

RULE 4607 GRAPHIC ARTS AND PAPER, FILM, FOIL AND FABRIC COATINGS
(Adopted April 11, 1991; Amended September 19, 1991; Amended December 17, 1992; Amended March 31, 1993; Amended May 19, 1994; Amended September 17, 1997; Amended December 20, 2001, Amended September 20, 2007, Amended December 18, 2008)

1.0 Purpose

The purpose of this rule is to limit VOC emissions from graphic arts printing operations, digital printing operations, and paper, film, foil or fabric coating operations.

2.0 Applicability

This rule is applicable to any graphic arts printing operation, to digital printing operations, and to any paper, film, foil, or fabric coating operation and to the organic solvent cleaning materials and processes associated with such operations.

3.0 Definitions

- 3.1 **Aerosol Adhesive:** an adhesive that is dispensed from a hand-held self-pressurized container by means of propellant induced force.
- 3.2 **Aerosol Product:** a hand-held, non-refillable container that expels a pressurized solvent-containing product by means of a propellant-induced force.
- 3.3 **APCO:** as defined in Rule 1020 (Definitions).
- 3.4 **Application Equipment:** a device, including, but not limited to, a spray gun, brush, roller, and a printing press, used to apply adhesives, coatings, or inks.
- 3.5 **Application Process:** any process where surface coatings are applied and/or cured to paper or fabric on a coating line. Such coating line shall include coating applicators, heating or drying ovens, any dryers, and other equipment where VOC emissions occur.
- 3.6 **ARB:** California Air Resources Board.
- 3.7 **ASTM:** American Society for Testing and Materials.
- 3.8 **Bench Scale Project:** a project (other than at a research and development facility) that is operated on a small scale, such as one capable of being located on a laboratory bench top.

- 3.9 Blanket: a synthetic rubber mat used in offset-lithography to transfer or "offset" an image from a planographic printing plate to paper or other substrate.
- 3.10 Blanket Repair Material: the material used in offset printing to correct low spots in the press blanket.
- 3.11 Blanket Wash: a solvent used to remove ink from the blanket of a press.
- 3.12 Capture Efficiency: in percent, is the ratio of the weight of the VOC in the effluent stream entering the control device to the weight of VOC emitted from the operation, both measured simultaneously, and can be calculated by the following equation:

$$\text{Capture Efficiency} = [W_c/W_e] \times 100$$

Where:

W_c = weight of VOC entering control device

W_e = weight of VOC emitted from the operation

- 3.13 CFR: Code of Federal Regulations.
- 3.14 Coating: the application of a uniform layer of material across the entire width of a substrate. Those machines which have both coating and printing units should be considered as performing a printing operation. Coating applications that are not performed in association with a printing operation are considered coating operations and are not graphic arts printing operations.
- 3.15 Coating Line: a series of coating applicators, flash-off areas, and any associated curing/drying equipment between one or more unwind/feed stations and one or more rewind/cutting stations.
- 3.16 Control Device: equipment such as an incinerator or adsorber, or cooler/condenser filtration used to prevent air pollutants from being emitted into the atmosphere.

- 3.17 Control Device Efficiency: in percent, is the ratio of the weight of the VOC removed by the control device from the effluent stream entering the control device to the weight of the VOC in the effluent stream entering the control device, both measured simultaneously, and can be calculated by the following equation:

$$\text{Control Device Efficiency} = [(W_c - W_d) / W_c] \times 100$$

Where:

W_c = Weight of VOC entering control device

W_d = Weight of VOC discharged from the control device

- 3.18 Converting Operation: coating, waxing, laminating, extrusion coating, or printing, to fabricate base materials which are then used to produce wraps, bags, and other pre-formed packages.
- 3.19 Conventional Printing Operations: those printing operations that utilize physical masters, stencils, screens or plates during the printing process. Conventional printing operations use technologies including but not limited to lithography, flexography, gravure, letterpress, and screen printing.
- 3.20 Cured Adhesive, Cured Coating, or Cured Ink: an adhesive, coating, or ink that is dry to the touch.
- 3.21 Degreaser: a tank, tray, drum or other container in which objects to be cleaned are exposed to a solvent or solvent vapor in order to remove contaminants. The objects to be cleaned include, but are not limited to, parts, products, tools, machinery, and equipment. An enclosed spray application equipment cleaning system is not a degreaser.
- 3.22 Die Coater (or Slit Coater): a type of application equipment that coats an object by flowing coatings through a slit directly onto the object moving past the slit.
- 3.23 Digital Printer: a printing device that uses a computer-driven machine to transfer an electronic image to a substrate through the use of inks, toners, or other graphic materials. Digital printing technologies include, but are not limited to, various forms of inkjet, thermography, electrophotography, ionography, and magnetography.
- 3.24 Digital Printing Operations: those operations that do not use a physical master, stencils, or plates but use digital data to control the deposition of ink, toner, or dye to create images.

