

# GLOSSARY OF UV/EB TERMS

## A

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

**ABRASION RESISTANCE:** The ability of a material to withstand mechanical action such as rubbing, scraping or erosion that tends to progressively remove material from the surface.

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

**ACCELERATION:** Increasing power of energy of electrons through electrical field (usually 50 to 350 thousand volts or more) in a vacuum.

**ACID NUMBER:** The quantity of base, expressed in milligrams of potassium hydroxide, that is required to neutralize the free acids present in the sample.

**ACRYLATE:** Chemical materials, usually monomer and oligomers, which contain the grouping  $\text{CH}_2 = \text{CHCO}$ .

**ADHESION:** A mechanical or chemically reactive bond between surfaces. Adhesion to a smooth surface may rely on polar adhesion.

**ADHESION, MECHANICAL:** Adhesion between two surfaces which is promoted by a physical interlocking. Plastisol ink adheres to fabric by such a bond after curing.

**ADHESIVE BLEED (Ooze):** Adhesive exudation from pressure sensitive stock before or after processing to finished product, as a result of cold flow or damp pressure.

**ADHESIVE, LAYFLAT:** An adhesive having the property of resistance to warping in laminations.

**ADHESIVE, PERMANENT:** An adhesive with relatively high ultimate adhesion properties.

**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 with dissimilar surfaces on tact with slightly firm pressure.

**ADHESIVE, REMOVABLE:** An adhesive characterized by high cohesive strength and low ultimate adhesion strength.

**AFTER TACK:** Tack that develops in an ink film after it has apparently dried or after a heat drying operation.

**AIR CONTAMINANT:** Any substance of either manmade or natural origin in the ambient air such as dust, gas, fumes, mist (other than  $\text{H}_2\text{O}$ ), smoke, heat, noise, etc.

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

**ALKALINITY NUMBER:** The quantity of base, expressed as milligrams of potassium hydroxide, present in a sample.

**AMPERE (A):** The constant current that, if maintained in two straight parallel conductors, of infinite length and negligible cross section and separate from each other by a distance of 1 meter in a vacuum, will produce between these conductors a force equal to  $2 \times 10^{-7}$  newton per meter length.

**ANGSTROM:** A unit of length equal to  $10^{-10}$  meter. Usually the measurement of wavelengths or frequencies of the electromagnetic spectrum.

**ANTIFOAMING AGENT:** Ink additive that breaks foaming bubbles that may occur during printing.

**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.

**AROMATIC KETONE:** A group of chemical materials most of which are sensitive to light and readily form free radicals. The structure is  $\text{ArCOR}$  (Ar.). Some of these are useful photoinitiators.

**ATMOSPHERE:** 1) In relation to screen printing, the term atmosphere makes reference to temperature and humidity (relative humidity). 2) A standard unit of pressure, equal to 101,325 newtons per square meter.

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

## B

**BAKING:** Heat treatment by convection, infrared or other heat source of an ink or coating deposition to improve durability and hasten ultimate drying.

**BALLAST:** A step up transformer with a range of capacitors for regulating line voltage to a lamp housing.

**BAR:** A unit of pressure. One bar equals 100,000 newtons per square meter.

**BARREL:** A unit of volume. One barrel equals 9702 cubic inches or 0.15889 cubic meter (used in petroleum).

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

**BARRIER PROPERTIES:** The properties of a substance which allow it to act as a barrier especially to water vapor or moisture.

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

**BELT CONVEYOR:** A moving belt system for transporting prints from one processing stage to the next as from press to dryer, through dryer, from dryer to packaging area, in almost any conceivable order. Belt may be made of metal, mesh, heavy cloth, web straps, wire, etc.

**BENZOIN ETHER:** A group of chemical materials, most of which are sensitive to light and readily form free radicals. Chemical structure is  $\text{ArCOCHORAr}$ . Some of these are useful photoinitiators.

**BENZOL:** An aromatic of extremely high solvent strength. Quite toxic, therefore not generally employed.

**BLACKENING:** A darkened defect in paper caused by crushing at the calendars which is usually associated with a decrease in opacity. It may also be caused by excessive moisture.

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

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

**BLADE COATING:** A method of coating paper utilizing a flexible blade set at an adjustable angle against the web in manufacture. The web is usually supported by a soft surfaced backing roll.

**BLOCKING:** An undesired adhesion between layers of material placed in contact under moderate pressure and/or temperature in storage or use. Usually occurs in a stack of printed material which is stacked prior to thorough drying.

**BLOTCH:** An area of discoloration, usually irregular in shape, which can be caused by numerous factors.

**BLOTTING:** 1) A spotting or staining blemished effect. 2) 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.

**BLUSH:** Precipitation of water vapors on the surface of a film.

**BOND STRENGTH:** The strength of the union between materials.

**BURN OFF TEMPERATURE:** The temperature at which organic media is removed from applied color or the temperature at which the unwanted portion of a glass article is melted for removal.

**BURSTING STRENGTH TESTER:** Instrument used to measure the point at which a paper, foil, film, textile, plastic or other material submits to bursting.

**BY-PRODUCT:** A chemical substance produced during the manufacture, processing, use or disposal of another substance or mixture.

