RULE 2.29
GRAPHIC ARTS PRINTING OPERATIONS

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100 GENERAL

101 **PURPOSE:** The purpose of this rule is to limit the emission of volatile organic compounds (VOCs) from graphic arts operations.

102 **APPLICABILITY:** The provisions of this rule are applicable to graphic arts operations regardless of the substrate, or any person who sells or distributes any material subject to the provisions of this rule.

110 **EXEMPTION - SMALL USER:**

110.1 The requirements of this Rule shall not apply to any facility that that is permitted to emit less than 1,200 pounds of VOCs per calendar quarter from graphic arts operations, including surface preparation and cleanup solvents. For the purpose of calculating exemption applicability, emissions of VOCs from the use of non-heatset lithographic ink shall be determined by the test methods specified in Section 600 of this Rule.

110.2 Any person claiming an exemption under this Section shall have information available, such as purchase orders or hazardous waste manifests, that would allow the APCO to verify facility usage.

111 **EXEMPTION – DIGITAL PRINTING**: The requirements of this Rule, with exception of Section 501 of this Rule, shall not apply to digital printers and digital printing operations.

112 **EXEMPTION – AEROSOL ADHESIVES:** The requirements of this rule shall not apply to aerosol adhesives.

113 **EXEMPTION – STRIPPING OF CURED COATINGS, ADHESIVES, OR INKS:** The requirements of this rule shall not apply to stripping of cured coatings, cured adhesives, and cured inks.

200 DEFINITIONS

201 **AEROSOL ADHESIVE:** An adhesive that is dispensed from a hand-held self-pressurized container by means of propellant induced force.

202 **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 are considered to be performing a graphic arts operation.

203 **CONTROL DEVICE:** Equipment such as an incinerator or adsorber used to prevent air pollutants from reaching the ambient air.

204 **CONVERTING OPERATION:** Coating, waxing, laminating, extrusion coating and printing, for fabrication of base materials. The base materials are then used to produce wraps, bags, and other preformed packages.

205 **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 ink jet, thermography, electrophotography, ionography, and magnetography.

206 **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.

207 **DOCTOR BLADE:** A steel blade used to scrape excess ink from a printing plate.

208 **DRYING OVEN:** An oven used to hasten the process of drying printed or coated material.

209 **ELECTOPHOTOGRAPHY:** 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.

210 **EMISSION CONTROL SYSTEM:** A control device and its associated collection system.

211 **EXEMPT COMPOUNDS:** As defined in District Rule 1.1, General Provisions and Definitions.

212 **EXTREME PERFORMANCE INK/COATING:** An ink or coating used in screen printing on a non-porous substrate that is designed to withstand any of the following:

212.1 More than two years of outdoor exposure; or

212.2 Exposure to industrial-grade chemicals, solvents, acids detergents, oil products, cosmetics, temperatures exceeding 76^{o}C (170^{o}F), vacuum forming, embossing, or molding.

213 **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.

214 **FLEXOGRAPHIC PRINTING:** A printing operation in which words, designs, or pictures are applied to a substrate by means of a roll printing technique in which a raised pattern is applied to an image carrier made of rubber or other elastomeric materials mounted on a steel matting cylinder. The image is then printed directly from the raised pattern to the substrate.

215 **FOUNTAIN SOLUTION:** The solution applied to the image plate to maintain the hydrophilic properties of the non-image areas and to keep the non-image area free from ink.

216 **FUGITIVE EMISSIONS:** Emissions of VOCs from any portion of the printing, coating, or lamination operation other than the drying oven.

217 **GRAPHIC ARTS OPERATIONS:** Publication gravure, packaging gravure, web-feed wallpaper screen printing, specialty gravure, flexographic printing operations, lithographic printing operations, letterpress printing operations, or any coating or laminating operation that manufactures flexible packaging material for the packaging industry. Coating operations which are performed by a machine having only coating units and no printing units are not graphic arts operations.

218 **GRAVURE PRINTING:** An intaglio printing operation in which the ink is transferred from minute etched wells which comprise the image on a plate to the substrate which is supported by an impression roller, with excess ink removed from the plate by a doctor blade.

219 **INK JET:** A digital printing technology in which ink is injected through print heads onto a substrate to create an image.

220 **INTAGLIO PRINTING:** A printing operation done from a plate in which the image is etched or engraved into the surface.

221 **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.

222 **LAMINATING OPERATIONS:** A process of composing two or more layers of material to form a single multiple-layer sheet by using adhesive as the bonding agent.

223 **LETTERPRESS PRINTING:** A printing operation in which the image area is raised relative to the nonimage area and the ink is transferred to the paper directly from the image surface.