- 3.25 Dip Coater: a type of application equipment that coats an object by submerging the object in a vat of coating, and subsequently withdrawing the object and draining off the excess coating.
- 3.26 Dissolver: an organic solvent that is added to an adhesive, coating, or ink in order to melt or to liquefy solid particles.
- 3.27 Doctor Blade: a steel blade used to scrape excess ink from a printing plate or inking cylinder.
- 3.28 Dryer: a hot air, high velocity system used to dry inks on printed or coated substrate.
- 3.29 Dye Sublimation: an imaging process that vaporizes colorant with heat and pressure, and deposits it onto a substrate in order to simulate a continuous tone image. Dye sublimation is a digital printing technology.
- 3.30 Electron Beam Ink: ink that, when exposed to electron energy, crosslinks or solidifies in milliseconds.
- 3.31 Electrophotography: a digital printing technology that works by recording an image on a drum in the form of an electrostatic charge, which is then transferred to the substrate. Electrophotography includes such technologies as laser printers, xerography, and liquid electrophotography.
- 3.32 Electrostatic Application: a method of applying coating whereby atomized paint droplets are charged and subsequently deposited on the substrate by electrostatic attraction.
- 3.33 EPA: United States Environmental Protection Agency.
- 3.34 Exempt Organic Compounds: all organic compounds not classified as VOC, as listed in Rule 1020 (Definitions).
- 3.35 Extreme Performance Ink/Coating: an ink or coating used in screen printing on a non-porous substrate that is designed to resist or withstand any of the following:
 - 3.35.1 more than two years of outdoor exposure; or
 - 3.35.2 exposure to industrial-grade chemicals, solvents, acids, or detergents, oil products, cosmetics, temperatures exceeding 170°F, vacuum-forming, embossing or molding.

- 3.36 Fabric Coating: any decorative or protective coating or reinforcing material applied or impregnated into textile fabric, vinyl coated textile fabric, or vinyl sheets.
- 3.37 Film Coating: a coating applied in a web coating process on any film substrate other than paper or fabric, including but not limited to typewriter ribbons, photographic film, magnetic tape, and metal foil gift wrap, but excluding coatings applied to packaging used exclusively for food and health care products for human or animal consumption.
- 3.38 Fine Arts Painting: any unique visual representation, consisting of paint, ink, or other media, hand applied to a substrate of canvas, wood, paper, metal, or other material.
- 3.39 Flexible Packaging: any package or part of a package the shape of which can readily be changed. Flexible packaging includes, but is not limited to, bags, pouches, liners, and wraps utilizing paper, plastic, film, aluminum foil, metalized or coated paper or film, or any combination of these materials.
- 3.40 Flexible Packaging Industry: establishments that convert materials consisting of light gauge papers, plastic films, cellulosic films such as cellophane, thin gauge metal sheets such as aluminum foil or steel foil, and combinations thereof into a variety of product packages.
- 3.41 Flexographic Printing: the application of words, designs, or pictures to a substrate by means of a roll printing technique in which the pattern is applied to an image carrier made of rubber or other elastomeric materials. The image to be printed is raised above the carrier surface, while the non-image area is not raised.
- 3.42 Flow Coater: a coating application system with no air supplied to the nozzle and where paint flows over the part and the excess coating drains back into the collection system.
- 3.43 Foam Coater: a coating application system that coats an object by flowing foam through holes or a slit directly onto the object moving underneath it.
- 3.44 Foil Coating: a coating applied in a web coating process on any foil substrate other than paper or fabric, including but not limited to typewriter ribbons, photographic film, magnetic tape, and metal foil gift wrap, but excluding coatings applied to packaging used exclusively for food and health care products for human and animal consumption.

- 3.45 Fountain Solution: solution composed mainly of water and contains at least one of the following materials: etchants such as mineral salts; hydrophilic gums; or other additives, which is applied to the image plate to maintain the hydrophilic properties of the non-image areas.
- 3.46 Fugitive Emissions: emissions of VOC from any portion of the printing, coating, or laminating operation other than from the dryer.
- 3.47 Grams of VOC Per Liter of Ink, Coating, Adhesive, or Wash Primer Less Water and Less Exempt Compounds: the weight of VOC per combined volume of VOC and coating solids, and can be calculated by the following equation:

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

Where:

- Ws = weight of volatile compounds, in grams
- Ww = weight of water, in grams
- Wec = weight of exempt compounds, in grams
- Vm = volume of material, in liters
- Vec = volume of exempt compounds, in liters
- Vw = volume of water, in liters

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

$$\text{Grams of VOC per Liter of Material} = \frac{W_s - W_w - W_{ec}}{V_m}$$

Where:

- Ws = weight of volatile compounds, in grams
- Ww = weight of water, in grams
- Wec = weight of exempt compounds, in grams
- Vm = volume of materials, in liters

- 3.49 Graphic Arts Coating: the application of a uniform layer of material across the entire width of a substrate. Those machines which perform both coating and printing should be considered as performing a printing operation. For purposes of this rule, digital printing is not considered graphic arts coating operations.

- 3.50 **Graphic Arts Printing Operations:** those operations employing conventional printing operations, or any coating or laminating process associated with conventional printing to produce published products and packages. Organic solvent cleaning operations performed in order to produce published products and packages are considered to be part of graphic arts printing operations.
- 3.51 **Gravure Printing:** an intaglio printing method in which the ink is transferred from minute etched wells on a cylinder to the substrate, which is supported by an impression roller with excess ink removed from the cylinder by a doctor blade.
- 3.52 **Hand Application Method:** a method of applying a coating to a substrate using manually held, non-mechanically operated equipment. Such equipment includes paintbrushes, hand rollers, caulking guns, trowels, spatulas, syringe daubers, rags, and sponges.
- 3.53 **Heating Oven:** a device into which paper or fabric is put to dry or cure the applied coating by applying heat.
- 3.54 **Heatset Ink:** a quick-drying ink in which the solvents are vaporized by passing the printed surface through a heater or oven.
- 3.55 **High-Volume, Low-Pressure (HVLP) Spray Equipment:** equipment used to apply materials by means of a spray gun which is designed and intended to be operated, and which is operated, between 0.1 and 10.0 psig of air atomizing pressure, measured dynamically at the center of the air cap and the air horns.
- 3.56 **Ink Jet:** a digital printing technology in which ink is ejected through printheads onto a substrate to create an image.
- 3.57 **Intaglio Printing:** printing done from a plate or cylinder in which the image is sunk below (etched or engraved into) the surface.
- 3.58 **Ionography:** a digital printing technology that utilizes a directed array of ions to create a charge on a nonconductive surface to create an image. Ionography can also be known as ion deposition or electron charge deposition printing.
- 3.59 **Key system operating parameters:** those parameters necessary to ensure compliance with Section 5.6, including, but not limited to, temperature, pressure drop, and air flow rate.
- 3.60 **Lamination:** a process of composing two or more layers of material to form a single, multiple-layer sheet by using an adhesive.

