

UV CURING SAFETY MANUAL

Protection Tips and Practices for
Maintaining Safe
UV Curing Operations



UVPS®
UV PROCESS SUPPLY, INC.

1229 W. Cortland Street • Chicago, IL 60614 USA
1-800-621-1296 • 773-248-0099 • Fax: 1-800-99FAXUV
773-880-6647 • info@uvps.com • www.uvprocess.com

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INTRODUCTION

Today, more than at any other time in our history, man has become conscious of the environment, and is increasingly aware of the damage already done to it. Global warming, greenhouse effect, ozone depletion, photochemical smog, pollution and deforestation are now household terms.

Environmental protection agencies, and governmental health and safety authorities operate in just about every industrialized country in the world. Governments and numerous non-government bodies are working locally, nationally and internationally to protect our health, our environment and the future of planet earth.

It follows from this awareness that manufacturers, including ink and coating, and users, including the graphic arts industry, of polluting or potentially polluting materials are working towards the use of benign processes.

The movement to water-based systems and away from solvent-based systems is well underway. High solids products are replacing low solids to effectively reduce solvent usage. After-burners for the destruction of emitted solvents are now common and, in many instances, mandatory.

In the thirty years that UV has been commercially viable, the health and safety aspects have been carefully monitored and controlled. As an overview of these developments, we will discuss in this section:

1. Environmental impact of UV coatings.
2. Safety and the UV process.

ENVIRONMENTAL IMPACT OF UV COATINGS

Introduction

When assessing the environmental impact of UV curable coatings, the following must be considered:

- (a) The environmental impact of the coatings being replaced versus the UV coatings replacing them.
- (b) Disposal and recyclability of liquid waste.
- (c) Disposal and recyclability of solid waste.

UV vs. Conventional Coatings

1. Conventional coatings

- (a) *Solvent-based coatings.* There is increasing pressure to reduce the volatile organic compound (VOC) content of such coatings. Many



of the VOCs contained in the solvents-based formulations evaporate into the atmosphere to contribute to ozone, or the “greenhouse” effect. Where gas fired ovens are used to cure these coatings, substantial quantities of carbon dioxide (another “greenhouse” gas) are also produced.

(VOCs react to UV in sunlight to produce radicals bearing oxygen. These oxygenates then react with nitric oxide, thus creating nitrogen dioxide. The nitrogen dioxide then reacts to create ozone and nitric oxide. While another radical will make the NO into NO₂, the process will continue until either the sun goes down or until the VOCs are depleted. And while these are the net reactions in creating ozone, there are numerous intermediate ones.)

(b) *Water based coatings*. This rapidly growing area is a substantial improvement over solvent-based systems; however, it should be recognized that:

(i) Small quantities (5% approx.) of volatile solvents (known as coalescents) are present.

(ii) Energy requirements for drying are substantial due to the high heat and air needed to vaporize water. Again, where gas fired ovens are utilized, substantial quantities of “greenhouse” gas are produced (carbon dioxide).

2. UV Coatings

Most UV cured coatings are solvent-free, and utilize a very efficient curing mechanism which is low in energy requirements (approximately 20% that of water based systems). In addition, no “greenhouse” or ozone depleting substances are produced in the process.

The UV source used for curing coatings is housed within a carefully shielded assembly so that the chances of harmful exposure are remote. As a higher than normal amount of ozone is produced in the UV process, the curing system must be vented to the atmosphere. In normal industrially polluted air, ozone readily decomposes to oxygen within one to three hours.

DISPOSAL AND RECYCLABILITY OF SOLID WASTE FROM UV COATINGS

Solid (cured) UV coatings are typically hard and infusible. Once the coatings are applied to a paper substrate, though, it has been argued that the paper is no longer recyclable. Recycling of such paper and board is carried out using two processes:

(1) Pulping process.

A range of UV (varnish and ink), EB (varnish) and aqueous coated boards have been tested by numerous regulatory bodies.

Agitation of paper board in water during the pulping process causes the cellulose fibers to fall apart and separation of the coatings to take place. UV varnishes produce larger fragments of hard resin than other coating types and thus a smaller proportion of this waste is currently able to be used in forming new board.

Nevertheless, such waste material is used regularly in “fillerboards” and “greyback” products produced by recycling industrial waste paper plants. Only clean (de-inked) whiteback boards are suitable waste for the virgin pulp replacement plant which produces the white fronts of greybacks and white backs.

It should be recognized that there will ALWAYS be a need for virgin fiber in the paper making process since:

- (a) Recycling weakens (shortens) the fibers in current use.
- (b) Some paper is permanently lost (e.g. tissues, wallpapers, archives).
- (c) There is annual growth in the market.

(2) De-inking process.

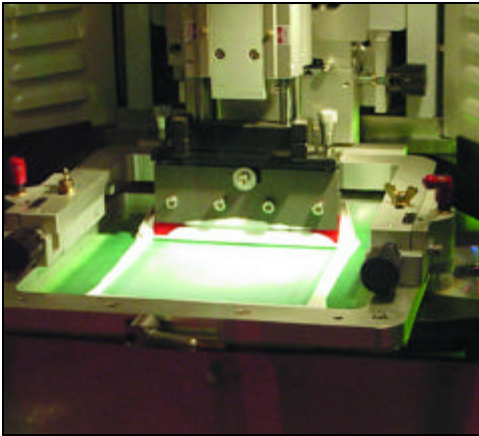
It is possible to install separation systems which are able to “float off” inks and coating residues, and then skim these away from the pulp.

Conclusion

Since it is possible to recycle UV coated boards, and since the technology exists to completely remove coating contamination from cellulose fibers, it can be argued, when viewed in context with the substantially lower energy requirements and zero solvent emissions, that UV printing processes are more environmentally friendly than solvent- or water-based systems.

SAFETY AND THE UV PROCESS

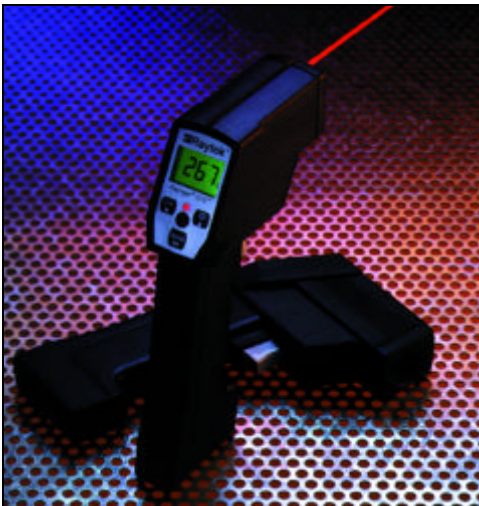
The spectra available for UV curing are quite varied. Coatings, inks and adhesives may be composed of formulations that require strong UV intensity of various wavelengths, long-wave UV (320-420nm) being considered the most practical. UV lamps with intensity in wavelengths for UV curing radiate UV that can cause UV burns to skin and eyes. However, UV filtering materials, UV safety glasses, and the proper protective clothing can prevent this.



Item #F007-015: Bronze Rigid UV Filter Material. Cut, size and fit to enclose in-line UV curing systems and production equipment. Use to replace inked, scratched and damaged panels. **Also available in Blue (#F007-022) and Clear (#F007-002) 4x4' panels.**



Item #I005-017: Orange UV Filtering Safety Glasses. Protective eyewear filters UV and Visible wavelengths up to 500nm for maximum protection.



Item #M005-047: ST Non-contact Thermometer. By periodically measuring infrared temperatures during production, you can guard against heat build-up which may result in damaged substrate and equipment.

Exposure to UV radiation, even limited, will evoke erythema on normal skin. Such erythema is transitory and will not produce blistering, as only a small amount of radiation penetrates the malpighian layer.

Suitable material used for shielding UV curing systems include CONTROL-CURE® Clear (#F007-002), Bronze (#F007-015) or Blue (#F007-022) Rigid UV Filtering Materials, chevron, metal or other temperature-resistant material. (As infrared energy is generated along with intense visible light, opaque, fireproof material that does not degenerate under UV radiation must be utilized.) Buyers of such equipment should consciously consider shielding features prior to purchasing and installation.

Direct light from the UV processor should not be visible to the operator or other personnel. Bounce (reflected) light should be minimized and avoided. Total shielding, with openings minimized for product entrance and exit from the UV processor, should be incorporated into processor design. Reflective surfaces coated with black UV absorbing paint reduce reflected UV radiation. Protective clothing, such as SAF-T-CURE® Disposable Coveralls (#I003-007), which shields against UV rays and prevents UV material absorption, and SAF-T-CURE® UV Filtering Safety Glasses (#I005-017), which provide UV filtering characteristics up to 500nm, should be worn if optimum shielding cannot be attained.

Thermal safety

Infrared energy, an inherent product of the arc utilized to create UV energy in UV processors, can cause overheating of processor components when adequate safeguards are not incorporated into UV processor design and application. By using an ST Series Non-Contact Thermometer (#M005-047) you can measure heat build-up during production to prepare against potential problems.

Thin, heat-dissipating materials and cooled heat sinks provide protection to press, conveyor, and other process components in or near the UV processor. The cooling system, should be carefully designed and properly maintained. In air-cooled systems, fan filters must be properly cleaned or replaced on a maintenance schedule related to powder, dust, and dirt conditions where the UV processor is operating.

Shielding design must allow for thermal expansion. Any exposed heated surfaces of the processor or related equipment should have guards to prevent contact.

Time delay circuits are necessary to shut down lamps if the press stops with the substrate under the UV processor. One-half power switches are incorporated into web press systems so that energy is reduced automatically when the web is slowed or stopped. Regular

inspection is required to ensure time limits and related circuits have not been altered or by-passed.

Halon No.1 211 fire extinguishers are to be used in event of fire to prevent damage to the press and lamps. COC fire extinguishers with dry chemical or water are not recommended. If a fire occurs, all residue of damaged substrate should be removed from curing area. Soot and ash must be cleaned from lamps and reflectors before re-start. An investigation to determine the malfunction causing the fire is most important. Correction must be made to eliminate re-occurrence. However, with a professionally installed system and the correct maintenance program, problems should not occur.

Electrical Safety

High voltage and currents are used to energize UV lamps in UV processors. Transformers and capacitors (stabilizers) are designed to provide lamp starting voltages, and to limit subsequent current, thus providing a uniform output of energy. UV processors have stabilizers with starting voltages from 400V to 600V, operating voltages from 285V to 1,870V, and currents from 4.5 amperes to 14.5 amperes. The lamp's arc length dictates the particular factors for its operational design.

A short circuit in the stabilizer (secondary) lamp circuit will not reflect in the primary line circuit. No fuses will blow or circuit breakers trip. Such a short circuit will continue to arc until an "insulation" space is burned into the equipment at arc point. As starting current of a lamp equals the secondary short circuit current, no fusing of the secondary circuit can be made. You can employ a variety of Multimeters to analyze individual electrical components for proper operation.

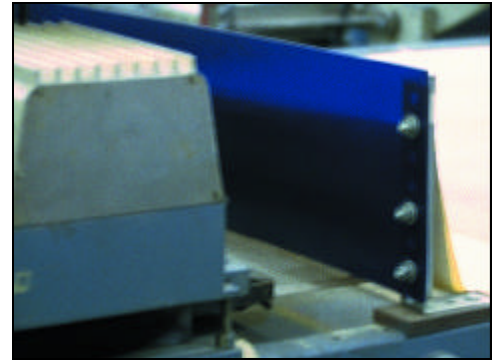
Hard to find High Voltage/High Temperature Wire (#A005-004) is utilized in UV processing circuits. Lamp conduit (#A005-017) is wiring separately from control or power wiring. All wires are kept from the lamp radiation area to negate infrared/UV degradation of wire insulation.

Electrical interlocks are provided on the processor and its control cabinets. Regular maintenance inspection should be made to ensure these are working properly. Junction boxes should remain closed and locked when the processor is operating.

UV processor electrical systems should be serviced only by qualified electricians.

