

Rule 74.13. Aerospace Assembly and Component Manufacturing Operations  
 (Adopted 4/15/86, Revised 10/13/87, 1/22/91, 9/10/96, 11/11/03)

A. Applicability

This rule is applicable to the manufacturing, assembling, coating, masking, bonding, paint stripping, and surface cleaning of aerospace components and the cleanup of equipment associated with these operations. Where Rule 74.12, Surface Coating of Metal Parts and Products, applies to the coating or cleaning of metal parts, including but not limited to tooling operations, this rule shall not apply.

B. Requirements

1. Aerospace Coatings and Adhesives: No person shall apply to any aerospace component, any coating, or adhesive with a ROC content in excess of the following limits, as applied:

Limits  
 Grams of ROC Per Liter, or Pounds per Gallon  
 of Coating (or Adhesive), Less Water and  
 Exempt Organic Compounds

<u>COATING or ADHESIVE</u>	<u>Grams per Liter</u>	<u>Pounds per Gallon</u>
Adhesion Promoter	850	7.1
Adhesives		
Non-Structural	250	2.1
Structural		
Autoclavable	50	0.4
Nonautoclavable	850	7.1
Adhesive Bonding Primers	780	6.5
Antichafe Coating	600	5.0
Barrier Coatings	420	3.5
Clear Topcoat	520	4.3
Conformal Coating	750	6.3
Dry Lubricative Materials		
Fastener Manufacturing	250	2.1
Nonfastener Manufacturing	880	7.3
Electric/Radiation Effect Coatings	800	6.7
Fastener Sealants	675	5.6
Fire Resistant Coatings		
Civilian (Interior)	650	5.4
Flight Test Coatings Used on Missiles or Single-Use Target Craft	420	3.5
All Others	600	5.0
Fuel Tank Coatings	420	3.5
Fuel Tank Adhesives	620	5.2
High Temperature Coating	850	7.1
Impact Resistant Coating	420	3.5
Maskants - Chemical Milling	250	2.1
Optical Anti-Reflective Coating	700	5.8
Pretreatment Coatings	780	6.5

<u>COATING</u>	<u>Grams per Liter</u>	<u>Pounds per Gallon</u>
Primers Not Resistant		
To Phosphate Esters	350	2.9
Phosphate Ester-		
Resistant Primers	350	2.9
Rain Erosion-Resistant Coating	420	3.5
Scale Inhibitor	880	7.3
Sealant	600	5.0
Solid Film Lubricants		
Fastener Manufacturing	250	2.1
Solid Film Lubricants		
Fastener Installation	880	7.3
Nonfastener Manufacturing	880	7.3
Space Vehicle Coatings		
Electrostatic Discharge Protection	800	6.7
Other Space Vehicle Coatings	1000	8.3
Space Vehicle Adhesives	800	6.7
Temporary Protective Coatings	250	2.1
Topcoats	420	3.5
Unicoats (Self-Priming Topcoats)	420	3.5
Wing Coating	420	3.5
Wire Coatings		
Electronic	420	3.5
Anti-Wicking	420	3.5
Pre-Bonding Etching	420	3.5
Phosphate Ester Resistant Ink	925	7.7

2. Surface and General Cleaning:

- a. Surface Cleaning: No person shall use a solvent for surface cleaning, clean-up or engine gas path cleaning excluding stripping coatings or cleaning coating application equipment unless:
  - 1) The solvent contains less than 200 grams of ROC per liter of material, as applied, or
  - 2) The ROC composite partial pressure of the solvent is less than or equal to 25 mm Hg at a temperature of 20° C.
- b. Coating Application Equipment Cleaning: No person shall use materials containing ROC for the cleaning of equipment used in coating operations unless an enclosed system or enclosed gun washer is used according to the manufacturer's recommendations and is closed when not in use.