## C

**CALENDAR (Machine Calendar):** 1) A set of cast iron rollers, testing 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 heat 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.

**CANDELA:** the luminous intensity of 1/600,000 of a square meter of a radiating cavity at the temperature of freezing platinum (2042 K).

**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.

**CARBON ARC:** Term indicating a light source consisting of two carbon elements within an electrical system with a controllable electric arc between the two carbon rods or elements. The emitted light is extremely high in actinic value.

**CARBON ARC LAMP:** See Arc Lamp.

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

**CATALYZED SYSTEM:** Chemical compound ink, coating or the like which requires the use of a catalyst. A true catalyst is a substance which acts in a chemical system to increase the rate of chemical reaction.

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

**CHARACTERISTIC CURVE:** A photographic term referring to a graph of relative response on the part of photographic materials to varying amounts of light.

**CHEMICAL FIXATION:** A hazardous waste treatment process involving reactions between certain chemicals, resulting in solids which encapsulate, immobilize or otherwise tie up components in the waste, thus minimizing the leaching of hazardous components and rendering the waste nonhazardous or more suitable for disposal.

**CIRCULAR MIL:** The area of a circle whose diameter is 0.0001 inch. One circular mil equals  $3.14/4 \times 10^6$  square inches.

**CLEAR COAT:** Transparent protective coating applied to a screen printed imprint such as a finished decal or poster to ensure maximum durability.

**CLEAVAGE/PEEL STRENGTH:** The average load per unit width of bond line required to produce progressive separation of two bonded, semi-rigid adherents under specified conditions.

**COATING SCREEN:** A printing screen designed to print a solid layer of clear varnish or ink over a large predetermined area, usually used for applying color to backgrounds or displays or similar uses. It has no design except the outline of the area to be coated.

**COATING WEIGHT:** The mass of an applied coating per square unit of surface area. Also called Mass Weight.

**COCKLE:** 1) In paper, the effect of uneven moisture absorption causes swelling of those areas, in turn causing the paper to "lump" into a slightly bumpy surface contour. 2) An irregular lump in a fabric thread.

**CODING:** A list of instructions for specific problem solving. Also, writing instruction procedure for programming a computer.

**COEFFICIENT OF FRICTION:** The measure of the relative difficulty with which the surface of one material will slide over an adjacent surface of itself or another material.

**COEFFICIENT OF THERMAL EXPANSION:** The measure of the change in length of a material when subjected to specified temperatures.

**COLD CATHODE LAMPS:** One of two types of germicidal, low pressure UV lamps. The other is Hot Cathode Lamp. See Germicidal Lamps.

**COLD CRACKING:** Many plastics increase in stiffness as temperature is lowered assuming 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.

**COLD SETTING INKS:** Solid inks which must be liquefied during application through a heated printing screen. They solidify again on contact with the substrate, which is not heated.

**COLLOID MILL:** A machine used for the dispersion of pigments in the manufacture of some printing inks, by producing intense shearing stresses in the liquid to which the solid pigments have been added.

**COLORANT:** A substance used to modify the colors of a material; e.g., dyes or pigments.

**COLOR CORRECTION:** Any of several methods used to modify or improve the color fidelity of a continuous tone original or screened separations by masking, dot etching or rescreening, etc. Primarily done to compensate for impurities in the ink color.

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

**COLOR SEPARATION:** 1) A manual technique of visually interpreting the color areas in artwork 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 a set of halftone (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 ink colors are yellow, magenta and cyan.

**COLOR STRENGTH:** In printing ink, the effective concentration of coloring material per unit of volume.

**COLOR TRANSPARENCY:** 1) A full color photograph on transparent film. 2) Full color manually drawn 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) A transparent film screen printed with translucent inks.

**COLOR VARIATION:** A term used to describe changes in a color which during printing or changes in the density of the color, 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 a change in squeegee pressure, addition of solvent, etc.

**COMBUSTION:** Burning or rapid oxidation. Achieving a state of burning.

**COMBUSTION PRODUCTS:** Matter resulting from combustion such as flue gases, ash, water vapor, etc.

**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.

**COMPLEMENTARY COLORS:** With reference to the Munsell color wheel, any color directly opposite from a selected color is complementary to the chosen color, including tints and tones of the complementary.

**COMPLIANCE COLORS:** The term given to nontoxic inks that conform to governmental regulations.

**COMPOUND:** 1) (n) A combination of elements in a stable molecular arrangement. 2) (v) To mix pure vinyl with plasticizers, stabilizers, lubricants, colorants or other ingredients before it can be properly processed.

**COMPRESSION:** A pushing type of force.

**CONDUCTION:** The transfer of heat by physical contact between substances.

**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.

**CONDUCTOR:** An element or substance which has many free electrons which permit a free flow of electric energy within its mass.

**CONJUNCTIVITIS:** A very painful condition of the eye or conjunctive, the inner lining of the eyelid, brought on by harsh light exposure as in UV light, sunburn or inflammation.

**CONTINUITY:** A completed circuit or trace line in an electronic product.

**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 Force Drying takes place.

**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 removing from the system.

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

**CATERING:** The result of rapid spreading of a component or contaminant over the surface of the applied material characterized by scattered depressions at the film surface.

