

10 CSR 10-5.442 Control of Emissions from Lithographic Printing Operations

(1) Applicability.

(A) This rule shall apply to installations that operate offset lithographic or letterpress printing presses including heatset web, non-heatset web (newspaper and non-newspaper), and non-heatset sheet-fed presses in the City of St. Louis and Jefferson, St. Charles, Franklin, and St. Louis Counties.

(B) This rule shall apply only to installations described in subsection (1)(A) of this rule, with total actual emissions from lithographic and letterpress printing operations, including related cleaning activities, before consideration of controls, of more than three (3) tons per twelve (12)-month rolling period of volatile organic compounds (VOCs).

(C) This rule shall not apply to printing on fabric, metal, or plastic.

(D) Once the installation exceeds the applicability level of this rule, it shall remain subject to this rule even if its actual emissions drop below the applicability level of this rule until it can demonstrate, to the satisfaction of the director, that the total actual VOC emissions from lithographic and letterpress printing operations including related cleaning activities, before consideration of controls, is less than three (3) tons per twelve (12)-month rolling period for sixty (60) consecutive months.

(E) VOC emissions calculations guidance may be found in subsection (5)(D) of this rule. As an alternative, the material use guidance in subsection (5)(E) of this rule may be used to determine applicability.

(2) Definitions. Definitions of certain terms specified in this rule may be found in 10 CSR 10-6.020.

(3) General Provisions.

(A) Fountain Solutions. This subsection applies only to offset lithographic presses with a total fountain solution reservoir capacity of one (1) gallon or more.

1. No owner or operator shall use or permit the use of any applicable offset lithographic printing press unless—

A. For each heatset web press—

(I) The fountain solution, as applied, contains one and six-tenths percent (1.6%) or less by weight of alcohol; or

(II) The fountain solution, as applied, contains three percent (3.0%) or less by weight of alcohol and is refrigerated to a temperature of sixty degrees Fahrenheit (60 °F) or less; or

(III) The fountain solution, as applied, contains five percent (5.0%) or less by weight of alcohol substitutes; and

(IV) The fountain solution mixing tanks are covered for alcohol-based solutions;

B. For each sheet-fed press with a maximum sheet size greater than eleven inches by seventeen inches (11" x 17")-

(I) The fountain solution, as applied, contains five percent (5.0%) or less by weight of alcohol; or

(II) The fountain solution, as applied, contains eight and five-tenths percent (8.5%) or less by weight of alcohol and is refrigerated to a temperature of sixty degrees Fahrenheit (60 °F) or less; or

(III) The fountain solution, as applied, contains five percent (5.0%) or less by weight of alcohol substitutes or a combination of alcohol and alcohol substitutes; and

(IV) The fountain solution mixing tanks containing alcohol-based solutions are covered; and

C. For each non-heatset web press, the fountain solution, as applied, contains no alcohol and five percent (5.0%) or less by weight of alcohol substitutes.

2. Direct measurement of the alcohol content of the fountain solution, as applied, shall be performed and recorded with a hydrometer, equipped with temperature correction or with readings adjusted for temperature, at least once per day or once per batch, whichever is longer. A standard solution shall be used to calibrate the hydrometer once per month for the type of alcohol used in the fountain.

3. For fountain solutions, as applied, containing alcohol substitutes or nonalcohol additives and, as an alternative to paragraph (3)(A)2. of this rule, the VOC content shall be established with proper record keeping which may include, as necessary to determine compliance, the amount of concentrated substitute added per

quantity of fountain water, date of preparation, calculated VOC content of the final solution, or by measurement using U.S. Environmental Protection Agency (EPA) Method 24 analysis as outlined in paragraph (5)(C)1. of this rule. For automatic mixing systems, verification and record keeping of the mixer settings shall be performed at least once each month.

4. The fountain solution temperature for each required refrigerated fountain reservoir containing alcohol-based solutions shall be measured at least once per day or once per batch, whichever is longer, by a thermometer or other temperature detection device capable of reading to one-half degree Fahrenheit (0.5 °F).

