

RULE 456 AEROSPACE ASSEMBLY AND COMPONENT COATING OPERATIONS

Adopted 2-23-93

(Amended 9-5-96, 7-23-98, [XX-XX-08](#))**INDEX****100 GENERAL**

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100 GENERAL

- 101 **PURPOSE:** To limit emissions of volatile organic compounds from the application and use of coatings, coating removers (strippers), surface preparation and cleaning material and application equipment cleanup material to aerospace components at each stage of the aerospace coating operations.
- 102 **APPLICABILITY:** The provisions of this rule shall apply within the District to the coating of aerospace components including coating removal (stripping), surface preparation and cleaning, and application equipment cleanup by any person, as defined in this rule. The requirements of Rule 441, ORGANIC SOLVENTS, shall not apply to operations subject to this rule.
- 103 **SEVERABILITY:** If any section, subsection, sentence, clause, phrase, or portion of this rule is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions thereof.
- 110 **EXEMPTION, LOW USAGE OF MATERIALS EXCEEDING VOC CONTENT LIMITS OR VOC COMPOSITE PARTIAL VAPOR PRESSURE LIMITS:** The requirements of Sections 301 or 302 shall not apply to the use of material exceeding the VOC content limits specified in Sections 301 and 302, or the VOC composite partial vapor pressure limits specified in Section 302, provided that the requirements in Sections 401 and 501 are satisfied and the combined total of all materials exceeding the VOC content limits or the VOC composite partial vapor pressure limits used at the stationary source does not exceed 200 gallons in a calendar year [prior to January 1, 2009 and 55 gallons in a calendar year beginning on or after January 1, 2009](#).
- 111 **EXEMPTION, AEROSOL CONTAINERS:** The requirements of this rule shall not apply to the following:
111.1 Coatings or cleaning solvents in non-refillable aerosol containers having a capacity of one liter (1.1 quarts) or less.
- 112 **EXEMPTION, APPLICATION EQUIPMENT:** The requirements of Section 303 shall not apply to the following:
112.1 Coatings that are applied via a template, stencil, stamp, or hand lettering to add designs, letters, or numbers to an aerospace component.
112.2 Touch-up and repair coating operations and the use of detail guns for coating application.
112.3 The application of coatings that contain fillers that adversely affect atomization with HVLP spray guns and that the District has determined cannot be applied by any of the application methods specified in Section 303.
112.4 Hand held spray containers with non-refillable propellant canisters having a capacity of 8 ounces or less where total facility usage does not exceed 10 gallons per year, pursuant to Section 501.3
- 113 **EXEMPTION, SURFACE PREPARATION AND CLEANING:** The requirements of Section 304.57 shall not apply to the following provided the requirements of Section 501 are satisfied:
113.1 Space vehicles.
113.2 Cleaning and surface activation prior to adhesive bonding.

200 DEFINITIONS

- 201 **ABLATIVE COATING:** A coating, applied to both new and rework aerospace components, which chars and becomes intumescent when exposed to open flame, such

as would occur during the failure of an engine casing. The purpose of the coating is to act as an insulative barrier and protect adjacent metal parts from an open flame.

- 202 **ADHESIVE:** A coating applied either over an adhesive bonding agent, or directly to the substrate to permanently bond one surface to another.
- 203 **ADHESIVE BONDING AGENT (PRIMER):** A coating applied in a thin film (.0001 to .0005 inches) to two or more aerospace components that are subsequently coated with an adhesive. The purpose of the agent is to provide a slight etching of the surface and ensure the strength of the adhesive bond.
- 204 **AEROSOL CONTAINER:** A hand-held, nonrefillable container which expels pressurized product ingredients by means of a propellant-induced force.
- 205 **AEROSPACE COMPONENT:** The fabricated part, assembly of parts, or completed unit of any aircraft or space vehicle including integral equipment such as models, mock-ups, prototypes, molds, jigs, tooling, hardware jackets and test coupons.
- 206 **AIRCRAFT:** Any vehicle designed to travel through the air without leaving the Earth's atmosphere, including airplanes, balloons, helicopters, rockets, and missiles.
- 207 **APPLICATION EQUIPMENT:** A device used to apply coatings or used in preparing a coating material, including, but not limited to, stir sticks or funnels.
- 208 **ATMOSPHERE:** For the purposes of this rule, the gaseous envelope surrounding the Earth, retained by the Earth's gravitational field and extending to a height of 20 miles above the surface of the Earth.
- 209 **CLEANING:** A solvent cleaning operation or activity carried out to keep tools, machinery, or general work areas in clean and operational condition. Cleaning operations include removal of overspray but do not include application equipment cleanup.
- 210 **CLEANUP MATERIAL:** A VOC-containing material used to clean application equipment used in aerospace coating operations.
- 211 **CLOSED CONTAINER:** A container which has a cover where the cover meets with the main body of the container without any visible gaps between the cover and the main body of the container.
- 212 **COATING:** A material applied to a surface to identify, beautify, protect, or minimize detection of such surface.
- 213 **COATING LINE:** Any operation or process for applying, baking, curing, or drying surface coatings, together with associated equipment, such as a coating applicator, flashoff area, and oven.
- 214 **COATING REMOVER (STRIPPER):** A material applied to the surface of any aerospace component to completely remove maskants, permanent coatings or coating residues. A coating remover (stripper) is not a surface preparation material, application equipment cleanup material or a material used for cleaning operations. Material used for the removal of overspray is not considered a coating remover.
- 215 **CONFORMAL COATING:** A coating applied to electronic circuit boards or the assembled components for the resistance of moisture, corrosion, bacteria, or fungi.
- 216 **DIP COAT:** A coating method which is applied by dipping an object into a vat of coating material and allowing any excess coating material to drain off.

