

COMMONWEALTH OF VIRGINIA  
STATE AIR POLLUTION CONTROL BOARD  
REGULATIONS FOR THE CONTROL AND ABATEMENT OF AIR POLLUTION

9 VAC 5 CHAPTER 40  
EXISTING STATIONARY SOURCES

PART II  
Emission Standards

Article 56.1  
Emission Standards for Offset Lithographic Printing Operations  
in the Northern Virginia Volatile Organic Compound Emissions Control Area, 8-hour  
Ozone Standard (Rule 4-56.1)

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9VAC5-40-8420. Applicability and designation of affected facility.

A. The affected facility to which the provisions of this article apply is any offset lithographic printing operation at a stationary source where the actual emissions of volatile organic compounds (VOCs) from all aspects of offset lithographic printing operations, including related cleaning activities, before the consideration of controls are equal to or exceed 3.0 tons per 12-month rolling period.

B. The provisions of this article apply only to sources of VOCs located in the Northern Virginia VOC Emissions Control Area designated in subdivision 1 a of 9VAC5-20-206.

9VAC5-40-8422. Definitions.

A. For the purpose of applying this article in the context of the Regulations for the

Control and Abatement of Air Pollution and related uses, the words or terms shall have the meanings given them in subsection C of this section.

B. Unless otherwise required by context, all terms not defined in this section shall have the meanings given them in 9VAC5-170 (Regulation for General Administration), 9VAC5-10 (General Definitions), or commonly ascribed to them by recognized authorities, in that order of priority.

C. Terms defined.

"Alcohol" means any of the following compounds when used as a fountain solution additive: ethanol, n-propanol, and isopropanol.

"Alcohol substitute" means any nonalcohol additive that contains volatile organic compounds and is used in the fountain solution.

"Batch" means a supply of fountain solution or cleaning solution that is prepared and used without alteration until completely used or removed from the printing process.

"Cleaning materials" means any washes, cleaners, solvents, or rejuvenators that are used to remove (i) excess printing inks, oils, and residual paper from a press, press equipment, or press parts or (ii) dried ink from areas around a press. Cleaning materials include solvents and cleaners used for manual cleaning and cleaning solutions used by automatic cleaning systems such as blanket wash, plate cleaner, metering roller cleaner, impression cylinder washes, rubber rejuvenators, and roller wash. Cleaning materials do not include cleaners used for cleaning electronic components of a press, pre-press cleaning operations (e.g., platemaking), post-press cleaning operations (e.g., binding), cleaning supplies such as detergents used to clean the floor (other than to remove dried ink from areas around a press), and cleaning performed in parts washers and cold cleaners subject to Article 47 (9VAC5-40-6820 et seq.) of Part II of 9VAC5-40 (Existing Stationary Sources).

"Composite partial vapor pressure" means the sum of the partial pressures of the compounds defined as volatile organic compounds. Composite partial vapor pressure is calculated as follows:

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

where:

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

$W_w$	=	Weight of water, in grams.
$W_e$	=	Weight of exempt compound, in grams.
$MW_i$	=	Molecular weight of the "i"th VOC compound, in grams/gram-mole.
$MW_w$	=	Molecular weight of water, in grams/gram-mole.
$MW_e$	=	Molecular weight of exempt compound, in grams/gram-mole.
$PP_c$	=	VOC composite partial pressure at 20°C, in millimeters of mercury (mm Hg).
$VP_i$	=	Vapor pressure of the "i"th VOC compound at 20°C, in mm Hg.

"First installation date" means the date that a control device is first installed for the purpose of controlling emissions. The first installation date does not change if the control device is later moved to a new location or installed on a different press.

"Fountain solution" means any mixture of water, volatile and nonvolatile chemicals, and additives applied to a lithographic plate to repel ink from the nonimage area on the plate.

"Heatset" means a printing process in which heat from a dryer is used to evaporate ink oils from the substrate.

"Heatset web offset lithographic printing dryer" means the dryer or dryers installed as part of a heatset web offset lithographic printing process that dries inks or surface coatings.