(B) Press Cleaning. No owner or operator shall use or permit the use of any applicable offset lithographic or letterpress printing press unless—

1. All cleaning solutions, excluding a quantity not to exceed one hundred ten (110) gallons per facility in any twelve (12) consecutive months, shall have a VOC content of seventy percent (70%) or less, by weight, or a composite partial vapor pressure less than or equal to ten (10) millimeters of mercury (Hg) at twenty degrees Celsius (20 °C);

2. The cleaning solutions are kept in tightly-covered containers at all times except when being dispensed as needed for cleaning operations;

3. The used cleaning cloths contaminated with cleaning solutions are placed in tightly-closed containers while awaiting off-site transportation. The cleaning cloths should be properly cleaned and disposed; and

4. The VOC content or composite partial vapor pressure of the cleaning solution, as applied, shall be established with proper record keeping which may include, as necessary to determine compliance, the amount of concentrated cleaning solution added per quantity of water, date of preparation, calculated VOC content, composite partial vapor pressure of the final solution, by measurement using EPA Method 24 analysis as outlined in paragraph (5)(C)2. of this rule, or the formula in paragraph (5)(C)3. of this rule. For automatic blanket wash systems, verification and record keeping of the mixer settings shall be performed at least once each month.

(C) Heatset Web Press Emission Control Systems. This subsection applies only to heatset web lithographic and letterpress printing presses with the potential to emit (PTE) VOCs from ink oil greater than twenty-five tons per year (25 tpy) unless any such press is used for book printing or has a maximum web width of twenty-two inches (22") or less.

1. No owner or operator shall use or permit the use of any press without a dryer which has one hundred percent (100%) of its exhaust ducted to a control device that is maintained and operated to achieve, at all times while the press is operating, at least the indicated percentage by weight control efficiency.

VOC Control Device First Installed	VOC Control Percentage
Prior to March 1, 2012	90
On or after March 1, 2012	95

The dryer pressure shall be maintained below the pressure of the press room at all times while the press is operating. Continuous dryer air flow monitoring is not required.

2. As an alternative to achieving the applicable control efficiency in paragraph (3)(C)1. of this rule, any press shall operate its control device to maintain a maximum VOC outlet concentration of twenty parts per million by volume (20 ppmv) as hexane (C₆H₁₄) on a dry basis.

(D) Use of emission control equipment under subsection (3)(C) of this rule shall require that continuous temperature monitors be installed, calibrated, maintained, and operated at all times while a connected printing press is operating. Temperatures shall be measured with an accuracy of plus or minus seventy-five hundredths of one percent (±0.75%) measured in degrees Celsius, or two and one-half degrees Celsius (2.5 °C). The operating temperatures to be used as the parameters for demonstrating continuous compliance shall be determined per subsection (5)(A) of this rule. The monitors continuously shall measure—

1. For catalytic oxidizers, the gas temperature upstream of the catalyst bed;

2. For thermal and regenerative oxidizers, the oxidizer operating temperature; and

3. Any other parameters considered necessary by the director to verify compliance and proper operation of emission control equipment.

(4) Reporting and Record Keeping.

(A) All persons subject to this rule shall maintain records as required by this section sufficient to determine continuous compliance with this rule. These records shall be kept for at least five (5) years or longer if enforcement action is pending. These records shall be available immediately upon request for review by the Department of Natural Resources' personnel and other air pollution control agencies upon presentation of proper credentials.

(B) All persons subject to subsection (3)(C) of this rule shall maintain records for each control device sufficient to demonstrate that the control efficiency is being maintained. These records shall include, but are not limited to:

1. The temperature readings, logged at least once every fifteen (15) minutes, from the monitors required by paragraphs (3)(D)1. and (3)(D)2. of this rule; and

2. The operating parameters of any required control device determined from any initial or subsequent control efficiency compliance testing as outlined in subsection (5)(A) of this rule.

(C) For each applicable printing press, records shall be maintained to show-

1. For each fountain solution whose VOC content is modified, the calculation or direct measurement data that indicates the resultant VOC content by weight. The calculation or measurement need only be performed once for each batch of fountain solution used except that it need not be performed at all for the dilution of a fountain solution containing alcohol substitutes purchased with less than five percent (5.0%) VOC content before dilution or for alcohol containing fountain solutions requiring refrigeration purchased with less than three percent (3%) or eight and five tenths percent (8.5%) VOC content, for heatset web and sheet-fed presses, respectively;

2. For each fountain solution, a manufacturer's formulation data sheet or Material Safety Data Sheet (MSDS) listing the physical properties of alcohol or alcohol substitute(s) such as density and percent VOC as purchased from the supplier;

3. Results of any testing conducted on an emission unit at a regulated facility;

4. Maintenance records and inspection results of any air pollution control equipment; and

5. The temperature, as required by paragraph (3)(A)1. of this rule, at least once per day or once per batch, whichever is longer.