224 **LINE:** The minimum equipment which is required for the application and/or curing of inks and/or coatings on a substrate, including the ink and/or coating applicators and heating oven(s) and associated ink and coating mixing equipment.

225 **LITHOGRAPHIC PRINTING:** A printing operation in which the image and nonimage areas exist in the same plane. The nonimage area is treated chemically so that the image areas will be printed onto the substrate.

226 **MAGNETOGRAPHY:** A digital printing technology whereby an image is printed using a magnetic toner, electromagnetic write heads, and magnetic fields on an imaging drum.

227 **MAKEUP SOLVENT:** That solvent which is added to printing inks to reduce viscosity.

228 **METALLIC INK:** An ink that contains greater than 50 grams of metal per liter (0.4 lb/gal) of ink.

229 **NONHEATSET INK:** An ink which dries primarily by oxidation and absorption into the substrate without the use of heat from dryers or ovens, used primarily in lithographic and letterpress printing.

230 **NONPOROUS SUBSTRATE:** Any substrate other than paper or paperboard, including but not limited to foil, polyethylene, polypropylene, cellophane, metallized polyester, nylon and polyethylene terephthalate (mylar), but not including wood, metal, or ceramic materials.

231 **OFFSET PRINTING:** A lithographic printing operation in which the image area is transferred, or offset, to another surface, and then printed onto the substrate.

232 **PACKAGING GRAVURE PRINTING:** A gravure printing operation on paper, paperboard, foil, film or other substrates which are to be used to produce containers or packages.

233 **PANTONE INKS:** A printing ink created for color matching by combination of process inks.

234 **POROUS SUBSTRATE:** Paper or paperboard.

235 **PRODUCTION UNIT:** A ream of paper, consisting of 500 sheets of paper.

236 **PUBLICATION GRAVURE PRINTING:** A gravure printing operation on paper which is subsequently formed into books, magazines, catalogs, brochures, directories, newspaper supplements or other publication material.

237 **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.

238 **SCREEN PRINTING:** A printing operation in which the printing ink passes through a refined form of stencil to a web or fabric. The stencil openings determine the form and dimension of the imprint.

239 **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.

240 **SOLVENT:** Organic compounds which are used as diluents, thinners, dissolvers, viscosity reducers, cleaning agents, or for other similar uses.

241 **SPECIALTY GRAVURE PRINTING:** A gravure printing operation for production of wall and floor covering, decorated household paper products such as towels and tissues, cigarette filter tips, vinyl upholstery, gift wrap, and woodgrains.

242 **SURFACE PREPARATION AND CLEANUP:** The removal of contaminants such as dust, soil, oil, grease, etc., prior to any step in a manufacturing process from parts, products, tools, machinery, equipment, and general work areas.

243 **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.

244 **VOLATILE ORGANIC COMPOUNDS (VOC):** As defined in Rule 1.1, General Provisions and Definitions.

245 **VOLATILE ORGANIC COMPOUND (VOC) CONTENT:** Weight of VOC per volume of material as calculated pursuant to the applicable Sections of 600.

246 **WEB:** A continuous sheet of substrate that is printed on web-feed printing presses.

247 **WEB-FEED:** An automatic system on a printing press which supplies a web substrate to the printing unit.

248 **WEB SPLICING ADHESIVE:** An adhesive used to join two continuous rolls of substrate.

300 STANDARDS

301 **FLEXOGRAPHIC, GRAVURE, LETTERPRESS, AND LITHOGRAPHIC REQUIREMENTS:** A person shall not operate a flexographic, gravure, letterpress, lithographic, related printing or coating operation unless the following product limits are met:

301.1 A person shall not use any ink, coating, or adhesive with a VOC content in excess of the following limits, expressed as grams of VOC per liter (or pounds per gallon) of product as applied, less water and exempt compounds.

Table 1

Product	VOC CONTENT Grams VOC/Liter of Product as applied, less water and exempt compounds (lbs/gal)
Ink	300 (2.5)
Coating	300 (2.5)
Adhesive	150 (1.25)
Web Splicing Adhesive	300 (2.5)

301.2 A person shall not use any fountain solution which contains a total VOC in excess of the following limits, expressed in Percent by Weight

Table 2	
Material Type	**VOC CONTENT % by Weight of As-Applied Product**
Heatset Web Offset Lithography	
Fountain Solutions Containing Alcohol 1. Chilled Using Refrigerated Chiller **2.** Non-Chilled Fountain Solutions Containing No Alcohol **1.** Chilled or Non-Chilled	 3 1.6 5
Coldset Web Offset Lithography	
Fountain Solutions Containing No Alcohol 1. Chilled or Non Chilled	 5
Sheet-fed Offset Lithography with maximum sheet size greater than 11 X 17 inches or total solution reservoir greater than 1 gallon	
Fountain Solutions Containing Alcohol 1. Chilled Using Refrigerated Chiller 2. Non-Chilled Fountain Solutions Containing No Alcohol 1. Chilled or Non-Chilled	 8.5 5 5
All other Presses	
All other Presses 1. Chilled Using Refrigerated Chiller 2. Non-Chilled	 10 8

301.3 The refrigerated chiller shall be equipped with a temperature gauge. The temperature of the fountain solution shall be maintained below 60° F (16° C) at all times.