"Lithographic printing" means a planographic printing process in which the image and nonimage areas are chemically differentiated with the image area being oil receptive and the nonimage area being water receptive. This process differs from other printing processes, where the image is a raised or recessed surface.

"Non-heatset" means a printing process in which the printing inks are set and dried by absorption or oxidation rather than heat. For the purposes of this article, UV-cured and electron beam-cured inks are considered non-heatset.

"Offset lithographic printing" means a printing process that transfers the ink film from the lithographic plate to an intermediary surface (blanket), which, in turn, transfers the ink film to the substrate.

"Offset lithographic printing operation" means one or more printing processes employing offset lithographic printing on printing presses and includes the related processes necessary to directly support the operation of those offset lithographic printing processes including, but not limited to, pre-press and post-press operations. Varnishes, glues, and other coatings that are applied by an offset lithographic printing process are part of offset lithographic printing operations and are not considered as a separate process (e.g., paper coating).

"Press" means a printing production assembly composed of one or more units to produce a printed substrate (sheet or web).

"Printing" means a photomechanical process in which a transfer of text, designs, and images occurs through contact of an image carrier with a substrate.

"Printing process" means any operation or system wherein printing ink or a combination of printing ink and surface coating is applied, dried, or cured and that is subject to the same emission standard. A printing process may include any equipment that applies, conveys, dries, or cures inks or surface coatings, including, but not limited to, flow coaters, flashoff areas, presses, digital output devices, fountain solutions, heaters, dryers, drying areas, and ovens.

"Sheet-fed" means a printing process in which individual sheets of substrate are fed into the press sequentially.

"Theoretical potential to emit" means for the purposes of this article the maximum capacity of a heatset web offset lithographic printing process to emit VOC and shall be based on emissions at design capacity or maximum production and maximum operating hours (8,760 hours/year) before add-on controls, unless the heatset web offset lithographic printing process is subject to state and federally enforceable permit conditions that limit production rates or hours of operation.

"12-month rolling period" means a period that is determined monthly and consists of the previous 12 consecutive calendar months.

"Unit" means the smallest complete printing component, composed of an inking system, of a printing press.

"VOC" means volatile organic compound.

"Web" means a continuous roll of printing substrate.

9VAC5-40-8424. Standard for volatile organic compounds.

A. No owner or other person shall use or permit the use of any offset lithographic printing press, offset lithographic printing process, or other offset lithographic printing operation that is subject to this article unless that press, process, or operation meets the requirements of this section.

B. Except as provided in subdivision 3 of this subsection, the following provisions apply to each heatset offset lithographic printing process at a facility whose potential to emit is greater than or equal to 10 tons per year of VOC, provided that the emission rates are determined in a manner acceptable to the board. All VOC emissions from printing inks, coatings, cleaning solutions, and fountain solutions shall be considered in determining the potential to emit for this subsection.

1. VOC emissions from the heatset web offset lithographic printing process

dryer shall be controlled as follows:

a. The dryer shall operate at a lower air pressure than the pressroom air pressure at all times when the printing process is operating.

b. Exhaust air from the dryer shall be collected and sent to a control device that operates at all times when the printing process is operating.

c. The control device shall reduce VOC emissions in the dryer air exhaust by at least 90%.

2. Where the heatset web offset lithographic printing process control device inlet VOC concentration is too low to achieve the control device efficiency requirements specified in subdivision 1 c of this subsection or there is no identifiable measurable inlet, the control device shall reduce the VOC concentration of the heatset web offset lithographic printing process dryer exhaust air to 50 parts per million volume (ppmv) or less, as carbon (minus methane and ethane).

3. The provisions in subdivisions 1 and 2 of this subsection do not apply to the following:

a. Any heatset web offset lithographic printing process with a theoretical potential to emit of 25 tons per year of VOC (petroleum ink oil) or more from the heatset web offset lithographic printing dryer. VOC standards for heatset web offset lithographic printing process with a theoretical potential to emit of 25 tons per year of VOC (petroleum ink oil) or more are provided in subsection C of this section.

b. Printing processes used exclusively for determination of product quality and commercial acceptance provided:

(1) The operation is not an integral part of the production process;

(2) The emissions from all product quality printing processes do not exceed 400 pounds in any 30-day period; and

(3) The exemption is approved by the board.

c. Photoprocessing, typesetting, or imagesetting equipment using water-based chemistry to develop silver halide images.

d. Platemaking equipment using water-based chemistry to remove unhardened image-producing material from an exposed plate.

e. Equipment used to make blueprints.

f. Any sheet-fed offset lithographic press with a cylinder width of 26 inches or less.