(D) For each lithographic and letterpress printing installation subject to this rule, records shall be maintained to show-

1. A Material Safety Data Sheet or manufacturer's formulations data listing the percentage by weight of VOC in the cleaning solution, the composite partial vapor pressure of VOC in the cleaning solution, or the necessary data to make a determination thereof as outlined in subsection (5)(C) of this rule;

2. For each cleaning solution whose VOC content is modified, the calculation that indicates the resultant VOC content by weight or composite partial vapor pressure. The calculation need only be performed once for each batch of cleaning solution used except that it need not be performed at all for the dilution of a cleaning solution which does not exceed the VOC limits of paragraph (3)(B)1. of this rule; and

3. The quantity of all cleaning solution used which does not meet the VOC limits set forth in paragraph (3)(B)1. of this rule on a twelve (12)-consecutive-month basis.

(E) The director may require other records as reasonable and necessary to carry out the provisions of the Missouri Air Conservation Law.

(5) Test Methods. Certain test methods mentioned in this rule may be found in 10 CSR 10-6.030. Other EPA test methods specific to this rule may be found in 40 CFR 60, Appendix A.

(A) Control Efficiency Testing. To demonstrate compliance with the emission limits of subsection (3)(C) of this rule, an initial emission test shall be performed after any required control equipment is installed. The emission limits shall not have been met until compliance has been verified through this testing. Testing shall also be required within one hundred eighty (180) days after significant modifications to any control equipment required by this rule. Significant modifications include any repairs or changes that might substantially alter or affect the overall control efficiency. This subsection outlines the methods to be used for any such testing.

1. The emission unit shall be run at typical operating conditions and flow rates compatible with scheduled production during any emission testing.

2. Capture efficiency testing for heatset dryers is not required if it is demonstrated that pressure in the dryer is negative relative to the surrounding press room and the airflow is into the dryer. This test may be performed with a differential pressure gauge or an airflow direction indicator (e.g., smoke stick or aluminum ribbons).

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

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

5. EPA Method 3 or 3A, as appropriate, shall be used to determine the concentration of oxygen (O₂) and carbon dioxide (CO₂).

6. EPA Method 4 shall be used to determine moisture content.

7. EPA Method 18, 25, or 25A shall be used to determine the VOC concentration of the exhaust stream entering and exiting the control device, unless the alternate limit in paragraph (3)(C)2. of this rule is being used for compliance, in which case only the VOC concentration of the exit exhaust shall be determined. In cases where the anticipated outlet VOC concentration of the control device is less than fifty (50) ppmv as carbon, EPA Method 25A shall be used.

8. If EPA Method 25A is used—

A. The outlet readings from a thermal or catalytic oxidizer may be corrected by using EPA Method 18 or 25 to determine non-VOC components (methane and ethane) and subtracting these from the Method 25A result; and

B. The director may require a retest by EPA Method 18 or 25 if the average corrected outlet reading is greater than fifty (50) ppmv VOC as carbon.

9. A compliance test shall consist of up to three (3) separate runs, each lasting a minimum of sixty (60) minutes unless the director determines that the circumstances dictate shorter sampling times.

10. EPA Method 25 specifies a minimum probe temperature of two hundred sixty-five degrees Fahrenheit (265 °F). To prevent condensation, the probe should be heated to at least the gas stream temperature, typically close to three hundred fifty degrees Fahrenheit (350 °F).

11. EPA Method 25A specifies a minimum temperature of two hundred twenty degrees Fahrenheit (220 °F) for the sampling components leading to the analyzer. To prevent condensation when testing heatset printing presses, the sampling components and flame ionization detector lock should be heated to at least the gas stream temperature, typically close to three hundred fifty degrees Fahrenheit (350 °F).

12. The oxidizer operating temperature or the temperature of the gas upstream of the catalyst bed may be used as the operating parameter for determining continuous compliance with the emission standard of subsection (3)(C) of this rule. This temperature shall be computed as the time-weighted average of the temperature values recorded during the test. The owner or operator must maintain the oxidizer at a three (3)-hour average temperature equal to or greater than a temperature fifty degrees Fahrenheit (50 °F) below the average temperature observed during the most recent stack test to demonstrate continuous compliance.

