FRALOCK
DIVISION OF LOCKWOOD INDUSTRIES, INC.
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General Cirlex® Processing Procedures

Drilling/ Machining

Drilling and machining of Cirlex® follows certain technical guidelines that can be used over all thicknesses. In general, Cirlex® can be machined similar to soft Aluminum materials. With the proper entry and back-up materials, hole drilling can be done so the holes are clean and linear top-to-bottom. Thicker materials may require either peck drilling or 2-sided drilling to get good top to bottom location.

Recommended drilling materials:

- Entry foil = L.C.O.A. type SEO+ (0.009")
- Backer foil = L.C.O.A. type EO+ (0.014")
- Backer board = phenolic

Use a phenolic backer board followed by the EO+, Cirlex®, and the SEO+ entry foil. Small holes (0.002" – 0.025") should not penetrate the EO+ backer foil. Larger drill sizes may go through slightly and still leave a clean hole. Keep a close watch on drill depth to assure good hole quality.

Drill recommendations:

- Carbide drills
- Thick web
- High relief flutes

Drilling parameters

- The best way/source for drilling information can be found at the below link. Just click/select **The Drilling Process** for an Excel file that shows many ways of processing/calculating drilling parameters. Cirlex® is considered an "Abrasive Material". The "F&S Tables" tab has listings for several material types. Use the "Abrasives" column to use as a reference for setting feeds and speeds.
- Optimum hole quality may require some adjustment in feed of speed. General drilling knowledge of materials is a key to making any required adjustments. Plasma etching can be used to clean holes for best results.

http://www.excellon.com/ApplicationEngineering/diam.htm

Mechanical Machining / Routing

- Machining and/or routing is most commonly done with multi-facet or 2-flute carbide routing bits. Generally feed rates from 10 to 30 IPM (inches per minute) are used, depending on the bit size.

Laser Machining

- Lasers are commonly used to machine Cirlex® materials. Most commonly laser machining is done be professional laser companies with several types of lasers. Laser drilling and laser routing are commonly used to produce intricate deigns.
- Lasers can also be used to remove polyimide to expose underlying pads and/or metal details. If electrical contact is required in these areas after polyimide removal, using plasma etching works the best to completely clean the area.

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Etching

Chemical Etching

- Process :

- 2N Aqueous alcoholic KOH @ 60 C or 12N Aqueous KOH @ 80 C

Chemical etching with generally leave a conical or trapezoidal hole where the top of the hole will be larger than the bottom. The sidewall will normally be ~ 45^0. Chemical will be the faster of the 2 common etching processes.

Other process options are possible depending upon desired results. Please contact us for more information.

Plasma Etching

- Cirlex® can be etched using 2 primary gas compositions.

1. Pure Oxygen – normally 5 to 10 minutes
2. Oxygen + Freon – normally 5 to 10 minutes

The above conditions are for surface preparation and hole cleaning only. Longer times will be required to remove substantial amounts of polyimide. Either process works well, although the pure Oxygen tends to be more aggressive and etch vertical walls more uniformly. Both processes are widely used in the industry. Etch rates may vary with application.