- 217 **ELECTRODEPOSITION:** A method of applying coatings using a water-based electrochemical bath process. The component being coated is immersed in a bath of the coating. An electrical potential is applied between the component and an oppositely charged electrode hanging in the bath. The electric potential causes the ionized coating to be electrically attracted, migrated and deposited on the component being coated.
- 218 **ELECTROSTATIC DISCHARGE COATING:** An electrically conductive coating which prevents the build-up of static charge on the surface of an aerospace component. Applications include, but are not limited to, composites, space vehicles (shuttle craft rework), missiles, or helicopter blades.
- 219 **ELECTROSTATIC SPRAY:** The spray application of coatings where an electrostatic potential is created between the part to be coated and the coating particles.
- ~~249~~20 **ENCLOSED GUN CLEANER:**
- ~~249~~20.1A device that is used for the cleaning of spray guns, pots, cups and hoses, that has an enclosed solvent container, is not open to the ambient air when in use, and has a mechanism to force the cleanup material through the gun while the cleaner is in operation; or
- ~~249~~20.2A device that is used for the cleaning of spray guns, pots, cups and hoses, that has an enclosed solvent container, uses non-atomized solvent flow to flush the spray equipment and collects and returns the discharged solvent to an enclosed container.
- ~~220~~1 **END USER:** Any person applying any coating, coating remover (stripper), surface preparation and cleaning material, or application equipment cleanup material subject to this rule.
- ~~224~~2 **EXEMPT COMPOUND:** For the purposes of this rule, "exempt compound" has the same meaning as in Rule 101—GENERAL PROVISIONS AND DEFINITIONS.
- ~~222~~3 **EXTREME PERFORMANCE COATING:** A coating that encounters acute or chronic exposure to salt water, corrosives, caustics, acids, oxidizing agents, wind- or ocean-driven debris, or electromagnetic pulses.
- ~~223~~4 **FIRE RESISTANT/RETARDANT COATING:** A coating applied to the interior passenger compartments of aircraft that meets the Federal Aviation Administration (FAA) fire protection requirements listed in the Code of Federal Regulations 14 CFR Ch.1 (1-1-89) Part 25.853.
- ~~224~~5 **FLIGHT TEST COATING:** A coating applied to aircraft to protect against corrosion and provide required marking during flight test evaluation.
- ~~225~~6 **FLOW COAT:** A coating method which is applied by flowing a stream of coating over an object and allowing any excess coating material to drain off.
- ~~226~~7 **FUEL TANK COATING:** A coating applied to the interior of an aircraft fuel tank to protect it from internal corrosion and bacterial growth.
- ~~227~~8 **HAND APPLICATION EQUIPMENT:** Manually held equipment such as brushes, rollers, trowels, spatulas, daubers, rags, sponges, and mechanically or pneumatically driven syringes that do not atomize the applied products.
- ~~228~~9 **HAND LETTERING:** A method utilizing hand application equipment to add letters and/or numbers on a substrate.
- ~~229~~30 **HIGH TEMPERATURE COATING:** A coating which must be able to withstand temperatures of more than 400 degrees F.