13. Use of an adaptation to any of the methods specified in this subsection may be approved by the director on a case-by-case basis. The owner or operator shall submit sufficient documentation for the director to find that the methods specified in this subsection will yield inaccurate results and that the proposed adaptation is appropriate.

(B) Control Device Inspection. For catalytic oxidizers, the catalyst bed material shall be inspected annually for general catalyst condition and any signs of potential catalyst depletion. The owner or operator shall also collect a representative sample of the catalyst from the oxidizer, per manufacturer's recommendations, and have it tested to evaluate the catalyst's capability to continue to function at or above the required control efficiency. An 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.

(C) VOC Content Testing.

1. Fountain solutions. Compliance with the VOC content limits for fountain solutions established in subsection (3)(A) of this rule shall be determined by one (1) of the following:

A. If fountain solution is diluted prior to use, a calculation that combines EPA Method 24 analytical data for the concentrated materials used to prepare the fountain solution and the proportions in which they are mixed to make the as-applied material. The analysis of the concentrated materials may be performed by the supplier of those materials. Owners or operators may use formulation information provided with the concentrated materials used to prepare the fountain solution, such as the container label, the product data sheet, or the MSDS sheet to document the VOC content of the concentrated material;

B. If fountain solution is not diluted prior to use, MSDS or manufacturer's formulation data sheet may be used; or

C. EPA Method 24 of a sample of fountain solution, as applied.

2. Cleaning solutions. The VOC content or VOC composite partial vapor pressure of cleaning solutions shall be determined by one (1) of the following:

A. Analysis by EPA Method 24 for VOC content or by an appropriate method for VOC composite partial vapor pressure of a sample of the cleaning solution. See formula in paragraph (5)(C)3. of this rule. The analysis may be performed by the supplier of those materials; or

B. Calculation for VOC content that combines EPA Method 24 analytical data for the concentrated materials used to prepare the cleaning solution and the proportions in which they are mixed to make the cleaning solution as applied. Owners or operators may use formulation information provided with the concentrated materials used to prepare the cleaning solution, such as the container label, the product data sheet, or the MSDS sheet to document the VOC content of the concentrated material;

C. If cleaning solution is not diluted prior to use, MSDS or manufacturer's formulation data sheet may be used.

3. Calculations. The VOC composite partial vapor pressure is the sum of the partial pressure of the compounds defined as VOCs. VOC composite partial vapor pressure is calculated as follows:

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

Where:

W_i = Weight of the i^{th} VOC compound, in grams

W_w = Weight of water, in grams

W_c = Weight of exempt compound, in grams

MW_i = Molecular weight of the i^{th} VOC compound, in g/g-mole

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

MW_c = Molecular weight of exempt compound, in g/g-mole

n = Number of VOC compounds

PP_c = VOC composite partial vapor pressure at 20°C (68°F), in mmHg

VP_i = Vapor pressure of the i^{th} VOC compound at 20°C (68°F), in mmHg

(D) VOC Emission Calculations, Retention Factors, and Capture Efficiencies. For purposes of determining VOC emissions from lithographic and letterpress printing operations, the following retention factors and capture efficiencies and formula shall be used:

1. A portion of the VOC contained in inks and cleaning solution is retained in the printed web or in the shop towels used for cleaning. The following retention factors shall be used:

A. For heatset inks printed on absorptive substrates, a twenty percent (20%) VOC retention factor shall be used meaning eighty percent (80%) of the VOC in the ink is emitted during the printing process and is available for capture and control by an add-on pollution control device;

B. For sheet-fed and non-heatset web inks printed on absorptive substrates, a ninety-five percent (95%) VOC retention factor shall be used, meaning five percent (5%) of the VOC in the ink is emitted during the printing process; and

C. For cleaning solution VOC emissions from shop towels using cleaning solutions with a VOC composite vapor pressure of no more than ten (10) mmHg at twenty degrees Celsius (20 °C) (sixty-eight degrees Fahrenheit (68 °F)), a fifty percent (50%) VOC retention factor shall be used if the contaminated shop towels are kept in closed containers;

2. A portion of the VOC contained in inks, fountain solutions, and automatic blanket washes on heatset presses is captured in the press dryer for control by add-on pollution control devices. The following capture factors shall be used:

A. For inks, a one hundred percent (100%) VOC capture efficiency shall be used. All the VOC in the ink that is not retained is assumed to be volatilized in the press dryer if it is demonstrated that the pressure in the dryer is negative relative to the surrounding press room and the airflow is into the dryer;

B. For fountain solutions containing alcohol substitutes, a seventy percent (70%) VOC capture factor shall be used; and

C. For automatic blanket wash solutions with a VOC composite partial vapor pressure of no more than ten (10) mmHg at twenty degrees Celsius (20 °C) (sixty-eight degrees Fahrenheit (68 °F)), a forty percent (40%) VOC capture factor shall be used; and

3. For calculating VOC emissions, the following equations shall be used:

A. For total VOC emissions from an offset lithographic printing facility, including all related cleaning activities—

$$VOC_{TOT} = \sum_{i=1}^m W_{INKi} * VOC_{INKi} * \left(\frac{1 - RF_{INKi}}{100} \right) + \sum_{i=1}^n VOL_{FSi} * VOC_{FSi} + \sum_{i=1}^p VOL_{Csi} * VOC_{Csi} * \left(\frac{1 - RF_{Csi}}{100} \right)$$

Where:

VOC_{TOT} = Total VOC emissions, expressed as pounds

W_{INK} = Weight of ink used, expressed as pounds

VOC_{INK} = Weight fraction of VOC in the ink

RF_{INK} = Retention factor of the ink, expressed as a percent

m = Number of inks

VOL_{FS} = Volume of fountain solution used, expressed as gallons

VOC_{FS} = VOC content of fountain solution, expressed as pounds per gallon

n = Number of fountain solutions

VOL_{CS} = Volume of cleaning solution used, expressed as gallons

VOC_{CS} = VOC content of cleaning solution, expressed as pounds per gallon

RF_{CS} = Retention factor of the cleaning solution, expressed as a percent

p = Number of cleaning solutions

and

B. For VOC ink oil emissions from a heatset web lithographic or letterpress printing press—

$$VOC_{TOT} = \sum_{i=1}^n W_{INK_i} * VOC_{INK_i} * \left(\frac{1 - RF_{INK_i}}{100} \right)$$

Where:

VOC_{TOT} = Total VOC emissions, expressed as pounds

W_{INK} = Weight of ink used, expressed as pounds

VOC_{INK} = Weight fraction of VOC in the ink

RF_{INK} = Retention factor of the ink, expressed as a percent

n = Number of inks

(E) Material Use Guidance: Applicability Determination. Based on EPA's *Potential to Emit (PTE) Guidance for Specific Source Categories* (April 14, 1998) and the equations of paragraph (5)(D)3. of this rule, the methods in this subsection may be used for determining if a facility or press meets the corresponding applicability thresholds.

1. For determining if a facility meets the applicability limits of subsection (1)(B) of this rule, the material use thresholds are as follows:

Type of Printing Operation	12-Month Rolling Material Use Threshold
Sheet-fed	768 gallons of cleaning solvent and fountain solution additives
Non-heatset Web	768 gallons of cleaning solvent and fountain solution additives
Heatset Web	5,400 pounds of ink, cleaning solvent, and fountain solution additives

2. For determining if a web heatset press is subject to subsection (3)(C) of this rule, the material use thresholds are as follows:

Type of Printing Press	Annual Material Use Threshold
Heatset Web	55,800 pounds of ink

EPA Rulemakings

CFR: 40 C.F.R. 52.1320(c)
 FRM: 77 FR 3144 (1/23/12)
 PRM: 76 FR 66013
 State Submission: 1/17/2007
 State Final: section 643.050, RSMo Supp. 2010; effective Aug. 30, 2011.
 APDB File: MO-305
 Description: This revision adds specific emission limits of VOCs for both offset lithographic and letterpress printing operations in the St. Louis Ozone Nonattainment area. It also lowers the applicability limit and adds letterpress printing as a new category.

CFR: 40 C.F.R. 52.1320(c)
 FRM: 65 FR 8060 (2/17/00)
 PRM: 61 FR 10968 (3/18/96)
 State Submission: 11/12/99
 State Final: 10 C.S.R. 10-5 (5/28/95)
 APDB File: MO-76
 Description: This rule restricts the emission of volatile organic compounds from lithographic printing operations.

Difference Between the State and EPA-Approved Regulation

None.