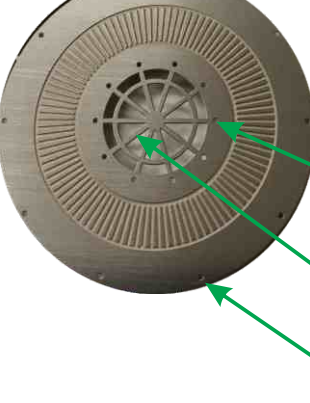


Metal Thickness Selection Guide - Etching Process

For the etching process there is a direct link between the maximum thickness that a design can be successfully etched from and the smallest detail appearing on the part/sheet.

The rules for stainless steel are different to all other metals, the examples below show drawing advice for both stainless steel and all other metals.

Stainless Steel Etched Parts - Full thickness & Fully etched detail



The minimum full thickness detail or fully etched (hole) detail must be 50% greater than the thickness of stainless steel selected.

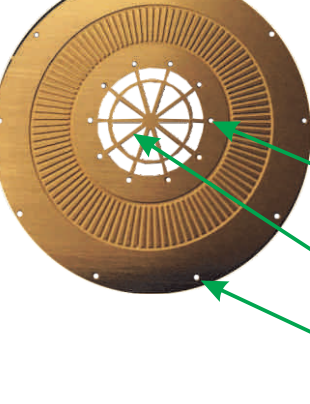
The disc on the left was etched from 0.2mm stainless steel.

For 0.2mm stainless steel, the smallest hole diameter that will etch through is 0.3mm (1.5 x 0.2mm) if the diameter is drawn smaller than 0.3mm it will not etch successfully.

The same rule applies to the remaining full thickness metal, in this case the full thickness bars must be a minimum of 0.3mm in width, if it is less than 0.3mm it may etch away.

Remember to check the width of material to the outside of a hole, this is something that is often overlooked on drawings, this too must be a minimum of 1.5 x the metal thickness.

All other metals (Brass/Nickel Silver/Copper/Phosphor Bronze) - Full thickness & Fully etched detail



The minimum full thickness detail or fully etched (hole) detail must be 20% greater than the thickness of the metal selected.


The disc on the left was etched from 0.3mm Brass.

For 0.3mm brass, the smallest hole diameter that will etch through is 0.36mm (1.2 x 0.3mm) if the diameter is drawn smaller than 0.36mm it will not etch successfully.


The same rule applies to the remaining full thickness metal, in this case the full thickness bars must be a minimum of 0.36mm in width, if it is less than 0.36mm it may etch away.

Remember to check the width of material to the outside of a hole, this is something that is often overlooked on drawings, this too must be a minimum of 1.2 x the metal thickness.

All Metals - Halfetch (Surface) etched detail



The rule for halfetched (surface) detail is not linked to the metal type or thickness, this must be drawn at a minimum of 0.18mm regardless of the thickness.



Remember to measure the width of any surface etched text, the width must be a minimum of 0.18mm.

Selecting a metal thickness for an existing drawing - Example 1

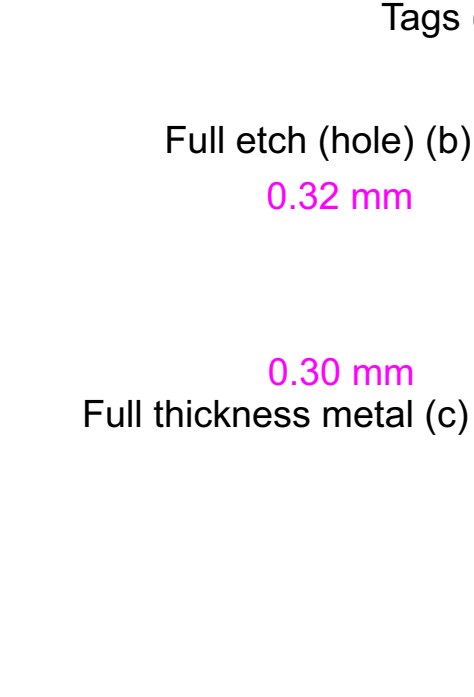
To determine the maximum thickness that may be used for an existing design, the following dimensions must be checked:-

