

DisplayMaker 72UVR

Frequently Asked Questions



1. What is Ultraviolet light?

Ultraviolet (UV) light is part of the electromagnetic spectrum. The wavelengths of UV light are between 50 and 400 nanometers (nm, or 1×10^{-9} meters). Visible light has slightly longer wavelengths and x-rays have shorter wavelengths. The Sun emits light at all the different wavelengths in electromagnetic spectrum, but it is ultraviolet waves that are responsible for causing sunburns. Though some ultraviolet waves from the Sun penetrate Earth's atmosphere, most of them are blocked from entering by various gases like Ozone.

2. What are UV-curable inks?

UV-curable inks have been widely used in the printing industry for over 20 years and their utility continues to grow. Water-based and solvent-based inks used in other inkjet printers contain water or solvents that must evaporate during the drying or curing phase. With UV-curable inks, the curing takes place through the interaction of the ink ingredients and a strong UV light source. Basically, the ink is applied to the material surface and instantly solidified. Since UV contains little or no solvent, there is a lot of interest in using it because of the lack of VOCs (volatile organic compounds), which has an appealing environmental effect.

UV-curable inks offer several key benefits for inkjet printers. One of the most notable advantages is the instant dry feature that leaves the graphic essentially cured and tack-free. As a result, UV-curable inks can be printed at high print speeds without the need for large complicated drying systems. Since UV-curable inks don't dry in the print head, they can eliminate some of the annoying problems associated with cleaning and purging the head to remove clogs. UV-curable inks cure on the surface of the print media instead of penetrating the media like a solvent ink allowing for UV ink to be printed on a wider variety of surfaces. UV-curable prints, much like their solvent counterparts, are very lightfast and completely waterfast.

3. How do UV-curable inks work?

UV-curable inks are composed of monomers, oligomers, photo-initiators, pigments and various additives to control specific parameters of ink performance. The most widely used UV-curable ink is that based on acrylate chemistry and is the type of chemistry employed in the SolaChrome UV-curable inks. The cross-linking or polymerization that occurs when the ink is 'dried' is facilitated by the photo-initiators absorbing light of specific wavelengths from the UV light source. When light is absorbed, reactive species or free radicals are formed which in turn start the polymerization reaction. As the polymerization progresses the ink film becomes more highly cross-linked giving the final ink film its hardness, gloss, flexibility and adhesion properties.

Photo-initiators → Chemicals that react with UV light to form highly reactive species that in turn react with monomers and oligomers to rapidly increase the ink viscosity and fix the ink film in place.

Monomers → Chemicals that impart a wide range of properties to UV-curable ink formulation depending on their viscosity and functionality. Most nonfunctional monomers act as a 'solvent' for UV-curable inks which provides for flow at room temperatures. Mono and di-functional monomers tend to impart flexibility to ink films while higher monomer functionalities tend to impart hardness and gloss to ink films.

Oligomers → Low molecular weight polymer reactive species that impart specific properties such as flexibility, chemical resistance, hardness, gloss, cure speed, shrinkage and abrasion resistance to final ink films.

Additives → Chemicals included in the ink formulation to aid specific properties such as flow, wettability, stability, gloss, shelf life, etc.

Colorants → Pigments used to give color to the ink film. Pigments impart lightfastness, chemical resistance and abrasion resistance to the ink film.

4. What materials can UV-curable inks print on?

A wide range of rigid materials such as corrugated board, Coroplast¹, Plexiglas, foam boards such as Foam-Cor² and GatorBoard³, Sintra⁴, PVC, polystyrene, wood, etc. Also a wide range of roll-fed materials including paper, vinyl, films, and fabrics.

1. Coroplast: An extruded twinwall plastic sheet produced from a high impact polypropylene copolymer.
2. Fome-Cor: A lightweight board consisting of a rigid extruded polystyrene foam core, sandwiched between clay coated craft paper liners.
3. GatorBoard: An expanded Styrene sandwiched between paper / plastic composite sheets.
4. Sintra: A rigid but flexible plastic board material.

5. What materials can UV-curable inks not print on?

Very few media's will not accept UV-curable inks. Typical failure modes are the lack of adhesion between the cured ink and the substrate or the handling characteristics of the media with our printer. Some materials that are very heavy or dense, such as glass or metal, will likely have difficulty feeding through the printer with accuracy. Other materials that are heat sensitive may not be able to remain flat while printing. One example is UltraBoard, a polystyrene-sheeted foam board that tends to bow causing head strikes. Also, very smooth materials such as glass, some polycarbonates and acrylics, most finished metals, and other highly polished surfaces present very little surface texture for the UV-curable inks to adhere to and mechanically bond.

6. When would solvent inks be more suitable than UV-curable inks?

Solvent inks are inexpensive compared to UV-curable inks, and they have stronger durability and adhesion on flexible media. If a greater majority of printing will be carried out on flexible media, such as vinyl, then a solvent printer may be better suited for the your application.

7. Can UV-curable inks evaporate, causing blockages within the print heads?

UV-curable inks remain in a liquid state until being exposed to ultraviolet light, therefore as long as light is kept from the print heads, the inks will not evaporate in the jets. Minimizing exposure to light, heat, and strong air currents will reduce the amount of effort required to keep jets firing reliably and extend the print head life.