- ~~2301~~ **HIGH-VOLUME LOW-PRESSURE APPLICATION EQUIPMENT:** Equipment used to apply coatings by means of a gun which is designed to be operated and which is operated between 0.1 and 10 psig air pressure measured dynamically at the center of the air cap and at the air horns.
- ~~2342~~ **LOW-VOLUME LOW-PRESSURE APPLICATION EQUIPMENT:** Application equipment with air pressure between 0.1 and 10.0 psig and air volume less than 15.5 cfm per spray gun and which operates at a maximum fluid delivery pressure of 50 psig.
- ~~2323~~ **MASKANT:** A coating applied directly to an aerospace component to protect surface areas during chemical processing operations such as aging, anodizing, bonding, chemical milling, etching, or plating.
- ~~234~~ **MATERIAL:** Any coating, coating remover, or solvent.
- ~~2335~~ **MISSILE:** A device consisting of an unmanned unit containing internal propulsion (ie.-- rocket) and guidance systems.
- ~~2346~~ **MOLD RELEASE:** A coating applied to a mold surface to prevent the molded piece from sticking to the mold as it is removed.
- ~~2357~~ **NON-COMPLIANT COATING MATERIAL:**
A ~~coating~~ material that exceeds the VOC content limits specified in Section 301 or 302 or the VOC composite partial vapor pressure limit specified in Section 302, and is in excess of the allowable volume per Section 110, and does not use Rule 107, Alternative Compliance or Section 305 for a compliance option.
- ~~2368~~ **PART MARKING COATING:** A coating or ink used to make identifying markings on materials, components, and/or assemblies and can be either permanent or temporary.
- ~~2379~~ **PRETREATMENT WASH PRIMER:** A coating which contains at least ½ percent acid by weight, as determined by Section 502.2, applied directly to aerospace components to provide surface etching, corrosion resistance or adhesion of subsequent coatings.
- ~~23840~~ **PRIMER:** A coating applied directly to the basic metal or other substrate of an aerospace component, and subsequently covered with a topcoat, to provide corrosion prevention, protection from the environment, functional fluid resistance or adhesion of subsequent coatings.
- ~~23941~~ **RADIATION EFFECT COATING:** An electronically conductive coating designed to prevent radar detection or electromagnetic interference.
- ~~2402~~ **RAIN EROSION RESISTANT COATING:** A coating applied primarily to radomes, canopies, and leading edges of aircraft to provide protection from erosion due to rain, dust, and other airborne particles.
- ~~2443~~ **REPAIR:** Recoating portions of previously coated products due to mechanical damage to the coating following normal coating operations.
- ~~2424~~ **ROCKET:** A propulsion system designed to propel an object by a thrust generated by the expulsion of matter, especially by the high speed ejection of the gaseous combustion products produced by internal ignition of solid or liquid fuels.
- ~~2435~~ **ROLL COATER:** A series of mechanical rollers that forms a thin coating film on the surface of the roller, which is applied to a substrate by moving the substrate underneath the roller.

- 2446 SEALANT:** A coating which prevents the intrusion of moisture, rain, salt water, dust, and aircraft fluids; and used for any of the following specified applications:
- 2446.1 Fuel sealing in fuel tanks;
 - 2446.2 Pressure area sealing in cabin areas;
 - 2446.3 Weather sealing on exterior skin surfaces of aerospace components;
 - 2446.4 Firewall sealing in engine and ordnance areas;
 - 2446.5 Electrical sealing for bulkhead wiring, electrical connectors and components;
 - 2446.6 Acid-resistant sealing in battery compartments and relief tanks;
 - 2446.7 Window sealing for windows;
 - 2446.8 High temperature sealing in engine areas, anti-icing ducts, and/or some electronics;
 - 2446.9 Aerodynamic sealing on exterior skin surfaces of aerospace components.
- 2457 SEALANT ADHESION PROMOTER COATING:** A special primer or adhesion promoter which is applied to aerospace components prior to sealant application to facilitate a bond between the sealant and the component.
- 2468 SELF-PRIMING TOPCOAT:** A two-component urethane coating which is self-priming and acts as a primer/topcoat system, applied directly to an aerospace component for corrosion protection, environmental protection and functional fluid resistance.
- 2479 SOLID FILM LUBRICANT:** A dry lubricant coating used to reduce friction between faying metal surfaces. The coating consists of an organic binder system containing one or more of the following substances: molybdenum disulfide, graphite, polytetrafluoroethylene (Teflon PTFE), other types of Teflon, lauric acid, cetyl alcohol, or waxes.
- 24850 SPACE VEHICLE:** A device designed to travel beyond the Earth's atmosphere, including satellites, manned vehicles (*i.e.*, -space shuttles), and missiles.
- 24951 STATIONARY SOURCE:** Any building, structure, facility, or emissions unit which emits or may emit any affected pollutant directly or as a fugitive emission.
- 24951.1 Building, structure, facility, or emissions unit includes all pollutant emitting activities which:
- a. Belong to the same industrial grouping, and
 - b. Are located on one property, or two or more contiguous properties, and
 - c. Are under the same or common ownership, operation, or control, or which are owned or operated by entities which are under common control.
- 24951.2 Pollutant emitting activities shall be considered as part of the same industrial grouping if:
- a. They belong to the same two-digit Standard Industrial Classification (SIC) code, or
 - b. They are part of a common production process, which includes industrial processes, manufacturing processes and any connected processes involving a common material.
- 2502 SURFACE PREPARATION MATERIAL:** A VOC-containing material applied to the surface of any aerospace component to clean the substrate prior to any coating application.
- 2543 TEMPORARY PROTECTIVE COATING:** A coating applied to an aerospace component to protect it from mechanical or corrosion damage during manufacturing and shipping.
- 2524 TEST COUPON:** A sample used to test aerospace coatings.
- 2535 THERMAL EXPANSION RELEASE COATING:** A coating which enables limited movement at the interface between the liner/propellant system and insulator of a rocket to ensure structural integrity during thermal expansion and contraction.