- 3.61 Letterpress Printing: a method where the image area is raised relative to the non-image area and the ink is transferred to the paper directly from the image surface.
- 3.62 Line: the minimum equipment which is required for the application and/or drying of inks and/or curing of ultraviolet coatings of inks, or coatings on a substrate, including the ink and/or coating applicators and drying systems, and associated ink and coating agitation and delivery systems.
- 3.63 Liquid Leak: a visible solvent leak from a container at a rate of more than three drops per minute, or a visible liquid mist.
- 3.64 Liquid Electrophotography (LEP): a digital printing technology that records a latent electrostatic image on a photoconductive surface, such as a drum or belt. The image created by applying toner to the charged areas of the photoconductor is electrically transferred to an intermediate surface. In a second transfer process, the image is released from the blanket surface to the final substrate, cooling rapidly as the substrate passes between the blanket and an impression drum, causing the image to “peel off” the blanket and be affixed to the substrate. This operation repeats itself on the one printing station for every color separation in the image.
- 3.65 Lithographic Printing: a plane-o-graphic printing method in which the image and non-image areas are on the same plane.
- 3.66 Magnetography: a digital printing technology whereby an image is printed using a magnetic toner, electromagnetic write heads, and magnetic fields on an imaging drum.
- 3.67 Maintenance Cleaning: a solvent cleaning operation or activity carried out to keep tools, machinery, equipment (excluding ink, coating, or adhesive application equipment) or general work areas in clean and good operational condition.
- 3.68 Manufacturing Process: the process of making goods or articles by hand or by machine.
- 3.69 Matte Finish Flexographic Ink: a printing ink which is applied on non-porous substrates in flexographic printing operations and contains at least five percent by weight silicon dioxide flattening agent.
- 3.70 Metallic Finish Flexographic Ink: a printing ink which is applied on non-porous substrates in flexographic printing operations and contains at least 28 percent by weight elemental metal particles.

- 3.71 Metallic Ink: ink containing at least 50 grams of elemental metal particles per liter of ink (0.4 lb/gal) as applied and which is not used in the manufacture of an electronic circuit.
- 3.72 Non-Absorbent Container: a container made of non-porous material that does not allow the migration of solvents through it.
- 3.73 Non-Atomized Solvent Flow: solvents in the form of a liquid stream without the introduction of any propellant.
- 3.74 Non-heatset Ink: an ink which dries by oxidation and/or absorption into the substrate without use of heat from dryers or ovens.
- 3.75 Non-Leaking Container: a container without liquid leak.
- 3.76 Non-porous Substrate: any substrate whose surface prevents penetration by water, including but not limited to foil, polyethylene, polypropylene, cellophane, metalized polyester, nylon, and polyethylene terephthalate (mylar), paper or paperboard coated with non-porous surface. Clay coated printing paper as defined by the American Paper Institute Classification System, and paperboard coated with clay to prevent water penetration, shall be considered non-porous substrates.
- 3.77 Offset Lithographic Printing: a plane-o-graphic method in which the image and non-image areas are on the same plane and the ink is offset from a plate to a rubber blanket, and then from the blanket to the substrate.
- 3.78 On-Press Component: a part, component, or accessory of a press that is cleaned while still being physically attached to the press.
- 3.79 Operation: any physical action resulting in a change in the location, form, or physical properties of a material, or any chemical action resulting in a change in the chemical composition or the chemical or physical properties of a material.
- 3.80 Operator: includes but is not limited to any person who owns, leases, supervises, or operates a facility and/or equipment.
- 3.81 Organic Solvent: the same as "Solvent."
- 3.82 Organic Solvent Cleaning: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).
- 3.83 Packaging Gravure: gravure printing on paper, paperboard, foil, film, or other substrates which are to be used to produce containers or packages.

