

DuPont™ Pyralux® LF & FR

FLEXIBLE COMPOSITES

Safe Handling Guide

Products

DuPont™ Pyralux® LF and FR flexible composites contain a modified acrylic adhesive. This adhesive is a polymer that is cured during use. Experience shows that Pyralux® laminated composites and roll goods can easily be handled safely. Pyralux® materials are classified as “articles” in the U.S. and E.U. and are not subject to an MSDS requirement. They have been tested under operating conditions and found to liberate measurable volatiles only well below¹ accepted safe limits (e.g. PEL). For these materials we, however, provide an MSDS that covers the vapors that may be liberated during processing.

Laminates

Copper-clad laminates are supplied in sheets and are fully cured (C-staged). DuPont is not aware of any health hazard associated with working with cured materials.

Roll Goods

Roll goods (e.g., coverlay, bond ply, sheet adhesive, impregnated glass fabric, and coated Teflon® FEP fluorocarbon film) have B-staged adhesive. B-stage refers to adhesive that has had solvent removed, but is not fully cured. Since B-staged adhesive contains trace quantities (parts per million) of unreacted monomers, the precautions and recommendations mentioned in this bulletin should be heeded.

Processing Lay-up

Roll goods are sheeted to size and laid up for lamination, during which time they are cured and bonded. In lay-up, the protective cover film is removed. The uncured acrylic monomers in the adhesive may impart a mild odor. Air sampling tests indicate either undetectable levels or levels orders of magnitude below protection limits for the volatile materials. However, clean, well-lighted, well-ventilated lay-up area is recommended.

Include the following handling techniques in routine lay-up. To eliminate contact between the skin and the adhesive, wear lint-free gloves or fingerpads. This serves a dual purpose: to prevent contaminating the adhesive with organic oils from the skin, and to prevent the skin from absorbing any materials from the adhesive. Although DuPont is not

aware of anyone developing contact dermatitis when using Pyralux®, some individuals may be more sensitive to the adhesive than others. They should take care to avoid or minimize contact. Instruct operators to wash their hands with soap and water before eating, smoking, or using restroom facilities. Gloves and fingerpads should be changed daily. Wash other protective clothing frequently.

Lamination

Adhesive is cured during lamination, using a press that applies heat and pressure. While the chemical reactions that occur during curing do not produce any vapors, there are trace impurities that are volatilized during heating. Airborne monitoring tests indicate concentrations to be extremely low and certainly well below acceptable limits. Press pad systems used in lamination of flexible and rigid/flex circuits include many different materials (e.g., paper, plastic films, and rubber). With a typical curing cycle of 360-390°F (182-199°C), 200-400 psi (14-28 kg/cm²), for 60-120 minutes, the press pad materials can liberate vapors. The composition of these vapors depends upon the type of press pad materials used. Some liberate by-products that might be harmful or, at the least, impart an unpleasant odor. Contact the manufacturers of the press pad materials for more detailed safety information.

Ventilation

Adequate ventilation and exhaust need to be provided in press rooms to prevent the build-up of potentially harmful vapors, to remove disagreeable odors, and to dissipate heat. An exhaust hood or canopy placed directly above each press is recommended. This allows the liberated warm vapors to rise and be effectively captured and removed. If there are no hoods, dilution ventilation is required. This can be accomplished by providing adequate room air changes and fresh air input to dilute vapors and remove them from the work area. Room ventilation pattern should be established to draw vapors away from operators. Should ovens be used to heat these materials before or after lamination, they should also be equipped with adequate ventilation. Refer to “Industrial Ventilation”, 18th Edition or latest available from the American Conference of Governmental Industrial Hygienists, 6500 Glenway, Building D-5, Cincinnati, OH, 45211.

¹Values for all materials monitored were well below 10% of their accepted limits (PEL or TLV). In only one case, did the concentration reach approximately 40% of its limit. This was an oven used to dry the material. This oven drying is not normally used in the process and during the exposure-monitoring test the oven was unventilated. Adequate ventilation is normally recommended for any heating process.

Drilling and Routing

Appropriate personal protection equipment should be used, and standard ventilation should be installed, when drilling or routing Pyralux®. Studies indicate that heavy drilling and routing activity, with standard equipment, does not generate hazardous quantities of airborne particles. Therefore, no additional or unique procedures are required beyond the standard procedures recommended by equipment vendors and required by OSHA standards.

Other Considerations

Thin copper-clad laminates can have sharp metal edges. Personnel handling these materials should be cautioned and provided with suitable protective gloves to prevent cuts. Presses used for bonding should be operated with adequate safety guards and controls to eliminate pinch points and hot surface hazards. Handling heated and/or heavy press loads also requires special precautions. Press operators should be adequately trained in safety aspects of working with this equipment. Operators handling Pyralux® in chemical or mechanical processes should use adequate eye protection and follow manufacturers' safety recommendations.

For more information on DuPont™ Pyralux® flexible circuit materials, please contact your local representative, or visit our website for additional regional contacts.

pyralux.dupont.com

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Caution: Do not use in medical applications involving permanent implantation in the human body. For other medical applications, see "DuPont Medical Caution Statement," H-50102.

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