Effective January 1, 1997, No person shall use materials containing ROC for the cleaning of coating application equipment unless:

- 1) An enclosed gun washer or "low emission spray gun cleaner" that has been approved in writing by the APCO is properly used for spray equipment cleaning, and
  - 2) The ROC composite partial pressure of organic solvent used is less than 45 mm Hg at 20°C.
3. Coating Strippers: No person shall use a coating stripper unless it contains less than 300 grams of ROC per liter, as applied, or unless its ROC composite partial pressure is 9.5 mm Hg or less at 20 °C.
4. Storage of ROC Containing Materials: Closed containers shall be used for disposal and storage of cloth, paper, or other solvent-containing materials used for surface preparation, coating, cleanup, or paint removal.
5. Coating Transfer Efficiency: No person shall apply coatings except by using properly operated coating application devices and by using:
  - a. Electrostatic application operated at a minimum of 60 kV,
  - b. Flow coat application,
  - c. Dip coat application,
  - d. Hand application methods,
  - e. High volume, low pressure spraying (HVLP), or
  - f. Such other coating application methods that are demonstrated to achieve a 65 percent transfer efficiency.
6. Add-on Control Equipment Option: A person may comply with provisions of Subsection B.1 or Subsection B.2 by using air pollution control equipment provided that:
  - a. The combined capture and control efficiency reduces emissions by at least 85 percent by weight, and
  - b. Written approval for such equipment is received from the APCO.
7. Prohibition of Solicitation: No person shall solicit, specify or require any other person to use in the District any coating, adhesive, solvent, spray equipment, or control equipment that does not meet the limits or requirements of this rule.
8. Coating Compliance Statement: The manufacturer of coatings subject to this rule shall designate on product labels or data sheets, the ROC content or the Volatile Organic Compounds (VOC) content of coatings including coating reducers and catalysts, as supplied. This designation shall include recommendations

regarding thinning, reducing, or mixing with any other ROC containing materials, and express the coating ROC or VOC content on an as applied basis when used in accordance with the manufacturer's recommendations. All letters and numbers used to designate ROC or VOC content on product labels shall be visible and legible.

9. Liquid Cleaning Material Compliance Statement: The manufacturer of liquid cleaning materials used in coating operations shall designate on product labels or data sheets the ROC content and ROC Composite Partial Pressure of cleaning materials as supplied. This designation shall include recommendations regarding mixing with any other ROC containing materials, and express the cleaning material ROC content when used in accordance with the manufacturer's recommendations. All letters and numbers used to designate ROC or VOC content on product labels shall be visible and legible.

#### C. Exemptions

1. This rule, except section B.7, shall not apply to any stationary source that emits less than 200 pounds of ROC in every rolling period of 12 consecutive calendar months from aerospace assembly and component manufacturing operations. Emissions from cold cleaners, vapor degreasers, and aerosol products, shall not be included in this determination.

Any person claiming this exemption shall provide operational records, data and calculations, as determined by the APCO to be necessary, to substantiate this claim.

2. The provisions of Subsection B.1 of this rule shall not apply to:
  - a. Any coating with separate formulations used in volumes of less than 20 gallons in any calendar year at a stationary coating source, or
  - b. Any adhesive with separate formulations used in volumes of less than 10 gallons in any calendar year at a stationary coating source,

provided that the total volume of noncomplying coatings (excluding noncomplying adhesives) used at a stationary source does not exceed 200 gallons annually.

3. The provisions of Subsection B.2.a of this rule shall not apply to the cleaning of aerospace assembly and subassembly surfaces that are exposed to strong oxidizers or reducers such as nitrogen tetroxide, liquid oxygen or hydrazine.
4. Any person seeking to claim the exemption in Subsection C.2 shall notify the APCO in writing that substitute complying coatings are not available.

5. The provisions of Subsection B.5 shall not apply to the application of coatings that contain less than 20 grams of ROC per liter of coating less water and less exempt organic compounds.
6. This rule shall not apply to aerosol coating products.

