BURLE Brings You The Most Advanced MCP Technology In The World

BURLE products have led the industry in electro-optics and fiberoptics for over 35 years. We supply standard and custom products and offer expert, personal service designed to meet the rigorous demands of radiation detection and signal amplification applications. Our unrivaled expertise in designing and manufacturing Long-Life™ Microchannel Plates and related technology ensures the most sensitive and highly-integrated systems available.

Our diverse manufacturing capabilities can provide solutions for virtually any detection application, no matter how unique.

BURLE has one of the largest microchannel plate manufacturing facilities in the world. Dedicated solely to manufacturing components for scientific detector products, this 50,000 sq. ft. facility features the most advanced equipment in the industry for producing microchannel plates and electron multipliers.

BURLE’s Long-Life™ Microchannel Plates use an exclusive material which has demonstrated superior lifetime characteristics in a wide range of detection applications. Long-Life™ Microchannel Plates are the foundation for a new generation of applications including image intensification, remote detection, and mass spectrometry. These devices offer longer life, higher gain, and lower dark current than any other commercially available microchannel plate. The Long-Life™ Microchannel Plate’s enhanced stability and extended dynamic range provide outstanding system performance and reliability for even the most demanding applications.
When ordering BURLE MCPs, the following table will assist you in selecting exactly the right configuration for your specific application. If you have any questions or need assistance, do not hesitate to contact BURLE Electro-Optics Customer Service at 1-800-648-1800, +1-508-347-4000, or sales@burle-eo.com.

### MCPs, EDRs, and Coatings

<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Bias Angle (deg)</th>
<th>Extended Dynamic Range</th>
<th>Configuration</th>
</tr>
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<tbody>
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<td>EDR</td>
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<td></td>
<td>MS</td>
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<td>8</td>
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<td></td>
<td>TZ</td>
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<td></td>
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<table>
<thead>
<tr>
<th>Diameter (mm)</th>
<th>Bias Angle (deg)</th>
<th>Extended Dynamic Range</th>
<th>Configuration</th>
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<td></td>
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<tr>
<td>6</td>
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</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
<td>None</td>
</tr>
</tbody>
</table>

### Coatings
- CsI
- CuI
- MgF₂
- MgO
- KBr
- Cu
- Au
- None

### Pitch
- C-to-C (microns)
- 3
- 6
- 10
- 12
- 32

### MCP Quality
- D - Detection
- I - Imaging
- P - Premium

### Aspect Ratio (L/D)
- 40:1
- 60:1
- 80:1

### Format
- CH – Center Hole
- WS – Wedge Shaped
- AS – Annular Sector
- PB – Partial Border

**BURLE Microchannel Plates are available in three classifications:**

**Detection Quality Microchannel Plates** are designed for a wide range of signal detection applications. These devices are for use as single-point detectors and amplifiers. Detection Quality MCPs are typically used in Time-of-Flight mass spectrometry, residual gas analysis and point detectors. Detection Quality MCPs are the best choice and value for non-imaging applications.

**Image Quality Microchannel Plates** are designed for use in imaging or position sensing applications. When used in conjunction with an appropriate readout, these devices provide an intensified high resolution image. Image Quality MCPs are found in such applications as second generation image intensifier tubes, ultra-fast cathode ray tubes and various analytical techniques such as ESCA, magnetic sector mass spectrometry and VUV spectrometry.

**Premium Quality Microchannel Plates** are designed for use in precision imaging applications requiring superior image quality. These high grade devices are manufactured to the highest quality specifications achievable. Premium Quality MCPs are found in such applications as high speed photography, third and later generations of image intensifiers and other electronic imaging applications. Premium Quality MCPs are the preferred choice for space applications where product reliability and performance are critical.
Bias Angle
The bias angle of a microchannel plate is the angle of the channel with respect to the surface normal. It can be varied in order to optimize the angular dependency of UV and soft X-ray detection (0-19°). Zero degree bias angles are primarily selected for collimation applications. A 5° bias angle is optimal for high resolution analog detection applications. Chevron and Z-Stack assemblies perform best with 8° or 12° bias angle MCPs.

