

Rule 1118

Aerospace Assembly, Rework and Component Manufacturing Operations

(A) General

(1) Purpose

- (a) To reduce Volatile Organic Compounds (VOCs) from aerospace assembly, Rework 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, civil 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

The definitions contained in District Rule 102 – *Definition of Terms* shall apply unless a term is otherwise defined herein. Terms that are defined within this rule, have been capitalized for ease of recognition.

- (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 form a chemical bond with a subsequently applied Sealant or other elastomer.
- (3) 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.
- (4) 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.

- (5) 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.
- (6) 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.
- (7) 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.
- (8) Antichafe Coating – A Coating applied to areas of moving Aerospace Components which may rub during normal operation.
- (9) Antique Aerospace Vehicle or Component – An Aircraft or component thereof that was built at least 30 years ago. An Antique Aerospace Vehicle would not routinely be in commercial or military service in the capacity for which it was designed.
- (10) Anti-Wicking Wire Coating – The outer Coating of a wire which prevents fluid wicking into insulation of the wire.
- (11) Aqueous Cleaning Solvent – A solvent in which water is at least 80 percent of the solvent as applied.
- (12) Barrier Coating – A Coating applied in a thin film to Fasteners to inhibit dissimilar metal corrosion and to prevent galling.
- (13) 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.
- (14) Bonding Maskant – A temporary Coating used to protect selected areas of aerospace parts from strong acid or alkaline solutions during processing for bonding.
- (15) 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.
- (16) Chemical Agent-Resistant Coating (CARC) – An exterior Topcoat designed to withstand exposure to chemical and biological warfare agents or the decontaminants used on these agents.

- (17) Chemical Milling – The removal of metal by chemical action of acids or alkalis.
- (18) 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.
- (19) 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.
- (20) Clear Topcoat – A Topcoat that contains no visible pigments and is uniformly transparent when applied.
- (21) 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.
- (22) 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.
- (23) 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.
- (24) Commercial Interior Adhesive – Materials used in the bonding of passenger cabin interior components. These components must meet the FAA fireworthiness requirements.
- (25) Compliance Assurance Monitoring – The combined total equipment, mechanism(s), and/or technique(s) used to demonstrate and insure compliance with the control device efficiency requirements stipulated in subsection (D)(2) of this rule. Such monitoring is used to analyze and/or provide a permanent record of process parameters, such as temperatures, pressures, and flow rates.
- (26) Compatible Substrate Primer – Either compatible epoxy Primer or Adhesive Primer. Compatible epoxy Primer is 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) 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.
- (34) Electric- or Radiation-Effect Coatings – Any electrically conductive Coatings and radiation effect Coatings, and Coating systems the uses of which may include the prevention of radar detection.
- (35) Electronic Wire Coating – The outer electrical insulation Coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.
- (36) 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.

- (37) 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.
- (38) Epoxy Polyamide Topcoat – Coating used where harder films are required or in some areas where engraving is accomplished in camouflage colors.
- (39) Extreme Performance Interior Topcoat – Any Topcoat used in interior spaces of Aircraft areas requiring a fluid, stain or nicotine barrier.
- (40) Extreme Performance Coating – Any Coating used on a metal surface where the coated surface is, in its intended use, exposed to any of the following:
- (a) Industrial-grade detergents, cleaners, or abrasive scouring agents;
 - (b) Frequent or chronic exposure to salt water, corrosives, caustics, acids, oxidizing agents, chemicals, chemical fumes, chemical mixtures or solution; or
 - (c) Other similar environmental conditions as determined in writing by the District's APCO.
- (41) 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.
- (42) 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.
- (43) Fastener Sealant – A Sealant applied to a device used to join two (2) or more parts together.
- (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) Flush Cleaning – Removal of contaminants such as dirt, grease, oil, and Coatings from an aerospace vehicle or component or Coating equipment by passing solvent over, into, or through the item being cleaned. The solvent may simply be poured into the item being cleaned and then drained, or assisted by air or hydraulic pressure, or by pumping. Hand-wipe Cleaning Operations where wiping, scrubbing, mopping, or other hand actions are used are not included.
- (48) Fuel-Tank Adhesive – An Adhesive used to bond components exposed to fuel that must be compatible with Fuel-Tank Coatings.
- (49) Fuel-Tank Coating, General – A Coating applied to a fuel tank of an Aircraft to protect it from corrosion and/or bacterial growth.
- (50) Fuel-Tank Coating, Rapid Cure – A Fuel-Tank Coating with shortened curing times and decreased sensitivity to low humidity during the curing process.
- (51) General Coating Product – Any Coating used on an Aerospace Vehicle which is not, as a category of products, specified in subsection (C)(1)(a) or (C)(1)(b) of this rule.
- (52) Hand-Wipe Cleaning Operation – Removing contaminants such as dirt, grease, oil, and Coatings from an aerospace vehicle or component by physically rubbing it with a material such as a rag, paper, or cotton swab that has been moistened with a cleaning solvent.
- (53) High Temperature Coating – A Coating that must withstand temperatures of more than 350°F.
- (54) 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.
- (55) Insulation Covering – Material that is applied to foam insulation to protect the insulation from mechanical or environmental damage.
- (56) 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.