302 **SCREEN PRINTING REQUIREMENTS:** A person shall not operate a screen printing operation, unless the product limits as shown in **Table 2**, expressed in grams of VOCs per liter (lbs/gal) as applied, less water and exempt compounds are met.

Table 3	
Product	**VOC CONTENT Grams VOC/Liter of Product as applied, less water and exempt compounds (lbs/gal)**
Ink	400 (3.3)
Coating	400 (3.3)
Adhesive	150 (1.25)
Resists	600 (5.0)
Extreme Performance Ink/Coating	400 (3.3)
Metallic Ink	400 (3.3)
Sign Ink/Coating	400 (3.3)

303 **EMISSION CONTROL SYSTEM:** In lieu of complying with the Sections 301 or 302, an operator may use a VOC emission control system that controls emissions from the source operation provided the following conditions are met:

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

303.2 The VOC emission control system shall be operated with an overall capture and control efficiency of at least 95 percent by weight during periods of emission producing activity.

304 **STORAGE AND DISPOSAL - GENERAL:** All VOC-containing materials, whether in its form for intended use or as a waste or used product, including items such as cloth or paper laden with VOC containing materials, shall be stored in non-absorbent, non-leaking containers which shall be kept closed at all times, except when filling or emptying, and disposed of in a manner to prevent evaporation of VOCs into the atmosphere at the facility.

305 **REQUIREMENTS FOR SURFACE PREPARATION AND CLEANUP MATERIALS:** Any solvent cleaning of application equipment, parts, products, tools, machinery, equipment, general work areas, and the storage and disposal of VOC-containing materials used in surface preparation and cleanup operations shall be carried out pursuant to Rule 2.31, Surface Preparation and Cleanup.

306 **PROHIBITION OF SALE:** A person shall not supply, sell, solicit, or offer for sale, any material for use in graphic arts operations that does not comply with the standards set forth in Sections 301, 302, or 303 of this rule. The prohibition in

this section shall not apply to graphic arts operations that are exempt from this rule pursuant to Section 110, 111, 112, or 113 or that uses emission control equipment pursuant to Section 305 of this rule.

400 ADMINISTRATIVE REQUIREMENTS

401 **PROHIBITION OF SPECIFICATION:** A person shall not specify the use of any ink, coating, adhesive, or fountain solution, in graphic arts operations subject to the provisions of this rule that does not meet the limits and requirements of this rule where such applications result in a violation of this rule. The requirements of this Section shall apply to all written or oral contracts.

402 **COMPLIANCE STATEMENT REQUIREMENT:** The manufacturer or distributor of all inks, coatings, adhesives, fountain solutions, or makeup solvents, which are sold for use in graphic arts operations within the District shall include on product data sheets a designation of both the as-supplied VOC content, less water, except for fountain solutions, (prior to any recommended dilution) and the as-applied VOC content (based on any recommended dilution) of each material. Fountain solution VOC content shall be expressed in grams per liter of material or pounds per gallon of material. The VOC content shall be expressed in grams per liter or pounds per gallon and may be determined either by calculation or analysis.

403 **OPERATION AND MAINTENANCE PLAN (O&M Plan):** Any person using an emission control device pursuant to Sections 303 of this Rule as a means of complying with this rule must submit, with the application for Authority to Construct, pursuant to Rule 3.1, GENERAL PERMIT REQUIREMENTS, an O&M Plan for the emission control device to the APCO for approval. The O&M Plan shall specify operation and maintenance procedures which will demonstrate continuous operation of the control device during periods of emission-producing operations. The O&M Plan shall also specify which records must be kept to document these operation and maintenance procedures. These records shall comply with the requirements of Sections 501.4 and 502 of this Rule. Any person using an emission control device must fully comply with all O&M Plans submitted for approval, even if such O&M Plans have not yet been approved, unless notified in writing by the APCO.

500 MONITORING AND RECORDS

501 **RECORD KEEPING - GENERAL:** Any person subject to the provisions of Sections 110, 301, 302, or 303 of this Rule shall:

501.1 Maintain a current list of inks, coatings, adhesives, fountain solutions and makeup solvent including the following:

a. Material name and manufacturer;
b. Application method;
c. Coating category and mix ratio specific to the coating; and
d. Actual VOC content for coatings and the regulatory VOC content for coatings, as applied.