Ozone safety

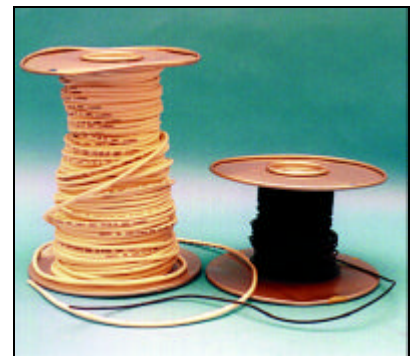
Triatomic oxygen or Ozone (O_3) is the only by-product of the UV lamp. It is formed by oxygen being exposed to 254nm wavelengths of UV energy.



Item #F007-022: Blue UV Filtering Materials. Mount this filter material to effectively block bounced or reflected light from entering the workplace.



Item #M015-009: Digital Multimeter. Multimeters can help identify failing electrical components during regular maintenance to help protect against downtime.



Item #A005-004: High Temperature/High Voltage Wire. During regular maintenance, check your power supply's wiring for excessive wear. Replace damaged wire to protect against improper arcing.

Ozone formation can be eliminated by using ozone-free quartz lamps. Certain dioxides are added to the quartz of these lamps which absorb the ozone producing wavelengths.

Ozone-free and pure fused quartz lamps are interchangeable. Ozone-free lamp usage may affect cure speeds if ink or coating formulation is designed to utilize the absorbed wavelengths. By using Ozone Test Strips (#I011-011) you can measure present atmospheric conditions through a easy-to-read 5-stage color chart.



Item #I011-011: Ozone Test Strips. Periodically measure ozone levels within any facility operating UV curing systems to ensure employees are working within a safe environment.

A nitrogen atmosphere in a processor also eliminates ozone production by eliminating oxygen. Lower power lamps may be used in a nitrogen atmosphere; however, cost of nitrogen will probably offset any operating cost savings attained.

Ozone can be effectively eliminated in the processing area by exhausting cooling system air outside the building. Such exhausting offers no danger as the unstable hot gas breaks down to oxygen rapidly.

Neither nitrogen atmosphere nor ozone-free lamps eliminate the need for processor cooling systems.

UV lamp handling

Fused quartz (silicon di-oxide) (SiO_2), with a high melting point and excellent UV transmissivity is used in the fabrication of UV processor lamps. A 22 x 25mm diameter tube with a wall thickness of 1.0 to 1.5mm is designed with Tungsten electrodes sealed into each end. Lamps are manufactured from 1.1112" to 77" in arc length. Quartz is very fragile and special cushioned packaging is utilized for safe transportation.



Item #I004-022: Cotton Inspection Gloves. UV lamps must remain clean of foreign matter to prevent damage to the quartz envelope during operation. These gloves prevent fingerprinting of the sleeve during handling.

The carton should be opened fully so the lamp can be lifted out of the packaging with no twisting or pulling. Unpacking should take place in an area large enough to eliminate the possibility of inadvertently striking the lamp against walls, pillars, pipes, beams or press machinery.

The lamp must be washed before placing in service. As bare skin contact with the quartz envelope must be avoided, wear Cotton Inspection Gloves (Men's, #I004-022; Ladies', #I004-031) to prevent marring. With lamps operating at 1,100 - 1,400°F, compounds from the skin will form permanent etching on the quartz, decreasing UV energy transmission. A finger-printed lamp will eventually fail as the accumulated dirt will increasingly convert to heat.

UV processor maintenance

Lamps and reflectors must be clean at time of installation and be kept in that condition so UV energy generated can reach the ink or coating most efficiently.

As the UV processor is an optical system, all types of dust, fingerprints, powder, grease, smoke and misting ink must be cleaned from lamp and reflectors. Dirty reflectors will also reduce cure rates and increase temperature. Approximately 50-60% of lamp energy is returned by the reflectors. Overheating due to a dirty system can cause warping, and possibly reduce electrical spacing, which could cause a short of the arc to ground.

To keep lamps and reflectors contaminate-free, use the UV Lamp/Reflector Maintenance Kit (#A002-017), a complete package designed specifically for cleaning UV lamps and reflectors. As part of the Maintenance Kit, UV Lamp/Reflector Cleaning Solution is specially formulated to remove contaminants from quartz and reflector surfaces without marring or streaking. After cleaning, wipe or polish the surface with a clean Webril® Wiper Pad to ensure all harmful contaminants have been removed.

Grease or ink on the reflector or lamp will require washing with solvent, then cleaning with a detergent solution. The use of steel wool, emery paper, or abrasive powders is not recommended.

UV Lamp Holders must also be cleaned or replaced to prevent arcing between the fittings and lamp ends.

TYPICAL HANDLING INSTRUCTIONS FOR UV INKS, VARNISHES & COATINGS

The handling of ink and coating materials, and wash-up chemicals requires procedures that should be issued by the related manufacturers of these products. Procedures should be followed by all users. Shutdown of the UV processor is mandatory when washing up the press and cleaning of blankets or plates. Alcohol and other flammable solvents should never be used near hot lamps.

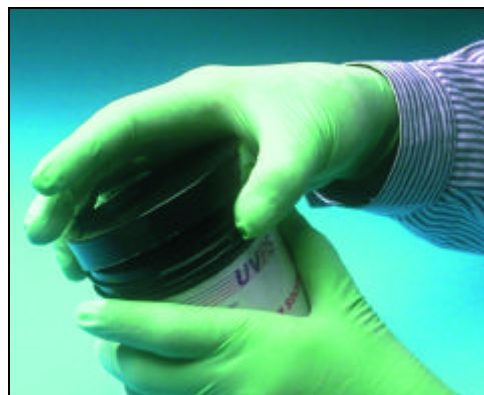
Ink manufacturers will provide solutions to any ink misting problem should it arise. Misting ink can be drawn into the UV processor and deposited as dust on lamps and reflectors. Such deposits reduce UV output and increase heat retention within the irradiator. Electrical arcing at lamp fittings is possible, as are slower curing speeds and high costs. Good house-keeping can eliminate such difficulties.

1. Handling and storage:

- (a) UV materials and finished products must be clearly labeled and kept separate from other products.
- (b) Whenever these materials are used, the area should be well ventilated.



Item #A002-017: Lamp/Reflector Maintenance Kit. Regular maintenance of a UV curing system MUST include periodic cleaning of the lamp AND reflector. This kit provides all the tools needed to ensure clean, contaminate-free surfaces.



Item #I004-003: Latex Gloves. Without limiting dexterity, these gloves offer excellent protection against contamination when handling UV inks and coatings.



Item #J001-007: Black Polyethylene Storage Containers. Protecting UV inks and coatings from ambient UV light sources extends the life of business' inventory.



Item #I003-007: Tyvek® Coveralls. When cleaning or working in an environment where coatings are sprayed, full body coveralls protect clothing and skin from contact with airborne particles.

(c) Employees who handle UV materials must use UV Barrier Cream (#I002-003) on their hands to protect against potential material penetration, and wear UV-resistant Latex (#I004-003) or NT Nitrile (#I004-047) Gloves (not vinyl) and protective Tyvek® Coveralls (#I003-007), Lab Coats (#I003-013), NP Neoprene Aprons (#I003-002), and long-sleeved shirts.

(d) Employees who accidentally spill UV materials on their bodies or clothes must change the clothing at once and wash their skin thoroughly with pH6 Liquid Soap (#I001-007), a deep cleansing soap which does not irritate skin, and water. If there is any sign of irritation, seek medical help.

(e) Wear anti-fogging UV Safety Goggles (#I005-007) if there is any chance of UV material getting into the eyes. Should this occur wash, thoroughly with water and seek medical attention.

(f) In case of a spill, immediately contain with UV Spill Clean-up Granules (#J005-019) to absorb and prevent hardening of spilled materials, wipe up with a tough, industrial shop towel such as Crumple Cloth (#J006-018), and dispose of waste and wipers in a FM/UL approved Safety Waste Can (#J112-001).

(g) Store UV inks and coatings in snap-on lid Black Polyethylene Containers (1 gal.: #J001-007; 1 quart: #J001-002). Black containers shield contents from ambient UV sources, such as sunlight and fluorescent shop lamps; and polyethylene “breathes”, allowing oxygen to permeate the container to prevent polymerization and extend shelf life. Do not re-use containers for other purposes.

2. Cleaning procedures:

(a) Only clean wipers are to be used and placed in the collection container when soiled. Wipers must not be reused after cleaning up UV materials.

(b) Use only recommended solvents for cleaning equipment soiled with UV material; keep in separate, clearly marked containers.

(c) Clean all equipment straight after use.

(d) UV Filtering Goggles (#I005-007) for preventing eye contamination, Latex (#I004-003) or NT (#I004-047) Gloves for effective hand protection against UV inks and coatings without loss of dexterity, and Tyvek® Coveralls (#I003-007) for full body protection, should be worn while cleaning equipment.

(e) Keep tools clean to protect the next user.

3. Personal hygiene:

(a) Always change work clothes at the end of the day, never wear clothes or shoes home.

(b) Clothes soiled with UV material must be cleaned before re-using.

(c) Always wash hands with a UV Hand Cleaner (#I001-001) before eating or using restroom facilities to effectively remove UV inks and coatings while protecting the skin against water insoluble irritants. UV Barrier Cream (#I002-003) must be re-applied after washing and before returning to work to prevent against the penetration of UV materials into the skin.

At the end of the work day, UV Skin Lotion (#I002-001) should be used to replenish lost skin oils, which, in turn, prevents skin rashes due to frequent hand cleaning.

(d) Eat or drink only in the lunch area provided, never in the workplace.



Item #I002-003: UV Barrier Cream. Apply UV Barrier Cream after every washing and use in conjunction with latex or nitrile gloves to ensure protection against UV material penetration into the skin.

GLOSSARY

A

ABRASIVENESS: the tendency of a material or coating to abrade or wear away a surface or an edge.

ABSORBENCY: that property of a porous material, such as paper, which causes it to take up liquids or vapors (e.g., moisture) when in contact, and allow penetration into its bulk.

ADHESION: a mechanical or chemically reactive bond between surfaces; smooth surfaces may rely on polar adhesion.

ADHESIVE, PRESSURE SENSITIVE: a type of adhesive which in dry (solvent-free) form is aggressively tacky at room temperature with the capability of inducing a bond of dissimilar surfaces upon contact and with slightly firm pressure.

AIR CONTAMINANT: any substance of either man-made or natural origin in the ambient air, such as dust, gas, fumes, mist (other than H₂O, smoke, heat, noise, etc.).

AIR POLLUTANT: dust, fumes, mist, smoke and other matter, vapor, gas, odorous substances, or any combination thereof.

AMPERE (A): the constant current that, if maintained in two straight parallel conductors of infinite length and negligible cross section and separated from each other by a distance of 1 meter in a vacuum, will produce a force equal to 2 X 10/newtons per meter length.

ARC LAMP: a light source of high actinic value. The arrangement contains two carbon rods spaced slightly apart at the tips through which passes an electric current which bridges the gap between the tips, the resulting arc emitting a light of high intensity. Used for exposing photosensitive materials.

ATTENUATION: a decrease in the maximum concentration or total quantity of an applied chemical during a fixed time.

B

BALLAST: a step-up transformer with a range of capacitors for regulating line voltage to a light source.

BARRIER COAT (Primer) (Sealer Coat) (Tie Coat): a coating applied to face material to provide increased opacity, and/or to prevent migration between the adhesive and face material, and to improve anchorage of adhesive to face material.

BATCH SAMPLE: the collection of substances or products of the same category, configuration or subgroup, which are drawn from a batch and from which test samples are drawn.

BLACK LIGHT: a common name for ultraviolet rays which have wavelengths between 3200 and 4000 Angstrom units.

BLADE: the flexible printing edge of the squeegee which may be made from polyurethane, neoprene or rubber.

BLOCKING: an undesired adhesion between layers of material resulting from moderate pressure, and/or from temperature. Usually occurs in a stack of printed material which is stacked prior to thorough drying.

BLOTTING: 1. a spotting or staining; 2. a spreading, blemished effect; 3. to absorb moisture from a stencil that has been previously exposed, washed out, and adhered to the fabric, usually by applying unprinted newsprint and a roller brayer to the top, or well side, of the screen.

BODY: the physical characteristics of an ink: viscosity, consistency and flow.