- 3.84 Pantone Ink: a printing ink created for color matching by combination of process inks.
- 3.85 Paper Coating: any coating applied on or impregnated into paper, including, but not limited to, adhesive tapes and labels, book covers, post cards, office copier paper, drafting paper, and pressure sensitive tapes.
- 3.86 Plastisizer: a material used to keep plastic material soft and viscous.
- 3.87 Plastisol: a coating that is a liquid dispersion of small particles of resins and plastisizers that are fused to become a plastic.
- 3.88 Porous Substrate: a substrate whose surface does not prevent penetration by water, including but not limited to, paper, paperboard, and any paper product coated with a porous material.
- 3.89 Process Ink: in printing, the hues: yellow, magenta, and cyan, plus black in the four-color print process.
- 3.90 Proof Press: a press used only for printing a sample copy of a graphic art product to check the quality of print, color reproduction and editorial content.
- 3.91 Propellant: any gas, including air, in a pressure container for expelling the contents when the pressure is released.
- 3.92 Publication Gravure: gravure printing on a substrate which is subsequently formed into books, magazines, catalogs, brochures, directories, newspaper supplements or other types of printed materials.
- 3.93 Removable Press Component: a part, component, or accessory of a press that is physically attached to the press but is disassembled and removed from the press prior to being cleaned. Rollers, blankets, metering rollers, fountains, impression cylinders and plates shall not be considered as removable press components.
- 3.94 Repair Cleaning: a solvent cleaning operation or activity carried out during a repair process.
- 3.95 Repair Process: the process of returning a damaged object or an object not operating properly to good condition.

- 3.96 Research and Development: a facility or portion thereof used to further the development of useful materials, devices, systems, or methods, including, but not limited to, design, development, and improvement of prototypes and processes. Research and development does not include the manufacturing process itself.
- 3.97 Resists: inks that are screen printed to form the required patterns, alphabets, numerals, designs, or symbols on the surface of the substrate; protect the screen printed or covered surface from the subsequent application of etching or plating solution; and are later removed from the substrate by a resist stripper. Resist applications include, but are not limited to, etched electronic circuits, display screens, chemical milling of parts, nameplates and signage.
- 3.98 Roll Coater: a type of application equipment in which a series of mechanical rollers form a thin coating film on the surface of a roller, which is subsequently applied to a substrate by moving the substrate underneath the roller.
- 3.99 Roller Wash: a solvent used to remove ink from the rollers of a press.
- 3.100 SCAQMD: South Coast Air Quality Management District.
- 3.101 Screen Printing: a commercial and industrial printing technique which involves the passage of a printing medium, such as ink, through a taut web or fabric to which a refined form of stencil has been applied. The stencil openings determine the form and dimension of the imprint.
- 3.102 Screen Printing Metallic Ink: an ink used in screen printing that contains greater than 50 grams of elemental metal per liter (0.4 lb/gal) of ink as applied.
- 3.103 Sign Ink/Coating: an ink or coating used in screen printing indoor and outdoor signs (excluding structural components) and murals, including lettering enamels, poster colors, copy blockers, and bulletin enamels.
- 3.104 Solvent: as defined in Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal).
- 3.105 Solvent Flushing: the use of a solvent to remove uncured adhesives, uncured inks, uncured coatings, or contaminants from the internal surfaces and passages of equipment by flushing solvent, by a non-atomized solvent flow, through the equipment.
- 3.106 Specialty Flexographic Printing: a flexographic printing on polyethylene or polypropylene food packaging, fertilizer bags, or liquid-tight food containers.

- 3.107 Specialty Gravure Printing: printing that uses the gravure process for production of wall and floor covering, decorated household paper products such as towels and tissues, cigarette filter tips, vinyl upholstery, woodgrains, and a wide variety of other products.
- 3.108 Specialty Ink: an ink that is applied only on non-porous substrates in flexographic printing operations, and is either:
- 3.108.1 a metallic ink that contains at least 28 percent elemental metallic powder, by weight; or
 - 3.108.2 a matte finish ink containing at least 5 percent silicon dioxide flattening agent, by weight.
- 3.109 Stationary Source: as defined in Rule 2201 (New and Modified Stationary Source Review Rule).
- 3.110 Stereolithography: a type of printing process that employs a system using a light to solidify photocurable resins in a desired configuration in order to produce a 3-dimensional object.
- 3.111 Stripping: the use of solvent to remove material such as cured adhesives, cured inks, cured or dried paint, cured or dried paint residue or temporary protective coating.
- 3.112 Substrate Retention Factor: a fraction, expressed in percent, of VOCs in lithographic inks which is retained in the substrate when the inks dry by adsorption or absorption.
- 3.113 Surface Preparation: the removal of contaminants from a surface prior to the application of coatings, inks, or adhesives or before proceeding to the next step of a manufacturing process.
- 3.114 Thermography: a digital printing technology that creates an image via a chemical reaction that occurs when portions of a thermal-coated substrate are subjected to heat. Thermographic technologies include but are not limited to thermal wax transfer, multi-bit thermal wax transfer, and dye sublimation.
- 3.115 Thinner: a solvent that is used to dilute coatings or inks to reduce viscosity, color strength, and solids, or to modify drying conditions.
- 3.116 Ultraviolet (UV) Ink: an ink which dries by polymerization reaction by ultraviolet or electron beam radiation.

- 3.117 Viscosity Reducer: an organic solvent which is added to an adhesive, coating or ink to make it more fluid.
- 3.118 Volatile Organic Compounds (VOCs): as defined in Rule 1020 (Definitions).
- 3.119 Wash Primer: a material used to clean and/or to activate surfaces of paper or fabric that contains no more than 5 percent, by weight, solid materials.
- 3.120 Waste Solvent Material: any solvent which may contain dirt, oil, metal particles, sludge, and/or waste products, or wiping material containing VOCs including, but not limited to, paper, cloth, sponge, rag, or cotton swab used in organic solvent cleaning.
- 3.121 Water Slide Decal: a decal that is screen printed onto treated paper stock and is removable from the stock by the dissolution of an underlying water- soluble adhesive or similar carrier.
- 3.122 Web: a continuous sheet of substrate.
- 3.123 Web Feed: an automatic system which supplies substrates from a web.
- 3.124 Web Splicing Adhesive: an adhesive used to join two continuous rolls of substrate materials.
- 3.125 Wipe Cleaning: a solvent cleaning activity performed by hand rubbing an absorbent material such as a rag, paper, sponge, brush, or cotton swab containing solvent.