**CRAWLING:** The contraction of an ink film into drops after printing onto a surface which the ink does not wet completely.

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

**CREEP:** The dimensional change of a material with time under load. The stain which develops when a constant stress is applied.

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

**CURE TIME:** The time/temperature combination required to bring organic decoration to the desired level of hardness, caustic and chemical resistance, etc.

**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 dry into the textile fibers. 3) A two (or more) part chemical reaction that, when completed, resembles a dried appearance. Photo-polymerization of UV curable coatings is one example.

**CURING AGENT:** A UV curing reactor that houses a UV energy emitter used for the polymerization of ultraviolet curable inks, coatings and adhesives.

**CURL:** 1) The tendency of a 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.

**CURTAIN COATER:** A coating machine which spreads an even thickness of low viscosity liquid (clear or adhesive) across a flat sheet or surface.

**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 screen printing press to complete one print cycle.

**CYLINDER PRESS:** 1) A screen printing press so constructed that the substrate, wrapped around a rotating drum, contacts the printing surface of a moving printing screen, being discharged onto a conveyor after printing. 2) A press used for die cutting.

## D

**DARK REACTION:** Reactions which take place in closed containers of radiation curable formulations, usually premature polymerization.

**DAYLIGHT FLUORESCENCE:** The phenomena of increased color brilliance of materials by conversion of wavelengths of other colors in the spectrum.

**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 farther away than the local distance.

**DEGRADATION:** The chemical breakdown of a high molecular weight material.

**DEGREASE:** Term used to indicate the act of removing the grease film from metal parts for printing or from screen fabrics prior to stencil application, using appropriate chemical means.

**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 or low humidity air or both. This is usually incidental to ink drying, storage, etc.

**DENSITY:** The weight per unit volume of a material usually expressed in grams/cc.

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

**DERMATITIS:** A skin condition or inflammation produced by direct contact with certain processing chemicals.

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

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

**DIELECTRIC CONSTANT:** An indication of the ability of an insulator to store electrical energy.

**DIELECTRIC INK:** A printable compound which has insulating properties on drying. Used for separating portions of circuits or

encapsulating components or entire modules for protection from environmental influences.

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

**DIGITAL OHMMETER:** Device for measuring resistance of a component in ohms.

**DILATANCY:** Phenomenon that occurs in solid dispersions, pigmented coatings and plastisols whereby viscosity increases with increasing shear rates.

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

**DILUTABLE:** That which is able to be thinned or made weaker in strength with the addition of the appropriate solvent, water or the like.

**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.

**DIPENTENE:** A true chemical compound having higher solvent power and slower evaporation rate than Turpentine. It has been largely used as an anti-skinning agent in inks.

**DISCHARGE PERMIT:** Document required by regulatory agencies before a plant may release effluent into the environment.

**DISCOLORATION:** Any changes from the original color or an unintended inconsistency of color.

**DISHING:** A term applied to paper in piles which is higher at the edges than at the center, usually caused by absorption of atmospheric moisture by the exposed edges of the sheets.

**DISPENSER:** A device that feeds pressure sensitive labels either manually or automatically in convenient units. It can serve as a protective package also.

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

**DISSIPATION FACTOR:** A measure of the amount of energy or power loss which occurs in virtually all dielectric materials.

**DOCTOR BLADE:** A scraping blade used to spread an even film of liquid or near liquid onto a surface. In screen printing, it is called 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 megarad equals  $10^8$  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.

**DOUBLE BOND:** A type of chemical bond wherein two pairs of electrons are shared between two atoms.

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

**DRIER:** An agent that, added to a compound such as ink, will promote rapid drying.

**DRUM PUMPS:** Pumps designed to withdraw flammable liquids safely from storage drums.

**DRUM VENTS:** Pressure and vacuum relief valves built into liquid storage drums.

## E

**EFFLUENT:** 1) Waste material (from an industrial source) in liquid form. 2) The releasing of pollutants into the environment generally with regard to discharge into waters.

**EFFLUENT LIMITATION GUIDELINES:** Regulation established by state or federal governments to control the levels of specific chemicals in liquid waste discharged by industry.

**EGG SHELL:** A semi-gloss surface resembling an egg shell in color and texture. Usually applied as descriptive to moderate curvature in the substrate.

**ELASTICITY RESERVE:** The extra resilience in a tautly stretched printing screen which permits its conformance to moderate curvature in the substrate.

**ELASTICITY:** Recovery, partial or complete, of original shape after deforming forces are removed.

**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:** A negatively charged particle with the mass of 9.21 times  $10^{26}$  grams.

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

**ELECTRON CURTAIN:** An electron beam generated via a linear source (a cathode), as opposed to a scanned source.

**ELECTRON PENETRATION:** The depth of penetration into a substrate by the 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 the 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.

**EMBOSSSED:** Printing or design in raised relief on the surface of face material, the relief being gained by suitably designed pressure plates.

**EMBRITTLMENT:** The loss of plasticity resulting in brittleness in a material.

**EMISSION CURVES:** Curves plotted on graphs to indicate variances to and from peak performances of emitted light or other rays.