- (57) 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.
- (58) Low-Solids Adhesive Coating, Primer or Sealant – An Adhesive Coating, Primer or Sealant which has less than one (1) 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 (1) hour.
- (59) 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.
- (60) Metallized Epoxy Coating – A Coating that contains relatively large quantities of flake pigmentation for appearance and/or added protection.
- (61) 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.
- (62) 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.
- (63) 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.
- (64) 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.
- (65) Phosphate Ester Resistant Ink – A Coating that is used for surface identification or marking which inhibits phosphate ester fluid corrosion.
- (66) 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.
- (67) 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.

- (68) 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.
- (69) Pretreatment Coating – A Coating which contains no more than twelve percent (12 %) solids by weight, and at least 0.5 percent (0.5%) acid by weight, to provide surface etching and which is applied directly to surfaces to provide corrosion resistance, adhesion and ease of stripping.
- (70) 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.
- (71) Primer Compatible with Rain Erosion-Resistant Coating – A Primer to which rain erosion resistant Topcoat is applied.
- (72) Rain Erosion-Resistant Coating – A Coating that protects the leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain impact during flight.
- (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) Seal Coat Maskant – An overcoat applied over a maskant to improve abrasion and chemical resistance during production operations.

- (81) Semiaqueous Cleaning Solvents – A solution in which water is a primary ingredient (≥ 60 percent of the solvent solution as applied must be water).
- (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) Sealant Bonding Primer – Any Coating applied in a very thin film to a part or product for the purpose of providing a Primer for a subsequent coat of silicone Sealant.
- (84) 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.
- (85) Space Vehicle – A vehicle designed to travel beyond 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 with a capacity of 8 ounces (236.4 ml) or less, or brushed while using a template to add identifying letters and or numbers to Aerospace Components.
- (89) Structural Adhesive – Autoclavable – An Adhesive used to bond load-carrying Aircraft components and is cured by heat and pressure in an autoclave.
- (90) 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).
- (91) 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.

- (92) Temporary Protective Coating – A Coating applied to an Aerospace Component to protect it from mechanical and environmental damage during manufacturing.
- (93) Thermal Control Coating – A Coating formulated with specific thermal conductive or radiative properties to permit temperature control of the substrate.
- (94) 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.
- (95) Touch-Up Operation – The application of Aerospace Materials by brush, air brush, or detail HVLP spray equipment outside of a permitted paint enclosure to repair minor surface damage and imperfections after the main Coating process.
- (96) Type I Etchant – A Chemical Milling etchant that contains varying amounts of dissolved sulfur and does not contain amines.
- (97) Type II Etchant – A Chemical Milling etchant that is a strong sodium hydroxide solution containing amines.
- (98) 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.
- (99) Wet Fastener Installation Coating – A Primer or Sealant applied by dipping, brushing, or daubing to Fasteners that are installed before the Coating is cured.
- (100) Wing Coating – A corrosion-resistant Coating that is resilient enough to withstand the flexing of the aircraft 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
Sealant Bonding Primer	720
COATINGS	--
General	350
Ablative Coating	600
Adhesion Promoter Coating	850
Antichafe Coating	420
Bearing Coating	620
Chemical Agent-Resistant Coating (CARC)	500
Conformal Coating	750
Cryoprotective Coating	600
Electric- or Radiation-Effect Coating	800
Electrostatic Discharge and Electromagnetic Interference (EMI) Coating	800
Extreme Performance Coating	420
Fire-Resistant (Interior) Coating	--
Civilian	650
Military	800
Space	800
Flight-Test Coating	--
Used on Missiles or Single Use Target Aircraft	420
All Other	840
Fuel-Tank Coating	--
General	420
Rapid Cure	720
High-Temperature Coating	720
Impact-Resistant Coating	420
Intermediate Release Coating	750
Lacquer Coating	830