C

CMYK: Represents Cyan, Magenta, Yellow, Black - the primary ink colors for color process reproduction.

CALENDER (Machine Calender): 1. a set of cast iron rollers, resting one on top of the other in a vertical bank at the dry end of a paper machine, through which the web passes for smoothing and surface leveling. The finish on the roll surfaces determines the degree of smoothness and/or gloss imparted to the paper; 2. a similar configuration of heated rollers used for flattening one or both sides of synthetic screen printing fabrics.

CALORIE (cal): a unit of heat. One calorie equals 4.1840 joules.

CAPACITOR: an electrical circuit element consisting of two conducting surfaces separated by a dielectric or insulating material, such as glass, ceramic, mica, or other non-conducting material, for storing electrical energy.

CATALYST: any material which aids completion of a chemical reaction without itself becoming part of the product.

CATIONIC CURE: occurs when an energized molecule reacts with cationically sensitive monomers to initiate polymerization.

CLEAR COAT: transparent coating applied to an imprint, such as a finished decal or poster, to ensure maximum durability.

COCKLE: 1. in paper, the effect of uneven moisture absorption, which, in areas of greatest absorption, causes swelling of those areas, and which causes the paper to "hump" into a slightly bumpy surface contour; 2. an irregular lump in a fabric thread.

COLD-CATHODE LAMPS: two types: germicidal, low pressure UV lamps, and hot-cathode lamps. Also see Germicidal Lamps.

COLD CRACKING: many plastics increase in stiffness as temperature is lowered, and assume brittleness that can result in breaking or shattering under stress. Cold cracking is the term applied to this deterioration.

COLD CURING: the process of curing at normal atmospheric temperature.

COLOR DENSITY: the property of any color which provides near approach or absolute opacity. Also a measure of purity or brilliance.

COLOR STANDARD: A wetted ink sample or proof used as a comparable benchmark for similar materials.

COLOR SEPARATION: 1. a manual technique of visually interpreting the color areas in art work and providing a separate transparency, hand-rendered for each (used in separating colors in line rendered art); 2. a photographic technique involving photographing original continuous tone colored art through a series of filters, each to provide negatives representing the colors used in rendering the original; 3. an electronic scanning technique using laser technology to provide halftone negatives (or positives) representing the colors in the original artwork.

COLORS, PRIMARY: the three basic colors, which, when properly selected and mixed, produce any hue. The three primary light (spectral) colors are green, red, and blue; the three primary or ink colors are yellow, magenta, and cyan.

COLOR TRANSPARENCY: 1. a full color photograph on transparent film; 2. full color design rendered in transparent color to permit light transmission through the film and color layers. A color transparency can be used in displays by back lighting, or as a photographic subject by transmitted, rather than reflected, light. 3. transparent film printed with translucent inks.

COLOR VARIATION: a term used to describe changes in color density which, during printing, may be caused by variations in the amount of ink accepted by paper, or by the amount of ink fed to the paper, due to change in squeegee pressure, addition of solvent, etc.

COMBUSTION: burning or rapid oxidation.

COMPATIBILITY: the ability of ink, film, substrate and/or solvents to function together in an acceptable manner. Manufacturers of inks, plastics and other printing materials usually recommend specific ink/solvent/substrate systems that are compatible. Essential to the ultimate performance of the system. Can also include compatibility with the screen stencil.

CONDUCTIVE INK: an ink for the screen printing of electronic circuits which contains materials that permit electric current flow through the printed line or pattern.

CONDUCTIVITY: In offset lithography, the property of fountain solutions which, along with pH, must be monitored and controlled to maintain print quality.

CONJUNCTIVITIS: a very painful condition of the eye or conjunctiva (the inner lining of the eyelid) brought on by harsh light exposure as in UV light, sunburn, or inflammation.

CONVECTION OVEN: a heat chamber into which air of elevated temperature is introduced in static form, in which drying can take place under uncirculated heat. When the air is circulated, then Forced Air Drying occurs.

CONVEYOR DRYER: an ink drying system which incorporates a drying chamber with a belt conveyor. Additional features may include an exhaust system, a cooling chamber, a UV lamp, etc. Belting materials may be metal or heat-resistant synthetics.

COOLING ZONE: that portion of a drying system in which dried products are cooled before exiting from the system.

COPOLYMER: mixture produced from a combination of two or more polymers or heteropolymers.

CRAWLING: the contraction of an ink film into drops after application in which the ink does not wet completely.

CRAZING: 1. a cracking and/or removal of ink from areas of a printed substrate; 2. a random pattern of minute intersecting cracks in plastic, ceramic glaze, or other surfaces.

CROSSLINKING AGENT: a reactive chemical material that will form bonds between other molecules in a formula.

CURING: 1. a drying process usually requiring elevated temperature of a film that cannot be dried by oxidation; 2. in textile decoration, the application of heat to remove volatiles and set the emulsion of pigment dye into the textile fibers; 3. a two- (or more) part chemical reaction that, when completed, resembles a dried appearance. Example: photopolymerization of UV curable coatings.

CURING AGENT: an additive which promotes curing.

CURL: 1. the tendency of sheet material, by itself or in laminate, to bend or partly wrap around the axis of one of its directions. Uneven moisture absorption throughout the thickness is the usual cause, and conversely, removal of moisture by heat application can cause curling; 2. deformation of a paper sheet tending to form into a roll or cylinder, the roll effect appearing across the grain direction.

CYCLE TIME: 1. an amount of time, expressed in nanoseconds, required for a computer to access data in its memory; 2. the time it takes for a printing press to complete one print cycle.

D

DAMPENING SYSTEM: In offset lithography, the press components that carry and regulate fountain solution flowing to the plate.

DARK REACTION: reactions within radiation curable formulations which take place in closed containers, usually resulting in premature polymerization.

dB: abbreviation for decibel, the logarithmic acoustical unit scale for sound levels.

DEFOCUSED SYSTEM: a curing system in which the substrate is positioned either closer to or further away than the focal distance.

DEGREE OF CURE: in UV curable coatings, it is generally inversely related to the level of free monomer.

DEHYDRATION: the loss of water from a sheet of paper subsequent to manufacture by exposure to high-temperature air, low-humidity, or both. This is usually incidental to ink drying, storage, etc.

DEPOSIT OF INK (Deposition): the ink imprint left on the substrate by the act of printing.

DERMATITIS: a skin condition, or inflammation, produced by direct contact with certain processing chemicals.

DETACKIFIER: an additive used to reduce tackiness in an ink, thereby improving ink flow and shear.

DIELECTRIC: a non-conducting medium or material which does not permit electric energy to flow or pass through, e.g., glass, porcelain, plastics, air, etc. An insulating material.

DIELECTRIC STRENGTH: the voltage which an insulator can withstand, expressed in volts/mil, without allowing current to pass through.

DILUENT: a volatile liquid which extends a solution but weakens the power of the active solvent, and reduces the concentration of resin.

DIMPLE: 1. a small depression in an applied coating or design; 2. a depression near the bottom of a bottle, used to register the decoration during printing.

DISHING: a term applied to stacked paper which is higher at the edges than at the center, usually caused by absorption of atmospheric moisture by the paper's exposed edges.

DISPENSER: a device that feeds materials, either manually or automatically, in convenient units. A protective package.

DISPERSING AGENT: a material added to a suspended medium to aid in the separation of individual, extremely fine particles such as pigments or colloids. Also see Emulsifying Agent.

GLOSSARY

DOCTOR BLADE: a blade used to spread an even film of liquid or near liquid onto a surface (in screen printing, a Flood Bar).

DOPED LAMP: an ultraviolet lamp in which the spectral output has been changed by the addition of a dopant, such as Beryllium or Iron.

DOSE: energy absorbed per unit mass. Usually Megarads = one million rads. One megard equals 108 ergs/g, 2.30 calories/g, 4.3 BTU's/lb, 10 wattseconds/g, or 4.54 KW seconds/lb.

DOSE RATE: the dose of energy per unit of time. Mrads/sec.

DRAIZE TEST: a method for estimating the skin or eye irritation due to contact with a chemical substance.

DRAWDOWN: A film of ink deposited on a substrate via a smooth-edge blade to evaluate ink undertone and mass.

E

EFFLUENT: 1. waste material (from an industrial source) in liquid form; 2. the discharging of pollutants into the environment (generally into waters).

ELASTICITY RESERVE: the extra resilience in a tautly stretched printing screen which permits conformance to moderate curvatures within a substrate.

ELASTICITY, MODULUS OF: ratio of stress-to-strain exhibited by an elastically deformed material.

ELECTROMAGNETIC SPECTRUM: the entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves, including visible light.

ELECTRON BEAM: a beam of electrons displaced from a metallic filament by a high voltage source of acceleration.

ELECTRON PENETRATION: the depth of penetration into a substrate by accelerated electrons. Depth of penetration depends on the kinetic energy imparted to the electron by the accelerating voltage.

ELLIPTICAL REFLECTOR: a directed light source reflector used in UV curing for focusing energy onto a specific area.

ELONGATION, ULTIMATE: the maximum distance a material will stretch in a lengthwise direction before breaking, expressed as a percent of the original (unstretched) length.

EMBRITTLMENT: the loss of plasticity resulting in material brittleness.

EMISSION FACTOR: the average amount of pollutants emitted per unit of material manufactured.

EMISSION STANDARD: the maximum legal amount of a pollutant allowed to be discharged from a single source, either mobile or stationary.

EMULSION: a liquid or semi-liquid compound used in (a) silver halide photographic film, (b) the photo-stencil process, or (c) textile inks. The compound is usually made from two or more ingredients, (such as oil or lacquer and water in ink manufacture) which do not intermix readily in their primary state.

ENVIRONMENTAL INFLUENCES: all conditions of weather (sunshine, heat, rain, cold, etc., plus gases) which may be present in exterior exposure conditions. Interior environment may include heat, humidity, vapors or fumes, and all other characteristics of surrounding atmosphere.

ERYTHEMA: an irritation of the skin, typically exhibited by redness, which can be caused by exposure to UV light rays.

EXPOSURE TEST: a test made by exposing sensitized films or coatings for a series of equal time intervals at a given distance from an actinic light source in order to establish "time of exposure" and "distance of light from sensitized surface" standards.

F

FALSE BODY: a characteristic of an ink or coating which has more body or heavier viscosity than the pigment/vehicle ratio would indicate. May be induced by adding a flocculant. Characteristically thins down by stirring.

FASTNESS: term used to describe the stability of colored pigments or dyestuffs under adverse conditions of light, alkalies or other agents.

FILL: the illuminant material in a UV lamp which is activated by energy, typically mercury although other elements are also used.

FILM THICKNESS: the distance from one face surface to the opposite face surface of a film material, usually measured in mils or microns.

FINISHING: term generally applied to encompass post-press operations such as trimming, die cutting, bindery, etc.

FLAME-TREATED PRODUCT: a container or other object typically formed of polyethylene or polypropylene plastic, the surface of which has been oxidized by contact with a flame to disperse surface solvents in preparation for printing.

FLASHED XENON (PULSED XENON): Lamp containing xenon gas which produces ultraviolet energy through a special electrical transformer system.

FLEXIBILITY (Conformability) (Pliability): the property of materials, measured under specific conditions, that permits them to be formed or bent, without rupture, to change their surfaces from a flat plane to a curve.

FLEXOGRAPHIC PRINTING: formerly called aniline printing. A method of rotary printing that utilizes flexible rubber plates and rapid drying fluid inks.

FLOW AGENT: an additive used to disturb surface tension and increase ink flow when bubbles or orange-peel occur.

FLUORESCENT: a pigment which not only reflects a visible wavelength, but is also activated by most of the remaining absorbed light to re-emit it as color of a longer wavelength. Results in reinforcement of the reflected color.

FOCAL DISTANCE: the optimum distance between the UV lamp/reflector and substrate for radiation curing.

FOCAL LENGTH: 1. the distance from the nodal point of the lens to the ground glass or film plane on which an object at infinity is in sharp focus; 2. the distance from the lens to the sensitized surface (film) when the lens is focused on an object at infinite distance.