4.0 Exemptions

- 4.1 The requirements of this rule, except for the recordkeeping requirements of Section 6.1, shall not apply to the following operations:
 - 4.1.1 Effective until December 31, 2009, any graphic arts printing operation which emits less than 400 pounds of VOC per calendar month.
 - 4.1.2 On and after January 1, 2010 any graphic arts printing operation that emits less than 200 pounds of VOC per 12 rolling consecutive calendar months.
 - 4.1.3 Blanket repair materials used in containers of four (4) fluid ounces or less.
 - 4.1.4 Digital printers and digital printing operations.

- 4.2 The exemptions in Section 4.1 shall not apply to paper, film, foil, or fabric coating operations as defined in Section 3.0.
- 4.3 The requirements of this rule shall not apply to:
 - 4.3.1 Proof presses;
 - 4.3.2 Aerosol adhesives;
 - 4.3.3 The application of coatings and use of cleaning solvents in creating fine arts paintings;
 - 4.3.4 Stripping of cured coatings, cured adhesives, and cured inks, except the stripping of such materials from spray application equipment;
 - 4.3.5 Cleaning operations in printing pre-press or graphic arts pre-press areas, including the cleaning of film processors, color scanners, plate processors, film cleaning, and plate cleaning.
- 4.4 The provisions of Section 5.5 shall not apply to the application of coatings via aerosol products, as defined in Section 3.0.
- 4.5 The VOC content limits of Table 7 shall not apply to cleaning in laboratory tests and analyses, or bench scale or research and development projects.

5.0 Requirements

5.1 Graphic Arts Printing Operation

An operator performing a graphic arts printing operation, not subject to Section 5.2, 5.3, 5.4, or 5.5, shall not use graphic arts materials in excess of the VOC content limits in Table 1 and Table 2, in accordance with the corresponding effective date.

Table 1 VOC Content Limits for Inks, Coatings, and Adhesives		
Material	Grams of VOC per liter (lb/gal), less water and less exempt compounds, as applied, effective through December 31, 2009	Grams of VOC per liter (lb/gal), less water and less exempt compounds, as applied, effective on and after January 1, 2010
Flexographic Ink on Porous Substrates	300 (2.5)	225 (1.88)
All Other Inks	300 (2.5)	300 (2.5)
Coatings	300 (2.5)	300 (2.5)
Adhesives	150 (1.25)	150 (1.25)
Web Splicing Adhesives	300 (2.5)	150 (1.25)

Table 2 VOC Content Limits for Fountain Solution		
Fountain Solution	Percent VOC by Volume, effective through December 31, 2009	Percent VOC by Volume, effective on and after January 1, 2010
Heatset Web Offset Lithographic	8	1.6
Coldset Web Offset Lithographic	8	5.0
Sheet-fed Offset Lithographic with maximum sheet size greater than 11 x 17 inches	8	5.0
All Other Presses	8	8.0

5.2 Flexographic Specialty Ink

5.2.1 An operator using a flexographic printing operation shall not use a specialty ink in excess of the VOC content limit in Table 3, and shall not use more than 2 gallons of specialty inks in a calendar day and 120 gallons of specialty inks in a calendar year.

Table 3 VOC Content Limits for Flexographic Specialty Ink		
Material	Grams of VOC per liter (lb/gal), less water and less exempt compounds, as applied, effective through December 31, 2009	Grams of VOC per liter (lb/gal), less water and less exempt compounds, as applied, effective on and after January 1, 2010
Metallic Ink	485 (4.1)	460 (3.8)
Matte Finish Ink	535 (4.5)	535 (4.5)
Metallic Ink and Matte Finish Ink on Flexible Package Printing	--	383 (3.2)

5.2.2 On and after January 1, 2009, facilities with the potential to emit or with actual emissions of at least 10 tons VOC in any calendar year shall not use specialty inks with VOC content greater than 300 grams VOC per liter, less water and exempt compounds, as applied.

5.3 Coldset Web Offset Lithographic Fountain Solution

On and after January 1, 2010, an operator performing coldset web offset lithographic printing shall use fountain solution with that is five percent alcohol substitute or less, by weight, and shall have no alcohol in the fountain solution.

5.4 Screen Printing Operation

An operator using a screen printing operation shall not use graphic arts materials in excess of the VOC content limits, as applied, in Table 4.

Table 4 VOC Content Limits for Screen Printing Inks, Coatings, and Adhesives	
Material	Grams of VOC per liter (lb/gal), less water and less exempt compounds
Inks and Coatings	400 (3.3)
Adhesives	150 (1.25)
Resists	600 (5.0)

5.5 Paper, Film, Foil, or Fabric Coating Operation

5.5.1 An operator using a paper, film, foil, or fabric coating operation shall not use any coating or wash primer in excess of the VOC content limits, as applied, in Table 5.

