 sq. ft. per Aircraft.
- (7) The provisions of paragraph (C)(1) shall not apply to the recoating of assembled Aircraft at Rework facilities if original Coating formulations are used.
- (8) The provisions of paragraph (C)(1) shall not apply to Adhesives with separate formulations that are used in volumes of less than ten (10) gallons per year.
- (9) The provisions of subdivision (C) shall not apply to laboratories which apply Aerospace Materials to test specimens for purposes of research, development, quality control, and testing for production-related operations.
- (10) The provisions of paragraph (C)(2) of this rule do not apply to the surface cleaning of solar cells, fluid systems, avionic equipment, and laser optics.
- (11) The provisions of subdivision (D)(1) and (C)(5) shall not be applied to the application of materials that contain less than 20 grams per liter of VOC per liter of material.
- (12) The provisions of paragraph (C)(5) shall not apply to the use of materials dispensed from airbrush operations provided that the paint reservoir on the air brush is eight (8) ounces or less and that the total amount of Coating used for Air Brush Operations at the Facility does not exceed five (5) gallons per year.
- (13) The provisions of this rule shall not apply to Aerosol Coating Products.

See SIP Table at <http://www.avaqmd.ca.gov/Modules/ShowDocument.aspx?documentid=921>