ink and related coating (i) used at the subject facility (or facilities).

$V_{wi}$=the water content, expressed as a volume fraction of water volume per total volume of coating, of each color of waterborne raw ink and related coating (i) used at the subject facility (or facilities).

$W_{oi}$=the VOC content, expressed as a weight fraction of mass of VOC per total mass of coating, of each color of raw ink and related coating (i) used at the subject facility (or facilities).

$W_{wi}$=the water content, expressed as a weight fraction of mass of water per total mass of coating, of each color of waterborne raw ink and related coating (i) used at the subject facility (or facilities).

(c) The following subscripts are used in this subpart with the above symbols to denote the applicable facility:

a=affected facility.
b=both affected and existing facilities controlled in common by the same air pollution control equipment.
e=existing facility.
f=all affected and existing facilities located within the same plant boundary.

[47 FR 50649, Nov. 8, 1982, as amended at 65 FR 61761, Oct. 17, 2000]

## § 60.432 Standard for volatile organic compounds.

During the period of the performance test required to be conducted by § 60.8 and after the date required for completion of the test, no owner or operator subject to the provisions of this subpart shall cause to be discharged into the atmosphere from any affected facility VOC equal to more than 16 percent of the total mass of VOC solvent and water used at that facility during any one performance averaging period. The water used includes only that water contained in the waterborne raw inks and related coatings and the water added for dilution with waterborne ink systems.

## § 60.433 Performance test and compliance provisions.

(a) The owner or operator of any affected facility (or facilities) shall conduct performance tests in accordance with § 60.8, under the following conditions:

(1) The performance averaging period for each test is 30 consecutive calendar days and not an average of three separate runs as prescribed under § 60.8(f).

(2) Except as provided under paragraphs (f) and (g) of this section, if affected facilities routinely share the same raw ink storage/handling system with existing facilities, then temporary measurement procedures for segregating the raw inks, related coatings, VOC solvent, and water used at the affected facilities must be employed during the test. For this case, an overall emission percentage for the combined facilities as well as for only the affected facilities must be calculated during the test.

(3) For the purpose of measuring bulk storage tank quantities of each color of raw ink and each related coating used, the owner or operator of any affected facility shall install, calibrate, maintain, and continuously operate during the test one or more:

(i) Non-resettable totalizer metering device(s) for indicating the cumulative liquid volumes used at each affected facility; or

(ii) Segregated storage tanks for each affected facility to allow determination of the liquid quantities used by measuring devices other than the press meters required under item (i) of this article; or

(iii) Storage tanks to serve more than one facility with the liquid quantities used determined by measuring devices other than press meters, if facilities are combined as decribed under paragraph (d), (f), or (g) of this section.

(4) The owner or operator may choose to install an automatic temperature compensator with any liquid metering device used to measure the raw inks, related coatings, water, or VOC solvent used, or VOC solvent recovered.

(5) Records of the measured amounts used at the affected facility and the liquid temperature at which the amounts were measured are maintained for each shipment of all purchased material on at least a weekly basis for:

(i) The raw inks and related coatings used;

(ii) The VOC and water content of each raw ink and related coating used as determined according to § 60.435;

(iii) The VOC solvent and water added to the inks used;

(iv) The VOC solvent used as a cleaning agent; and

(v) The VOC solvent recovered.

(6) The density variations with temperature of the raw inks, related coatings, VOC solvents used, and VOC solvent recovered are determined by the methods stipulated in § 60.435(d).

(7) The calculated emission percentage may be reported as rounded-off to the nearest whole number.

(8) Printing press startups and shutdowns are not included in the exemption provisions under § 60.8(c). Frequent periods of press startups and shutdowns are normal operations and constitute representative conditions for the purpose of a performance test.

(b) If an affected facility uses waterborne ink systems or a combination of waterborne and solvent-borne ink systems with a solvent recovery system, compliance is determined by the following procedures, except as provided in paragraphs (d), (e), (f), and (g) of this section:

(1) The mass of VOC in the solvent-borne and waterborne raw inks and related coatings used is determined by the following equation:

$$(M_o)_a = \sum_{i=1}^{k}(M_{ci})_a(W_{oi})_a$$
$$+ \sum_{i=1}^{m}(L_{ci})_a(D_{ci})_a(W_{oi})_a$$
$$+ \sum_{i=1}^{n}(L_{ci})_a(V_{oi})_a(D_{oi})_a$$

where:

k is the total number of raw inks and related coatings measured as used in direct mass quantities with different amounts of VOC content.

m is the total number of raw inks and related coatings measured as used by volume with different amounts of VOC content or different densities.

n is the total number of raw inks and related coatings measured as used by volume with different amounts of VOC content or different VOC solvent densities.

