COATINGS & ADHESIVES CORPORATION

UV/EB Health and Safety v1.1

Energy curable UV and EB coatings are formulated with a different chemical composition than conventional litho over-print varnishes, waterbased coatings or solvent lacquers. The difference in the chemical make-up of Energy Curables requires that workers employ different material handling and safety precautions.

UV/EB coatings are potential skin "sensitizers" and precautions should be taken to prevent skin and eye contact. Most UV/EB coatings act like penetrating liquids when they make contact with skin or clothing. Unlike other chemicals that are irritants, UV/EB coatings do not have good warning signals to indicate immediate or short-term contact. Many other chemical skin irritants have "early warning signals" such as itching, burning, or stinging immediately or shortly after direct skin contact. Since UV/EB coatings do not usually produce these "signals", direct skin contact may go temporarily un-noticed. If the coating material is not washed off the skin promptly and properly, a rash, blistered area or burn may occur, lasting several hours or a few days. Additionally, since UV/EB materials are skin sensitizers, a person can become allergic to the materials over a period of time. Most people never become "sensitized" or allergic to UV/EB materials, however, contact is best avoided.

UV/EB Coating Safety Precautions

Safety Data Sheets (SDS)	Read and understand the Safety Data Sheet(SDS) for each specific UV/EB coating product being used. Valuable information for potential hazards, safety, handling and clean-up is contained in the SDS sheet. SDS sheets can be acquired by contacting your Coatings and Adhesives Corporation Technical Sales Representative, or through our website at www.cacoatings.com. For SDS access through our website, membership is required.
Contact Avoidance	The best way to avoid the possibility of becoming "sensitized" to UV/EB material is to avoid skin contact. Contact is best avoided by wearing protective equipment and following adequate personal hygiene habits. The hands are the most common skin area to come in contact with UV/EB materials. To avoid contact, good quality gloves such as nitrile rubber should be worn when handling these materials. The gloves should be washed or discarded as soon as they are removed and caution should be taken to avoid spilling any material onto clothing or transferring the material unknowingly causing secondary contamination. The use of disposable safety clothing can be used to protect personal clothing from contamination.
Personal Hygiene	Personal hygiene procedures, such as washing hands after handling UV/EB materials, should be routinely followed when the possibility for contact exists. Soap and water should be used for washing. Solvents should never be used to wash hands or skin as this will only enable penetration of the UV/EB coating into the skin. In addition to avoiding solvent, conventional "water-less" hand cleaners should also be avoided. Solvents and water-less hand cleaners will dry out the skin in addition to opening the skins pores, which allows the absorption of UV/EB materials. The following practices should be employed when working with UV/EB materials: - Do not eat, drink or smoke when handling UV/EB coatings - Wash hands regularly; prior to breaks/lunch and prior to and after using the restroom - Wash hands and face with soap and water after handling UV/EB coatings - Remove any contaminated clothing or shoes immediately - Shower as soon as possible after completion of work-day

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UV/EB Coating Safety Precautions - *continued*

Clothing	Long sleeved shirts should be worn to protect the arms. Contaminated clothing should be removed and washed/laundered properly. Contaminated clothing should not be taken home to wash. If home laundering is essential then UV/EB contaminated clothing should be washed separately. If necessary, extra precautions should be taken such as separating the clothing by placing it in a bag, being certain not to get any UV/EB material on the outside of the bag. When emptied, the bag should be discarded to avoid accidental secondary contamination. If your clothing does accidentally become contaminated it should be removed as soon as possible. Remember that UV/EB coatings act as penetrating liquids and they do not dry or evaporate. Once the clothing is removed and stored properly, the affected skin areas should be washed thoroughly with soap and water. Special attention should be given to hard to clean areas, such as hair, under arms, nose and ears.
Shoes	Shoes that become contaminated should be discarded if the UV/EB material penetrates the shoes and skin contact is possible. The use of specialized chemical resistant safety shoes is recommended; avoid wearing shoes that are made from high-absorbency materials such as canvas, suede and nubuck. UV/EB coatings do not dry and prolonged exposure to skin may cause sensitization.
Personal Protective Equipment	- Wear safety glasses/goggles with UV protection. - Wear chemical resistant gloves when handling/cleaning UV/EB coatings. - Wear disposable chemical resistant safety clothing during handling/cleaning of UV/EB coatings if clothing/skin contamination is unavoidable. - Wear respiratory equipment when UV/EB misting/aerosols are present. UV/EB coatings can form mists/aerosols at liquid transfer points during application. A fresh air mask or an organic respirator should be worn whenever aerosols are present if localized exhaust is not present or insufficient to withdraw the vapor.
Housekeeping	General housekeeping procedures should be followed. All spills, leaks, and contamination should be cleaned promptly to avoid accidental exposure. Gloves and eye protection should be used to protect against spills and splashes. Disposable chemical resistant safety clothing may be necessary if clothing/skin contamination is unavoidable.

First Aid

Eyes	- Flush contaminated eyes and surrounding skin thoroughly with water for at least 15 minutes - See a physician immediately
Skin	- Use soap and water to clean contaminated skin areas - Remove contaminated clothing/shoes immediately - Shower immediately
Inhalation	- Remove individual to fresh air if overcome by vapors/ozone/aerosols
Ingestion	- DO NOT induce vomiting - Obtain medical attention immediately

Seek medical attention if symptoms/irritation persists.

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UV Curing System Safety

UV Energy	UV lamp equipment areas should be shielded to prevent skin and eye burns during operation which can occur even with brief exposure. UV burns can take several hours before they are felt, unlike thermal or heat burns, which are felt immediately. Short-term exposure to an intense UV lamp can cause serious injuries, especially if the UV bulb is not properly shielded. Proper precautions should be taken to avoid skin or eye exposure.
UV Heat	In addition to UV energy, UV systems generate IR heat at high temperature levels. Maintenance procedures should include regularly scheduled cleaning of the unit to avoid overheating. The cooling system should be tested to ensure it is functioning properly. Safe handling of the equipment should also include handling hot materials and extreme care should be taken while attempting any maintenance and handling of the UV bulbs. Broken bulbs should be cleaned up immediately.
Ozone	Ozone is a pungent smelling and irritating gas that is generated by a reaction of oxygen exposure to UV energy. Unfortunately, ozone is a by-product of the UV curing bulb and is created by most UV curing systems. Ozone is created whenever the UV system is operational and is not related directly to the UV coating product. Symptoms of ozone exposure can include: - Dry and scratchy nose and throat - Respiratory irritation - Nausea - Fatigue - Headache
Health/Safety Considerations	- Make certain that all informational machine stickers/labels are in place - Make certain that all protective guards/safety switches are in place and functional - Make certain that protective shielding is in place for the UV bulbs - Make certain air/liquid cooling systems for UV bulbs are functioning properly - Make certain all localized air extraction/exhaust systems for the UV bulbs are functioning properly - Make certain that all machine air extraction systems are functioning properly - Make certain that adequate ventilation is provided for Operators

Electron Beam Accelerator Safety

EB units generate high-energy electrons, which can cause free-radical polymerization. EB units produce potentially harmful X-rays, which requires expensive shielding. Unlike UV processors, EB does not generate ozone. Since oxygen inhibits free-radical polymerization, nitrogen inerting is used for maximum EB curing efficiencies.

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