FOCUS: the sharpest image obtained; the process of transmitting a sharply defined image through a lens onto the ground glass in a camera onto film or onto enlarging paper.

FOUNTAIN: the ink reservoir on a screen printing press.

FOUNTAIN ROLLER: the roller in the ink fountain which, by revolving, agitates the ink.

FOUNTAIN SOLUTION (also dampening solution): In lithography, a mixture of water, acid, buffer and gum that prevents the non-image area of the plate from accepting ink.

FPM: abbreviation for feet per minute. Used in the measurement of surface speed.

FREE RADICAL: a reactive material which initiates polymerization in UV curable formulations, generally by the loss of an electron.

FREE RADICAL REACTION: a chemical reaction which takes place only when a free radical or molecule has lost one electron.

FUSION: the process of melting two or more materials to produce interaction or attachment.

G

GEL POINT: the stage at which gelatin begins.

GERMICIDAL LAMP: a low pressure mercury-vapor lamp operating between 1 and 10 watts per linear inch, and used as a UV energy source in conjunction with those units utilizing an inert atmosphere.

H

HEAT CURING: 1. in textile printing, the subjection of the printed substrate to steam heat to set the dyes and drive off volatiles; 2. in other printing applications, the use of dry heat for a predetermined interval to drive off volatiles, speed drying, and, in some instances, to harden the printed film on the substrate.

HEAT RESISTANCE: the property of a material which inhibits physical or chemical changes caused by exposure to elevated temperature.

HICKEYS: an imperfection in printed coatings due to dirt, hardened specks of ink, etc., which have attached to the wet surface.

HOLDING POWER: the time required for a given weight to peel a given amount of pressure sensitive tape or material from a vertical panel.

HOMOGENIZER: a high pressure ink mixer.

HOMOPOLYMER: a polymer produced from a single type of monomer.

I

IMMISCIBLE: incompatibility by mixing, e.g., oil and water.

IMPEDANCE: 1. the rate at which a substance absorbs and transmits sound; 2. resistance to alternating current.

IMPREGNATION: the penetration of fluid ink into a porous or absorbent substance.

INERT ATMOSPHERE: the blanketing (usually from air) with a non-reactive gas, usually nitrogen or a mixture of nitrogen and carbon dioxide.

INFRARED: an area in the electromagnetic spectrum extending beyond red light from 760 nanometers to 1000 microns (106 Nm). It is the form of radiation used for making non-contact temperature measurements.

INHIBITOR: a substance, sometimes added to a coating material to extend pot-life, which retards a chemical or catalytic reaction.

INK DEPOSITION (Ink Deposit): the actual ink placed on the substrate by printing techniques. Usually used in relation to thickness of the printed ink film without inference as to the actual print.

INK FLOW: the ability of imprinted ink deposits to spread minutely in order to provide a solid coating.

INK MOTTLE: a non-uniform appearance of the ink film in printed areas, with respect to density, color or both. Caused by varying ink film thickness, by variation in the ink receptivity, and/or by absorption of the paper.

INK RECEPTIVITY: the property of a substrate which causes it to accept and/or absorb ink.

INK TONERS: ink composition designed to change the characteristics of a base color by intermixing.

INSOLUBLE: describes a condition in which a solute will not dissolve in a particular solution.

IONIZATION REACTION: reaction of molecules having lost or gained an electron pair.

IRRADIATION: exposure to ultraviolet light or another high energy ray.

IRRADIATOR: the lamp housing and reflector assembly in a UV curing system.

IRRITANT: a chemical substance or mixture (not a corrosive) which, on immediate, prolonged or repeated contact with normal living tissues, induces a local inflammatory response in the skin, eyes or mucous membrane. 16 CFR 1500.41

J

JELLING: the thickness of an ink or other liquid, which cannot be reversed by stirring.

L

LAMINATE: (n.) a series of thin layers bonded into a single sheet; (v.) the technique of placing two or more sheets together with an adhesive to form a single multi-layer sheet, using pressure and heat.

LAMINATION: a sheet of material composed of two or more layers of material adhered together to form the sheet, e.g., liner and face material together with an adhesive to form a sheet of pressure sensitive label stock.

LAMP: the source of the UV light used in exposing photo-sensitive materials.

LATENT CURING: the use of a curing agent that is stable at room temperatures, but which promotes a rapid cure at higher temperatures.

LIGHT: the aspect of radiant energy of which a human observer is aware through visual stimulation of the retina.

GLOSSARY

LIGHT METER (Exposure Meter): a device for measuring the light reflected from a subject, or, in some cases, for measuring the intensity of light falling on the subject. Calibrated so the correct exposure for the light and subject can be determined through shutter speed, lens aperture, and ASA film rating.

LUMINOSITY: the brightness sensation produced by a unit of light intensity.

M

MEGARAD or MRAD: one Mrad equals one million rads. The megarad is the term usually used to describe the dose given: i.e., 0.5 Mrad, 2 Mrads, etc.

MEGAVOLT or MEV: a megavolt is one million electron volts. This is the kinetic energy acquired by an electron accelerated across a potential one million volts (1,000,000 volts).

MERCURY LAMP: quartz tube in which light is generated through presence of mercury vapor. Most UV lamps are mercury vapor lamps.

MERCURY-HALIDE LAMP: a light source which uses an electrical discharge enclosed within a quartz glass tube containing mercury to produce light. For stencil exposure.

MESH: the open space between the threads of a woven fabric; also, the threads collectively on the fabric itself.

MESH MARKS: 1. a fine, cross-hatch pattern left by the printing fabric after the ink film has been dried due to printing with an ink that does not have sufficient flowout; 2. a condition occurring when certain areas of the screen do not properly separate from the substrate, due to poor tensioning of the fabric or insufficient off-contact distance. See Screen Marks.

MICROWAVE: energy with wavelengths between 100 and 1000 microns.

MIGRATION: 1. the movement of one or more components of adhesive to either the substrate or face material, or the movement of one or more of the components of either or both of the face material and the substrate into the adhesive; 2. the movement of one or more components of an ink film into a succeeding application of ink (i.e. discoloration caused by a dye-type pigment in the preceding coat or print).

MONOMER: a molecule of relative low molecular weight and simple structure capable of combining with itself or other similar molecules through reactive sites to form a polymer.

N

NANOMETER: a unit of distance commonly used in measuring wavelength in the electro-magnetic spectrum, or one billionth of a meter (10⁻⁹).

NEWTON VALUE: unit of measure, used in screen fabric tensioning, generally expressed in Newtons per centimeter.

NITROGEN BLANKETING: The practice of using nitrogen gas to exclude air from the surface to be cured during radiation processing.

NON-VOLATILE MATTER: the ingredients of an ink or coating composition which, after drying, are left behind on the material and which constitute the dry film.

O

OFFSET: Indirect print method in which ink is transferred from the printing plate to a rubber blanket and then to the substrate.

OIL-SOLUBLE RESIN: a resin which will dissolve in drying oil at slightly elevated temperature to yield an homogenous film.

OLIGOMER: A lower molecular weight resin or polymer which is used in a radiation curable formula. Usually liquid or easily liquifiable.

OPAQUE: 1. non-transparent and non-translucent film unable to transmit light; 2. (v.) to apply an opaquing fluid to a negative.

OPTIMUM THICKNESSES: the maximum thickness allowable by specification.

ORANGE PEEL: dried ink film surface which failed to flow out to a perfectly smooth surface, thus retaining very small elevations and valleys resembling the texture of an orange peel.

OSHA: the Occupational Safety and Health Administration of the U.S. Department of Labor, Occupational Safety and Health Act.

OVEREXPOSURE: the subjection of photosensitive material to light for a longer period than necessary to accomplish the desired result.

OXIDATION: the effect produced by contact with oxygen, either in the atmosphere or introduced in more concentrated form, which produces drying of some screen printing inks, deterioration of photographic developers in open trays, etc.

OXYGEN INHIBITION: the effect of oxygen to terminate or slow a polymerization reaction by deactivating radicals.

OZONE: gaseous form of oxygen containing three atoms (O₃); may be generated by a high-voltage discharge across a stream of air. Causes oxidation of metals and other materials.

OZONE SAFETY: Measures taken to ensure that buildup of ozone concentration does not occur.

P

PHOTOACTIVITY: the process of using photon energy (light) to start a chemical reaction.

PHOTOCHEMICAL OXIDANTS: air pollutants formed by the action of sunlight on oxides of nitrogen and hydrocarbons which contribute to smog formation.

PHOTOCHEMISTRY: the study of chemical actions influenced by the action of light.

PHOTOINITIATOR: a substance which absorbs light and is directly involved in the production of initiator radicals for polymerization (as in UV curing).

PHOTOPOLYMER: a composition which will either crosslink or depolymerize on exposure to light, forming a physical differentiation between the exposed and unexposed portion.

PHOTOSENSITIVE RESISTS: printable solutions which are not affected by etching chemicals, but which are affected by exposure to actinic light applied through a mask. This will predetermine a pattern for the subsequent chromium tanning process to stabilize the protected portions of the resist film.

PHOTOSENSITIZER: a chemical agent for energy transfer which activates a system in response to light.

PIGMENT DYES: textile dyes formulated from appropriate vehicles, mineral or synthetic pigments.

PIGMENT VOLUME: the percentage by volume of a pigment in the non-volatile portion of an ink, calculated from bulking value and other data.

PIT: small depression on a surface. May be found as a variation in second surface ink when viewed from the first surface.

PLASMA: a vapor in which there are energetic free radicals, ions or molecules; usually formed by radio frequency discharge.

PLASMA TREATMENT: an electrical/gas treatment where grease, oily film or possible organic solvent residue is removed from polyolefins prior to surface treatment.

PLASTICITY: the property of a material which allows it to be repeatedly deformed without rupture when acted upon by a force sufficient to cause deformation. Material will retain its shape after the applied force has been removed.

POINT: 1. a measure of cardboard thickness equal to 1/1,000 inch. For example, 50 point board is specified .050 and is 5/100 inch or 50/1,000 inch thick; 2. a unit of measure in printing where 72 points equal one inch.

POLYMER: a macromolecule consisting of an indefinite number of monomer units. The molecular weights may range from roughly 20,000 into the millions.

POLYMERIZATION: a chemical reaction usually carried out with a catalyst, heat or energy source in which two or more relatively simple compounds or molecules combine to form a macromolecule.

POST CURE: 1. the continuation of a polymerization (curing) process within a UV ink or coating after exposure to UV radiation has been terminated; 2. a final or more complete resolving of organic materials after the initial curing process.

POT LIFE: a term indicating the length of time, under normal storage conditions, that a chemical composition will not lose usefulness through deterioration. Also called "Working Life."

PRESSURE SENSITIVE: 1. a tacky adhesive which can be applied to sheet material enabling the sheet to be adhered to an unrelated surface by contact and light pressure, and without the use of water or solvent; 2. a sheet material that has pressure sensitive adhesive applied either at the factory or in the printing plant.

PULSED XENON: describes a type of actinic illuminant (xenon gas) which has been incorporated into photographic exposure systems, light units, and UV curing reactors.

Q

QUARTZ TUBE: a lamp made from a silicate material (quartz) which is fitted with electrical connections to form an irradiator. Can be made into an infrared emitter or filled with mercury vapor to produce ultraviolet light.

R

RAD: the unit of dose equal to energy absorption of 100 ergs per gram.

RADIATION: radiation as generally applied to coatings and printing inks comprises three energy groupings: high velocity electrons (electron beam and scanning linear cathode), ultraviolet, and infrared energy.

RADIATION HAZARDS: physiological hazards caused by high energy photons, electrons, or x-rays.

RADIO FREQUENCY: a method of producing electrical energy in the 100 to 1000 micron range. It can be used to ionize or excite chemical molecules, both inorganic and organic, without direct electrical contact.

REACTIVE DILUENT: a chemical which serves two purposes in a formulation: thinning or viscosity reduction, and providing reactivity with other ingredients for curing or polymerization.

RESIN: a polymeric material, either natural or synthetic, which is considered an ingredient in a formulation.

S

SAFELIGHT: an illuminated source that due to the color (yellow) of its projected light rays will not cause chemical changes in certain light-sensitive, photographic emulsions, films, etc.