**EMISSION FACTOR:** The average amount of pollutants that will be 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 type used in (a) silver halide photographic film, (b) photostencil process, or (c) textile inks. The compound is usually made from two or 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. including 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.

**EPA:** Acronym for the U.S. Environmental Protection Agency, formed in order to implement the Federal Water Pollution Control Act of 1972 and subsequent environmental legislation, including the Clean Air Act and Solid Waste Amendments.

**EPA HAZARDOUS WASTE NUMBER:** The number assigned by EPA to each hazardous waste listed in 40 CFR 261, of the U.S. Code of Federal Regulations.

**EPA IDENTIFICATION NUMBER:** The number assigned by EPA to each U.S. hazardous waste generator, hazardous waste transporter or hazardous waste facility.

**EPOXY GROUP:** A reactive part of a chemical molecule with the structure CH/o\CH.

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

**EXCITATION PURITY:** A relative colorimetric quantity used in designating depth of color. One of the three quantities used in the C.I.E. specification of color.

**EXEMPT SOLVENTS:** Descriptive or evaporative solvents not currently subject to air pollution regulation.

**EXPOSURE TEST:** A test made by exposing to actinic light sensitized films or coatings for a series of equal time intervals at a given distance from light sources, in order to establish standard time of exposure and standard distance of light from sensitized surface.

**EXTRACTABLES:** Any material which can be removed from a cured film by solvents, usually measured as a weight difference.

## F

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

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

**FATIGUE:** Condition of stress in a material resulting from repeated flexing or impact.

**FATIGUE LIFE:** The number of cycles of stress or strain (of a specified character) that a sample can sustain before failure of a specified nature occurs.

**FEATHER EDGE (Feathering):** Term used to denote the appearance of the dye of a printed area where the color ink seeps out or is forced beyond the predetermined print edge, giving the edge a feathery appearance; unsharp edge of print.

**FIBER:** A threadlike filament, many times greater in length than its diameter.

**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.

**FIRING:** 1) A process of fusing glass colors onto the articles to which they have been applied. 2) Subjecting a glass or ceramic article, either before or after decorating, to high temperature to harden the article or fuse the decoration.

**FISH EYES:** The moving away of a coating to form a circular deformation, usually caused by contamination or wetting difficulties.

**FLAME RETARDANT:** A material which, when added to the formulation, decreases its flammability.

**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 prepare the object for printing.

**FLASHED XENON (Pulsed Xenon):** Lamp containing xenon gas which produces ultraviolet energy using special electrical transformer system.

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

**FLEXOGRAPHIC PRINTING:** Formerly called aniline printing. A method of rotary printing utilizing flexible rubber plates and rapid drying fluid inks.

**FLOW AGENT:** An additive used to disturb the surface tension and increase the ink flow, when bubbles or orange peel occur.

**FLOW OUT:** The ability of an applied material to eliminate surface markings to produce a smooth, uniform surface on drying.

**FLOW PROMOTER:** A substance which, when added to an ink or coating system, usually in small amounts, will improve the leveling and finish continuity of the coated film.

**FLUFF TEST:** Testing the amount of fibers which are loose or insufficiently bonded to various substrates such as paper, boxboard, cartons, etc.

**FLUORESCENT:** A pigment which not only reflects a visible wavelength, but is activated by most of the remaining absorbed light to reemit it as color of a longer wavelength, which results in reinforcement of the reflected color.

**FLUORESCENT WHITE:** 1) Colorless dyes or pigments which increase the brightness of paper by absorbing the UV energy and reemitting it as visible light. 2) "White" paper containing fluorescent material.

**FOAMING:** The dispersion of a gas in a liquid or solid.

**FOCAL DISTANCE:** The optimum distance between UV lamp reflector and substrate for radiation curing.

**FOCAL LENGTH:** 1) The distance from 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 infinity 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 to obtain a sharp image.

**FOCUSED SOURCE:** An electron beam which is generated through a simple filament source as opposed to a linear cathode source.

**FORMABILITY:** The act of thermoforming without affecting the strength, flexibility or clarity of the material.

**FOUNTAIN:** The ink reservoir on a screen printing press.

**FOUNTAIN ROLLER:** The roller in the ink fountain which, by revolving, agitates the 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, which has lost one electron, is generated.

**FUNCTIONALITY:** The capacity of any one molecule to react to a free radical in a UV curable formulation.

**FUSION:** The process of melting, usually of 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.

**GLASS TRANSITION TEMPERATURE:** The temperature at which a material changes from a soft, rubbery state to a more brittle state.

**GLOSS:** The property of a surface which causes it to reflect light.

**GLOSS INK:** An ink that dries with minimum penetration into the substrate surface and which yields a high luster.

**GRAFT POLYMERS:** Polymeric structures made by attaching monomers to longchain molecules.

**GRAIN LONG:** A term indicating that the grain or machine direction of a sheet is parallel to the length of the sheet, its longest dimension.

**GRAIN SHORT:** A term indicating that the grain or machine direction of a sheet of material is parallel to the short dimension or width.

