

## General Specifications

### Quality System


- The Quality System at Hybrid Laser Tech is accredited to ISO9001:2000.
- Internal inspection of both the product and process is carried out at all stages of manufacture.
- All laser processing work shall take place on the front side and all drawings shall be interpreted as being front view, unless otherwise clearly stated.
- Ceramic is purchased as per Company Procurement Specification (CPS).
- Hybrid Laser Tech does not warrant total cleanliness of supplied product. Hybrid Laser Tech recommends the clean firing of laser processed substrates by the customer upon receipt.

### Special Requirements

For any requirements not covered in this document please contact Hybrid Laser Tech for further assistance.

# Standard Specification Guide

Laser Processing of Technical Ceramics



# Mechanical tolerances



## Scribing

- As fired ceramic thickness range +/-10%
- Scribe depth 0.08mm to 0.75mm +/-0.05mm
- Nominal scribe depth 33% to 50% of substrate thickness
- Nominal non-accumulative pulse spacing 0.16mm +/-0.025mm
- Surface slag height less than 0.025mm - (avg across length of scribed edge)
- Diapad service to reduce slag height and surface spatter available on request
- Location:

Scribe line to:	Distance apart:	Tolerance:
Scribe line	Up to 100mm	+/-0.05mm
Fired edge	Up to 100mm	+/-0.10mm
Centre of hole	Up to 100mm	+/-0.05mm
Profile cut edge	Up to 100mm	+/-0.05mm

## Drilling

- Smallest drilled hole size = 0.1mm
- Hole size - 0.25mm - 1mm thick = nominal +/-0.05mm
- Hole size - 1.25mm - 2mm thick = nominal +/-0.076mm
- Hole taper typically = 5% of substrate thickness
- Location:

Hole centre to:	Distance apart:	Tolerance:
Hole centre	Up to 100mm	+/-0.05mm
Fired edge	Up to 100mm	+/-0.10mm
Profiled edge	Up to 100mm	+/-0.05mm

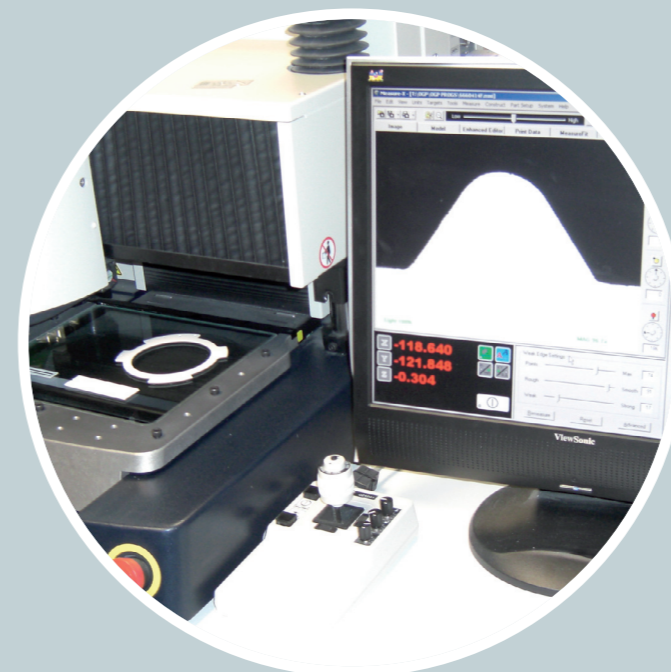
## Laser Profiling

- Perpendicularity of laser profiled edges +/-0.05mm
- Minimum profile slot cut width = 0.1mm
- Minimum radius 0.05mm +0.05/-0.00mm
- Location:

Profiled edge to:	Distance apart:	Tolerance:
Profiled edge	Up to 100mm	+/-0.05mm
Fired edge	Up to 100mm	+/-0.10mm

# Inspection methods

Attribute/Test Procedure	Tolerance
<b>Scribe Pulses</b> Viewed under maximum magnification (170x) with rear projection illumination. Plugged pulse marks appear black or dark.	<ul style="list-style-type: none"> <li>• 90% clean</li> <li>• 1 in 10 plugged</li> </ul>
<b>Scribe Depth</b> Snap Substrate and measure from the entrance side with non contact optical system.	<ul style="list-style-type: none"> <li>• +/-0.05mm standard</li> </ul>
<b>Holes</b> Using Non contact optical system, minimum of 15 data points taken for each hole using rear projection illumination.	<ul style="list-style-type: none"> <li>• Free of debris</li> <li>• Nominal hole diameter taken at laser exit side</li> <li>• (See Mechanical Tolerances Drilling section)</li> </ul>
<b>Profile slots/edges</b> Using non contact optical system, taken at exit dimensions unless otherwise stated.	<ul style="list-style-type: none"> <li>• Free of debris</li> <li>• (See Mechanical Tolerances Laser Profiling section)</li> </ul>
<b>Part Detail</b> Using non contact optical system.	<ul style="list-style-type: none"> <li>• Within overall specifications limits</li> </ul>
<b>Cracks</b> High intensity, low angled light using the unaided eye. Dye testing service available on request.	<ul style="list-style-type: none"> <li>• None allowed</li> </ul>
<b>Chips</b> High intensity, low angled light using the unaided eye. Verification of chip size achieved using no contact optical system.	<ul style="list-style-type: none"> <li>• Depth 0.75mm</li> <li>• Height 50% thickness</li> <li>• Length length of tile</li> </ul>



## Visual Inspection

- After lasering, the substrate is inspected for defects under high intensity, low angled lighting.

## Packaging

- All products are wrapped in clear polythene after final inspection. Packets are individually sealed in bubble wrap before being double packed to ensure safe delivery to the customer.
- Packaging other than standard should be noted on the purchase order. Other special services are available upon request, e.g. labelling or special handling requirements.

## Customer Supplied Material

- With a process yield greater than 90%, Hybrid Laser Tech warrants that substrates manufactured from Customer Supplied Material will be free of defects in workmanship. Hybrid Laser Tech can accept no liability for Customer Supplied Material. Please contact the quality department for further advice.