SCREEN MESH: 1. a term generally indicating screen printing fabric; 2. that portion of the screen printing fabric which can be counted or measured to identify fineness or coarseness.

SCREEN VALUE: the number of lines per square inch on any halftone, tint or four color separation. The higher the screen value, the finer the screen and the more detail will be reproduced. Because the dots in finer screens are so close together, ink can "trap" or collect around the dots and muddy fine detail, especially if printed on lesser grades of paper.

SCUFF RESISTANCE: the ability of a dried ink film or substrate surface to withstand wear by friction.

SHORT WAVE INFRARED: wavelengths between 0.76 and 2 microns, which are typically reflected by light substrates, but penetrate darker colors.

SOLVENT: A liquid material capable of dissolving another element to form a solution.

SOLVENT ATTACK: the effect or change in a material after coming in contact with a solvent. Solvent-based inks may be attacked by the proper solvent, even when dried.

SOLVENT RESISTANCE: the resistance of a printed area and/or the substrate to the dissolving action of specified organic liquids.

SPECTRAL TRANSMITTANCY: the reflected light bands produced during radiation curing by dispersed pigments which (directly) affect the ink's absorption of radiation energy.

SQUEEGEE: a tool used to force ink through the openings of a screen printing stencil when in contact with a substrate. Consists of a rubber or plastic blade held in the edge of a wooden or metallic handle.

SQUEEGEE PRESSURE: the force exerted by the squeegee on the printing screen to bring it into contact with the substrate, and to force ink through the open screen apertures.

GLOSSARY

STABILIZERS: additives to coating, ink or adhesive formulations which help extend shelf life, resistance to heat, or other degradations.

STENCIL THICKNESS: the actual thickness of the stencil portion of a printing screen, measured in mils.

SUBLIMABLE DYES: dyes that can be vaporized (from a solid directly to a gaseous state) by the application of heat. They are then condensed and absorbed by synthetic textile fibers. For heat transfer printing, this must occur within a temperature range that will not damage the fabric.

SUBSTRATE: the unfinished product upon which a finishing (e.g., coating, ink, or adhesive) is placed.

SURFACE MOUNT TECHNOLOGY: printed circuitry in which surface mounted component leads are soldered to the top-level conductors of the PCB.

SURFACE PREPARATION: the physical and chemical methods used to prepare a surface for further processing, e.g. priming, solvent degreasing, etc.

SURFACE RESISTIVITY: the electrical resistance between two opposite points of a unit of its surface.

T

TACK-FREE FINISH: any coating or ink that is not sticky to touch after curing or drying.

TACKIFIER: an additive used to improve stickiness of an adhesive film. Also see Detackifier.

TEMPERATURE TAPES: paper tapes treated with heat sensitive substances which drastically change in color at a specified temperature. Designated Fahrenheit or Celsius, or equated to both. Used to determine the temperature within a drying or curing environment.

THERMAL ENDURANCE: relative ability of a material, such as glass or other rigid substrates, to withstand thermal shock.

THERMAL SETTING: the use of elevated temperatures in setting or curing to obtain a usable form of product.

THERMAL SHOCK: sudden reduction or increase in temperature beyond the normal rate under normal conditions.

THERMOCOUPLE: an instrument for measuring temperature, usually constructed of two dissimilar metals joined at one or both ends, for producing a thermoelectric current which is transmitted to a scale for direct reading.

THERMOSET: a type of plastic that can be shaped to a desired form by heat, hardens on cooling, and is substantially infusible and insoluble.

THIOLENE REACTION: Descriptive term for a type of radiation-catalyzed polymerization in which sulfur contaminated with unsaturated chemicals is utilized.

THIXOTROPY: Property of liquid or plastic material that permits viscosity breakdown as it is agitated over a period of time.

THRESHOLD LIMIT VALUE (TLV): the airborne concentration of the substance at which it is believed nearly all workers may be repeatedly exposed to day after day without adverse effect. TLV's may be measured over an 8-hour workday/40-hour work week (TWA), or during a 15 minute average exposure (STEL).

TLV: abbreviation for Threshold Limit Value. A term used to express levels of airborne particulates of a material, below which there are generally no adverse health effects.

TLV-STEL: abbreviation for Threshold Limit Value-Short Term Exposure Limit.

TLV-TWA: abbreviation for Threshold Limit Value-Time Weighted Average.

TOXIC CHEMICALS: those chemicals which have been demonstrated to possess the potential to cause death, cancer, or genetic defects through exposure to living organisms.

TOXICITY: 1. the degree or intensity of virulence of a substance judged to be poisonous to humans; 2. property of being harmful or poisonous.

TRANSLUCENT: a term indicating the property of a substitute or other material which permits passage of some light rays in a diffused manner so as not to clearly establish the design or object from which the rays are reflected.

U

ULTRAVIOLET BLACK LIGHT: ultraviolet light generated at low power using a low pressure lamp.

ULTRAVIOLET CURING: polymerization effected by the presence of ultraviolet rays.

ULTRAVIOLET DRYING SYSTEM: any system which utilizes ultraviolet rays to effect the drying or curing of inks, coatings or adhesives. More correct term is "ultraviolet curing system".

ULTRAVIOLET LIGHT: highly energetic part of the electromagnetic spectrum falling between 200 and 400 nanometer wavelengths, which are shorter than that of visible light. Carbon arc lamps, black light and mercury vapor lamps are examples of artificial ultraviolet light sources in use today.

ULTRAVIOLET LIGHT REACTION: a chemical reaction induced upon exposure to ultraviolet light.

UNDEREXPOSED: film or emulsion that has been exposed for less than the recommended time, or for the required time but with a weaker light source, or with a light source too far removed from the film or emulsion, thus supplying less light than required.

UNSATURATION: in a UV-curable formulation, a double-bond in a molecule which reacts to free radicals.

UV: abbreviation for Ultraviolet.

UV INK: refers to inks which are chemically formulated to polymerize under exposure to intense ultraviolet light.

V

VAPOR PERMEABLE: property of allowing a vapor to pass through a material. (Porosity is air permeable.)

VAPOR PRESSURE: the outward pressure of a given vapor mass at a specified temperature, used as an indicator of volatility. Expressed in mm of Hg at 20 degrees C.

VARNISHING: a process whereby a sheet, either printed or unprinted paper, paperboard or similar substrate, is coated with a film-forming liquid.

VISCOSITY: Element property that determines flow resistance.

VOC (Volatile Organic Compound): A vaporized organic compound that reacts with the atmosphere and sunlight to create smog and other pollutants. VOC emissions are subject to government regulations.

W

WATER MISCIBLE: solvents or other liquids which can be stirred into and blended with water.

WAVELENGTH: a measuring unit to determine hue, color, and position in the spectrum.

WEB: A continuous substrate roll passing through a printing press.

WETTABILITY: the relative affinity of a liquid for a surface, measured by the contact angle formed between the liquid and the surface. If the contact angle is zero, complete wettability occurs. If the contact angle is greater than 90 degrees, the condition is one of non-wettability.

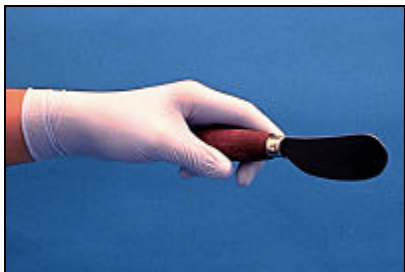
Z

ZAHN CUP: an apparatus used for measuring the viscosity of a liquid (water thin or slightly heavier) coating system. Usually used to measure efflux time, expressed in seconds, of non-pigment or low-solids coating systems.

SAF-T-CURE® HAND PROTECTION

It is essential that personnel who handle UV/EB material be protected from direct skin contact. These materials are classified as skin irritants. The hands are best protected by wearing impervious gloves. However, the most effective gloves against penetration by these materials may be uncomfortable to the user and may in some situations seriously interfere with manual dexterity. UV Process Supply has researched the market and has selected different types of disposable gloves and reusable gloves. These gloves offer the maximum protection while allowing optimum dexterity.

DISPOSABLE PROTECTIVE GLOVES



NT SURGICAL-TYPE* GLOVES

SAF-T-CURE™ NT Surgical-Type* Gloves are a remarkable improvement in hand protection. These 4-mil, soft nitrile (NT) disposable gloves may be used for a wide range of applications in the production or lab area, including as a UV skin block.

The unique pressure-reduction quality provides form-fitting comfort at 100% stretch for maximum dexterity and working ease while protecting your hands. For added comfort, NT gloves have a low-modulus property that delivers a cool, soft and dry feel, unmatched by other disposable gloves. These non-handed gloves hold patent #5,014,364. Sold 100/pack, 20 packs/case. Four sizes available.

LIGHT USE: More solvent resistant than natural rubber latex gloves. Provide better puncture and abrasion resistance than PVC/vinyl or polyethylene gloves, of comparable thickness. Effectively block UV rays. For short-term, intermittent use. Virtually static-free, ideal in electronics printing and assembly, pre-press processes, handling and mixing UV/EB inks, coatings or chemicals and solvents.

*Note: Our description "Surgical-Type" does not imply that these gloves meet the FDA requirements for a full surgical glove, but refers only to the style in relationship to thickness and dexterity of use.

Item No.	Description	Item No.	Description
I004-045	SMALL	I004-046	MEDIUM
I004-047	LARGE	I004-048	EXTRA LARGE
I004-052	NON-POWDER; SM	I004-053	NON-POWDER; MED
I004-054	NON-POWDER; L	I004-055	NON-POWDER; XL



DISPOSABLE LATEX SURGICAL-TYPE GLOVES

Solvent-resistant latex surgical-type gloves designed for short-term one-time usage. Surgical design, thin gauge and optimal quality allows optimum touch sensitivity and dexterity. Gloves fit either hand and feature roll cuff protection at wrist. For use with formulations and when cleaning with solvents such as acetone, alcohol and MEK. 5 mil thickness. 100/pack.

Item No.	Description	Item No.	Description
I004-002	SMALL	I004-044	MEDIUM
I004-003	LARGE		



POWDER-FREE LATEX SURGICAL-TYPE GLOVES

SAF-T-CURE™ Powder-free Latex Surgical Type Gloves offer protection for your hands and the delicate parts you handle. Constructed of 0.16 mm thick natural rubber latex, this ambidextrous latex surgical glove is manufactured without powder for safe use by workers who handle electronic and other delicate parts highly sensitive to particulate contamination. Ideal for applications: laboratory analysis and technical work, handling delicate and intricate parts, quality control, electronic assembly and other processes where freedom from particulate matter is important. Sold 100/box.

LIGHT USE: Provide good chemical resistance upon short-term or intermittent and accidental exposure to many acids, alcohols, alkalies and ketones. Features a longer cuff than other brands for added wrist protection.

Item No.	Description	Item No.	Description
I004-049	SMALL	I004-050	MEDIUM
I004-051	LARGE		

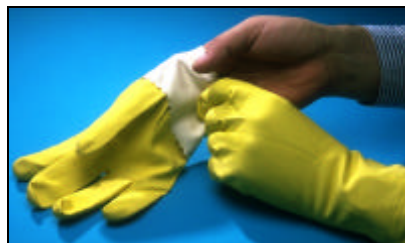
UV SAFETY PRODUCTS

FLOCK-LINED GLOVES

SAF-T-CURE™ Flock-Lined Gloves are 18 mil solvent-resistant latex, allowing for longer term use and easy manipulation. Flock lining is comfortable and durable, while keeping hands dry. They protect to the forearm and are easy on/off. 18 mil thickness. 12/pack, 12 packs/case.

MEDIUM USE: Intended for clean-up longer than 20 minutes, but less than 3 hours. Recommended for use with formulations and solvents such as acetone, alcohol and MEK.

Item No.	Description	Item No.	Description
I004-006	Size 7	I004-008	Size 8
I004-010	Size 9	I004-012	Size 10



NATURAL RUBBER GLOVES

SAF-T-CURE® Natural Rubber Gloves provide excellent finger dexterity and slip on and off easily. These disposable gloves protect forearms from solvent exposure. 18 mil thickness. 12/pack, 12 packs/case.

MEDIUM USE: Recommended for use with a wide variety of chemicals.