**GRIND:** The dispersion of particles (usually pigments) in a coating, ink or adhesive.

**GRINDING:** The process of pulverizing raw materials to a desired degree of particle size.

## H

**HARDNESS:** The property of a material which causes it to resist indentation and scratching.

**HAZE:** That percentage of transmitted light which in passing through the specimen deviates from the incident beam by forward scattering.

**HEATCURE (ThermalCure):** A curing reaction which takes place when the materials are subjected to a form of heat.

**HEAT CURING:** 1) In textiles printing, the subjection of the printed substrate to steam heat to set the dyset and drive off volatiles. 2) In other screen printing, the application of dry heat for predetermined interval to drive off volatiles and 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.

**HEAT SEALING:** Uniting two distinct surfaces by fusion, either of the coatings or of the base materials, under controlled conditions of temperature, pressure and time (dwell).

**HICKEYS:** An imperfection in screen printed coatings due to many things such as dirt, hardened specks of ink, etc., having attached to the wet surface.

**HIGH GLOSS:** A type of surface having extreme smoothness and excellent light reflecting qualities is said to have a "high gloss".

**HIGH TEMPERATURE ADHESIVE:** Adhesive that will enable a pressure sensitive label to adhere well when applied to a surface that has an elevated temperature.

**HMS (Hazardous Materials Identification System):** Developed by NPCA to provide information regarding three hazards encountered in the workplace: health, reactivity and flammability. For each hazard, a number is assigned indicating the degree of the hazard: 0 being the least, up to 4 for the most severe. Letters are used to designate personal protective equipment which is recommended to protect the employee handling the material.

**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.

**HYBRID CIRCUIT:** A thick film screen printed circuit made by attaching active components to the passive thick film printed pattern; may be a single layer or multilayer where at least two conductive layers are separated by dielectrics.

**HYDROXYL NUMBER:** The number of milligrams of potassium hydroxide equivalent to the number of OH groups present in the sample.

## I

**IMMISCIBLE:** Incompatibility by mixing; e.g., oil and water.

**IMPACT:** The energy absorbed by a specimen when subjected to a falling object.

**IMPACT RESISTANCE:** The ability of a material or coating to resist sudden shocks or impacts without breakage.

**IMPEDANCE:** 1) The rate at which a substrate 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 nonreactive gas, usually nitrogen, sometimes a mixture of nitrogen and carbon dioxide.

**INFRARED:** An area in the electromagnetic spectrum extending beyond red light from 760 nanometers to 1000 microns (10<sup>6</sup> Nm). It is the form of radiation used for making noncontact temperature measurements.

**INFRARED ENERGY:** Photon energy having wavelengths between 1 and 100 microns.

**INFRARED REACTION:** Normally a heat or thermal reaction induced by application of infrared energy.

**INFRARED SPECTROSCOPY:** The spectral analysis of compounds using radiation in the infrared region (7500-350,000 Å)

**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 screen printing techniques, usually used in relation to thickness of the ink film when printed.

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

**INK MOTTLE:** A nonuniform appearance of the ink film in printed areas, with respect to density, color or both. It may be caused by varying ink film thickness, by variation in the receptivity and absorption of the paper or both these causes acting together.

**INK RECEPTIVITY:** That 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.

**INLINE:** A conveyerized system for transporting a product through a series of automated machines or printing presses.

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

**INSULATOR:** A material that is a poor conductor of electricity.

**INTEGRATED CIRCUIT:** A solid state unit which contains basic electronic circuits, printed, in which parts or components are produced and contained in single small blocks of the unit; the components designed to perform different functions as resistors, capacitors, etc.

**INTERMEDIATE:** Any chemical substance which either is consumed in whole or in part in chemical reaction(s) used for the manufacture of other chemical substance(s) or mixture(s), or is intentionally present for the purpose of altering the rate of such chemical reaction(s).

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

**IRRADIATION:** Exposure to ultraviolet light or other 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

**LABEL ADHESION TEST:** A test method concerned with determining the degree to which a standard or designated label adhesive will adhere to a surface under specific conditions.

**LAMINANT:** Adhesive used for combining and bonding films, foils, plastics, papers or other material in sheet or web form.

**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 multilayer sheet, using pressure and heat.

**LAMINATING FILM:** Usually a clear or transparent sheeting; manufactured for use as a protective top strata of a cold seal or thermal lamination to processed material. Since abrasion resistance and general protection are prime requisites, the more durable polyesters are frequently used.

**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 UV light used in exposing photosensitive materials.

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

**LEVELING:** The ability of the surface of a material to withstand mechanical forces.

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

**LIGHT INTEGRATOR:** A light sensitive device that measures units of light, used for maintaining consistent exposure of film or stencil.

**LIGHTNESS:** Relative brightness of a color as related to position on a gray scale.

**LIGHT METER (Exposure Meter):** A device for measuring the light reflected from a subject or, in some cases, also measuring the intensity of light falling on the subject, so calibrated that correct exposure for the light and subject can be determined by matching film ASA rating with light intensity and reading shutter speed and lens aperture.

**LINE SPEED:** The rate of travel of the substrate under the beam or curtain, usually expressed in feet per minute.

**LINEAR CATHODE or LINEAR SOURCE:** See electron curtain.

**LOW TACK ADHESIVE:** An adhesive with an initial nonaggressive character for ease of application that usually becomes a more permanent bond after 24 hours or other preselected time period.