Table 5 VOC Content Limits of Paper, Film, Foil, or Fabric Coating and Wash Primer		
Material	VOC Content Limit. Effective through December 31, 2009	VOC Content Limit. Effective on and after January 1, 2010
Coating	265 gm/liter (2.2 lb/gal) of coating, less water and exempt compounds	265 gm/liter (2.2 lb/gal) of coating, less water and exempt compounds
Wash Primer	265 gm/liter (2.2 lb/gal) of material	265 gm/liter (2.2 lb/gal) of material
Plastisols	---	20 gm/liter (0.16 lb/gal)

5.5.2 On and after January 1, 2010, an operator performing pressure sensitive tape and label surface coating operations shall not use any VOC content materials or combinations of materials that exceed a VOC content of either 0.20 kg of VOC/kg of solids (0.20 lb VOC/lb of solids), as applied, or an additional limit of 0.067 kg VOC/kg of coating (0.067 lb of VOC/lb of coating), as applied.

5.6 Approved VOC Emission Control System

5.6.1 Heatset Web Offset Lithographic or Letterpress

On and after January 1, 2010, an operator performing heatset web offset lithographic or letterpress printing that has greater than 25 tpy potential to emit prior to controls shall use an add-on control device, on the dryers, as follows:

5.6.1.1 Heatset web offset lithographic or letterpress printer control device installed prior to December 31, 2008 shall have an overall capture control efficiency of 90%.

5.6.1.2 Heatset web offset lithographic or letterpress printer control device installed after December 31, 2008 shall have an overall capture control efficiency of 95%.

5.6.2 In lieu of compliance with Sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.7, or 5.8 an operator may use a VOC emission control system. The VOC emission control system must meet all of the following requirements:

5.6.2.1 The VOC emission control system shall be approved, in writing, by the APCO.

5.6.2.2 During continuous operation, not to exceed 24 hours, the VOC emission control system shall have a minimum overall VOC capture and control efficiency as specified in Table 6, in accordance with the corresponding effective date;

Table 6 VOC Emission Control System Overall Capture and Control Efficiency		
Process	Overall VOC capture and control efficiency %, by weight, effective through December 31, 2009	Overall VOC capture and control efficiency %, by weight, effective on and after January 1, 2010
Flexible Package Printing (All Technologies)	67%	80%
Publication Gravure	75%	85%
Other Printing Operations	67%	75%
Paper, Film, Foil, or Fabric Coating Operations	86%	90%

5.6.2.3 The collection system shall vent all drying oven exhaust to the control device and shall have one or more inlets for collection of fugitive emissions; and

5.6.2.4 The VOC emission control system shall reduce VOC emissions, at all times, to a level that is not greater than the emissions which would have been achieved through the use of compliant materials, compliant equipment or compliant work practices in Sections 5.1, 5.2, 5.3, 5.4, 5.5, 5.7, or 5.8.

5.7 Coating Application Equipment

No operator shall apply coatings unless coatings are applied with equipment operated according to manufacturer's specifications, and only by the use of one of the following types of coating application equipment:

- 5.7.1 Flow coater,
- 5.7.2 Roll coater,
- 5.7.3 Dip coater,
- 5.7.4 Foam coater,
- 5.7.5 Die coater,
- 5.7.6 Hand application methods, or
- 5.7.7 High-volume, low- pressure (HVLP) spray for air dried coatings
 - 5.7.7.1 For HVLP spray guns manufactured prior to January 1, 1996, the end user shall demonstrate that the gun meets HVLP spray equipment standards. Satisfactory proof will be either in the form of manufacturer's published technical material or by a demonstration using a certified air pressure tip gauge, measuring the air atomizing pressure dynamically at the center of the air cap and at the air horns.
 - 5.7.7.2 A person shall not sell or offer for sale for use within the District any HVLP spray gun without a permanent marking denoting the maximum inlet air pressure in psig at which the gun will operate within the parameters specified in Section 3.0.
- 5.7.8 Other coating application methods which are demonstrated to the APCO to be capable of achieving at least 65 percent transfer efficiency as determined in accordance with Section 6.4. Prior written approval from the APCO shall be obtained for each alternative method used.
- 5.7.9 In lieu of complying with Sections 5.6.1 through 5.6.8, an operator may control emissions from the coating application equipment with a VOC emission control system that meets the requirements of Section 5.6.

5.8 Organic Solvent Cleaning

5.8.1 An operator shall not use organic solvents for cleaning operations that exceed the VOC content limits specified in Table 7 in accordance with the corresponding effective date.

Table 7 VOC Content Limits for Solvent Cleaning		
Type of Solvent Cleaning Operation	VOC Content Limit Grams of VOC/liter of material (lb/gal), effective through December 31, 2009	VOC Content Limit Grams of VOC/liter of material (lb/gal), effective on and after January 1, 2010
A. Product Cleaning During Manufacturing Process; or Surface Preparation for Coating, Ink, or Adhesive Application	25 (0.21)	25 (0.21)
B. Repair and Maintenance Cleaning	25 (0.21)	25 (0.21)
C. Cleaning of Coating or Adhesive Application Equipment	25 (0.21)	25 (0.21)
D. Cleaning of Ink Application Equipment		
1. General	25 (0.21)	25 (0.21)
2. Flexographic Printing	25 (0.21)	25 (0.21)
3. Specialty Flexographic Printing	100 (0.83)	100 (0.83)
4. Gravure Printing		
4.1 Publication	100 (0.83)	100 (0.83)
4.2 Packaging	25 (0.21)	25 (0.21)
5. Lithographic (Offset) or Letterpress Printing		
5.1 Roller Wash – Step 1	500 (4.2)	100 (0.83)
5.2 Roller Wash – Step 2; Roller Wash – not specified; Blanket Wash, and On-Press Components	500 (4.2)	100 (0.83)
5.3 Removable Press Components	25 (0.21)	25 (0.21)
6. Screen Printing	500 (4.2)	100 (0.83)
7. Ultraviolet Ink/Electron Beam Ink Application Equipment (except screen printing)	650 (5.4)	100 (0.83)

5.8.2 An operator performing the following cleaning operations from Table 7 outside of an APCO-approved VOC emission control system and using solvent with VOC content greater than 25 g/L shall meet the requirements of Sections 5.8.3 through 5.8.5, in addition to meeting the applicable VOC content limits of Table 7.