D. Recordkeeping

1. Any person subject to the requirements of this rule shall have coating manufacturer's specification sheets, such as Material Safety Data Sheets (MSDS), available for review and shall maintain current records which show the following for each coating and adhesive:
  - a. Type
  - b. Grams of ROC per liter of coating, less water and less exempt organic compound, as applied
  - c. Mix ratio of coatings and reducers or quantities of any coating components, reducers or thinners used
  - d. Daily volume of coating and adhesive applied. Any person that uses only complying coatings and adhesives may maintain these records on a monthly basis instead of a daily basis.
  - e. Method of application
2. Any person subject to this rule shall have manufacturer's specification sheets for all strippers and solvents subject to this rule available for review and shall maintain records which include the following items:
  - a. Type
  - b. ROC content of solvent, in grams per liter, as applied
  - c. Daily volume of solvent and stripper used. Any person that uses only complying solvents and strippers may maintain these records on a monthly basis instead of a daily basis.
  - d. ROC composite partial pressure of solvent used
3. Any person claiming the coating exemption in Subsection C.2 shall maintain records of each exempt coating which show on a monthly basis, the following for each coating:
  - a. Coating type
  - b. Volume of coating applied
  - c. Mix ratio of coatings and reducers or quantities of any coating components, reducers or thinners used

- d. Grams of ROC per liter of coating, less water and exempt organic compounds as applied.
  - e. Method of application
4. Any person subject to this rule shall record any coating or adhesive intended for use in any of the specialty categories listed below. This record shall be available for review and shall include the manufacturer name, product ID number, specialty category, ROC limit as applied, and information to support that the specialty coating or adhesive has been specified for the intended application.

Adhesion Promoter Coating                      Antichafe Coating  
 Electric/Radiation Effect Coating      Fuel Tank Adhesive  
 High Temperature Coating  
 Optical Anti-Reflective Coating

5. Any person using an emission control system as a means of complying with this rule shall maintain daily records of key system operating and maintenance procedures which will demonstrate continuous operation and compliance of the emission control device during periods of emission producing activities. Key system operating parameters are those necessary to ensure compliance with subsection B.6 such as temperatures, pressures and flow rates.
6. Such records shall be maintained for a minimum of two (2) years and shall be available for inspection by the APCO. A longer period of time for record retention may be specified by a permit condition.

E. Test Methods

1. Coating ROC content and solvent ROC content shall be determined using EPA Reference Method 24 or its constituent methods. The ROC content of coatings or solvents containing exempt organic compounds shall be determined by CARB Test Method 432.
2. The solid content of pretreatment coatings shall be determined using ASTM Method D2369. The acid content of pretreatment coatings shall be determined using ASTM Method D1639-83.
3. The test method for determining the fire resistance of an interior coating shall be Federal Aviation Administration required Ohio State University Heat Release, Fire and Burn Tests.
4. ROC composite pressure of a solvent or stripper shall be calculated using a widely accepted published source such as: Boublik, T., V. Fried and E. Hala, "The Vapor Pressure of Pure Substances," Elsevier Scientific Publishing Co., New York (1973), Perry's Chemical Engineer's Handbook, McGraw-Hill Book Company, CRC Handbook of Chemistry and Physics, Chemical Rubber Publishing Company (1986-87), and Lange's Handbook of Chemistry, John A. Dean, editor, McGraw-Hill Book Company (1985). The true vapor

pressure of a component in a solvent mix may be determined by ASTM Method D2879-86. The ROC composite pressure of a solvent mix consisting entirely of ROC may be determined by ASTM Method D2879-86.

5. The active and passive solvent losses from spray gun cleaning systems shall be determined using South Coast Air Quality Management District's "General Test Method for Determining Solvent Losses from Spray Gun Cleaning Systems" dated October 3, 1989. The test solvent for this determination shall be any lacquer thinner with a minimum vapor pressure of 105 mm Hg at 20 °C. The minimum test temperature shall be 15 °C.
6. Transfer efficiency shall be determined in accordance with the South Coast Air Quality Management District method entitled "Spray Equipment Transfer Efficiency Test Procedure for Equipment Users".
7. The capture and control device efficiency of any air pollution control equipment shall be determined according to EPA's technical document, "Guidelines for Determining Capture Efficiency," January 9, 1995, and methods in 40 CFR 52.741 (a)(4)(iv) Control Device Efficiency Testing and Monitoring. The calculation of control device efficiency shall be determined only during periods of continuous coating operations and shall be averaged over the duration of the coating operation not to exceed 24 hours.

F. Violations

Failure to comply with any provision of this rule, including the requirement to maintain records, shall constitute a violation of this rule.