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

**LUX:** The amount of illumination produced by a light source of one candela intensity on a surface one meter (3.28 ft) distant.

## M

**MAR RESISTANCE:** The ability of the surface of a material to withstand mechanical forces.

**MECHANICAL PROPERTIES:** Of a plastic material, its elasticity or inelasticity.

**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 of one million volts (1,000,000 volts).

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

**MERCURY VAPOR LAMP:** A type of illuminant high in actinic value; used in camera lighting systems and in UV curing reactors.

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

**MESH MARKS:** 1) A fine, crosshatch pattern left by the mesh of the printing fabric due to printing with an ink that does not have sufficient flowout after the ink film has been dried. 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 offcontact distance. See Screen Marks.

**MICROWAVE:** Energy having wavelengths between 100 and 1000 microns.

**MIGRATION:** 1) The movement of one or more components of adhesive to either a substrate or a 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. Usually a discoloration caused by a dye type pigment in the preceding coat or print.

**MISTING:** Emission into the air of small amounts of material during processing.

**MODULUS:** A measure of the ratio of the stress on a material during processing.

**MOISTURE VAPOR TRANSMISSION RATE:** The rate at which water permeates a cured film under specified conditions.

**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

**N.A.A.Q.S.:** Abbreviation for national Ambient Air Quality Standards, a set of maximum concentration levels for air pollutants established by the 1970 U.S. Clean Air Act; particulate matter, sulfur oxides, carbon monoxide, photochemical oxidants, hydrocarbons and nitrogen oxides are among the substances regulated.

**NANOMETER:** A unit of distance commonly used in measuring wavelength in the electromagnetic spectrum one billionth of a meter ( $10^9$ ).

**NATURAL AGING:** The change, if any, in a material occurring when the material is exposed to normal environmental conditions.

**NEMA:** Acronym for the National Electrical Manufacturers Association, located in Washington, D.C.

**NEWTONIAN LIQUID:** Fluids which have an absolute viscosity; e.g., water.

**NEWTON VALUE:** Unit or measure used in screen fabric tensioning, generally expressed in Newtons per centimeter.

**NEWTON'S RINGS:** A phenomenon created by light rays passing through layers of essentially transparent materials in areas where air may be trapped between the layers, thus causing uneven refraction. The appearance, similar to a drop of oil on water, is easily identifiable and correctable because the light rays are separated into their spectrum colors. The phenomenon is more or less common in vacuum frames, pressure contact frames, etc. during exposure to film through a glass layer.

**NFPA:** Acronym for National Fire Protection Association, located in Quincy, Massachusetts.

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

**NOMINAL WEIGHT:** The weight per 500 or 100 sheets at which paper is billed. It can be less than the weight stated so long as it is within customary tolerances.

**NONVOLATILE MATTER:** The ingredients of an ink or coating composition which, after drying, are left behind on the material to which it has been applied and which constitute the dry film.

**NORMALIZE:** To shift the readings representing a quantity to within a specified range on an instrument.

## O

**OEM:** Abbreviation for Original Equipment Manufacturer.

**OILSOLUBLE RESIN:** A resin which will dissolve in drying oil at slightly elevated temperature to yield a homogenous film.

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

**OOZING ADHESIVE:** The adhesive which is forced out from between the face film and backing sheet of pressure sensitive laminates by pressure in die or guillotine cutting.

**OPAQUE:** 1) Not able to transmit light; not transparent and not translucent. 2) (v) To apply an opaquing fluid to a negative.

**OPTIMUM THICKNES:** The maximum thickness allowable by specification.

**ORANGE PEEL:** A term describing the surface of a dried ink film 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:** Acronym for the Occupational Safety and Health Administration of the U.S. Department of Labor, or Occupational Safety and Health Act.

**OVEREXPOSURE:** The subjection of photosensitive material to light for a longer period than is 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 in 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 to the molecule (O<sub>3</sub>); may be generated by a high voltage discharge across a stream of air. Causes oxidation of metals, other materials.

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

## P

**PEEL STRENGTH:** Stripping strength.

**PERCENT ELONGATION:** The increase in length produced by a tensile load, expressed as a percentage of the gauge length.

**PHOTOACTIVITY:** The process of using photon energy (light) to start some type of chemical reaction.

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

**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 designed to be affected by exposure to actinic light applied through a mask to predetermine a pattern for the later 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.

**PICK OFF:** Loss of adhesion usually discovered during a tape adhesion test.

**PIGMENT DYES:** Textile dyes formulated from appropriate vehicles and pigments of mineral or synthetic origin.

**PIGMENT VOLUME:** The percentage by volume of a pigment in the nonvolatile portion of an ink, calculated from bulking value and other data.

**PIN HOLE:** Surface imperfection of a material caused by the breaking of bubbles.

**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. These are usually formed by radio frequency discharge.

**PLASMA TREATMENT:** An electrical/gas treatment where grease, oily films or possible organic solvent residue are 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 and which allows it to retain its shape after the applied force has been removed.