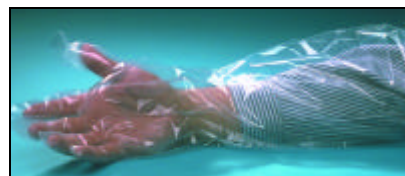
Item No.	Description	Item No.	Description
I004-014	Size 7	I004-016	Size 8
I004-018	Size 9	I004-023	Size 10



DISPOSABLE SHOULDER LENGTH GLOVES

Heat-sealed clear polyethylene gloves provide complete arm protection. Gloves fit over sleeves of clothing for the ultimate prevention measure. Good for protecting the entire arm when cleaning hard to reach areas of equipment. Designed to be used once and thrown away. 1.5 mil thickness. 50 per roll.

Item No. I004-005



HEAT SEALED POLYETHYLENE GLOVE

Same as I004-005, but wrist length, with heat sealed seams and 1-1/4 mil thickness, these durable polyethylene gloves are clear in color. They fit either hand. 100/pack.

Item No. I004-004



REUSABLE PROTECTIVE GLOVES

NP GLOVES

SAF-T-CURE™ NP Gloves are strong, reusable, non-slip neoprene which provide several hours of protection from UV/EB materials. 30 mil thickness. 12/pack. S,M,L: 12 packs/case. XL: 8 packs/case.

HEAVY USE: Recommended for cleanup where solvents are used. Excellent for long periods of repetitive use.

Item No.	Description	Item No.	Description
I004-024	Small	I004-025	Medium
I004-026	Large	I004-034	X-Large



NP LATEX GLOVES

SAF-T-CURE™ NP Latex Gloves are constructed of unsupported neoprene over natural rubber. Strong, reusable, and non-slip, these gloves provide several hours of protection from a wide range of UV materials and solvents. Excellent comfort, high flexibility and excellent sensitivity. Tractor-tread grip encourages fluid run-off. 100% cotton flock lining absorbs perspiration and permit easy removal. Once black area turns blue, time to change. Length: 13". 26 mil. Sold per dozen.

HEAVY USE: Recommended for cleanup where solvents are used. Excellent for long periods of repetitive use.

Item No.	Description	Item No.	Description
I004-057	Small	I004-058	Medium
I004-059	Large	I004-060	X-Large



UV SAFETY PRODUCTS



NT GLOVES

SAF-T-CURE™ NT Gloves are made of non-slip nitrile impervious to most solvents. Recommended for long term exposure and clean up. Highly resistant to punctures, snagging, abrasion. 11 mil thickness. 12/pack, 12 packs/case.

HEAVY USE: Recommended for ink cleanup and handling of formulations because of their excellent chemical resistance.

Item No.	Description	Item No.	Description
I004-027	Size 7	I004-028	Size 8
I004-029	Size 9	I004-033	Size 10

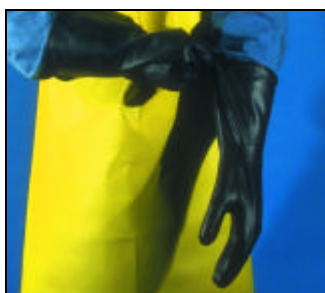


EDMONT FLOCK-LINED GLOVES

SAF-T-CURE™ Edmont Flock-lined Gloves are constructed of specially-compounded, non-slip nitrile for excellent strength and resistance to most solvents. Will not swell or weaken during long-term exposure and clean up. Highly resistant to punctures, snagging, abrasion. Straight cuff with natural hand fit. Soft, cotton flock lining absorbs perspiration and permits easy removal. Sold per dozen.

HEAVY USE: Recommended for ink cleanup and solvent handling.

Item No.	Description
I004-036	Size 9, 9-1/2
I004-037	Size 10



GAUNTLET GLOVES

Thick, neoprene SAF-T-CURE™ Gauntlet Gloves offer superior performance in many acids, solvents, oils, caustics and greases. Heavy Use: Because of its extra thick body it has high cut resistance but poor abrasion compared to other gloves. Good for high or low temperature extremes from 50 to 300°F. Smooth finish. 40 mil thickness. Specify 14 or 18" length.

Item No.	Description
I004-040	14" Length
I004-041	18" Length



BT GLOVES

SAF-T-CURE™ BT Gloves have the highest resistance to UV/EB materials of any commercially available glove for long term exposure. 17 mil thickness. Sold by the pair, 12 pairs/case.

EXTREME USE: To protect against most UV/EB inks, coatings, adhesives, solvents or raw materials.

Item No.	Description
I004-030	Size 8
I004-042	Size 9
I004-032	Size 10
I004-043	Size 11



COTTON INSPECTION GLOVES

When handling UV lamps, finger prints or any foreign matter can cause a lamp to fail or at least an obstruction of the UV light. The substance will eat its way into the lamp and as the lamp ages it will get darker and present curing problems. To prevent this, it is suggested to wear cotton gloves whenever handling UV Lamps. Specify men's or ladies'. Sold per dozen.

Item No.	Description
I004-022	Men's
I004-031	Ladies'



KEVLAR® GLOVES

Kevlar Gloves protect hands from cuts, slashes and abrasions when working with steel rule dies. Made of tough and cut-resisitant Kevlar fibers. Open mesh knit stretches for a comfortable fit. Reversible, left or right, to maximize wear. PVC dots for a sure grip. Sold per dozen.

Item No.	Description
I004-056	

UV SAFETY PRODUCTS

SAF-T-CURE® SKIN CARE PRODUCTS

UV BARRIER CREAM

UV Process Supply, Inc., has developed SAF-T-CURE® UV Barrier Cream specifically to protect the skin against penetration of UV/EB materials. This water-based cream repels water insoluble materials. Barrier Cream should be applied generously to hands and exposed arm areas prior to potential contact and should only be applied to clean skin. NEVER APPLY BARRIER CREAM AFTER EXPOSURE.

Please note: Barrier Cream wipes off easily and may not offer complete skin coverage. Therefore, Barrier Cream is recommended as a protective layer preferably used in combination with gloves. Sold per pint.

Advantages:

- Easy to apply
- Offers skin protection against contact dermatitis
- Excellent protection for fingernails, knuckles and other collecting areas
- Does not interfere with manual dexterity
- Buffered to the average pH of the acid mantle of the skin
- Easily removed with mild soap and water

Item No. I002-003



DERMATECH BARRIER CREAM

Dermatech Barrier Cream is an antiseptic agent that protects skin from dryness, salts, solvents, dyes, colorants, detergents, and common causes of contact allergies. It forms a soft, long lasting, monomolecular shield that is permeable to air, allowing the skin to breathe normally. Its water-repellant qualities create a barrier to protect the skin against water-based irritants.

Softens, moisturizes and prevents dryness by reducing transdermal water loss. Its foam-like consistency provides excellent emolliency without the drawbacks of greasiness, stickiness, or slip that can interfere with handling printing materials.

Safe, odorless, nonirritating and nonsensitizing, Dermatech is ideal for work situations that require both skin protection and manual dexterity. Available individually in 6 oz dispenser cans.

Item No. Description

I002-006 DERMATECH BARRIER CREAM



UV BLOCK 30

Proven to protect against harmful UVA and UVB rays, this non-greasy, paba-free and water-proof lotion should be applied generously before working near any UV light source. Reapply as necessary or after 80 minutes if continuously exposed to sweat or water. Contains natural skin moisturizers like Vitamin E, cocoa butter and aloe to help prevent chafing. 16 oz.

Item No. Description

I002-008 UV BLOCK 30



UV HAND CLEANER

SAF-T-CURE® UV Hand Cleaner is specially developed for cleansing hands of UV/EB inks and coatings, conventional inks and the toughest dirt, grease, grime, soils, resins, paints and glue. Its pH balanced formulation does not contain water, petroleum distillate and other organic solvents. It contains a unique additive that counteracts the irritation effect of direct contact to UV/EB materials. It is also formulated with aloe, jojoba oil and lanolin to condition and moisturize hands for preventing the break out of dermatitis often caused by frequent hand cleaning using ordinary soaps or wash-up solvents.

Simply rub the UV Hand Cleaner into dry hands (no need to use water), until dirt, ink, grease or stain is dissolved. Wipe dry with cloth or rinse with water. After application of UV Hand Cleaner, a thin barrier layer remains on the skin for



UV SAFETY PRODUCTS

protection against water insoluble irritants. SUGGESTED USE: When a UV/EB curable material comes in contact with one's hands or skin, a liberal amount of SAF-T-CURE Hand Cleaner should be applied and rubbed on the affected area using the fingers, until the material is dissolved.

Packaged in three convenient sizes. Gallon sizes come in biodegradable pump style container for easy dispensing.

Item No.	Description
I001-001	UV HAND CLEANER/1-GALLON
I001-002	UV HAND CLEANER/QUART
I001-003	UV HAND CLEANER/PINT
I001-010	UV HAND CLEANER/1-GALLON WITH PUMICE



PLASTIC HAND CLEANER DISPENSER/CRANK STYLE

Constructed of molded, break resistant ABS plastic, this paste type dispenser features positive crank style delivery. Adjustable discharge. Fits 5-7/8" cans, including 1-gallon containers of SAF-T-CURE® UV Hand Cleaner (Item# I001-001). Beige finish.

Item No.	Description
J010-001	PLASTIC HAND CLEANER DISPENSER/CRANK STYLE



pH6 LIQUID HAND SOAP

SAF-T-CURE® pH6 Liquid Hand Soap is a mild non-alkaline liquid cleanser that safely and efficiently removes industrial grime without irritating or defatting skin. pH6 is a blend of select sulphonated vegetable oils of the highest quality and as the name implies is slightly less acidic than normal skin which has a pH of 5.

Due to its remarkable qualities of penetration and emulsification, the cleanser penetrates deeply into the pores and quickly removes soils. Regardless of frequent washings, continued use of PH6 Liquid Hand Soap will keep a normal, healthy skin condition. Ideal substitute for those allergic to soap.

Item No.	Description
I001-007	pH6 LIQUID HAND SOAP



LIQUID SOAP DISPENSER

Rust-proof and corrosion resistant dispenser. No drip pump action, suitable for lotion, liquid synthetic detergent or oil dispensing. Chrome finish. For use with SAF-T-CURE® pH6 Liquid Hand Soap (Item# I0001-007).

Item No.	Description
J010-003	LIQUID SOAP DISPENSER



POWDERED HAND SOAP

SAF-T-CURE® Powdered Hand Soap is for those tough soils that need a completely water soluble mineral scrubber. Its gentle action, with skin conditioners, will rub out the dirt without irritating sensitive hands. This cleanser can be used in the factory, shop, and office or anytime a scrubbing skin cleanser is needed. Skin conditioners added. Sold in 10 lb. boxes, 5 boxes/case.

Item No.	Description
I001-008	POWDERED HAND SOAP

UV SAFETY PRODUCTS

UV SKIN LOTION

SAF-T-CURE® Skin Lotion completes the cycle of hand protection. It is a modern skin conditioner specifically designed for routine daily use. With the frequency of hand cleaning, the skin's natural oils are washed away daily, therefore, losing its natural defense against dermatitis. The skin lotion replaces lost oils and prevents cracking and drying of the skin. Skin lotion contains emollients in a neutral vanishing cream base. It also contains a special additive to counteract irritation caused by most UV/EB materials. Sold individually in 8 ounce bottles or 16 bottles/case.

Item No.	Description
I002-001	SAF-T-CURE® SKIN LOTION/8 oz.



SAF-T-CURE® UNBURN

SAF-T-CURE® Unburn immediately cools skin burned by UV light, eases pain, and protects wounds from further contamination. Containing pain-relieving lidocaine, it moisturizes as it cools to help prevent peeling. It is nonsticking, and nonstaining.

Easy to store and transport, it can be kept on-site for all types of burns. It does not require a water source or special training for use. A gel, it washes away quickly with water and leaves no residue. 12 foil dispenser packs, each containing 6 grams.

Item No.	Description
I002-007	SAF-T-CURE® UNBURN



SAFETY STARTER SAMPLER KIT

SAF-T-CURE® products are developed to ensure protection of your most valuable asset—YOU! UV Process Supply now offers a Safety Starter Sampler Kit to give you the opportunity to test some of our most popular skin protection products.