- 2546 THERMOCONTROL COATING:** A coating applied to provide specific emissivity or reflectivity properties to space vehicles.
- 2557 TOOLING:** Instruments or devices used in the manufacturing or rework on parts or completed units of any aerospace component.
- 2568 TOPCOAT:** A coating or series of coatings applied over a primer to provide an appearance, identification, or protection.
- 2579 TOUCH-UP:** That portion of the coating operation which is incidental to the main coating process but necessary to cover minor imperfections.
- 25860 TYPE I CHEMICAL MILLING MASKANT:** A coating that is applied directly to aluminum components to protect surface areas when chemical milling the component with a Type I etchant. A Type I etchant contains varying amounts of dissolved sulfur and does not contain amines.
- 25961 TYPE II CHEMICAL MILLING MASKANT:** A coating that is applied directly to aluminum components to protect surface areas when chemical milling the component with a Type II etchant. A Type II etchant is a strong sodium hydroxide solution containing amines.
- 2602 VOLATILE ORGANIC COMPOUND (VOC):** For the purposes of this rule, "volatile organic compound" has the same meaning as in Rule 101—GENERAL PROVISIONS AND DEFINITIONS.
- 2643 VOLATILE ORGANIC COMPOUND (VOC) AS APPLIED:** For the purpose of this rule, VOC as applied means the VOC content including thinners, reducers, hardeners, retarders, catalysts and additives calculated pursuant to Sections 404 or 405 as applicable.
- 2624 WET FASTENER INSTALLATION COATING:** A primer or sealer applied by dipping, brushing, or daubing to fasteners that are installed before the coating is cured.

300 STANDARDS: The following standards shall apply to any person or stationary source subject to this rule:

- 301 VOC CONTENT OF COATINGS FOR AEROSPACE COMPONENTS:** Except as provided in Sections 110, 111, and 305, a person shall not apply to any aerospace component any coating that exceeds the following VOC content limits as applied. The VOC content per volume of coating shall be determined pursuant to Section 502.1.

VOC CONTENT: Grams/Liter (Lbs/Gal)
less water and exempt compounds

COATING TYPE

~~DECEMBER 31, 1998~~

Ablative	600 (5.0)
Adhesive	600 (5.0)
Adhesive Bonding Agent	780 (6.5)
Conformal	600 (5.0)
Electrostatic Discharge	612 (5.1)
Extreme Performance	750 (6.3)
Fire Resistant/Retardant	600 (5.0)
Flight Test	420 (3.5)
Fuel Tank	650 (5.4)
High Temperature	420 (3.5)

Maskants	
Type I - Chemical Milling	622 (5.2)
Type II - Chemical Milling	160 (1.3)
All Others	850 (7.1)
Mold Release	762 (6.4)
Part Marking	850 (7.1)
Pretreatment Wash Primer	780 (6.5)
Primer	350 (2.9)
Radiation Effect	600 (5.0)
Rain Erosion Resistant:	
Fluoroelastomer	800 (6.7)
All Other	600 (5.0)
Sealant	600 (5.0)
Sealant Adhesion Promoter	750 (6.3)
Self-priming Topcoat	420 (3.5)
Solid Film Lubricant	880 (7.3)
Space Vehicle:	
Electrostatic Discharge	880 (7.3)
All Other	1000 (8.3)
Temporary Protective	250 (2.1)
Thermal Expansion Release	762 (6.4)
Thermocontrol	600 (5.0)
Topcoat:	
Acrylic Lacquer for F-111	780 (6.5)
All Other	420 (3.5)
Wet Fastener Installation	620 (5.2)