501.2 Record on a monthly basis the type and amount of all using one of the following methods:

a. Group the quantity of all inks used and identify the maximum VOC content and use the minimum density of 1.01 kg/l (8.44 lb/gal);
b. Report process inks and pantone separately and use the specific VOC content and density value for each process ink and the highest VOC and 1.01 kg/l (8.44 lb/gal) for pantone inks;
c. Report process inks and pantone inks separately using the maximum VOC content and minimum density for both process and pantone inks or use the density of 1.01 kg/l (8.44 lb/gal);
d. Itemize each ink and pantone ink and use the specific VOC content and density value for each.

501.3 Record on a monthly basis the type and amount of each coating, adhesive, fountain solution; and makeup solvent used.

501.4 Maintain O&M Plan records required by the provisions of Section 403 of this Rule on a daily basis.

502 **RECORD KEEPING - EMISSION CONTROL SYSTEMS:** If compliance with this rule is achieved through the use of an emission control system, in addition to the provisions of Section 501, the owner or operator shall maintain:

502.1 Daily usage records of all ink, coating adhesive, fountain solution; and makeup solvent used.

502.2 Daily records of key operating parameters such as temperatures, pressures, flowrates, and hours of operation of the control device to verify compliance of the capture and control device.

502.3 Maintenance work which interferes with the operation of the control device.

503 **REPORTING:** All records required by this Rule shall be maintained on site for a period of five years and made available to the APCO upon request.

600 TEST METHODS AND CALCULATIONS

601 **GENERAL:** For the purposes of this Rule, the following test methods or calculation methods shall be used. Other test methods determined to be equivalent and approved in writing by the District and the EPA may also be used. VOC emissions or other parameters determined to exceed any limits established by this Rule through the use of any of the following test methods or calculations shall constitute a violation of this Rule.

602 **VOC CONTENT:** The VOC content of adhesives, coatings, fountain solutions, makeup solvents and all inks subject to the provisions of this Rule, except UV inks, shall be determined in accordance with EPA Method 24 and 24A.

603 **VOC CONTENT - UV INKS:** The VOC content of UV inks shall be determined by using test method D5403-93(2013).

604 **EXEMPT COMPOUNDS:** Compounds considered exempt from the definition of VOC shall be determined in accordance with ASTM D4457-02(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.

605 **CALCULATION OF VOC CONTENT:** The VOC content per volume of material shall be calculated as follows:

605.1 The VOC content per volume of inks, coatings and adhesives shall be calculated less water and less exempt compounds as follows:

$$VOC_{con} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:

VOC_{con} = Grams of VOC per liter of material
W_s = Weight of volatile compounds in grams
W_w = Weight of water in grams
W_{es} = Weight of exempt compounds in grams
V_m = Volume of coating materials in liters
V_w = Volume of water in liters
V_{es} = Volume of exempt compounds in liters

605.2 The VOC content per volume of fountain solution shall be calculated by the following equation:

$$VOC_{con} = \frac{(W_S - W_W - W_{ES})}{V_M}$$

Where:

VOC_{con}= Grams of VOC per liter of material
W_S = Weight of volatile compounds in grams
W_W = Weight of water in grams
W_{ES} = Weight of exempt compounds in grams
V_M = Volume of material in liters

606 **CAPTURE EFFICIENCY:** The capture efficiency of a VOC emission control system's collection device shall be determined according to EPA's "Guidelines for Determining Capture Efficiency," January 9, 1995 and 40 CFR 51, Appendix M, Methods 204-204F, as applicable.

607 **CONTROL EFFICIENCY:** The control efficiency of a VOC emission control system's collection device shall be determined by using EPA Methods 2, 2A, or 2D for measuring flow rates and EPA Method 25, 25A, or 25B for measuring total gaseous organic concentrations at the inlet and outlet of the control device. EPA Method 18 or CARB Method 422 shall be used to determine the emissions of exempt compounds.

608 **OVERALL CAPTURE AND CONTROL EFFICIENCY**: For VOC emission control systems that consist of a single VOC emission control device, the overall capture and control efficiency shall be calculated by using the following equation:

CEoverall = [CEcapture x CEcontrol] / 100%

Where:

CEoverall = Overall Capture and Control Efficiency
CEcapture = Capture Efficiency of the collection device*
CEcontrol = Control Efficiency of the collection device**

*As determined in Section 606
**As determined in Section 607

609 **METAL CONTENT:** The measurement of metal content shall be determined in accordance with South Coast Air Quality Management District's Method 318 Determination of Weight Percent Elemental Metal in Coatings by X-Ray Diffraction.