SPECIALTY COATING VOC LIMITS	
Grams Per Liter of Coating Less Water and Less Exempt Compounds	
Metallized Epoxy Coating	700
Mold Release Coating	780
Optical Anti-Reflection Coating	700
Part Marking Coating	850
Pretreatment Coating	780
Rain Erosion-Resistant Coating	600
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 Topcoat	420
Epoxy Polyamide Topcoat	660
Other Topcoat	340
Extreme Performance Interior Topcoat	420
Unicoat	420
Wet Fastener Installation Coating	675
Wing Coating	750
Wire Coatings	--
Anti-Wicking	420
Electronic Wire Coating	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	700
SEALANTS	
Rollable, Brushable or Extrudable Sealant	280
Fastener Sealant	675
Other	600
MASKANTS	--
Bonding Maskant	1230
Critical Use and Line Sealant Maskant	750
Chemical Milling Maskant	
For use with Type I Etchant	250
For use with Type II Etchant	160

SPECIALTY COATING VOC LIMITS	
Grams Per Liter of Coating Less Water and Less Exempt Compounds	
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, as applied.
 - (b) A person shall not use Stripper on Aerospace Components unless:
 - (i) The Stripper contains less than 300 grams per liter (2.5 lbs per gal) of VOC content; or

- (ii) The VOC composite partial pressure is 9.5 mm Hg (0.18 psia) or less at 20°C (68°F).
 - (c) Cleaning solvents used in Hand-Wipe Cleaning Operations shall:
 - (i) Meet the definition of Aqueous Cleaning Solvent; or
 - (ii) Have a VOC composite pressure less than or equal to 45 mm Hg at 20°C (68° F).
 - (d) For cleaning solvents used in the Flush Cleaning of aerospace parts, assemblies, and Coating unit components, the used cleaning solvent must be emptied into an enclosed container or collection system that is kept closed when not in use or captured on wipers and disposed of in accordance with subsection (C)(3)(a). Aqueous and Semiaqueous Cleaning Solvents are excluded from these requirements.
 - (e) Spray guns must be cleaned by one or more of the following methods:
 - (i) Enclosed spray gun cleaning system that is kept closed when not in use.
 - a. Leaks from enclosed spray gun cleaners are repaired within 14 days from when the leak is first discovered. If the leak is not repaired by the 15th day after detection, the cleaning solvent shall be removed and the enclosed cleaner shall be shut down until the leak is repaired or its use is permanently discontinued;
 - (ii) Unatomized discharge of cleaning solvent into a waste container that is kept closed when not in use;
 - (iii) Disassembled spray gun that is cleaned in a vat and kept closed when not in use; or
 - (iv) Atomized spray into a waste container that is fitted with a device designed to capture atomized cleaning solvent emissions.
 - (f) A person shall not atomize any solvent into open air.
- (3) Storage of VOC-Containing Materials
- (a) 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.
 - (b) Handling and transfer procedures must be implemented to minimize spills during filling and transferring cleaning solvent to or from enclosed systems, vats, waste containers, and other cleaning operation equipment that hold or store fresh or used cleaning solvents.

- (c) The provisions of Subsections (C)(3)(a) and (b) shall not apply to:
 - (i) Cotton tipped swabs used for very small cleaning operations.
 - (ii) Aqueous Cleaning Solvents.
- (4) Transfer Efficiency
 - (a) No person or Facility shall apply Aerospace Material unless it is applied with properly operated 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:
 - (i) Electrostatic application;
 - (ii) Flow/curtain coater application;
 - (iii) Roll coater;
 - (iv) Dip coater;
 - (v) High-Volume, Low-Pressure (HVLP) spray;
 - (vi) Electrodeposition;
 - (vii) Cotton tipped swab application;
 - (viii) Hand Application Methods, or
 - (ix) Such other alternative application methods as are demonstrated to the APCO, using District-approved procedures, to be capable of achieving a Transfer Efficiency at least equivalent to method (C)(4)(a)(v). Such alternative application techniques shall be approved in writing prior to use by the APCO.
 - (x) Approved air pollution control equipment under subsection (C)(5).
- (5) Control Equipment
 - (a) Owners and/or operators may comply with provisions of paragraphs (C)(1), (C)(2), and (C)(4) by using approved air pollution control equipment provided that the VOC emissions from such operations and/or materials are reduced in accordance with the following:
 - (i) 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.
 - (ii) The owner/operator demonstrates that the system collects at least 90 percent (90%), by weight, of the emissions generated by the sources of emissions.
- (6) 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.