- 302 **VOC CONTENT FOR COATING REMOVERS (STRIPPERS):**
~~Effective December 31, 1998, a~~ [person](#) shall not use a coating remover (stripper) in aerospace coating operations which contains more than 300 grams of VOC per liter of material (2.5 pounds per gallon) or has a VOC composite partial vapor pressure of greater than 9.5 mmHg (0.18 psia) at 68 F (20 C). The VOC content shall be determined pursuant to Section 502.1. The VOC composite partial vapor pressure shall be determined pursuant to Section 502.6.
- 303 **APPLICATION EQUIPMENT REQUIREMENTS:** A person or stationary source shall not apply any coating unless one of the following application methods is used:
- 303.1 Hand application equipment, such as brush or roller.
 - 303.2 Dip coat.
 - 303.3 Flow coat.
 - 303.4 Roll coater.
 - 303.5 Electrodeposition.
 - 303.6 Electrostatic spray.
 - 303.7 High-volume low-pressure (HVLP) spray.
 - 303.8 Low-volume low-pressure (LVLP) spray.
 - 303.9 Any other equivalent method which has been approved in writing by the Air Pollution Control Officer and the U.S. Environmental Protection Agency.
- 304 **SURFACE PREPARATION AND CLEANING, APPLICATION EQUIPMENT CLEANUP, AND STORAGE REQUIREMENTS:** Any person subject to this rule shall comply with all of the following requirements:
- 304.1 Closed containers shall be used for the disposal of cloth, sponges, or paper used for surface preparation, cleanup and coating removal.
 - 304.2 VOC-containing materials shall be stored in closed containers when not in use.
 - 304.3 [Prior to \(one year after adoption date\)](#) ~~E~~except for electrostatic spray guns, a person shall not use VOC-containing materials for the cleaning of spray guns used in coating operations unless the spray gun is cleaned in an enclosed gun cleaner, or the VOC content of the material used does not exceed 200 grams/liter

(1.67 pounds per gallon). The VOC content shall be determined pursuant to Section 502.1.

304.4 Effective (one year after adoption date) and prior to (two years after adoption date), a person shall not use VOC-containing materials for the cleaning of application equipment used in coating operations unless the application equipment is cleaned in an enclosed gun cleaner, or the VOC content of the material used does not exceed 25 grams/liter (0.21 pounds per gallon). The VOC content shall be determined pursuant to Section 502.1.

304.5 Effective (two years after adoption date), a person shall not use VOC-containing materials for the cleaning of application equipment used in coating operations unless the VOC content of the material used does not exceed 25 grams/liter (0.21 pounds per gallon). The VOC content shall be determined pursuant to Section 502.1

304.46 Prior to (one year after adoption date), Sspray gun nozzles only, may be soaked in solvent-based materials for cleaning, provided the container (not to exceed five (5) gallons in size) is kept tightly covered at all times except when accessing the container.

304.57 ~~Effective December 31, 1998, a~~A person shall not perform cleaning or surface preparation unless the VOC content of the material used does not exceed 200 grams per liter (1.67 pounds/gallon) or the material has a VOC composite partial vapor pressure of 45 mmHg or less at 68 F (20 C), as determined by Sections 502.1 and 502.6.

305 **EMISSION CONTROL SYSTEM REQUIREMENTS:** As an alternative to Section 301, 302 and 304 a person may use air pollution control equipment that has been permitted by the Air Pollution Control Officer, pursuant to Rule 201, General Permitting Requirements, that provides an overall system efficiency, as determined by Section 408, of not less than 85%.

400 ADMINISTRATIVE REQUIREMENTS

401 **LOW USAGE EXEMPTION SUBMITTAL:** ~~Effective January 31, 1999, and annually thereafter, t~~The total previous calendar year usage records, as specified in Section 501.3, for all non-compliant ~~coatings~~materials shall be submitted annually to the Air Pollution Control Officer by January 31.