C. Except as provided in subdivisions 3, 4, and 5 of this subsection, the following provisions apply to each heatset web offset lithographic printing process with a theoretical potential to emit of 25 tons per year of VOC (petroleum ink oil) or more from the dryer. These provisions do not apply to non-heatset web offset lithographic printing processes or to sheet-fed offset lithographic printing processes.

1. VOC emissions from the heatset web offset lithographic printing process dryer shall be controlled as follows:

a. The dryer shall operate at a lower air pressure than the pressroom air pressure at all times when the printing process is operating.

b. Exhaust air from the dryer shall be collected and sent to a control device that operates at all times when the printing process is operating.

c. For a control device whose first installation date is prior to February 1, 2016, the control device shall reduce VOC emissions in the dryer air exhaust by at least 90%.

d. For a control device whose first installation date is on or after February 1, 2016, the control device shall reduce VOC emissions in the dryer air exhaust by at least 95%.

2. Where the heatset web offset lithographic printing process control device inlet VOC concentration is too low to achieve the control device efficiency requirements specified in subdivisions 1 c and 1 d of this subsection or there is no identifiable measurable inlet, the control device shall reduce the VOC concentration of the heatset web offset lithographic printing process dryer exhaust air to 20 parts per million volume (ppmv) or less, as hexane on a dry basis.

3. Federally enforceable limitations on (i) the VOC petroleum ink oil) content of inks, varnishes, and other coatings applied prior to the dryer; (ii) the total amounts of inks, varnishes, and other coatings applied; (iii) the press application rates of inks, varnishes, and other coatings; or (iv) the hours of press operation may be used to meet the 25 ton per year exception to this subsection.

4. The provisions of subdivisions 1 and 2 of this subsection do not apply to (i) any heatset web offset lithographic printing process constructed on or after February 1, 2016 and used exclusively for book printing, or (ii) any heatset web offset lithographic printing process constructed on or after February 1, 2016 with a maximum web width of 22 inches or less.

5. The heatset web offset lithographic printing process dryer control device

provisions of subdivision 1 d of this subsection do not apply to (i) any heatset web offset lithographic printing process used exclusively for book printing; or (ii) any heatset web offset lithographic printing process with a maximum web width of 22 inches or less.

D. The following provisions shall apply to fountain solution applied to each offset lithographic printing press, except that these provisions shall not apply to (i) sheet-fed offset lithographic printing processes with a sheet size of 11 inches by 17 inches or smaller or (ii) sheet-fed offset lithographic printing processes with a total fountain solution reservoir of less than one gallon.

1. For each heatset web press:

a. When the fountain solution contains alcohol:

(1) The fountain solution, as applied, shall contain no more than 1.6% volatile organic compounds by weight; or

(2) The temperature of the fountain solution shall be maintained at or below 60°F and the fountain solution, as applied, shall contain no more than 3.0% VOCs by weight; or

b. When the fountain solution contains no alcohol, the fountain solution, as applied, shall contain no more than 5.0% VOCs by weight.

2. For each non-heatset web press, the fountain solution, as applied, shall contain no alcohol and shall contain no more than 5.0% VOCs by weight.

3. For each sheet-fed press:

a. The fountain solution, as applied, shall contain no more than 5.0% VOCs by weight; or

b. The temperature of the fountain solution shall be maintained at or below 60°F and the fountain solution, as applied, shall contain no more than 8.5% VOCs by weight.

E. Cleaning materials used at each offset lithographic printing operation shall meet one of the following limits, as applied:

1. A VOC content of 30% by weight; or

2. A composite vapor pressure of 10 mm Hg at 20°C (68°F).

The use of cleaning materials not meeting the limits in subdivision 1 or 2 of this subsection is permitted provided that the quantity of cleaning material used does not exceed 110 gallons over any 12-month rolling period.