Our experience of starting up a printer that has been idle overnight or a weekend is simply to print two prime bars to recover all of the jets. Under normal situations, purging or wiping the heads is not necessary. If left for a longer period of time, recommended maintenance includes a purge and wipe cycle to remove any partially cured ink from the print heads

8. What maintenance is required to keep the printheads operational without banding?

Jets can usually be brought up to speed by printing two prime bars after extended periods of inactivity that can range to as much as 48 hours. Recommended maintenance for a longer period of time includes a purge and wipe cycle to remove any partially cured ink from the print heads. Removal of the ink and purging with the UV flush solution is recommended if the printheads are expected to be inactive for more than 7 days. Minimizing exposure to light, heat, and strong air currents will extend print head life and reduce the amount of effort required to keep jets firing reliably.

9. Do UV-curable inks smell? Will I need to vent the air?

The inks do not have a strong odor like solvent inks, although they do have a characteristic odor due to their acrylate components. The vapor pressure of UV-curable inks is very low and the concentration in the atmosphere is therefore extremely low. UV lamps do generate ozone, another characteristic odor that may need to be evacuated or neutralized when printing in a production environment for extended periods of time.

10. How safe are UV-curable inks?

The materials used in SolaChrome UV-curable inks have been specifically selected to have low toxicity and can be safely handled as long as routine precautions are taken to avoid ingestion. The materials are also selected to have very low irritant properties although some are classified as irritants for both skin and eyes. But again, the inks are safe to handle as long as appropriate personal protection equipment such as gloves and safety glasses are used. If good working practices are not followed it is possible that prolonged skin contact may cause skin irritation. Certain individuals may develop sensitization or allergic reaction after repeated exposure and would need to be removed from the source of contact.

11. Why are the inks in a box, and not in an open container like on the DisplayMaker 72s?

The inks need to remain in darkness. Exposure to light could cause the ink to begin its curing process.

12. How much are the inks? What is the cost per m²?

The MRSP for a 3 liter box of ink is €520, or approximately €173 per liter.

When compared to the solvent ink used in the DisplayMaker 72s, the DisplayMaker 72uvr will lay down about the same amount of UV-curable ink as solvent ink for similar print jobs. The difference between the two is the waste factor in purges, idle spits and gutter spits, which are necessary to maintain good jet health with solvent inks. Assuming both printers use 10.76 ml / m² of ink for printing we estimate these costs with waste factored in to be approximately:

Cost per m ² UV	=	€1.87 / m ²
Cost per m ² SOLVENT	=	€1.25 / m ²

13. What are the order numbers for the inks and print head flush?

0901147-001	SolaChrome UV Ink, Cyan, 3 liter	€520
0901147-002	SolaChrome UV Ink, Magenta, 3 liter	€520
0901147-003	SolaChrome UV Ink, Yellow, 3 liter	€520
0901147-004	SolaChrome UV Ink, Black, 3 liter	€520
0901147-500	SolaChrome UV Print head Flush, 3 liter	€ 89

14. Does exposure to the UV light provide any health risks?

The lamps emit high power UV light and must be adequately shielded. Exposure to such high intensity light can damage skin and eyes, in much the same way as would excessive exposure to sunlight or looking at the sun without eye protection. The DM72UVR has been engineered to adequately shield users from excessive UV light in normal use. UV light protective eyewear can be used as an extra precaution.

Ozone generated by UV lamps is formed when short wavelength UV light (184nm) interacts with oxygen and its formation tends to be greatest during lamp start-up. This colorless gas can cause biological effects such as headaches, fatigue, dryness of the upper respiratory tract, pulmonary irritation, etc. if exposed to large concentrations of the gas at one time. This however, is not a problem in practice, as ozone is short-lived since air movement will mix the ozone with the atmosphere where it reverts back to oxygen.

15. How long does the UV lamp last? What does it cost?

The UV lamp assembly has an estimated useful life of 500 to 1000 hours of printing. As the lamp ages, it loses its intensity and therefore its ability to cure the inks at higher print speeds. The printer will issue a warning at 500 hours of life, which is about the time that its intensity will be at the threshold of being able to cure the ink in Billboard Quality mode. If you are printing in this mode and find that the ink not curing completely, you can either slow the printer down to Production Quality or High Quality mode, or change the lamp.

There are two lamps, each is placed in a cassette that slides into the lamp assembly on each side of the printer's carriage. A replacement bulb can be purchased for €350. One must use care when replacing the bulb to keep skin oils off of the bulb. It may be desirable to purchase and replace the lamp cassette and bulb as one assembly. The lamp cassette can be purchased for €750.

16. Does the printer come in a version without the tables for printing on roll material only?

The printer is only available with the tables. The tables can be moved aside when printing on flexible roll-fed material.

17. What is the maximum thickness and size of media?

Maximum thickness is 6.35 mm (¼"). The printer can accept media up to 185 cm (73") wide. The maximum length of roll-fed media is determined by outside diameter of the roll, which is limited to 19 cm (7.5"). The set of roller tables will accommodate a 152 cm (60") long sheet of media with some overhang. For longer sheets, a second set of roller tables can be purchased as an option.

18. What comes with the printer?

The printer ships with a set of 4-color inks (3 liters each), 3-liters Print head Flush, one roll of 72" wide vinyl, two roller-tables and accessory kit.

19. How long is the warranty period?

One year on the printer and six months on the print heads. Extended warranties are available.

20. Who will install and service the printers?

The DisplayMaker 72UVR should only be installed and serviced by a certified ColorSpan trained technician.