The width of the smallest tags used

The dimension of the smallest 'full etch' area

The dimension of the thinnest 'full thickness' part

The width of the smallest halfetch (surface) etch detail



Tags (full thickness) (a) 0.25 mm

Full etch (hole) (b) 0.31 mm

Full etch (hole) (b) 0.32 mm

Full thickness metal (c) 0.30 mm

Halfetch detail (d) 0.18 mm

Halfetch detail (d) 0.24 mm

Halfetch detail (d) 0.20 mm

Full thickness metal (c) 0.30 mm

The example above shows a typical etch and the measurements taken:-

The width of the thinnest tags used, and the type (a) 0.25mm (full thickness)

The dimension of the smallest 'full etch' area (b) 0.31mm

The dimension of the thinnest 'full thickness' part (c) 0.3mm

The width of the smallest halfetch (surface) etch detail (d) 0.18mm

Once the dimensions are checked, the calculation to determine the maximum thickness possible can be carried out:-

For Stainless Steel: (b) or (c) whichever is lower divided by 1.5 0.3mm / 1.5 = 0.2mm

For all other metals: (b) or (c) whichever is lower divided by 1.2 0.3mm / 1.2 = 0.25mm


The metal stock list must now be checked for a thickness of metal either equal to or less than the 0.2mm for stainless steel and 0.25mm for any other metal.

In this case the maximum thickness that PPD stock that the design may etched from would be:-

0.2mm stainless steel or 0.25mm brass.

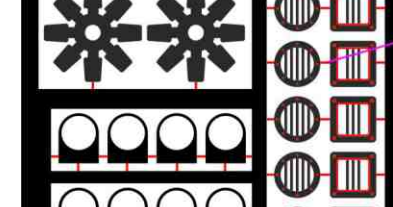
Tags (a)

Once the maximum thickness is known, the recommended tag type and minimum width must be checked, in the example the tags are 'full thickness' at 0.25mm which is suitable for brass at 0.25mm and stainless steel at 0.2mm. Our recommended tag width for each metal type and thickness can be found on a pdf file on our 'Artwork Guide' page on our website.



Tags (full thickness) (a) 0.25 mm

In this example the tags are drawn as recommended for the metal type and thickness, this will etch successfully

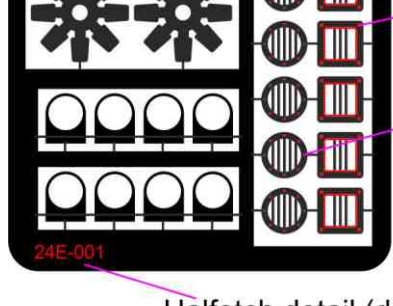


Tags (half thickness) (a) 0.25 mm

In this example the tags are not drawn as recommended for the metal type and thickness, the tags are likely to fail and the components lost.

Halfetch detail (d)

The minimum halfetch (surface) etch detail that we can resolve on all metals is 0.18mm, this applies to all detail on the parts or text.



Halfetch detail (d) 0.24 mm

Halfetch detail (d) 0.20 mm

Halfetch detail (d) 0.18 mm

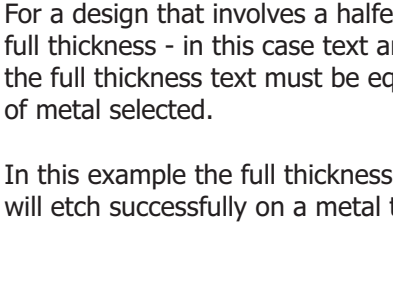
In this example the lowest measured halfetch detail is the text at the bottom left of the fret, this measures 0.18mm which is the smallest detail that will successfully etch.

No changes would be required to the halfetch.

Other Drawing/Dimension Tips

Take a look at the examples below for advice on specific types of layout.

