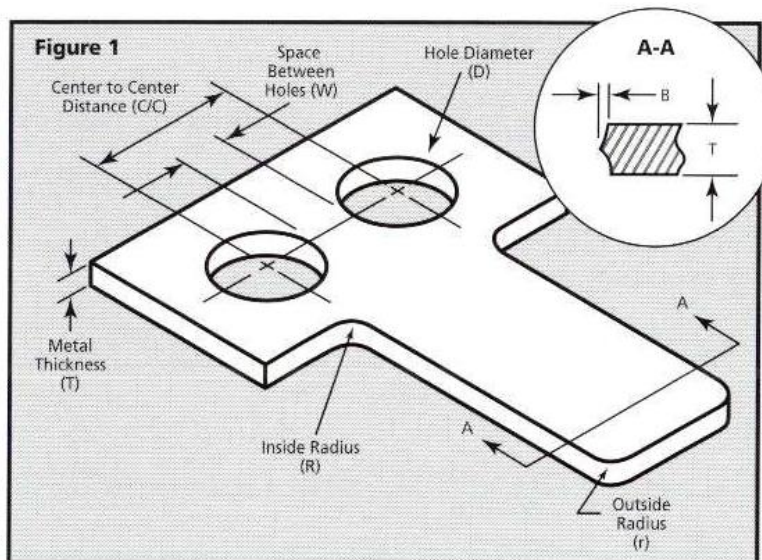


ENGINEERING DESIGN GUIDE

Because of the nature of the etching process and the inherent undercutting at the edges of the resist pattern on the surface, all dimensions, tolerances and configurations are a function of the thickness of the stock being etched, the material itself and, and to a lesser extent, the process variables.

In the sections which follow, data are given for a variety of thicknesses. This data is generally applicable to equipment, processes, metals and configurations. They do not however define the ultimate capabilities of chemical machining.



Please note: These are “General Guidelines” and are a means to assist the engineer with a design to have their product “Chemically Etched.” SME’s technology can produce “Optimum hole sizes, slots and spacing. However, these features need to be a minimum of 1.5 times the material thickness. (ie: A slot or hole with an opening in .010” material should be .015”). Please consult with our engineering staff for finer features.

For dimensions such as slots, corners, etc, there are few guidelines for designers which express practical limitations when the dimensions under consideration approach the thickness of the metal. The most common rules are as follows:

Relation of Hole Diameter & Features to Metal Thickness

Generally, the diameter of a hole (D) cannot be less than the metal thickness (T). This relationship is typically (T x 1.5) for optimum etchability. See below for examples.

Metal Thickness (T)	Hole Diameter	Tolerance
.005" (0.127 mm)	.0075" (0.1905 mm)	+/- .001" (0.0254 mm)
.008" (0.2032 mm)	.012" (0.3048 mm)	+/- .002" (0.0508 mm)
.012" (0.3048 mm)	.018" (0.4570 mm)	+/- .003" (0.0762 mm)

Relationship of Line Width to Metal Thickness

The width of metal between features is not a particular problem in chemical machining. However, when this space is the remaining surface area in a large field of slots or holes, there are limitations as to how small the metal width between the holes can be. This relationship is shown below.

Metal Thickness (T)	Space Between Holes (W)
Less than .005" (0.127 mm)	At least the metal thickness
.005" (0.127 mm) or over	At least 120% of metal thickness

Relationship of Inside Corner Radius to Metal Thickness

The smallest corner radius is approximately equal to the thickness of the metal (ie for metal 0.002in (0.0508mm) thick, the corner radius would be 0.002 in. (0.0508mm). Under certain circumstances, this radius can be made smaller. Please contact the SME Sales Dept. when applications call for a smaller radius than the metal thickness.