F. The following work practices shall be implemented.

1. Cleaning materials, fountain solution, inks, varnishes, and coatings containing VOCs shall be kept in closed containers at all times unless filling, draining, or performing cleaning operations.

2. Shop towels, sponges, and other manual cleaning aids that (i) have been used for picking up excess ink, fountain solution, varnishes, and other coatings containing VOCs or (ii) have been used with cleaning materials containing VOCs shall be kept in closed containers.

3. Spills of cleaning materials, fountain solution, inks, varnishes, and other coatings containing VOCs shall be minimized and shall be cleaned up promptly.

9VAC5-40-8426. Standard for visible emissions.

The provisions of Article 1 (9VAC5-40-60 et seq.) of Part II of 9VAC5-40 (Existing Stationary Sources) apply.

9VAC5-40-8428. Standard for fugitive dust/emissions.

The provisions of Article 1 (9VAC5-40-60 et seq.) of Part II of 9VAC5-40 (Existing Stationary Sources) apply.

9VAC5-40-8430. Standard for odor.

The provisions of Article 2 (9VAC5-40-130 et seq.) of Part II of 9VAC5-40 (Existing Stationary Sources) apply.

9VAC5-40-8432. Standard for toxic pollutants.

The provisions of Article 4 (9VAC5-60-200 et seq.) of Part II of 9VAC5-60 (Hazardous Air Pollutant Sources) apply.

9VAC5-40-8434. Compliance.

A. The provisions of 9VAC5-40-20 (Compliance) apply.

B. If requested by the board, an emission test of the control device installed on a heatset web offset lithographic printing process dryer shall be performed to demonstrate compliance with the provisions of 9VAC5-40-8424 B and C. The negative dryer pressure shall be established during the initial test using an airflow direction indicator, such as a smoke stick or aluminum ribbons, or a differential pressure gauge. The board may accept the results of an emission test conducted prior to the compliance date specified in 9VAC5-40-8436 if the owner or operator provides information and data that



demonstrate that the test demonstrated compliance with the provisions of 9VAC5-40-8424 B and C.

C. Continuing compliance with the heatset web offset lithographic printing process dryer control requirements in 9VAC5-40-8424 B and C shall be demonstrated for the catalytic or thermal oxidation control device by monitoring the control device in accordance with 9VAC5-40-8440 B 3, B 4, and B 5. The owner shall maintain the three-hour average of the monitored temperature at a temperature no less than 50°F below the three-hour average temperature that was recorded during the most recent performance test during which compliance was demonstrated. In the absence of performance test results acceptable to the board that provide dryer control device temperatures that demonstrate continuing compliance with the requirements in 9VAC5-40-8424 B and C, control device temperatures that demonstrate compliance with manufacturer recommendations may be considered by the board to demonstrate compliance with heatset web offset lithographic printing process dryer control requirements in 9VAC5-40-8424 B and C.

D. A portion of the volatile organic compounds contained in inks and cleaning solution is retained in the printed web and in the shop towels used for cleaning. When applicable, the following retention factors may be used in determining volatile organic compounds emissions from offset lithographic printing operations:

1. A 20% volatile organic compound retention factor may be used for petroleum ink oils contained in heatset inks that are printed on absorptive substrates, meaning that 80% of the VOC (petroleum ink oil) in the ink is emitted during the printing process and is available for capture and control by an add-on pollution control device.

2. A 100% volatile organic compound retention factor may be used for vegetable ink oils contained in heatset inks that are printed on absorptive substrates, meaning that none of the VOC (vegetable ink oil) in the ink is emitted during the printing process and available for capture and control by an add-on pollution control device.

3. A 95% volatile organic compound retention factor may be used for petroleum ink oils contained in sheet-fed and non-heatset web inks printed on absorptive substrates, meaning that 5.0% of the VOC (petroleum ink oil) in the ink is emitted during the printing process.

4. A 100% volatile organic compound retention factor may be used for vegetable ink oils contained in sheet-fed and non-heatset web inks printed on absorptive substrates, meaning that none of the VOC (vegetable ink oil) in the ink is emitted during the printing process.

