Types of Seal

Ratings – 5= good, 1= poor. Although cost is an important criteria it’s not provided as it depends on which complementary components are used to allow the seal to operate.

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Application</th>
<th>Solvent resistance</th>
<th>Pressure rating</th>
<th>Re-use</th>
<th>Usability</th>
<th>Dead volume</th>
<th>Cost</th>
<th>Comments</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>Bonding a length of tubing to a port on the microfluidic device with epoxy or other suitable adhesive</td>
<td>A</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flared/ flanged</td>
<td>The flattened surface of a tube is pressed against the flat surface of a chip</td>
<td>A</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td></td>
<td>Resistance depends on material used. High stress loads on chip (connector/interface designed to withstand)</td>
<td>Diba</td>
</tr>
<tr>
<td>Interference fitting</td>
<td>Two components (ferrule and port, or connector/port) are screw or press-fit together</td>
<td>A</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td></td>
<td></td>
<td>Luer</td>
</tr>
<tr>
<td>Push in</td>
<td>Tube is pushed into recess to create interference fit</td>
<td>A</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
<td>Uni Cal.</td>
</tr>
<tr>
<td>Nipple/Barb</td>
<td>Soft wall tubing is stretched over a conical or cylindrical shaped device</td>
<td>A</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>1</td>
<td></td>
<td></td>
<td>Value Plastics</td>
</tr>
<tr>
<td>Needle through membrane</td>
<td>A needle is pushed through a typically elastomeric membrane</td>
<td>A</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td></td>
<td>limited pressure range,</td>
<td>Cytocentrics</td>
</tr>
<tr>
<td>Gasket</td>
<td>Mechanical (typically Elastomer) seal compressed between two components to prevent fluid leakage. May or may not grip and seal onto a tube.</td>
<td>B</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td></td>
<td>Complicated and expensive connector design</td>
<td>Dolomite</td>
</tr>
<tr>
<td>Ferrule</td>
<td>A metal or polymer ring, tube or cap, placed at or fastened to the end of a tube</td>
<td>B</td>
<td>5</td>
<td>4</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td></td>
<td>Complicated to design for multiconnects. Only one component to change in the event of a seal failure</td>
<td>Omnifit</td>
</tr>
<tr>
<td>O-ring</td>
<td>An elastomer ring of circular cross-section compressed between two components to prevent fluid leakage. May or may not grip and seal onto a tube.</td>
<td>A</td>
<td>4</td>
<td>4</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td></td>
<td></td>
<td>Generic</td>
</tr>
<tr>
<td>Free path</td>
<td>Introducing liquids into an open port on the microfluidic device with the use of an external delivery system such as a pipette</td>
<td>A</td>
<td>5</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td></td>
<td>Possibility of leaks and spills, contamination. Discrete delivery. Lack of overpressure restricts the applicability of the microfluidic device.</td>
<td></td>
</tr>
</tbody>
</table>
**Classes of application**

A: up to 2 bar (14, 3 psig or 29 psi) to include practically all PoC, Loc like instruments for instance for biochemical testing.

B: Up to 100 bar (1450 psi) we find here many gasflow sensors etc.

C: The last are the connectors for analytical instruments like GC: up to 1000 or even 3000 bar.

**Distinctive factors**

- multiple interconnections
- a small area
- leak tight
- easy to assemble
- chemically resistant
- Smooth fluidic transitions, the ideal interconnect design is one that has the least possible effect on fluid flow.
- low dead volume
- low cost to assemble, and be amenable to automated assembly
- Reversibility; (Cost of servicing and flexibility of system)
- Leak rate; (Loss of fluid and entrance of bubbles)
- Maximum pressure; (High pressures need robust design of the connector)
- Change of cross-section; (influences degassing due to sudden pressure drops and carryover)
- Maximum temperature; (Choice of materials for connector/device)
- Compatibility of materials. (Influences reliability of sample and carryover)