

TECHNICAL GUIDELINES



Precision Micro
Etching. Enhanced.



INTRODUCTION

Whether you're exploring photochemical etching for the first time or seeking to refine your existing design, our chemical etching technical guidelines have been created to guide you through designing for the chemical etching process.

Should you have any specific features or requirements not covered in this document, please do not hesitate to contact our technical sales team. They are equipped to offer guidance on the possibilities achievable with chemical etching technology.

CAD DATA SUPPLY

To ensure accurate assessment and production of your component, please ensure that the CAD files provided are drawn to scale, with continuous lines and nominal dimensions. For QA inspection measurements, a drawing with clearly identified critical features is required. Additionally, please clearly indicate any areas where surface etching is required.

We accept the following file formats:

- Fully dimensioned drawing
- DWG
- DXF
- Step
- IGES
- CorelDRAW
- Adobe Illustrator

Please supply your design files by email to: [**sales@precisionmicro.com**](mailto:sales@precisionmicro.com)

SUITABLE MATERIALS, THICKNESSES & SHEET SIZES

Our comprehensive material stock is comprised of standard and specialist grades, offering thicknesses that range from 0.010mm to 2.5mm and sheet sizes of up to 600mm x 1500mm. We can also work with customer-supplied materials on request.



ALUMINIUM

METAL	GRADES/TYPES
ALUMINIUM	All grades
ALUMINIUM BRONZE	CA102

COPPER & COPPER ALLOYS

MATERIALS	GRADES/TYPES
BERYLLIUM COPPER	All grades
BRASS	All grades
COPPER	All grades, including oxygen-free
FERRY	-
PHOSPHOR BRONZE	All grades

STEEL & STAINLESS STEELS

MATERIAL	GRADES/TYPES
LOW CARBON (MILD) STEEL	All grades
ELECTRICAL STEEL	Transil
MARAGING STEEL	All grades
SANDVIK STRIP STEEL	Chromflex (7C27Mo2, 13C26, 12C27, 6C27), Hiflex
UDDEHOLMSTRIP FLAPPER VALVE STEEL	20C, 716
HIGH CARBON (SPRING) STEEL	All grades
STAINLESS STEEL	Austenitic (300 series), ferritic/martensitic (400 series), precipitation hardened (17-4, 17-7), duplex, super duplex



NICKEL & NICKEL ALLOYS

METAL	GRADES/TYPES
ALLOY	42, 52, 59, 151, 194, 195, 602
COPPER-NICKEL (CUPRONICKEL)	90-10, 70-30, 66-30-2-2
ELGILOY	-
HAYNES	25, 214, 230, HR120
HIGH PERM	49
HYMU	80
INCOLOY	800HT
INCONEL	600, 617, 690, 718, X-750
INVAR	-
KOVAR	-
MONEL	400, 401, 404, K-500, 405
NICHROME	-
NICKEL IRON	-
NICKEL SILVER	All grades
NICKEL	200, 201, 205, 233, 270
NIMONIC	90
RADIOMETAL	4550

OTHER METALS

METAL	GRADES/TYPES
MOLYBDENUM	-
POLYIMIDE METALLISED FILM	Aluminium/copper clad



PROFILE ETCHING FEATURES & TOLERANCES

Below is a list of standard minimum feature sizes and tolerances. Greater accuracy can be achieved with development, so please contact us to discuss your requirements in more detail.

MATERIAL THICKNESS	MINIMUM HOLE/SLOT	MINIMUM ETCHING TOLERANCE	MINIMUM LAND AREA
0.01mm - 0.1mm	0.1mm	$\pm 0.025\text{mm}$	0.050mm
0.1mm - 0.25mm	100% metal thickness	$\pm 0.025\text{mm}$	75% metal thickness
0.25mm - 2.5mm	100% metal thickness	$\pm 10\%$ metal thickness*	75% metal thickness

*Please note that certain metals or features may have a minimum etching tolerance of up to $\pm 20\%$ of the metal thickness. Please ask for details.

SURFACE ETCHING FEATURES & TOLERANCES

MINIMUM SURFACE ETCH DEPTH	MINIMUM LINE WIDTH	SURFACE ETCHING TOLERANCE
0.025mm	Twice the surface etch depth	$\pm 0.010\text{mm}$ subject to required depth

POSITIONAL ACCURACY

Positional accuracy is achievable to $\pm 0.010\text{mm}$ subject to component size.

SURFACE ROUGHNESS & FLATNESS

During chemical etching, photoresist protects the material surface to preserve unetched areas. Surface roughness across etched areas is influenced by material type and hardness, meaning Precision Micro cannot measure or guarantee surface roughness repeatability.

Flatness is not directly altered during the chemical etching process, but material with high residual stress may stress relief subject to design.

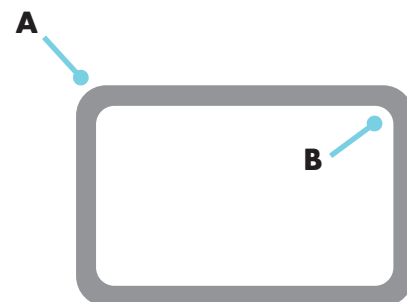


CORNER RADII

The smallest inside and outside corner radius achievable is directly proportional to the thickness of the selected metal being processed.

A - Outside corner radius - minimum of 75% material thickness

B - Inside corner radius - minimum of 100% material thickness



PROFILE GEOMETRY

Chemical etching creates a distinct profile, known as a "cusp," typically representing 10 to 20% of the material's thickness. Precision Micro has the capability to regulate this cusp, enabling a variety of profiles. This imparts unique attributes to products, including sharp cutting edges or conical openings.

SINGLE SIDED ETCH



Used to achieve a specific depth, profile or for thin gauge metals

CONVEX PROFILE



Standard profile for through-etched components

PARALLEL PROFILE



Used to reduce etch cusp

70/30 ETCH



Used for conical holes or counterbore features

DOUBLE-SIDED DEPTH ETCH



Used for surface etching on both sides of the material

CONCAVE ETCH



Used to achieve a straighter edge profile

2/3 STAGE ETCH



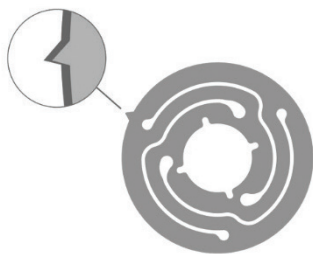
Used to achieve multiple depths, requiring additional imaging



COMPONENT TAGS

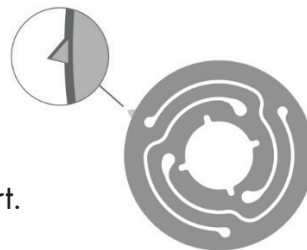
Tags are small threads of metal used in the etching process to secure components within the sheet. They become essential when precise etch tolerances are needed or when components need subsequent electroplating or assembly.

Precision Micro provides various etch tags to choose from, depending on the component's shape, thickness, or intended use. Following chemical etching, components can either be delivered with tags intact within the sheet or as separate individual parts. Depending on the required size, design, or tolerance specifications, Precision Micro can also produce components without etch tags.



PROTRUDING TAG

The default tag which does not affect the surface area of the part.



HALF-ETCH PROTRUDING TAG

Aids component removal from the sheet.



RECESS TAG

This is used when a tag protrusion is not permitted.



HALF-ETCH RECESS TAG

Removes tag protrusion and aids component removal from the sheet.



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