5. A 50% volatile organic compound retention factor may be used for cleaning solution VOC in shop towels for those cleaning solutions with a volatile organic compounds composite vapor pressure of no more than 10 millimeters of mercury (Hg) at 20°C (68°F) provided that the cleaning materials and used shop towels are kept in

closed containers.

E. A portion of the volatile organic compounds contained in inks, fountain solutions, and automatic blanket washes is captured for control by add-on air pollution control equipment. When applicable, the following capture efficiencies may be used in determining volatile organic compounds emissions from offset lithographic printing operations:

1. A 40% volatile organic compound capture efficiency may be used for automatic blanket washing when the VOC composite vapor pressure of the cleaning material is less than 10 millimeters of mercury (Hg).

2. A 70% volatile organic compound capture efficiency may be used for alcohol substitutes in fountain solutions.

3. A 100% volatile organic compound capture efficiency may be used for VOC (petroleum ink oils) from oil-based paste inks and oil-based paste varnishes (coatings) when the dryer is demonstrated to be operating at negative pressure relative to the surrounding pressroom.

4. Conventional heatset lithographic inks and varnishes are paste-type materials. If other types of inks or coating materials are used on a heatset lithographic press (e.g., fluid inks or coatings), capture efficiency testing shall be conducted for the VOC from these other materials if the printer wants to take into account the effect that the dryer controls have on VOC emissions from these other types of inks or coatings.

9VAC5-40-8436. Compliance schedule.

The owner shall comply with the provisions of this article as expeditiously as possible but in no case later than February 1, 2017.

9VAC5-40-8438. Test methods and procedures.

- A. The provisions of 9VAC5-40-30 (Emission testing) apply.

- B. The following EPA test methods shall be used to demonstrate compliance with the heatset web offset lithographic printing process dryer control device control requirements in 9VAC5-40-8424 B and C.

1. Reference Method 1 or 1A, as appropriate, shall be used to select the sampling sites.

2. Reference Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the velocity and volumetric flow rate of the exhaust stream.

3. Reference Method 3 or 3A, as appropriate, shall be used to determine

the concentration of O<sub>2</sub> and CO<sub>2</sub>.

4. Reference Method 4 shall be used to determine moisture content.

5. Reference Methods 18, 25, or 25A shall be used to determine the VOC concentration of the dryer exhaust stream entering and exiting the control device, unless the alternate limit in 9VAC5-40-8424 B 2 or C 2 is being met, in which case only the VOC concentration of the dryer exhaust control device outlet shall be determined.

6. Reference Method 25A shall be used to determine the dryer exhaust control device inlet and outlet VOC concentrations when the control device outlet concentration is less than 50 parts per million volume (ppmv) VOC as carbon.

7 If the control device is an oxidizer, the combustion chamber temperature or catalyst bed inlet temperature corresponding to destruction efficiencies that meet the requirements of 9VAC5-40-8424 B or C, as appropriate, shall be recorded.

C. The VOC content of as-applied inks, varnishes and other coatings, fountain solutions, and cleaning materials shall be determined using Reference Method 24.

1. The analysis of as-supplied materials may be performed by the manufacturer or the supplier. Formulation information from the manufacturer may be used in lieu of Reference Method 24 analysis unless the board or the owner has reason to believe that the formulation information provided by the manufacturer is inaccurate.

2. The owner may use VOC content information provided by the manufacturer or supplier, such as the container label, the product data sheet, or the Safety Data Sheet (SDS) to document the VOC content of the as-supplied material.

3. If fountain solution or cleaning materials are diluted by the owner prior to use, a calculation that combines the as-supplied VOC content information provided by the manufacturer or supplier, the VOC content of the diluent, and the proportions in which they are mixed may be used to make a determination of VOC content of the as-applied fountain solution or cleaning material in lieu of Reference Method 24.

4. The owner shall conduct Reference Method 24 testing of any as-applied fountain solution or cleaning material used for offset lithographic printing operations at any time at the board's request. The owner shall be prepared to sample as-applied fountain solution or cleaning materials at all times.

D. A thermometer or other temperature detection device capable of reading the temperature of the fountain solution to within 0.5°F shall be used to determine compliance with fountain solution temperature requirements in 9VAC5-40-8424 D.