5.8.3 Solvent Cleaning Methods

Cleaning activities that use solvents with VOC content greater than 25 grams per liter of material shall be performed by one or more of the following methods:

5.8.3.1 Wipe cleaning; or

5.8.3.2 Application of solvent from hand-held spray bottles from which solvents are dispensed without a propellant-induced force; or

5.8.3.3 Non-atomized solvent flow method in which the cleaning solvent is collected in a container or a collection system which is closed except for solvent collection openings and, if necessary, openings to avoid excessive pressure build-up inside the container; or

5.8.3.4 Solvent flushing method in which the cleaning solvent is discharged into a container that is closed except for solvent collection openings and, if necessary, openings to avoid excessive pressure build-up inside the container. The discharged solvent from the equipment must be collected into containers without atomizing into the open air. The solvent may be flushed through the system by air or hydraulic pressure, or by pumping.

5.8.4 Solvent shall not be atomized into the open air unless it is vented to a VOC emission control system that complies with Section 5.6. This provision shall not apply to printing operations where the roller or blanket wash is applied automatically and the cleaning of nozzle tips of automated spray equipment systems, except for robotic systems, and cleaning with spray bottles or containers described in Section 5.8.3.2.

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

5.8.6 In lieu of complying with the VOC content limits of Table 7 or the provisions of Sections 5.8.3 through 5.8.5, an operator may control emissions from cleaning operations with an APCO-approved VOC emission control system that meets the requirements of Section 5.6.

5.9 Organic Solvent Disposal and Storage

An operator shall store or dispose of fresh or spent solvents, waste solvent cleaning materials, coatings, adhesives, catalysts, thinners, and ink in closed, non-absorbent and non-leaking containers. The containers shall remain closed at all times except when depositing or removing the contents of the containers or when the container is empty.

5.10 Work Practices

An operator shall properly use and properly operate all graphic arts printing technologies as directed and/or specified by the manufacturer of the printer or graphic arts material.

6.0 Administrative Requirements

6.1 Recordkeeping

An operator subject to the provisions of this rule, including stationary sources exempt pursuant to Sections 4.1 shall maintain the following records on-site for a minimum of five years, and make records available to the APCO, ARB, and EPA upon request:

6.1.1 Materials List

Maintain a current file documenting coatings, inks, adhesives, fountain solutions, wash primers, and solvents in use and in storage. The file shall include a material safety data sheet (MSDS) or product data sheet showing the material name, manufacturer's name, VOC content as applied, specific mixing instructions, and density.

6.1.2 Compliant Materials Records

If only compliant materials in Sections 5.1, 5.2, 5.3, 5.4, 5.5, or Table 7 are used to comply with the rule:

6.1.2.1 Record, on a monthly basis, the type and amount of all inks used according to one of the following methods:

6.1.2.1.1 Group the quantity of all inks used and identify the maximum VOC content and use the minimum density of 1,010 gm/liter (8.44 lb/gal); or

6.1.2.1.2 Report process inks and pantone inks separately and use specific VOC content and density value for each process ink, and the highest VOC content and the minimum density of 1,010 gm/liter (8.44 lb/gal) for pantone inks; or

6.1.2.1.3 Report process inks and pantone inks separately and use the maximum VOC content and minimum density value for both process and pantone inks, or use the density of 1,010 gm/liter (8.44 lb/gal) for pantone inks; or

6.1.2.1.4 Itemize each ink and pantone ink and use the specific VOC content and density value for each.

6.1.2.2 Record, on a monthly basis, the type and amount of each coating, adhesive, wash primer, and solvent (including cleaning solvent) used.

6.1.2.3 Record, on a monthly basis, the type, amount, and percent VOC by volume of fountain solution used.

6.1.3 Noncompliant Materials Records

If noncompliant materials are used, and compliance with the rule is achieved through Section 5.6, the operator shall record, on a daily basis, the type and amount of all inks, coatings, adhesives, fountain solutions, wash primers, and solvents (including non-compliant cleaning solvent) used.

6.1.4 Records for Flexographic Specialty Inks

If flexographic specialty inks are used pursuant to Section 5.2, record, on a daily basis, the type and amount of each specialty ink used.

6.1.5 VOC Emission Control System Records

An operator using a VOC emission control system pursuant to Section 5.6 as a means of complying with this rule shall maintain daily records of key system operating parameters to demonstrate continuous operation and compliance of the VOC emission control system during periods of emission-producing activities.

6.1.6 Digital Printing Records

6.1.6.1 On and after January 1, 2010, operators shall keep records, in accordance with Section 6.1.6.2, for each digital printer that:

6.1.6.1.1 Uses solvent-based inks and has a print capacity of 1,000 ft²/hr or more, or

6.1.6.1.2 Uses water-based inks, or UV inks and has a print capacity of 10,000 ft²/hr or more,

6.1.6.2 Operators with printers Subject to Section 6.1.6.1 shall keep the following records:

6.1.6.2.1 A current file of inks, coatings, adhesives, and solvents in use and in storage. The file shall include a MSDS or product data sheet showing the material name, manufacturer's name, VOC content as applied, specific mixing instructions, and density.