(2) The total mass of VOC used is determined by the following equation:

$$(M_t)_a = (M_o)_a + \sum_{i=1}^{m}(L_{di})_a(D_{di})_a + (M_d)_a$$
$$+ \sum_{i=1}^{n}(L_{gi})_a(D_{gi})_a + (M_g)_a$$

where "m" and "n" are the respective total numbers of VOC dilution and cleaning solvents measured as used by volume with different densities.

(3) The mass of water in the waterborne raw inks and related coatings used is determined by the following equation:

$$(M_w)_a = \sum_{i=1}^{k}(M_{ci})_a(W_{wi})_a$$
$$+ \sum_{i=1}^{m}(L_{ci})_a(D_{ci})_a(W_{wi})_a$$
$$+ \sum_{i=1}^{n}(L_{ci})_a(V_{wi})_a(D_{wi})_a$$

where:

k is the total number of raw inks and related coatings measured as used in direct mass quantities with different amounts of water content.

m is the total number of raw inks and related coatings measured as used by volume with different amounts of water content or different densities.

n is the total number of raw inks and related coatings measured as used by volume with different amounts of water content or different water densities.

(4) The total mass of water used is determined by the following equation:

$$(M_v)_a = (M_w)_a + (M_h)_a + \sum_{i=1}^{m}(L_{hi})_a(D_{hi})_a$$

where "m" is the total number of water dilution additions measured as used by volume with different densities.

(5) The total mass of VOC solvent recovered is determined by the following equation:

$$(M_r)_a = (M_m)_a + \sum_{i=1}^{k}(L_{mi})_a(D_{mi})_a$$

where "k" if the total number of VOC solvents, miscellaneous solvent-borne waste inks, and waste VOC solvents measured as recovered by volume with different densities.

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(6) The average VOC emission percentage for the affected facility is determined by the following equation:

$$P_a = \left[ \frac{(M_t)_a - (M_r)_a}{(M_t)_a + (M_v)_a} \right] \times 100$$

(c) If an affected facility controlled by a solvent recovery system uses only solvent-borne ink systems, the owner or operator may choose to determine compliance on a direct mass or a density-corrected liquid volume basis. Except as provided in paragraphs (d), (e), (f), and (g) of this section, compliance is determined as follows:

(1) On a direct mass basis, compliance is determined according to paragraph (b) of this section, except that the water term, $M_v$, does not apply.

(2) On a density-corrected liquid volume basis, compliance is determined by the following procedures:

(i) A base temperature corresponding to that for the largest individual amount of VOC solvent used or recovered from the affected facility, or other reference temperature, is chosen by the owner or operator.

(ii) The corrected liquid volume of VOC in the raw inks and related coatings used is determined by the following equation:

$$(L_o)_a = \sum_{i=1}^{k} \frac{(M_{ci})_a (W_{oi})_a}{D_B} \\ + \sum_{i=1}^{m} \frac{(L_{ci})_a (D_{ci})_a (W_{oi})_a}{D_B} \\ + \sum_{i=1}^{n} \frac{(L_{ci})_a (V_{oi})_a (D_{oi})_a}{D_B}$$

where:

k is the total number of raw inks and related coatings measured as used in direct mass quantities with different amounts of VOC content.

m is the total number of raw inks and related coatings measured as used by volume with different amounts of VOC content or different densities.

n is the total number of raw inks and related coatings measured as used by volume with different amounts of VOC content or different VOC solvent densities.

(iii) The total corrected liquid volume of VOC used is determined by the following equation:

$$(L_t)_a = (L_o)_a + \sum_{i=1}^{m} \frac{(L_{di})_a (D_{di})_a}{D_B} + \frac{(M_d)_a}{D_B} \\ + \sum_{i=1}^{n} \frac{(L_{gi})_a (D_{gi})_a}{D_B} + \frac{(M_g)_a}{D_B}$$

where "m" and "n" are the respective total numbers of VOC dilution and cleaning solvents measured as used by volume with different densities.

