SILK SCREENING ATTACHMENT

SILK SCREENING

General instructions for washer operation are printed on the inside lid of each unit. Two automatic silk screen presses with attached electric dryers are used to complete the lid printing. The silk screening is completed near the warehouse area. The only emissions from silk screening will be VOCs emitted as the ink drys and during cleanup operations.

Silk Screening

According to the silk screen press operators the maximum ink usage is 0.125 gallons of ink per hour. Depending on the consistency of the ink, the ink mixing ratio varies. The following are the components added to the ink and their maximum application rate.

Isophorone - 1 part to 8 parts ink
Anti-Foam - 1 part to 8 parts ink
PTSA Catalyst - 1 part to 80 parts ink

1 gallon mixed ink contains: 0.125 gallons isophorone, 0.125 gallons anti-foam, 0.013 gallons catalyst, and 0.738 gallons black ink. As such 0.125 gallons would contain 0.016 gallons isophorone, 0.016 gallons anti-foam, 0.002 gallons catalyst, and 0.092 gallons black ink.

The density and VOC content of each of the components as per their material safety data sheet (MSDS) is as follows.

Black Ink: 8.53 lbs/gal, 90 %VOC
Isophorone: 7.68 lbs/gal, 100 % VOC
Anti-Foam: 6.85 lbs/gal, 90 % VOC
PTSA Catalyst: 7.26 lbs/gal, 100 % VOC

The following calculation presents the potential VOC emissions per press.

[0.092 gal ink/hr x 8.53 lbs/gal x (90 lbs VOC/100 lbs ink)] +[0.016 gal isophorone/hr x 7.68 lbs/gal x (100 lbs VOC/100 lbs ink)] + [0.016 gal anti-foam/hr x 6.85 lbs/gal x (90 lbs VOC/100 lbs ink)] + [0.002 gal catalyst x 7.26 lb/gal x (100 lbs VOC/100 lbs ink)] = 0.942 lbs VOCs/hour
0.942 lbs VOCs/hour x 8760 hours/year x 1 ton/2000 lbs = 4.13 tons VOC/year

It is assumed that 80 percent of the VOC emissions will be emitted at the press, and the remaining 20 percent in the drying oven. Actual VOC emissions from silk screening including cleanup activities is reported to be 1.01 tons.

Silk screening in combination with cleanup (discussed in the next section) is a significant activity and is required to be listed in the Title V permit application.

Silk Screen Cleaning

The silk screens are cleaned after every run. The ink is washed out of the screen in a solvent tank that contains lacquer thinner RL 19098. The approximated usage of the thinner is 12 to 14 gallons per week. For the potential to emit calculation it is assumed that the usage rate is 14 gallons per week. Emissions from silk screen cleaning will be VOCs emitted into the room from the thinner. The solvent tank is not vented separately from the building's general building ventilation system. The potential VOC emissions from silk screening are calculated as follows.

14 gal/week x 1 week/120 hours x 7.17 lbs/gal x (100 lbs VOC/100 lbs thinner) = 0.84 lbs VOC/hour

0.84 lbs VOC/hour x 8760 hours/year x 1 ton/2000 lbs = 3.68 tons VOC/year

The presses are wiped down with rags dampened with isophorone. The maximum usage of the isophorone is 55 gallons per year. If it is conservatively assumed that 100 percent of the isophorone volatizes during the cleaning process and the potential VOC emissions into the room would be as follows.

55 gallons/yr x 7.68 lbs/gallon x 100 lbs VOC/100 lbs isophorone = 422.40 lbs/yr

422.40 lbs VOC/yr x 1 yr/8760 hrs = 0.048 lbs VOC/hr

0.048 lbs VOC/hr x 8760 hrs/yr x 1 ton/2000 lbs = 0.211 tons VOC/yr

The total potential VOC emissions from the silk screen cleaning are as follows.

3.68 tons VOC/yr + 0.21 tons VOC/yr = 3.89 tons per yr

Silk screen cleaning in combination with the printing (as discussed in the previous section) is a significant activity and is required to be listed in the Title V permit application.