6.1.6.2.2 Monthly records of the type, and amount of each ink, coating, and/or adhesive used.

6.1.6.2.3 Monthly records of the type, and amount of solvent used for thinning the ink, coating, or adhesive, and for cleaning.

6.2 Compliance Statement

The manufacturer of inks, coatings, adhesives, fountain solutions, wash primers, and solvents which are sold for use in graphic arts printing operations, and paper, film, and foil or fabric coating operations within the District shall include a designation in the MSDS or product data sheet to include the material name, manufacturer's name, specific mixing instruction, VOC content, and density.

6.3 Determination of VOC Emissions from Inks Used in a Lithographic Printing Operation

For the purposes of determining compliance with emissions limits, and determining eligibility for exemption under Section 4.1 of this rule, the amount of VOC emitted from heatset and non-heatset inks used shall be discounted by the following substrate retention factors: 20 percent for heatset inks and 95 percent for non-heatset inks. These substrate retention factors shall not be used when determining compliance of inks with applicable VOC content limits specified in this rule, and heatset and non-heatset lithographic inks shall meet the VOC content limits specified in Section 5.1, Table 1.

6.4 Test Methods

The VOC content of materials subject to the provisions of this rule and overall capture and control efficiency of VOC emission control systems shall be determined by the following test methods specified in Sections 6.4.1 through 6.4.9, or alternative test methods approved by the APCO, EPA, and ARB.

6.4.1 Except for UV inks, the VOC content of printing inks, adhesives, fountain solutions, solvents and coatings shall be determined by using EPA Method 24 or 24A as applicable. The VOC content of UV inks, except for thin film UV inks, shall be determined by using ASTM D5403-93 (2007) (Test Methods for Volatile Content of Radiation Curable Materials).

6.4.2 Exempt Compound Content: Exempt compound content shall be determined by using ARB Method 432, "Determination of Dichloromethane and 1,1,1-Trichlorethane in Paints and Coatings," September 12, 1989; ARB Method 422 "Determination of Volatile Organic Compounds in Emission from Stationary Sources," January 22, 1987; or, SCAQMD Method 303-91 "Determination of Exempt Compounds," August 1, 1996.

- 6.4.3 The content of silicon dioxide as a flattening agent in a matte finish ink shall be determined by using the latest EPA approved revision of ASTM D717-86 (Standard Test Methods for Analysis of Magnesium Silicate Pigment).
- 6.4.4 The metal content of metallic inks shall be determined by SCAQMD Test Method 318, (Determination of Weight Percent Elemental Metal In Coatings by X-Ray Diffraction).
- 6.4.5 Determination of emissions of VOC from spray gun cleaning systems shall be made using SCAQMD method "General Test Method for Determining Solvent Losses from Spray Gun Cleaning Systems," October 3, 1989.
- 6.4.6 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.
- 6.4.7 Determination of Overall Capture and Control Efficiency of VOC Emission Control Systems
 - 6.4.7.1 The capture efficiency of a VOC emission control system's collection device(s) shall be determined according to EPA's "Guidelines for Determining Capture Efficiency," January 9, 1995 and 40 CFR 51, Appendix M, Test Methods 204-204F, as applicable.
 - 6.4.7.2 The control efficiency of a VOC emission control system's VOC control device(s) shall be determined using EPA Test Methods 2, 2A, or 2D for measuring flow rates and EPA Test Methods 25, 25A, or 25B for measuring total gaseous organic concentrations at the inlet and outlet of the control device(s). EPA Method 18 or ARB Method 422 shall be used to determine the emissions of exempt compounds.

6.4.7.3 For VOC emission control systems that consist of a single VOC emission collection device connected to a single VOC emission control device, the overall capture and control efficiency shall be calculated by using the following equation:

$$CE_{\text{Capture and Control}} = [CE_{\text{Capture}} \times CE_{\text{Control}}] / 100$$

Where:

$CE_{\text{Capture and Control}}$ = Overall Capture and Control Efficiency, in percent

CE_{Capture} = Capture Efficiency of the collection device, in percent, as determined in Section 6.4.8.1.

CE_{Control} = Control Efficiency of the control device, in percent, as determined in Section 6.4.8.2.

6.4.7.4 The following equation shall be used to determine if the minimum required overall capture and control efficiency of an emission control system is at an equivalent or greater level of VOC reduction as would be achieved using compliant materials, equipment, or work practices, as stated in Section 5.6.2.4.

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

Where:

CE = Minimum Required Overall Capture and Control Efficiency, percent

VOC_{LWc} = VOC Limit, less water and less exempt compounds

$VOC_{LWn,Max}$ = Maximum VOC content of noncompliant ink (or coating or adhesive) used in conjunction with a control device, less water and less exempt compounds

$D_{n,Max}$ = Density of solvent, reducer, or thinner contained in the noncompliant ink (or coating or adhesive), containing the maximum VOC content of the multi-component ink (or coating, or adhesive) printing line

D_c = Density of corresponding solvent, reducer, or thinner used in the compliant ink (or coating, or adhesive) system = 880 gm/liter.

7.0 Compliance Schedule

The operator who becomes subject to the emission limits/standards of this rule through loss of exemption in Section 4.0 shall not operate the subject equipment, except as required for obtaining a new or modified Permit-to-Operate, until the operator demonstrates that the operation is in full compliance with the requirements of this rule.