402 **PROHIBITION OF SPECIFICATION:** No person shall require for use or specify the application of a coating subject to this Rule if such use or application results in a violation of any of the provisions of this Rule. The prohibition of this Section shall apply to all written or oral contracts under the terms of which any coating is to be applied to any aerospace component at any physical location within the District.

403 **PRODUCT INFORMATION REQUIREMENTS FOR SELLERS:** Any person who sells any coating, coating remover (stripper), surface preparation and cleaning material or application equipment cleanup material subject to this rule shall provide the following information on material data sheets made available to the purchaser at the time of sale:

403.1 The material type by name/code/manufacturer

403.2 For coating material, the maximum VOC content of the material, as applied, after any mixing or thinning as recommended by the manufacturer. VOC content shall be displayed as grams of VOC per liter of coating (or pounds of VOC per gallon), excluding water and exempt compounds, pursuant to Section 404.

403.3 For coating removers (strippers), surface preparation and cleaning material, and application equipment cleanup material the maximum VOC content of the material, as applied, after any mixing or thinning as recommended by the manufacturer, and the VOC composite partial vapor pressure. VOC content shall be displayed as grams of VOC per liter of coating (or pounds of VOC per gallon), including water and exempt compounds, pursuant to Section 405. The VOC composite partial pressure shall be displayed in mmHg @ 20°C.

- 403.4 For all material, recommendations regarding thinning, reducing, or mixing with any VOC containing material, as defined in Section 25962.
- 403.5 For all material, VOC content may be calculated using product formulation data, or may be determined using the test method in Section 502.1.
- 403.6 The VOC composite partial pressure may be calculated using product formulation data or may be determined using the test method in Section 502.6.

- 404 **CALCULATION FOR DETERMINING VOC CONTENT OF COATINGS, LESS WATER AND EXEMPT COMPOUNDS:** The volume of coating material is defined as the volume of the original coating, plus any VOC-containing material added to the original coating. The weight of VOC per combined volume of VOC and coating solids shall be calculated by the following equation:

$$G_1 = \frac{(W_v - W_w - W_{ec})}{(V_m - V_w - V_{ec})}$$

- Where: G_1 = Weight of VOC per total volume of coating, less water and exempt compounds, in grams per liter
- W_v = Weight of all volatile compounds including any volatile materials added to the original coating supplied by the manufacturer, in grams
- W_w = Weight of water, in grams
- W_{ec} = Weight of compounds listed as exempt in Section 2242 from the definition of VOC, in grams
- V_m = Volume of coating material, in liters
- V_w = Volume of water, in liters
- V_{ec} = Volume of compounds listed as exempt in Section 2242 from the definition of VOC, in liters

- 405 **CALCULATION FOR DETERMINING VOC CONTENT OF COATING REMOVERS (STRIPPERS), SURFACE PREPARATION AND CLEANING MATERIAL AND APPLICATION EQUIPMENT CLEANUP MATERIAL:** The volume of material is defined as the volume of the original material, plus any VOC-containing material added to the original material. The weight of VOC per total volume of material shall be calculated by the following equation;

$$G_1 = \frac{(W_v - W_w - W_{ec})}{V_m}$$

- Where: G_1 = Weight of VOC per total volume of material, in grams per liter
- W_v = Weight of all volatile compounds, in grams
- W_w = Weight of water, in grams
- W_{ec} = Weight of exempt compounds as listed in Section 2242, in grams
- V_m = Volume of material, in liters

- 406 **CALCULATION FOR DETERMINING VOLATILE ORGANIC COMPOUND COMPOSITE PARTIAL VAPOR PRESSURE:** VOC composite partial vapor pressure shall be calculated by the following equation:

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

Where: PP_c	=	VOC composite partial vapor pressure at 20°C, in mm Hg.
W_i	=	Weight of the "i"th VOC compound, in grams, as determined by the most current version of ASTM E 260-96 (2006).
W_w	=	Weight of water, in grams as determined by the most current version of ASTM D 3792-05.
W_e	=	Weight of the "e"th exempt compound, in grams, as determined by the most current version of ASTM E 260-96 (2006).
Mw_i	=	Molecular weight of the "i"th VOC compound, in grams per g-mole, as given in chemical reference literature.
Mw_w	=	Molecular weight of water, 18 grams per g-mole.
Mw_e	=	Molecular weight of the "e"th exempt compound, in grams per g-mole, as given in chemical reference literature.
Vp_i	=	Vapor pressure of the "i"th VOC compound at 20°C, in mm Hg, as determined by Section 502.7 of this rule.