**PLASTICIZED:** Describes a chemical compound to which a plasticizer has been added.

**PLASTICIZER:** A compound added to increase the flexibility and toughness of the final product.

**POINT:** 1) A measure of cardboard thickness. A point is equal to 1/1000 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.

**POLAR:** Description of a molecule in which the positive and negative electrical charges are permanently separated.

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

**POLYMERIZATION:** A chemical reaction usually carried out with a catalyst, heat or energy 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 during storage in a specific container under normal storage conditions, that chemical composition will not lose usefulness through deterioration in the original container. Also called "Working Life".

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

**PROCESS CONTROL:** Procedure for evaluating future performance through the use of statistical quality control methods.

**PULSED XENON:** Describes a type of actinic illuminant (xenon gas) which has been incorporated into photographic exposure systems, light units or UV curing reactor.

## Q

**QUALITATIVE:** A description of the quality of a material.

**QUANTITATIVE:** A description of the amount of a material.

**QUARTZ TUBE:** A lamp made from a silicate material called quartz which is fitted with electrical connections to form an irradiator. It may be made into an infrared emitter or it may be filled with mercury vapor to produce ultraviolet light.

## R

**RAD:** The unit of dose equal to an 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.

**REAM:** A number of sheets of paper, either 480 or 500, usually the latter, according to grade.

**RECIPROCITY LAW FAILURE:** The failure of photographic materials to respond to variable intensity light sources on an inverse scale of exposure times; i.e., doubling the intensity of light does not allow having the exposure time to achieve the same density on film.

**REFRACTIVE INDEX:** The deviation of light as it passes through a given substance, given as the ratio of its velocity in a vacuum to its velocity within the substance.

**REMOVABILITY:** A relative term applied to decals to describe the force required or the condition under which they can be removed from a substrate.

**RESIN:** A polymeric material, either natural or synthetic, and which is usually considered an ingredient in formulation.

**RESISTIVITY:** The resistance to leakage of a material.

**RHEOLOGY:** Measurement of the movement of a fluid.

**RUPTURE STRENGTH:** The greatest stress a material can withstand prior to ripping.

## S

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

**SAG:** The movement of the surface layer of a wet film (on a vertical surface) downwards.

**SAG RESISTANCE:** The ability of the surface layer of a wet film to resist downward motion (on a vertical surface).

**SCAN:** A method of controlling or focusing an electron beam; usually done with high energy beams.

**SCREEN MARKS (Mesh Marks):** Marks left by the fabric in the surface of the screen printed imprint, due to lack of flow capability in the ink or color, or to insufficient sapon.

**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 of the fabric.

**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 the fine detail, especially if printed on lesser grades of paper.

**SCUFFING:** A print defect which allows the print to mark severely when rubbed.

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

**SHEAR:** The stress which tends to make one part of a body slide over the adjacent part.

**SHELF LIFE:** The amount of time a material may be stored under specified conditions with no significant changes in properties.

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

**SLINGING:** Emission into the air of large quantities of material during processing.

**SMT:** Abbreviation for Surface Mount Technology.

**SOLDER MASK:** A screen printable resist that is applied to circuit board laminate prior to soldering, cleaning, drilling and coating operations. See Solder Resist.

**SOLDER RESIST:** A coating applied by screen printing to a printed circuit board to prevent bridges from forming between circuits during the soldering or hot air leveling steps in production.

**SOLVENT:** A substance capable of dissolving another substance to form a uniform, dispersed mixture at the molecular or ionic level.

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

**SOLVENT EVAPORATION:** Vaporizing of liquid solvents, resulting in their removal from a printed film, hence drying of the ink film.

**SOLVENT POWER:** The dissolving power of a solvent.

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

**SPECTRUAL TRANSMITTANCY:** The reflected light bands effected during radiation curing of dispersed pigments (directly) affecting the absorption of radiation of the ink dispersion.

**SQG:** Abbreviation for Small Quantity Generator. In the U.S., this is a firm which produces less than 2,200 lbs. (1000 kg) of hazardous waste in a calendar month.

**SQUEEGEE:** A tool used to force ink through the openings of a screen printing stencil when in contact with a substrate, consisting of a rubber or plastic strip or blade held in the edge of a wooden or metallic handle. A variety of blade shapes and hardness are available.

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

**STABILIZERS:** Additives to coating, ink or adhesive formulations which help extend shelf life, resistance to heat or other degradation.

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

**STREAKS:** Elongated defects: 1) On film, by scratching or by uneven application of processing chemicals, or by uneven drying. 2) In stencils, by uneven washing out or processing or exposure variance. 3) On prints, by uneven squeegee edge, by a fragment or foreign matter in the ink, overthinning of the ink, partial drying in the screen of the ink, or any other condition preventing a uniform flow of the ink through the stencil to the substrate.

**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 FREE ENERGY:** The energy which exists at the surface interface of a film as compared to the energy in the bulk of the film.

**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 of a material between two opposite points of a unit of its surface.

**SURFACE SLIP:** The ability and ease of sliding of the surface of one material over the surface of itself or another material.

**SURFACE TENSION:** The attractive force exerted by the molecules below the surface upon those at the surface/air interface.