The Kit includes the following:

SAF-T-CURE® UV HAND CLEANER

Specially formulated to remove UV/EB curable inks, coatings and adhesives from the skin. It contains a monomer neutralizing agent that counteracts irritation while softening and protecting the skin. Used without water, UV Hand Cleaner eliminates the need for extra plumbing facilities throughout the shop. 1 PINT.

SAF-T-CURE® UV BARRIER CREAM

Forms a physical barrier to most water insoluble irritants. The skin becomes sensitized from repeated contact with UV/EB materials, even after apparent trouble-free periods of exposure. Barrier Cream should be applied to clean skin PRIOR to chemical contact. It does not interfere with manual dexterity, prevents build-up around fingernails, knuckles and other areas where materials concentrate, and is most effective when used with gloves. SAF-T-CURE UV Barrier Cream is buffered to the average pH of the skin's acid mantle and easily washes off with mild soap and water. 1 PINT

SAF-T-CURE® UV SKIN LOTION

This lotion completes the skin protection cycle by replenishing lost oils and preventing dermatitis, cracking and drying due to frequent washing and drying. It contains a special additive to counteract irritation caused by most UV/EB materials. 8 OUNCES

SAF-T-CURE™ NT SURGICAL-TYPE* GLOVES

Durable, 4 mil thick gloves are designed to offer hand protection in many light-use industrial applications. Their unique pressure-reducing quality provides form fitting comfort at 100% stretch for manual dexterity and working ease while protecting your hands. These anti-static gloves are ideal for use in electronics printing and assembly, pre-press processes, and handling and mixing UV/EB inks, coatings and chemical solvents. BAG OF 100, SIZE X- LARGE

Note: Our description "Surgical-Type" does not suggest or imply that these gloves meet the FDA requirements for a full surgical glove, but refers only to the style in relationship to thickness and dexterity of use.

Item No.	Description
I002-004	SAFETY STARTER SAMPLER KIT





SAF-T-CURE FULL BODY PROTECTION

For most applications of Ultraviolet and Electron Beam materials, a long sleeved laboratory apron made of impervious material provides adequate protection to the body and clothing. However, in cases where exposure to coatings and aerosols are likely, UV Process Supply recommends the maximum protection with our Aprons, Coveralls and Boots for whole body protection.

NP APRONS

SAF-T-CURE™ NP Aprons are heavy duty yellow neoprene with tape-reinforced edges that protect from neck to knee. The neoprene will not stick, peel, crack or stiffen. Any solvent or ink contamination can be removed with soap and water. Sold individually or 72/case.

Item No.	Description
I003-002	NP APRONS



DISPOSABLE COVERALLS

SAF-T-CURE™ Disposable Coveralls are fluid repellent, nonwoven Tyvek with a zipper front and rear pocket. Can be worn comfortably over clothing. Sold separately or 50/case.

Item No.	Description
I003-003	DISPOSABLE COVERALLS; Small
I003-005	DISPOSABLE COVERALLS; Medium
I003-007	DISPOSABLE COVERALLS; Large
I003-016	DISPOSABLE COVERALLS; X-Large
I003-008	DISPOSABLE COVERALLS; XX-Large
I003-004	DISPOSABLE COVERALLS; XXX-Large
I003-006	DISPOSABLE COVERALLS; XXXX-Large



DISPOSABLE LAB COATS

SAF-T-CURE™ Disposable Lab Coats are ideal for shop and lab use. Made of nonwoven Tyvek, they feature long sleeves, collar, full(c)cut and front snaps. They fit comfortably over clothing and are available in four sizes. Sold individually or 50/case.

Item No.	Description
I003-009	DISPOSABLE LAB COATS; Small
I003-011	DISPOSABLE LAB COATS; Medium
I003-013	DISPOSABLE LAB COATS; Large
I003-014	DISPOSABLE LAB COATS; X-Large



HEAVY DUTY BOOTS

SAF-T-CURE™ Heavy Duty Boots are durable, reusable footwear at the price of a disposable boot suitable for numerous UV/EB clean-up and production jobs. Made of safety yellow, extra strong .50 mm stretch latex for maximum protection. Sold by the pair.

Item. No.	Description
I003-017	HEAVY DUTY BOOTS; Large
I003-018	HEAVY DUTY BOOTS; Extra Large

UV SAFETY PRODUCTS

SAFE-T-CURE® UV PROTECTIVE EYEWEAR

ORANGE UV FILTER GLASSES

Protect your workers against hazardous UV with proper eye protection. Our SAFE-T-CURE™ Orange UV Filter Glasses provide the best protection against UV exposure up to 400 Nm, and against “blue light” between 400 and 510nm. Blue light can cause eye irritation and damage especially when taking photosensitizing medications. Our Orange UV Filter Glasses meet OSHA requirements and ANSI-Z87.1-1979. Sold individually or 24/case.

Item No.	Description
I005-017	ORANGE UV FILTER GLASSES



SOLAR SHIELD UV FILTER GLASSES

SAF-T-CURE™ Solar Shield UV Filter Glasses protect the eyes by absorbing short-wave UV radiation to 400nm, and eliminating long-wave “blue haze” interference. The wrap around frames fit comfortably over regular glasses. Reduces eye fatigue and complies with OSHA and ANSI-Z87.1-1979. Sold individually or 24/case.

Item No.	Description
I005-018	SOLAR SHIELD GLASSES; Yellow
I005-020	SOLAR SHIELD GLASSES; Green
I005-021	SOLAR SHIELD GLASSES; Clear
I005-022	SOLAR SHIELD GLASSES; Grey



ANTI-FOGGING UV SAFETY GLASSES

Anti-fogging UV Safety Glasses absorb 99.9% of wavelengths up to 380nm. Tough clear and grey lenses are made of polycarbonate to provide excellent impact resistance. Both lenses meet ANSI Z87.1-1989 standards for industrial eye protection, and grey lenses also meet ANSI Z80.3-1986 standards for blocking UVA and most UVB rays. Both lenses comply with OSHA standards for industrial protective eyewear. Anti-fogging. Available in eight styles.

Item No.	Description
I005-037	UV SAFETY GLASSES; black & yellow frame w/clear lens
I005-038	UV SAFETY GLASSES; black & yellow frame w/grey lens
I005-039	UV SAFETY GLASSES; red frame w/clear lens
I005-040	UV SAFETY GLASSES; red frame w/grey lens
I005-041	UV SAFETY GLASSES; purple & green frame w/clear lens
I005-042	UV SAFETY GLASSES; purple & green frame w/grey lens
I005-043	UV SAFETY GLASSES; black frame w/yellow lens
I005-044	UV SAFETY GLASSES; black & yellow frame w/yellow lens



UV FILTER SAFETY GLASSES #385

SAF-T-CURE™ UV Filter Glasses #385 have a lightweight aviator design with hardcoated polycarbonate lenses. They provide 99.9% UV protection up to 385 nanometers. A black metal frame and unique vinyl bridge design provide comfort without slipping. Made of 58mm hard coated polycarbonate lenses, and built-in sideshields, they offer excellent abrasion resistance. Their universal size keeps down inventory costs. UV Filter Glasses #385 comply with OSHA requirements and ANSI-Z87.1-1989 standards. Available in four colors: Green for extra IR protection, Gray for anti-glare, Amber for enhanced vision, Clear for maximum visibility. Sold individually or 24/case.

Item No.	Description
I005-024	#385 UV Filter Glasses w/GREEN lenses
I005-025	#385 UV Filter Glasses w/GRAY lenses
I005-026	#385 UV Filter Glasses w/AMBER lenses
I005-027	#385 UV Filter Glasses w/CLEAR lenses
I005-031	Replacement Lenses; CLEAR
I005-032	Replacement Lenses; GRAY
I005-033	Replacement Lenses; GREEN
I005-034	Replacement Lenses; AMBER



UV SAFETY PRODUCTS



DISPOSABLE UV FILTER GLASSES

SAF-T-CURE™ Disposable UV Filter Glasses block UV radiation up to 400 nm. Designed with flexible temples, adjustable to fit all head sizes. Fits comfortably over most prescription glasses. Offered at very low cost to promote safety-wear even for people visiting your production shop. Can be worn comfortably by virtually everyone with minimum adjustment. Designed with thick sides for additional protection, ideal for light-sensitive eyes. One-piece molded construction provides great durability. Smoke gray color. Pack/10.

Item No.	Description
I005-023	DISPOSABLE UV FILTER GLASSES



GLASS LENS CLEANING TOWELS

Keep safety glasses and goggles clean and fog-free with these disposable chemically-treated towels. Handy dispenser is ideal for use anywhere in your shop or lab where safety glasses are required. Perfect for high humidity and high activity environments where fogging and dust build-up occur.

Item No.	Description
I005-036	GLASS LENS CLEANING TOWEL



UV VIEWING GOGGLES

When looking into a UV curing environment, UV protective viewing goggles are recommended. These viewing goggles are provided with a glass UV filter (400 nm), designed with the highest filtration for eye protection. Note: Since the glass filters are very dense it will be difficult to use them under regular shop lighting. Also, when viewing UV curing, remember to protect the entire face to prevent "sunburn" by applying UV Solar Shield #30 (#I002-005). Replacement Filter shade #8 also available.

Item No.	Description
I005-016	UV VIEWING GOGGLES
I005-014	Replacement Filter; Shade #8



HIGH IMPACT UV PROTECTIVE GOGGLES (High Style)

High impact polycarbonate lens protects against airborne particulate. Offers 99.9% UV protection to 380nm. Lightweight, flexible frame. Wide angle lens provides exceptional peripheral vision. Vent system prevents fogging. Fits over most personal glasses and respirators. Meets ANSI Z87.1-1989 and complies with OSHA regulations regarding eye and face protection.

Item No.	Description
I005-048	HIGH IMPACT UV PROTECTIVE GOGGLES



CHEMICAL SPLASH/IMPACT GOGGLES

Polycarbonate lens offers impact protection from chemical and liquid splash, spray and other airborne particulate. Absorbs 99.9% of UV radiation to 380nm. Vertical vent system prevents fogging. Includes chemical-resistant headband. Wide angle lens offers excellent vision and fits over personal glasses and respirators. Meets ANSI Z87.1-1989 and complies with OSHA regulations for eye and face protection.

Item No.	Description
I005-049	CHEMICAL SPLASH/IMPACT GOGGLES



TINTED LENS IMPACT GOGGLES

Tinted polycarbonate lens offers protection against from airborne particulate. Ventilation system prevents fogging. Includes flame-retardant headband. Wide angle lens offers excellent vision and fits over personal glasses. Meets ANSI Z87.1-1989 and complies with OSHA regulations for eye and face protection.

Item No.	Description
I005-050	TINTED LENS IMPACT GOGGLES

UV SAFETY PRODUCTS

UV FILTER GOGGLES

Excellent eye protection against impact and optical UV radiation. Shade 5 polycarbonate filter plates absorb UV and infrared. Flexible, green opaque mask includes vents to redirect light and minimize fogging. Wide angle lens offers excellent vision and fits over personal glasses. Meets ANSI Z87.1-1989 and complies with OSHA regulations for eye and face protection.

Item No.	Description
I005-051	UV FILTER GOGGLES



SPLASH GOGGLES WITH UV FILTRATION

Splash goggles protect the eyes from UV/EB materials. Indirect louvers provide ventilation to reduce fogging but also prevent liquids from entering the protected area. The lenses and frame are made of clear plastic for optimum visibility and will filter UV light up to 400 nm. *Note SAF-T-CURE Goggles are recommended for short term use. Skin perspiration can absorb chemical vapors.

Item No.	Description
I005-007	SPLASH GOGGLES WITH UV FILTRATION



UV FILTER FACE SHIELDS

These face shields provide 100% face protection from exposure to the full UV spectrum (200-405nm), and from accidental splashes of harmful liquids. They consist of a lightweight plastic head gear and a clear plastic face window. The foam plastic sweatband fits inside and is easily removed for replacement or cleaning. The face shield dimensions are 6" x 11.5". Meets USASI standards.