- 407 **CALCULATION FOR DETERMINING PERCENT CONTROL EFFICIENCY AND VOC MASS EMISSION RATE:** The VOC mass emission rate shall be calculated both upstream and downstream of the emissions control device based on the respective VOC mass concentration and volumetric flowrate, pursuant to Section 502.4 and the following equation:

$$M = (Q)(C)(60 \text{ min/hr}) \quad [\text{Calculated upstream and downstream}]$$

Where: M	=	VOC mass emission rate (upstream and downstream), in lbs/hr
Q	=	the volumetric flowrate at the inlet (upstream) or exhaust stack outlet (downstream), in scfm.
C	=	the VOC mass concentration at the inlet (upstream) or outlet (downstream), in lb/scf, as measured by EPA Method 18, 25, 25A, EPA Method 2 or 2C (whichever is applicable).

The percent control efficiency is calculated as follows:

$$\%CE = [(M_U - M_D) / M_U] \times 100$$

Where: CE	=	control efficiency.
M_U	=	the upstream VOC mass emission rate, in lb/hr.
M_D	=	the downstream VOC mass emission rate, in lb/hr.

- 408 **CALCULATION FOR DETERMINING OVERALL SYSTEM EFFICIENCY:** To verify compliance with Section 305, the overall system efficiency is calculated as follows:

$$\%SE = [\%CLE \times \%CE] / 100$$

Where: SE	=	system efficiency.
CLE	=	collection efficiency, as determined by Section 502.5
CE	=	control efficiency, as determined by Sections 407 and 502.4

- 409 **OPERATION AND MAINTENANCE PLAN:** Any person using an approved emission control device pursuant to Section 305 must submit an Operation and Maintenance Plan for the emission control equipment to the Air Pollution Control Officer for approval. The Plan shall specify operation and maintenance procedures which will demonstrate continuous operation and compliance of the emission control equipment during periods of emissions-producing operations. The Plan shall also specify which records must be kept to document these operation and maintenance procedures. These records shall comply with the requirements of

Section 501. The Plan shall be implemented upon approval of the Air Pollution Control Officer.

500 MONITORING AND RECORDS

501 **RECORDKEEPING FOR END USERS:** In addition to any existing permit conditions issued pursuant to Rule 201, any person subject to this rule, including operations claiming exemption under Sections 110, 112 and 113 shall comply with the following requirements:

501.1 **LIST OF MATERIALS:** A list shall be maintained of currently used coatings, coating removers (strippers), surface preparation and cleaning materials, application equipment cleanup materials and other VOC containing materials including, but not limited to thinners, reducers, hardeners, retarders, catalysts, etc. The list shall contain all such materials that are currently used and stored on site and shall include the following information:

- a. The material type by name/code/manufacturer and the appropriate category as designated by the coating categories in Sections 301, 302 and 304 or "exempt" as specified by Sections 112 and 113, as applicable.
- b. The actual VOC content of the material, as applied, as determined pursuant to Section 502.1, and for coating removers (strippers), surface preparation and cleaning material and application equipment cleanup material, the VOC composite partial vapor pressure. VOC content as provided by the manufacturer pursuant to Section 403 is acceptable, if following manufacturer's recommended mix ratio. The VOC composite partial pressure may be calculated using product formulation data or may be determined using the test method in Section 502.6.
- c. The actual mixing ratio used for the material, as applied.
- d. Identification of each material type exceeding the VOC limits specified in Sections 301 and 302 or the VOC composite partial vapor pressure limits specified in Section 302.

501.2 **PRODUCT INFORMATION:** A data sheet applicable to each material type shall be maintained on site and made available to the Air Pollution Control Officer on request. The data sheet shall be provided by the supplier to the end user, pursuant to Section 403, and shall include the following information:

- a. The material type by name/code/manufacturer.
- b. For coating material: the maximum VOC content of the coating material, as applied, after any mixing or thinning as recommended by the manufacturer. VOC content shall be displayed as grams of VOC per liter of coating (or pounds of VOC per gallon), excluding water and exempt compounds, pursuant to Section 404.
- c. For coating removers (strippers), surface preparation and cleaning material and application equipment cleanup material the maximum VOC content of the material, as applied, after any mixing or thinning as recommended by the manufacturer, and the VOC composite partial vapor pressure. VOC content shall be displayed as grams of VOC per liter of coating (or pounds of VOC per gallon), including water and exempt compounds, pursuant to Section 405. The VOC composite partial pressure shall be displayed in mmHg @ 20°C.
- d. For all material, recommendations regarding thinning, reducing, or mixing with any VOC containing material, as defined in Section 2602.
- e. For all material, VOC content may be calculated using product formulation data, or may be determined using the test method in Section 502.1.
- f. The VOC composite partial pressure may be calculated using product formulation data or may be determined using the test method in Section 502.6.