(iv) The total corrected liquid volume of VOC solvent recovered is determined by the following equation:

$$P_e = \left[ \frac{(L_t)_e - (L_r)_e}{(L_t)_e} \right] \times 100$$

where "k" is the total number of VOC solvents, miscellaneous solvent-borne waste inks, and waste VOC solvents measured as recovered by volume with different densities.

(v) The average VOC emission percentage for the affected facility is determined by the following equation:

$$P_a = \left[ \frac{(L_t)_a - (L_r)_a}{(L_t)_a} \right] \times 100$$

(d) If two or more affected facilities are controlled by the same solvent recovery system, compliance is determined by the procedures specified in paragraph (b) or (c) of this section, whichever applies, except that $(L_t)_a$ and $(L_r)_a$, $(M_t)_a$, $(M_r)_a$, and $(M_v)_a$ are the collective amounts of VOC solvent and water corresponding to all the affected facilities controlled by that solvent recovery system. The average VOC emission percentage for each of the affected facilities controlled by that same solvent recovery system is assumed to be equal.

(e) Except as provided under paragraph (f) of this section, if an existing facility (or facilities) and an affected facility (or facilities) are controlled in common by the same solvent recovery system, the owner or operator shall determine compliance by conducting a separate emission test on the existing facility (or facilities) and then conducting a performance test on the combined facilities as follows:

(1) Before the initial startup of the affected facility (or facilities) and at any other time as requested by the Administrator, the owner or operator shall conduct emission test(s) on the existing facility (or facilities) controlled by the subject solvent recovery system. The solvent recovery system must handle VOC emissions from only the subject existing facility (or facilities), not from affected facilities, during the emission test.

(2) During the emission test, the affected facilities are subject to the standard stated in § 60.432.

(3) The emission test is conducted over a 30 consecutive calendar day averaging period according to the conditions stipulated in paragraphs (a)(1) through (a)(5) of this section, except that the conditions pertain to only existing facilities instead of affected facilities.

(4) The owner or operator of the existing facility (or facilities) shall provide the Administrator at least 30 days prior notice of the emission test to afford the Administrator the opportunity to have an observer present.

(5) The emission percentage for the existing facility (or facilities) during the emission test is determined by one of the following procedures:

(i) If the existing facility (or facilities) uses a combination of waterborne and solvent-borne ink systems, the average VOC emission percentage must be determined on a direct mass basis according to paragraph (b) or (d) of this section, whichever applies, with the following equation:

$$P_e = \left[ \frac{(M_t)_e - (M_r)_e}{(M_t)_e + (M_v)_e} \right] \times 100$$

where the water and VOC solvent amounts pertain to only existing facilities.

(ii) If the existing facility (or facilities) uses only solvent-borne ink systems, the owner or operator may choose to determine the emission percentage either on a direct mass basis or a density-corrected liquid volume basis according to paragraph (c) or (d) of this section, whichever applies. On a direct mass basis, the average VOC emission percentage is determined by the equation presented in article (i) of this paragraph. On a density-corrected liquid volume basis, the average VOC

emission percentage is determined by the following equation:

$$P_a = \left[ \frac{(L_t)_a - (L_r)_a}{(L_t)_a} \right] \times 100$$

where the VOC solvent amounts pertain to only existing facilities.

(6) The owner or operator of the existing facility (or facilities) shall furnish the Administrator a written report of the results of the emission test.

(7) After completion of the separate emission test on the existing facility (or facilities), the owner or operator shall conduct performance test(s) on the combined facilities with the solvent recovery system handling VOC emissions from both the existing and affected facilities.

(8) During performance test(s), the emission percentage for the existing facility (or facilities), $P_e$, is assumed to be equal to that determined in the latest emission test. The administrator may request additional emission tests if any physical or operational changes occur to any of the subject existing facilities.