- (b) The requirements of this paragraph shall apply to all written or oral agreements executed or entered into after October 26, 2015.

(D) Monitoring, Recordkeeping and Reporting

(1) Recordkeeping

Persons subject to this rule shall maintain the following records:

- (a) Materials List Record – Maintain a current listing of all VOC-containing materials in use at Facility. This listing shall include:
 - (i) Material name and manufacturer identification;
 - (ii) Application method;
 - (iii) Material category and specific use instructions;
 - (iv) Specific mixing ratio; and
 - (v) Maximum VOC content as applied (including thinning solvents).
- (b) Technical Information Records – Current Coating manufacturer specification sheets, Material Safety Data Sheets (MSDS) or current air quality data sheets, which list the VOC content of each material in use at Facility, shall be available for review on site.
- (c) Purchase Records – Maintain purchase records identifying the type or name and the volume of material purchased for each VOC-containing material.
- (d) Materials Usage Records
 - (i) Maintain on a daily basis a record of the volume, VOC content, and resulting VOC emissions of each VOC-containing material used. These records shall be summarized cumulatively on a monthly basis and for each calendar year.
 - (ii) If the Facility uses, exclusively, Coatings formulations compliant with Section (C), records may be maintained on a monthly basis.
- (e) Cleaning Solvent Recordkeeping
 - (i) For Aqueous and Semiaqueous Cleaning Solvents, maintain a list of materials used with corresponding water contents.
 - (ii) For vapor pressure compliant Hand-Wipe cleaning solvents:
 - a. Maintain a current list of cleaning solvents in use with their respective vapor pressures or, for blended solvents, VOC composite vapor pressure.
 - b. Record cleaning solvent usage on a monthly basis.
 - (iii) For cleaning solvents with a vapor pressure greater than 45 mm Hg used in exempt Hand-Wipe Cleaning Operations:
 - a. Maintain a list of exempt Hand-Wipe Cleaning Operations.
 - b. Record cleaning solvent usage on a monthly basis.

- (2) Add-on Emissions Control Equipment Records – Operators of Facilities that use non-compliant Coating materials with compliance achieved through the operation of add-on emission control equipment shall:
- (a) Maintain daily records of key operating and maintenance procedures.
 - (b) Utilize Compliance Assurance Monitoring, as approved by the APCO, to meet administrative and equipment operational requirements.
 - (c) If a control device is used, each owner/operator shall conduct an initial performance test to demonstrate compliance with the overall reduction efficiency specified in subsection (C)(5). For carbon adsorption systems, the initial performance test shall be used to establish the appropriate rolling average material balance period for determining compliance.
- (3) Except for Specialty Coatings, any source that complies with the recordkeeping requirements of the Aerospace NESHAP, 40 CFR 63.752, is deemed to be in compliance with the requirements of (D)(1).
- (4) Records Availability and Retention – All records required by this rule shall be retained for the previous five (5) year period and be available for inspection upon request by the APCO or their designated representative.
- (5) Any person or Facility claiming to be exempt from Section (C) of this rule must comply with applicable Recordkeeping requirements to provide documentation for the claimed exempt status.
- (6) Any person or Facility claiming exempt status must make, in writing, a certified Statement of Compliance to the District at the same time as the annual permit review/renewal or by March 1 of each calendar year for facilities not required to have permits to operate by the District.

(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:

$$\begin{array}{l} \text{Grams of VOC per Liter of} \\ \text{Coating, Less Water and Less} \\ \text{Exempt Compounds} \end{array} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:

- 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:

$$\begin{array}{l} \text{Grams of VOC per Liter of} \\ \text{Coating, Less Water and Less} \\ \text{Exempt Compounds} \end{array} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:

- 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:

$$\begin{array}{l} \text{Grams of VOC per Liter of} \\ \text{Coating} \end{array} = \frac{W_s - W_w - W_{es}}{V_m}$$

Where:

- 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 302-91, 303-91, and 304-91 (Determination of Volatile Organic Compounds (VOC) in Various Materials, February 1996) (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 Section (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 (Determination of Total Gaseous Nonmethane Organic Emissions as Carbon), 25A (Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer), or SCAQMD Test Method 25.1 (Determination of Total Gaseous Non-Methane Organic Emissions as Carbon, February 1991) or SCAQMD Test Method 25.3 (Determination of Low Concentration Non-Methane Non-Ethane Organic Compound Emissions from Lean 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 EPA Method 204A (Volatile Organic Compounds in Liquid Input Steam), EPA Method 204B (Volatile Organic Compounds Emissions in Captured Steam), EPA Method 204C (Volatile Organic Compounds Emissions in Captured Steam (Dilution Technique)), EPA Method 204D (Volatile Organic Compounds Emissions in Uncaptured Stream from Temporary Enclosure), EPA Method 204E (Volatile Organic Compounds Emissions in Uncaptured Stream from Building Enclosure), and EPA Method 204F (Volatile Organic Compounds Content in Liquid Input Stream (Distillation Approach)) 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) contained in the SCAQMD “Laboratory Methods of Analysis for Enforcement Samples” manual. The VOC composite partial pressure is calculated using the equation in subsection (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 Section (C)(1) shall not apply to Aerospace Materials with separate formulations that are used in volumes of less than 20 gallons in any calendar year, provided that the total volume of non-complying Coatings used at a stationary source does not exceed 200 gallons annually.
- (2) The provisions of Section (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 subsections (C)(1) and (C)(4) 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 subsection (C)(2)(a) shall not apply to Space Vehicle manufacturing.
- (5) The provisions of subsection (C)(1) shall not apply to clear or translucent Coatings applied on clear or transparent substrates.

- (6) The provisions of subsection (C)(4) 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 subsection (C)(1) shall not apply to the recoating of assembled Aircraft at Rework facilities if the original Coatings formulations are used.
- (8) The provisions of this rule shall not apply to Rework operations performed on Antique Aerospace Vehicles or Components.
- (9) 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.
- (10) The provisions of Section (C) shall not apply to laboratories which apply Aerospace Materials to test specimens for the purpose of research, development, quality control, and testing of production-related operations.
- (11) The provisions of subsection (C)(2) do not apply to the surface cleaning of solar cells, fluid systems, avionic equipment, and laser optics.
- (12) The following Hand-Wipe Cleaning Operations are exempt from the requirements of subsection (C)(2)(c):
 - (a) Cleaning during the manufacture, assembly, installation, maintenance, or testing of components of breathing oxygen systems that are exposed to the breathing oxygen;
 - (b) Cleaning during the manufacture, assembly, installation, maintenance, or testing of parts, subassemblies, or assemblies that are exposed to strong oxidizers or reducers (i.e., nitrogen tetroxide, liquid oxygen, hydrazine);
 - (c) Cleaning and surface activation prior to adhesive bonding;
 - (d) Cleaning of electronics parts and assemblies containing electronics;
 - (e) Cleaning of Aircraft and ground support equipment fluid systems that are exposed to the fluid, including air-to-air heat exchangers and hydraulic fluid systems;
 - (f) Cleaning of fuel cells, fuel tanks, and confined spaces;
 - (g) Surface cleaning of coated optics, and thermal control surfaces;
 - (h) Cleaning during fabrication, assembly, installation, and maintenance of upholstery, curtains, carpet, and other textile materials used on the interior of the Aircraft;
 - (i) Cleaning of metallic and nonmetallic materials used in honeycomb cores during the manufacture or maintenance of these cores, and cleaning of the

- completed cores used in the manufacture of aerospace vehicles or components;
- (j) Cleaning of Aircraft transparencies, polycarbonate, or glass substrates;
 - (k) Cleaning and solvent usage associated with research and development, quality control, or laboratory testing;
 - (l) Cleaning operations, using nonflammable liquids, conducted within 5 feet of energized electrical systems. Energized electrical systems means any AC or DC electrical circuit on an assembled Aircraft once electrical power is connected, including interior passenger and cargo areas, wheel wells and tail sections; and,
 - (m) Cleaning operations identified as essential uses under the Montreal Protocol for which the Administrator has allocated essential use allowances or exemptions in 40 CFR § 82.4.
- (13) The provisions of subdivision (D)(1) and (C)(4) shall not be applied to the application of materials that contain less than 20 g per L of VOC per liter of material.
- (14) The provisions of (C)(4) shall not apply to the use of materials dispensed from airbrush application methods 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.
- (15) The provisions of this rule shall not apply to Aerosol Products.

[SIP: See SIP Table at <http://www.mdaqmd.ca.gov/>]