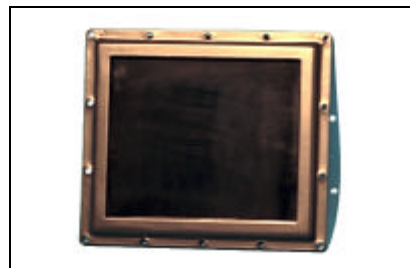
Item No.	Description
I005-002	UV FILTER FACE SHIELDS



UV VIEWING WINDOW

The UV Viewing Window permits safe viewing into a curing zone when process observation is critical and standard UV protective eyewear is insufficient. The UV Viewing Frame and filter lens can be installed in the side of the curing reactor and allow safe viewing into the reactor. NOTE: NEVER LOOK DIRECTLY AT A UV LAMP WHEN IT IS ON. SAF-T-CURE® Filter glasses are designed to offer the employee protection against UV radiation leaks while feeding work in and out of the UV Processor and from minor leaks due to incomplete shielding. Replacement Filter (shade #10) for #I005-013 available.

Item No.	Description
I005-013	UV VIEWING WINDOW; 1-3/4" X 3-3/4"
I005-011	UV VIEWING WINDOW; 3-7/8" X 4-3/4"
I005-015	REPLACEMENT FILTER; Shade #10 for #I005-013



AUTOMATIC UV VIEWING WINDOW

Achieve better supervision of the curing process safely with the proper eye protection against harmful UV radiation. The SAF-T-CURE® Automatic UV Viewing Window combines functionality and 100% UV and IR protection. Battery-powered, the lens changes automatically to adjust to given lighting conditions, from nearly transparent for clear vision under normal lighting conditions to dark which is automatically triggered in 1/500th of a second under brighter lights. Meets ANSI Z87.1 Standard.

Features:

- Automatic lens shade adjustment
- Always provides UV/IR protection for your eyes and facial skin
- Lightweight: Only 15 oz (450g) including the helmet
- Nearly transparent but with full UV/IR protection
- New low power electronics giving increased battery life (1000 hours) only 2 to 3 battery changes per year
- Faster darkening filter - 2/1000 second in normal use
- Overall Dimension: 4-1/2" x 5-1/4"
- Viewing area: 3-5/8" x 1-3/4"

Item No.	Description
I005-030	AUTOMATIC UV VIEWING WINDOW



UV SAFETY PRODUCTS



ELECTRONIC UV VIEWING WINDOW

Features 12-level electronic lighten/darken lens. Automatically adjusts degree of shade to compensate for exposed light level. Lighter shades permit viewing into the chamber when the lamp is shutdown. Mounts to the side of any UV curing chamber for safe viewing when process observation is critical and standard UV protective eyewear is insufficient. Please note: Never look directly at the UV lamp when on. Also, to protect against minor leaks due to incomplete shield, we recommend SAF-T-CURE® Filter glasses for full employee protection.

Features:

- Lighter gradients provide good visibility when lamp is off.
- Automatically darkens within one millisecond right at lamp start-up
- Offers excellent protection from ultraviolet and infrared rays
- Weighs less than standard glass windows

Specifications:

- | | |
|-----------------------------|---------------------------------|
| • Switching time: | Less than 1 millisecond |
| • Delay from dark to light: | 2 tenths of a second |
| • Light sensors: | 2 detectors |
| • Sensitivity Adjust: | Hi and low settings |
| • Automatic Shutoff: | Always on |
| • Power Supply: | Solar powered |
| • Operating Temperature: | -230°F to 131°F (-20°C to 55°C) |
| • Viewing Area: | 3.78 x 1.61" |
| • Overall Size: | 4.5 x 5.25" |
| • Weight: | 3.21 oz |
| • Depth: | 0.20" |

Item No.	Description
I005-035	ELECTRONIC UV VIEWING WINDOW

OZONE/TOXIC/COMBUSTIBLE GAS DETECTORS

OZONE TEST STRIP

By OSHA standards, ozone concentrations produced by UV curing systems and other sources in excess of 0.10 ppm is considered a health hazard. SAF-T-CURE's disposable Ozone Test Strips offer a fast, accurate method for measuring ozone to minimize health hazards. After a quick ten minute exposure test, the chemically-treated plastic strip changes color to correspond with the present ozone level. By measuring the strip's color against the 5-stage color chart supplied with each pack, you can obtain a reading of present conditions:

Ozone Test Strips provide good indication if your work environment complies with OSHA standards and whether current ozone extraction methods are sufficient. 30/pack.



Item No.	Description
I011-011	OZONE TEST STRIPS

TOXIC/COMBUSTIBLE GAS DETECTOR

The Toxic/Combustible Gas Detector will respond to gas concentrations well below their lower explosive limit or OSHA levels. Can detect levels as low as one part per million. Patented design and rust proof belt clip allows easy portability. Scratch resistant, Lexan faced, analog meter shows results even in noisy environments and gives an indication of the size of the leak. Three-position sensitivity switch adapts for use in different environments. Weight: 1.01 lbs. including battery.

Detection capability:

- | | |
|------------------|---|
| • Solvent Vapors | • Propane |
| • Hydrogen | • Natural Gas and other Combustible Gases |
| • Sulfur Dioxide | • Ammonia |
| • Ethylene Oxide | • Hydrogen Sulfide and other Toxic Gases |

Item No.	Description
I011-002	TOXIC/COMBUSTIBLE GAS DETECTOR



UV SAFETY PRODUCTS

OZONE GAS DETECTOR

The Ozone Gas Detector is a specialized rechargeable gas detector equipped with a unique, highly sensitive sensor able to detect gases in concentrations as low as one part per million. Features include an analog meter which makes it easy to operate in a noisy environment, a sound alarm with off and on switch, and a belt clip. The unit has a purge button that enables the user to quickly clear the sensor after exposure to large concentrations. Weight: 1.01 lb. including batteries.

Detection capabilities:

- Ozone
- Chlorine
- Bromine and other Halogen Gases
- Nitrogen Dioxide
- Fluorine

Item No.	Description
I011-003	OZONE GAS DETECTOR



OZONE INDICATOR BADGES

Most UV curing equipment produces ozone, which can be dangerous for machine operators. Insufficient ventilation can result in hazardous ozone concentrations. SAF-T-CURE® Ozone Indicator Badges change from white to brown when concentration reaches 0.1ppm. Ten ozone indicator tapes, sensitive to .1ppm, are included with each badge. To be worn or placed near the processing equipment.

Item No.	Description
I011-001	OZONE INDICATOR BADGES



SAF-T-CURE® INHALATION PROTECTION DEVICES

Work areas where UV materials are handled should be thoroughly ventilated. For extra protection, UV Process Supply highly recommends the regular use of respirators while handling UV inks, coatings and other hazardous chemicals, or as required by OSHA Standards (for specific materials). For specific inhalation protection requirements when handling a particular formulation, refer to the product Material Safety Data Sheet (MSDS).

DUAL ELEMENT RESPIRATOR

Form-fitting respirator features adjustable headstraps to prevent inhalation of airborne contaminants through nose and mouth. Features dual chemical replacement cartridges for filtering organic vapors, dust, mist and other particulate. Ideal for screen and press cleaning and other functions where solvents are used. Cleans easily after each use. Respirator cartridges sold separately. Use according to directions.

Note: Do not use in poorly ventilated areas or where concentrations or contaminants are immediately dangerous to life or health, or may irritate eyes and skin.

Item No.	Description
I006-014	DUAL ELEMENT RESPIRATOR w/cartridges; Medium
I006-016	DUAL ELEMENT RESPIRATOR ONLY; Medium
I006-017	DUAL ELEMENT RESPIRATOR ONLY; Small
I006-013	RESPIRATOR REPLACEMENT CARTRIDGES



REUSABLE/DISPOSABLE DUST RESPIRATOR

Pleated, dust/mist respirator offers excellent economy for reuse or disposal. Suitable for most screen or press cleaning applications, each respirator is approved for protection against pneumoconiosis and fibrosis producing dusts and mists; dusts and mists having a time weighted average not less than 0.05 milligrams per cubic meter or 2 million particles per cubic foot; or any combination thereof. Sold 50/box. NOTE: Not for use in atmospheres containing toxic gases or vapors.

Item No.	Description
I006-018	REUSEABLE/DISPOSABLE DUST RESPIRATOR



UV SAFETY PRODUCTS



DISPOSABLE DUST/MIST RESPIRATORS

Disposable dust masks protect against inhaling fumes and other airborne particulate. Unique double-shell construction with strong outer shell will not collapse from humidity or moisture. Softer inner shell is smooth, for more comfortable wear without irritation. Prestretched, heavy-duty headstraps eliminate breakage and do not require user adjustment. Adjustable nosepiece and foam inner seal provides custom fit for different facial sizes. Lightweight, compact design can be worn with glasses and goggles. Meets NIOSH standards. Sold 20/box.

Note: Do not use where concentrations or contaminants are immediately dangerous to life or health. Do not use for protection against asbestos, fumes, gases, vapors or spray painting.

Item No.	Description
I006-012	DISPOSABLE DUST/MIST RESPIRATORS



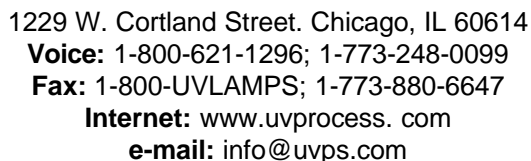
DISPOSABLE FACE MASK

SAF-T-CURE® Disposable Face Masks are designed for use against non-toxic nuisance dusts not exceeding the OSHA Permissible Exposure Limit. The low profile design permits unobstructed visibility and can be worn with glasses or safety goggles. Contour fit, soft metal nosepiece adjusts closely over bridge of the nose. Sold 50/pack, 12 packs/case.

NOTE: Not designed for protection against asbestos, silica, and cotton dust or any other toxic dusts, fumes, mists, gases and vapors or in spray paint operations.

Item No.	Description
I005-012	DISPOSABLE FACE MASKS

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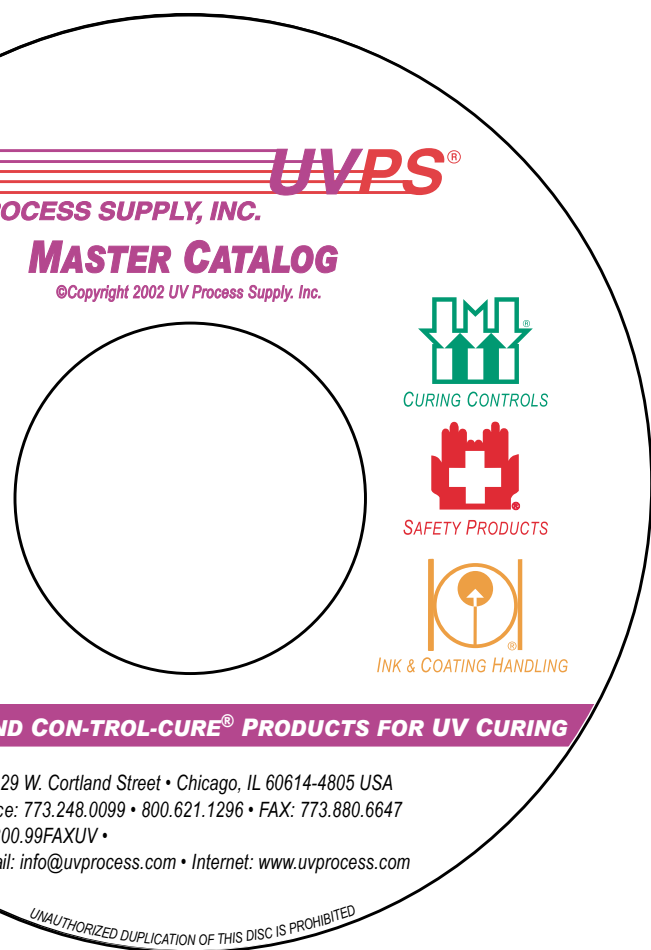
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- [illegible]

Total Merchandise Value	
Standard Shipping & Handling (see page A for details)	
Subtotal	
ILLINOIS Deliveries add 8.75% sales tax to Subtotal	
TOTAL	

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