



CANADIAN PRINTING INK MANUFACTURERS ASSOCIATION

WHAT ARE VOCs?

A Volatile Organic Compound (VOC) contains one or more carbon atoms and has a high vapour pressure that allows it to readily evaporate into the atmosphere. Once in the atmosphere, the compound participates in atmospheric photochemical reactions. Ground-level ozone is produced when nitrogen oxides and volatile organic compounds (VOC's) react in the presence of sunlight. This is a major component of urban smog, which, at elevated levels, presents a potential health hazard to people of all ages and possibly damages vegetation and degrades the environment.

It is for this reason that government legislation to control VOC emissions has been implemented in Canada, the U.S., Europe and other parts of the world. While there are thousands of compounds that meet the definition, most government programs focus on 50 to 150 of the most abundant compounds containing two to twelve carbon atoms. (http://www.ene.gov.on.ca/envision/monitoring/VOC_List.pdf)

Printing inks and coatings used in the commercial graphic printing industry contain VOC's in varying amounts depending on the type of ink, the drying and printing process, and the substrate and end-use requirements. With the exception of water based inks, essentially all weight lost when the wet ink dries on the printed substrate is VOC.

The need to lower the levels of air pollution caused by the Graphic Arts Industry has resulted in changes in formulations and printing technology. All areas that emit VOC – inks, coatings, fountain solutions, blanket washes, plate developers, etc. – have been investigated and modified where possible.

A summary of the types and typical concentrations of VOC's in the major ink systems used today and alternative means of reducing VOC emissions into the atmosphere follows:

The Sheetfed Offset Lithographic Ink

These inks dry by a chemical oxidation process. There is typically about 10% to 20% of VOC in the form of petroleum distillates in a conventional quickset ink. Most ink manufacturers also produce sheetfed inks which contain less than 10% VOC; however these inks generally set slower depending on the type of substrate used. It is best to consult with the ink manufacturers for recommendations on the proper pressroom operating procedure for low VOC inks.

Web Offset Heatset Lithographic Inks

These inks are printed using high-speed web-offset presses and utilize heat in an oven dryer to evaporate most of the petroleum distillates present in the inks. Typical VOC content in the web heatset inks is 35% to 45%. The primary method of VOC emission reduction and/or control is the use of emission control devices such as a catalytic incinerator.

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Web Offset Coldset Lithographic Inks

These inks are used on high-speed web-offset presses to print newspapers and advertising flyers. Web coldset inks dry primarily by absorption of the ink oil into the paper fibres. VOC content of the web coldset ink typically range from less than 5% to maximum of 30%, mainly of petroleum distillates and ink oil. Ink oils have extremely low volatility and most of them are retained in the ink film and substrate after printing.

Flexographic Inks

These inks are available in both solvent-based and water-based systems. Solvent-based flexographic inks primarily contain alcohols and esters as VOC's in concentrations from 50% to 70% at press viscosity. Depending on the substrates, end-use applications and type of press, a printer can control VOC emissions by use of a solvent recovery system, incinerator or water-based flexographic ink.

Water-based flexographic inks with extremely low VOC's have successfully replaced traditional solvent-based inks on many substrates and end-use applications. Examples of these are: paper, foils & films for labels, plastic shopping bags, wall coverings, polycoated beverage containers and general folding cartons. Consult with the ink manufacturers for their recommendations on the type of water-based inks best suited to meet quality and end-use requirements.

Gravure Inks

Solvent-based gravure inks for packaging cartons and flexible films are basically similar to flexographic inks in their content and composition. Again, water-based gravure inks have successfully replaced high VOC containing solvent-based gravure inks in many general folding carton applications. Water-based inks are being used wherever possible on flexible films and publication printing in the US to reduce VOC emission.

U.V./E.B Inks and Coatings

These types of inks dry through the use of energy to affect a rapid cure. These technologically sophisticated printing inks contain components that are essentially non-volatile and therefore emit minimal VOC's during printing and curing.