G. Definitions

1. "Adhesion Promoter": A coating applied to a substrate in a monomolecular thickness to promote wetting and form a chemical bond with the subsequently applied material.
2. "Adhesive": A substance that is used to bond one surface to another.
3. "Adhesive Bonding Primer": A coating applied in a very thin film to aerospace adhesive bond detail components for corrosion inhibition and adhesion.
4. "Aerosol Coating Product": A pressurized coating product containing pigments or resins that dispenses product ingredients by means of a propellant, and is packaged in a disposable can for hand held application, or for use in specialized equipment for ground traffic/marketing applications.
5. "Aerospace Component": Any raw material, partial or completed fabricated part, assembly of parts, or completed unit of any

aircraft, helicopter, missile, or space vehicle, including mockups and prototypes.

6. "Antichafe Coating": A coating applied to areas of moving aerospace components which may rub during normal operation.
7. "Anti-Wicking Wire Coating": The outer coating of a wire which prevents fluid wicking into the insulation of the wire.
8. "Barrier Coating": A coating applied in a thin film to fasteners to inhibit dissimilar metal corrosion and to prevent galling.
9. "Coating": A material which is applied to a surface and which forms a film in order to beautify and/or protect such surface.
10. "Conformal Coating": A coating applied to electrical conductors and circuit boards to protect them against electrical discharge damage and/or corrosion.
11. "Dry Lubricative Coating": A coating consisting of lauric acid, cetyl alcohol, waxes, or other non-cross linked or resin-bound materials which act as a dry lubricant or protective coat.
12. "Electric- or Radiation-Effect Coating": An electric-effect coating is electrically conductive. A radiation-effect coating helps in the prevention of radar detection.
13. "Electronic Wire Coating": The outer electrical insulation coating applied to tape insulation of a wire specifically formulated to smooth and fill edges.
14. "Electrostatic Application": A sufficient charging of atomized paint droplets to cause deposition principally by electrostatic attraction. This application shall be operated at a minimum 60 KV.
15. "Exempt Organic Compounds": As defined in Rule 2, of these rules.
16. "Fire Resistant Coating - Civilian (Interior)": A cabin interior coating that passes Federal Aviation Administration standards using the Ohio State University Heat Release, Fire and Burn Tests.
17. "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.
18. "Fuel Tank Adhesive": An adhesive used to bond components exposed to fuel and which must be compatible with fuel tank coatings.
19. "Fuel Tank Coating": A coating applied to the interior of a fuel tank or areas of an aircraft that are continuously wetted by fuel to protect it from corrosion and/or bacterial growth.



20. "Grams of ROC per liter of Coating, less water and exempt organic compounds": The weight of ROC per combined volume of ROC and coating solids, calculated using the following equation:

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

where  $W_s$  = Weight of volatile compounds (grams)  
 $W_w$  = Weight of water (grams)  
 $W_{es}$  = Weight of exempt organic compounds (grams)  
 $V_m$  = Volume of material (liters)  
 $V_w$  = Volume of water (liters)  
 $V_{es}$  = Volume of exempt organic compounds (liters)

21. "Grams of ROC per Liter of Material": The weight of ROC per volume of material calculated as follows:

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

where  $W_s$  = Weight of volatile compounds (grams)  
 $W_w$  = Weight of water (grams)  
 $W_{es}$  = Weight of exempt organic compounds (grams)  
 $V_m$  = Volume of material (liters)

22. "Gun Washer": Electrically or pneumatically operated system that is designed to clean spray application equipment while enclosed. A gun washer may also be considered a gun cleaning system that consists of spraying solvent into an enclosed container using a snug fitting.
23. "Hand Application Methods": The application of coatings, sealants, or adhesives, by nonmechanical hand-held equipment including but not limited to paint brushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, rags and sponges.
24. "High Temperature Coating": A coating that must withstand temperatures of more than 350°F.
25. "High Volume Low Pressure Application (HVLP)": Spray equipment which uses a high volume of air delivered at pressures between 0.1 and 10.0 psig and which operates at a maximum fluid delivery pressure of 100 psig.
26. "Impact Resistant Coating": A flexible coating that protects aerospace components, such as aircraft landing gear, and landing gear compartments, and other surfaces subject to abrasive impacts from runway debris.
27. "Low emission spray gun cleaner": Any properly used spray equipment cleanup device which has passive solvent losses of no more than 0.6 grams per hour and has active solvent losses of no

more than 15 grams per operating cycle as defined by the test method in Subsection E.5.