Pitch
The spatial and temporal resolution of microchannel plates varies inversely with their center-to-center spacing (Pitch). BURLE’s Long-Life™ MCPs are available with 2, 5, 8, 10, and 25-micron pores. BURLE’s 2-micron pore MCPs are the highest resolution MCPs available. The 2-micron pore Long-Life MCP is ideal for applications where image detail or response time is important.

Aspect Ratio
BURLE offers Standard 40:1 Length-to-Diameter (L/D) ratio or Advanced Performance 60:1 L/D ratio MCPs. BURLE’s Standard MCPs have been optimized and demonstrate superior performance for imaging applications. Advanced Performance MCPs are the preferred devices for most detection applications.

Advanced Performance MCPs, with their higher length-to-diameter ratio, provide a thicker, more robust microchannel plate. This ensures greater mechanical durability and simplifies handling and assembly operations.

EXTENDED DYNAMIC RANGE™
The dynamic range of an MCP is ultimately limited, at high count rates, by the bias current. In operation, secondary electrons produce a region of charge depletion at the emissive surface. Further multiplication cannot occur until the charge is replenished. The EXTENDED DYNAMIC RANGE™ (EDR) option will typically increase the maximum signal detection limit by a factor of ten.

MCP Configurations
Matching the bias currents of the MCP sets allows the set to be operated from a single power supply, which eliminates the need for center tabs and voltage dividers, leading to improvements in spatial resolution and Pulse Height Distribution.

Matched Set – Two single MCPs with matched resistance suitable for making a Chevron™.

Tested as a Chevron™ - Two matched MCPs tested in the high gain Chevron™ configuration.

Matched Z – Three single matched resistance MCPs suitable for making a Z-stack.

Tested as a Z-Stack – Three matched MCPs tested in the high gain Z-Stack configuration.

Coatings
Cesium Iodide (CsI), Copper Iodide (CuI), and Magnesium Fluoride (MgF₂) enhance the detection of ultraviolet photons from 200 to 2000 angstroms. Potassium Bromide (KBr) improves detection efficiency of soft X-rays in the 0.2 to 9 keV range.

Mounting Pad Technology
BURLE’s new, patent-pending Mounting Pad Technology virtually eliminates MCP warping and cracking. All rimmed MCPs are subject to warping or cracking if exposed to even a small amount of moisture. Rimless MCPs trap gas and edge pores are easily damaged, causing excessive noise in operation. BURLE’s Mounting Pad Technology gives you the best of both worlds. Mounting pads provide a rigid area to clamp the MCP without damaging any pores and allow for efficient degassing. These MCPs are also virtually warp-free, regardless of the storage environment.

Custom Microchannel Plates
In addition to the most complete line of Standard and Advanced Performance MCPs available, BURLE also offers a wide range of custom products. Among the options available are: Custom formats (rectangular, mounting holes, virtually any shape and size), special coatings, optimized bias currents, specialized performance testing, and custom aspect ratios.
MCP PERFORMANCE CHARACTERISTICS

<table>
<thead>
<tr>
<th>Configuration</th>
<th>L/D Ratio</th>
<th>Maximum Voltage</th>
<th>Gain</th>
<th>Pulse Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single MCP</td>
<td>40:1</td>
<td>1000</td>
<td>&gt;4x10^3</td>
<td>Neg. Exp.</td>
</tr>
<tr>
<td></td>
<td>60:1</td>
<td>1200</td>
<td>&gt;1x10^5</td>
<td>Neg. Exp.</td>
</tr>
<tr>
<td>Chevron</td>
<td>40:1</td>
<td>2000</td>
<td>&gt;4x10^6</td>
<td>&lt;175%</td>
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<tr>
<td></td>
<td>60:1</td>
<td>2400</td>
<td>&gt;1x10^7</td>
<td>&lt;100%</td>
</tr>
<tr>
<td>Z-Stack</td>
<td>40:1</td>
<td>3000</td>
<td>&gt;3x10^7</td>
<td>&lt;120%</td>
</tr>
<tr>
<td></td>
<td>60:1</td>
<td>3600</td>
<td>&gt;2x10^8</td>
<td>&lt;60%</td>
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</tbody>
</table>

Custom Format Microchannel Plates

- **Center Hole**
- **Wedge-Shaped**
- **Circular Sector**
- **Partial Border**

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