(9) The emission percentage for the affected facility (or facilities) during performance test(s) with both existing and affected facilities connected to the solvent recovery system is determined by one of the following procedures:

(i) If any of the combined facilities uses both waterborne and solvent-borne ink systems, the average VOC emission percentage must be determined on a direct mass basis according to paragraph (b) or (d) of this section, whichever applies, with the following equation:

$$P_a = \left\{ \frac{(M_t)_b - (M_r)_b - \left( \frac{P_e}{100} \right)[(M_t)_e + (M_v)_e]}{(M_t)_a + (M_v)_a} \right\} \times 100$$

where $(M_t)_b$ and $(M_r)_b$ are the collective VOC solvent amounts pertaining to all the combined facilities.

(ii) If all of the combined facilities use only solvent-borne ink systems, the owner or operator may choose to determine performance of the affected facility (or facilities) either on a direct mass basis or a density-corrected liquid volume basis according to paragraph

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(c) or (d) of this section, whichever applies. On a direct mass basis, the average VOC emission percentage is determined by the equation presented in article (i) of this paragraph. On a density-corrected liquid volume basis, the average VOC emission percentage is determined by the following equation:

$$P_a = \left[ \frac{(L_t)_b - (L_r)_b - (L_t)_e\left(\frac{P_e}{100}\right)}{(L_t)_a} \right] \times 100$$

where $(L_t)_b$ and $(L_r)_b$ are the collective VOC solvent amounts pertaining to all the combined facilities.

(f) The owner or operator may choose to show compliance of the combined performance of existing and affected facilities controlled in common by the same solvent recovery system. A separate emission test for existing facilities is not required for this option. The combined performance is determined by one of the following procedures:

(1) If any of the combined facilities uses both waterborne and solvent-borne ink systems, the combined average VOC emission percentage must be determined on a direct mass basis according to paragraph (b) or (d) of this section, whichever applies, with the following equation:

$$P_b = \left[ \frac{\left(M_t\right)_b - \left(M_r\right)_b}{\left(M_t\right)_b + \left(M_v\right)_b} \right] \times 100$$

(2) If all of the combined facilities use only solvent-borne ink systems, the owner or operator may choose to determine performance either on a direct mass basis or a density-corrected liquid volume basis according to paragraph (c) or (d) of this section, whichever applies. On a direct mass basis, the average VOC emission percentage is determined by the equation presented in article (i) of this paragraph. On a density-corrected liquid volume basis, the average VOC emission percentage is determined by the following equation:

$$P_a = \left[ \frac{(L_t)_a - (L_r)_a}{(L_t)_a} \right] \times 100$$

(g) If all existing and affected facilities located within the same plant boundary use waterborne ink systems

or solvent-borne ink systems with solvent recovery systems, the owner or operator may choose to show compliance on a plantwide basis for all the existing and affected facilities together. No separate emission tests on existing facilities and no temporary segregated liquid measurement procedures for affected facilities are required for this option. The plantwide performance is determined by one of the following procedures:

(1) If any of the facilities use waterborne ink systems, the total plant average VOC emission percentage must be determined on a direct mass basis according to paragraph (b) of this section with the following equation:

$$P_a = \left\{ \frac{(M_t)_b - (M_r)_b - \left(\frac{P_e}{100}\right)[(M_t)_e + (M_v)_e]}{(M_t)_a + (M_v)_a} \right\} \times 100$$

Where $(M_t)_f$ and $(M_v)_f$ are the collective VOC solvent and water amounts used at all the subject plant facilities during the performance test.

(2) If all of the plant facilities use only solvent-borne ink systems, the owner or operator may choose to determine performance either on a direct mass basis or a density-corrected liquid volume basis according to paragraph (c) of this section. On a direct mass basis, the total plant average VOC emission percentage is determined by the equation presented in article (i) of this paragraph. On a density-corrected liquid volume basis, the total plant average VOC emission percentage is determined by the following equation:

$$P_f \left[ \frac{\left(L_t\right)_f - \left(L_r\right)_a - \left(L_r\right)_e - \left(L_r\right)_b}{\left(L_t\right)_f} \right] \times 100$$

Where $(L_t)_f$ is the collective VOC solvent amount used at all the subject plant facilities during the performance test.

[47 FR 50649, Nov. 8, 1982, as amended at 65 FR 61761, Oct. 17, 2000]

## § 60.434  Monitoring of operations and recordkeeping.

(a) After completion of the performance test required under § 60.8, the owner or operator of any affected facility using waterborne ink systems or solvent-borne ink systems with solvent recovery systems shall record the