28. "Maskant for Chemical Milling": A coating applied directly to an aerospace component to protect surface areas when chemical milling such component.
29. "Non-Structural Adhesive": An adhesive that bonds non-load carrying aircraft components in noncritical applications.
30. "Optical Anti-Reflective Coating": A coating with a low reflectance in the infrared and visible wavelength range and is used for anti-reflection on or near optical and laser hardware.
31. "Phosphate Ester Resistant Wire Ink Coating": A coating that is used for surface identification or mark on aerospace wire or cable which inhibits the corrosion caused by contact with phosphate ester type hydraulic fluids.
32. "Pretreatment Coating": A coating which contains no more than 12 percent solids by weight, and at least one-half percent acid, by weight, to provide surface etching, and is applied directly to metal surfaces to provide corrosion resistance, adhesion and ease of stripping.
33. "Primer": A coating applied directly to an aerospace component for purposes of corrosion prevention, protection from the environment, functional fluid resistance and adhesion of subsequent coatings.
34. "Rain Erosion Resistant Coating": A coating that protects leading edges, flaps, stabilizers, and engine inlet lips against erosion caused by rain during flight.
35. "Reactive Organic Compounds(ROC)": As defined in Rule 2.
36. ROC Composite Partial Pressure": The sum of the partial pressures of the compounds defined as ROCs. ROC composite partial pressure is calculated as follows:

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

Where:

$W_i$  = Weight of the "i"th ROC compound, in grams

$W_w$  = Weight of water, in grams

$W_e$  = Weight of the "e"th exempt organic compound, in grams

$MW_i$  = Molecular weight of the "i"th ROC compound, in g/(g-mole)

$MW_w$  = Molecular weight of water, in g/(g-mole)

$MW_e$  = Molecular weight of the "e"th exempt compound, in g/(g-mole)

$PP_C$  = ROC composite partial pressure at 20 C, in mm Hg  
 $VP_i$  = Vapor pressure of the "i"th ROC compound at 20 C, in mm Hg.

37. "Scale Inhibitor": A coating that is applied to the surface of a part prior to thermal processing to inhibit the formation of tenacious scale.
38. "Sealant": A viscous semisolid material that fills voids in order to seal out water, fuel, and other liquids and solids, and in some cases air movement.
39. "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.
40. "Space Vehicle Coating": A coating applied to vehicles designed to travel beyond earth's atmosphere.
41. "Stripper": A volatile liquid applied to remove a maskant for chemical processing, cured or dried paint, cured or dried paint residue or temporary protective coating.
42. "Structural Adhesive - Autoclavable": An adhesive used to bond load-carrying aircraft components and is cured by heat and pressure in an autoclave.
43. "Structural Adhesive - Nonautoclavable": An adhesive cured under ambient conditions and is used to bond load-carrying aircraft components or other critical functions, such as nonstructural bonding near engines.
44. "Surface Cleaning": Any method of cleaning outside of a degreaser, including but not limited to:
  - a. wipe cleaning
  - b. equipment flushing
45. "Temporary Protective Coating": A coating applied to an aerospace component to protect it from mechanical and environmental damage during manufacturing or shipping.
46. "Topcoat": A coating applied over a primer for purposes such as appearance, identification, or protection.
47. "Transfer Efficiency": The ratio of the weight or volume of coating solids adhering to the part being coated to the weight or volume of coating solids used in the application process, expressed as a percentage.
48. "Unicoat": A coating that is applied directly to an aerospace component for purposes of corrosion protection, environmental protection and functional fluid resistance that is not

subsequently topcoated. A unicoat is used in lieu of the application of a primer and a topcoat.

49. "Wing Coating": A coating that is corrosion resistant and is resilient enough to withstand the flexing of wings.
50. "Wire Prebonding Etchant": A nonadditive surface treatment process to provide bondability of aerospace wire coatings to the underlying insulation layer.