Example 2 - Halfetched background with raised text



Full thickness 0.5 mm

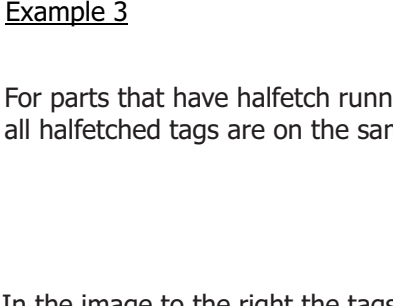
Full thickness 0.5 mm

For a design that involves a halfetched background and areas of full thickness - in this case text and border, the minimum width of the full thickness text must be equal to or greater than the thickness of metal selected.

In this example the full thickness detail measures 0.5mm, this part will etch successfully on a metal thickness of 0.5mm or less

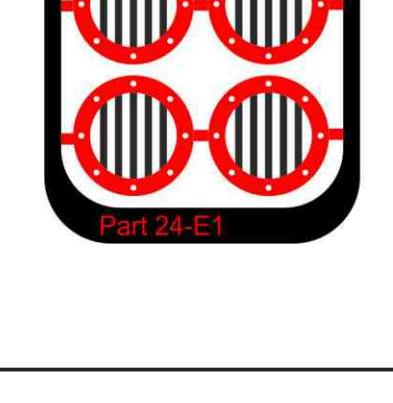
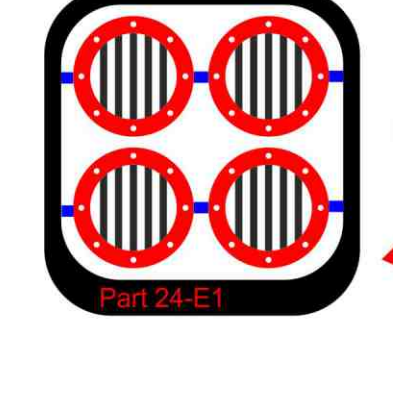
If this part was etched on a metal thickness greater than 0.5mm then the full thickness detail may start to etch away.

Example 3



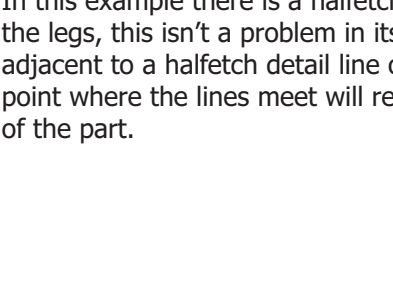
For parts that have halfetch running to perimeter, it is important that all halfetched tags are on the same side

In the image to the right the tags will be etched on the opposite side to the halfetch detail on the front, this can result in failures at the point where they both meet resulting in the parts falling out of the sheet.



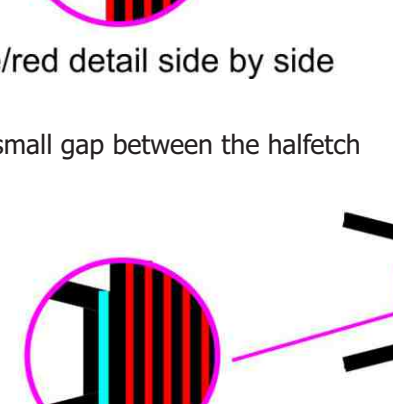
To prevent a failure the tags must be drawn on the same side as the halfetch detail, as shown in the right hand image.

Example 4



Blue/red detail side by side

To avoid this type of failure we recommend that there is a small gap between the halfetch on the front and on the back of 0.25mm




Blue/red detail with a gap of 0.25mm

Example 5

In some applications a desired effect can be achieved by drawing slightly below our recommended dimensions, one such application is the rivets for a model railway part, the example below shows a buffer beam with rivets.

Our recommended minimum diameter would be 1.5 x the metal thickness for stainless steel and 1.2 x metal thickness for all other metals, if this rule is followed the rivets will etch as a defined shape protruding from the halfetched background.

To achieve a less defined - more rounded appearance, the rivets can be drawn slightly less than the recommended dimensions, this results in the resist effectively 'falling off' of the surface and the rivets actually etch in the latter part of the etching process. This isn't a guaranteed result but generally results in a finish that works.



Full etch (hole) Halfetch on the front

Etch ready artwork

Red: halfetch on the front

White: Full etch (hole)

Black: Full thickness metal

Full thickness metal

Example etch

0.4mm Nickel Silver

0.4mm diameter rivets