501.3 **USAGE RECORDS:** Any person within the District using materials regulated by this rule shall update and maintain the records as follows:

- a. Monthly:

1. Records of total applied volume for each coating, coating remover (stripper), surface preparation and cleaning material and application equipment cleanup material, specified by category as listed in Sections 301, 302 and 304.
 2. The method of application, specified by coating category as listed in Sections 301 and 302, or by exemption pursuant to Section 112, as applicable.
 3. Records of total applied volume for each material type exceeding the VOC limits specified in Sections 301 and 302 or the VOC composite partial vapor pressure limits specified in Section 302 by name/code/manufacturer and coating category.
- b. Daily:
1. If, pursuant to Section 305, an emission control device is used as a means of complying with this rule, records of the material type by name/code/manufacturer and the total applied volume of each material.
 2. For non-compliant coatings, as defined in Section 2357, records regarding the use, including the lack of use, of each material type by name/code/ and the total applied volume of each material.

501.4 **CONTROL EQUIPMENT:** Any person using an emission control system pursuant to Section 305 as a means of complying with this rule shall maintain such records as required by the Operation and Maintenance Plan in Section 409 on a daily basis.

501.5 **DURATION OF RECORDS:**

- a. ~~Prior to (two years after date of adoption),~~ such records shall be maintained on-site for the most recent continuous three year period.
- b. Effective (two years after date of adoption), such records shall be maintained on-site for a continuous five-year period and made available for review by the Air Pollution Control Officer upon request.

502 TEST METHODS

- 502.1 **DETERMINATION OF VOC CONTENT:** VOC content of coatings, coating removers (strippers), surface preparation and cleaning material and application equipment cleanup material shall be determined in accordance with EPA Method 24 and Sections 404, or 405 and 502.3 of this rule.
- 502.2 **DETERMINATION OF ACID CONTENT:** The weight percent acid in a pretreatment wash primer shall be determined in accordance with ASTM D ~~4639-83~~1613-06.
- 502.3 **DETERMINATION OF COMPOUNDS EXEMPT FROM VOC DEFINITION:** Compounds exempted from the VOC definition, as listed in Section 2201 of this rule, shall be determined in accordance with ASTM D 4457-~~85~~02 (2008) or ARB Method 432. If any of the perfluorocarbons are being claimed as exempt compounds, the person making the claim must state in advance which compounds are present, and the EPA-approved test method used to make the determination of these compounds.
- 502.4 **DETERMINATION OF CONTROL EFFICIENCY:** Control efficiency of control equipment shall be determined in accordance with EPA Method 18, 25, 25A, EPA Method 2 or 2C (whichever is applicable) and Section 407.
- 502.5 **DETERMINATION OF COLLECTION EFFICIENCY:**
~~Collection efficiency shall be determined using:~~ Collection efficiency shall be determined in accordance with the U.S. EPA technical guideline document, "Guidelines for Determining Capture Efficiency," dated January 9, 1995. Individual capture efficiency test runs subject to U.S. EPA technical guidelines shall be determined by:
- a. Applicable U.S. EPA methods 204, 204A, 204B, 204C, 204D, 204E, and/or 204F; or
 - b. Any other method approved by the U.S. EPA, the California Air Resources Board, and the Air Pollution Control Officer.
- 502.6 **DETERMINATION OF VOC COMPOSITE PARTIAL VAPOR PRESSURE:** VOC composite partial vapor pressure shall be determined in accordance with Sections 406 and 502.7 of this rule.

- 502.7 **VAPOR PRESSURE:** The vapor pressure shall be determined using ~~the most current version of~~ ASTM Method D2879-[97 \(2007\)](#) or may be obtained from the most current edition of standard engineering reference texts, including but not limited to:
- a. *The Vapor Pressure of Pure Substances*, Boublik, Fried, and Hala; Elsevier Scientific Publishing Company, New York.
 - b. *Perry's Chemical Engineer's Handbook*, McGraw-Hill Book Company.
 - c. *CRC Handbook of Chemistry and Physics*, Chemical Rubber Publishing Company.
 - d. *Lange's Handbook of Chemistry*, John Dean, editor, McGraw-Hill Book Company.

502.8 **MULTIPLE TEST METHODS:** *When more than one test method or set of test methods is 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 this rule.*