## T

**TACK:** The stickiness of a substance.

**TACKFREE FINISH:** Any coating or ink that is sticky to touch after curing or drying.

**TACKIFIER:** An additive used to improve stickiness of an adhesive film. See also Detackifier.

**TACKY SURFACE:** A surface having a sticky feel on touching, such as pressure sensitive adhesive, ink that may not be completely dry, etc.

**TAK:** The stickiness of a substance.

**TEMPERATURE TAPES:** Usually paper tapes treated with heat sensitive colored substances which drastically change in color at specified temperature, designated either Fahrenheit or Celsius or equate to both. Used to determine the temperature inside a dryer.

**TENSILE STRENGTH:** The rupture strength (stress strain product at break) per unit area of a material subjected to a specific dynamic load.

**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 of reduction or increase under normal conditions.

**THERMOCOUPLE:** An instrument for measuring temperature, usually constructed of two dissimilar metals joined at one end, 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 desired form by heat, that hardens on cooling and then is substantially infusible and insoluble.

**THIOLENE REACTION:** Descriptive term for type of radiation catalyzed polymerization in which sulfur containing unsaturated chemicals are utilized.

**THRESHOLD LIMIT VALUE (TLV):** The airborne concentration of the substance at which it is believed nearly all workers may be repeatedly exposed 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).

**THROUGH CURE:** The curing of the bulk of a material down to and including the material/substance interface as opposed to a surface cure where only the material/air interface is cured.

**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.

**TLVSTEL:** Abbreviation for Threshold Limit Value Short Term Exposure Limit.

**TLVTWA:** Abbreviation for Threshold Limit Value Time Weighted Average.

**TORQUE:** A force which tends to cause torsion or rotation.

**TOUGHNESS:** The stiffness, rigidity or resilience of a material.

**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 of intensity of virulence of a substance judged to be poisonous to man. 2) Property of being harmful or poisonous.

**TRANSLUCENT:** A term indicating the property of a substrate or other material to permit 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.

**TRAPPING OF INKS:** The property of a printing ink that makes it possible to superimpose one color on another, both in wet and dry printing; may be used to obtain a third color which is a combination of the two applied or to hide the first by overprinting the second with an opaque color.

**TWEAKING:** Minor adjustments made after a screen has been imaged, by slightly increasing/decreasing tension at specific locations on an adjustable screen chase, thereby slightly distorting the resulting print; used occasionally in circuit board printing.

## U

**ULTRAVIOLET BLACK LIGHT:** Ultraviolet light built to operate 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 process of inks, coatings or adhesives. More correct term is Ultraviolet Curing System.

**ULTRAVIOLET LIGHT:** Highly energetic part of the electromagnetic spectrum of rays 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 sources of ultraviolet light used by the screen printer.

**ULTRAVIOLET LIGHT PROCESSORS:** Engineered equipment for UV curing which includes UV lamps with conveying equipment for "inline" operation.

**ULTRAVIOLET LIGHT REACTION:** A chemical reaction induced upon exposure to Ultraviolet light.

**ULTRAVIOLET WHITE LIGHT:** Ultraviolet light built to operate near the visible spectrum. This may be more nearly similar to a fluorescent lamp.

**UNDEREXPOSED:** Film or emulsion that has been exposed for less than the recommended time, or at full time with a weaker light source, or a light source that is too far removed, thus supplying less light than stipulated.

**UNDERGLAZE INKS:** Screen printing inks for ceramic and glass decorating, usually combined with a flux to impart color or design to the bisque ware or initially fired glass.

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

**UV:** Abbreviation for Ultraviolet Light.

**UV INK:** Refers to screen printable 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 permeability).

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

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

**VISCOSPATULA:** An instrument measuring the runon time of ink from one marking to the next, used in conjunction with a timing device.

**VISCOSITY:** the internal resistance to flow exhibited by a fluid.

**VOLATILES:** Solid or liquid materials which pass into the vapor state at a given temperature.

## W

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

**WATER QUALITY STANDARDS:** Limits on concentration of the components of water based on the proposed use of that water.

**WATER VAPOR TRANSMISSION RATE:** the steady water vapor flow in unit time through unit area of a material under specified conditions.

**WAVE LENGTH:** A measuring unit to determine hue, color or position in the spectrum.

**WEAR RESISTANCE:** The ability of a coating in bulk to withstand mechanical forces.

**WETSTRENGTH PAPER:** A type of paper designed and made for the production of outdoor posters which accepts printing well and has high tear resistance when wet with poster paste used in hanging. Longer fibers and weather resisting impregnate aid in initial posting (gluing) and subsequent weathering.

**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 nonwettability.

**WETTING:** The unforced, instantaneous spreading of a liquid to cover a solid substrate.

**WINDOW:** 1) Term used to describe the limits of a material within which a reactive process can take place; e.g., a UV curable ink may have a window of reactivity between 200 and 400 nanometers. 2) A metallic foil in an electron beam generating unit that allows passage of energetic electrons from the beam.

## Z

**ZAHN CUP:** An apparatus used for the measurement of viscosity of a liquid (water thin or slightly heavier) coating system. Usually used to measure afflux time, expressed in seconds, of nonpigment of low solids coating systems.