E. The VOC composite partial vapor pressure of cleaning solutions shall be

determined using the formula provided in 9VAC5-40-8422 C or by an appropriate test method approved by the board.

1. The determination VOC composite partial vapor pressure for as-supplied cleaning solutions may be performed by the manufacturer or the supplier. The determination of as-applied composite vapor pressure based upon the manufacturer's instructions for dilution may be performed by the manufacturer or supplier.

2. The owner may use VOC composite partial vapor pressure information provided by the manufacturer or supplier, such as the container label, the product data sheet, or the Safety Data Sheet (SDS), to document the VOC composite partial vapor pressure of the as-supplied or as-applied cleaning materials.

3. The following provisions apply to the determination of VOC composite partial vapor pressure for cleaning materials that are diluted by the owner prior to use:

- a. If the dilution is made according to the manufacturer's instructions, the VOC composite partial vapor pressure for the as-applied cleaning material provided by the manufacturer or supplier may be used.

- b. If a dilution is made and an as-applied VOC composite partial vapor pressure has not been provided by the manufacturer or supplier, or if the dilution is not made according to the manufacturer's instructions, then the owner shall determine the VOC composite partial vapor pressure using the calculation method provided in 9VAC5-40-8422 C.

4. The owner shall conduct testing of any as-applied cleaning materials used for offset lithographic printing operations at any time at the board's request. The owner shall be prepared to sample as-applied cleaning materials at all times.

9VAC5-40-8440. Monitoring.

- A. The provisions of 9VAC5-40-40 (Monitoring) apply.

- B. Periodic monitoring of offset lithographic printing operations shall be conducted as follows:

1. The alcohol concentration of offset lithographic printing process fountain solution shall be monitored with a hydrometer, equipped with temperature correction or with readings adjusted for temperature, and recorded at least once per shift or once per batch, whichever is longer. A standard solution shall be used to calibrate the hydrometer for the type of alcohol used in the fountain.

2. The temperature of refrigerated fountain solution shall be measured at the recirculating tank at least once per operating day.

3. The temperature of a catalytic or thermal oxidation control device shall be monitored at least once every 15 minutes while the printing process is operating, and that temperature shall be recorded by an analog or digital recording device.

a. For a catalytic oxidizer, the dryer exhaust temperature upstream of the catalyst bed shall be monitored and recorded.

b. For a thermal oxidizer, the combustion chamber temperature of the oxidizer shall be monitored and recorded.

4. Catalyst bed material in a catalytic oxidation control device shall be inspected annually for general catalyst condition and any signs of potential catalyst depletion. Sampling and evaluation of the catalyst bed material shall be conducted whenever the results of the inspection indicate signs of potential catalyst depletion or poor catalyst condition based on manufacturer's recommendations, but not less than once per year.

5. If a heatset web offset lithographic printing process is interlocked to ensure that the control device is operating and airflow is present when the printing process is operating, then periodic monitoring of dryer air flow is not required. If no interlock is present, then the printing process dryer air flow shall be verified and recorded once per operating day.

9VAC5-40-8450. Notification, records, and reporting.

The provisions of 9VAC5-40-50 (Notification, records, and reporting) apply.

9VAC5-40-8460. Registration.

The provisions of 9VAC5-20-160 (Registration) apply.

9VAC5-40-8470. Facility and control equipment maintenance or malfunction.

The provisions of 9VAC5-20-180 (Facility and control equipment maintenance or malfunction) apply.

9VAC5-40-8480. Permits.

A permit may be required prior to beginning any of the activities specified in this section if the provisions of 9VAC5-50 (New and Modified Stationary Sources) and 9VAC5-80 (Permits for Stationary Sources) apply. Owners contemplating such action should review those provisions and contact the appropriate regional office for guidance on whether those provisions apply.

1. Construction of a facility.

2. Reconstruction (replacement of more than half) of a facility.
3. Modification (any physical change to equipment) of a facility.
4. Relocation of a facility.
5. Reactivation (re-startup) of a facility.
6. Operation of a facility.

HISTORICAL NOTES:

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