Although MicroMax® NS is significantly less expensive than Tyvek®, cost should always be secondary to safety.

So how do you make a systematic and defensible choice between the world’s two leading Protective Clothing brands? Comparative performance data for a range of exposure types is the only objective way.

Fortunately, comparative performance data are available for each fabric in the user instructions published by each company in accordance with ISO 16602, an international standard endorsed by DuPont.

The ISO 16602 standard is based upon a system of “Types” according to the type and degree of the hazard (as shown below). Standardized test methods for each Type then determine what Performance Class a given fabric meets: the better the performance the higher the Class numeric rating.

<table>
<thead>
<tr>
<th>ISO 16602</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TYPE 6</strong></td>
</tr>
<tr>
<td><strong>TYPE 5</strong></td>
</tr>
<tr>
<td><strong>TYPE 4</strong></td>
</tr>
<tr>
<td><strong>TYPE 3</strong></td>
</tr>
<tr>
<td><strong>TYPE 2</strong></td>
</tr>
<tr>
<td><strong>TYPE 1</strong></td>
</tr>
</tbody>
</table>

The following are the comparative test results for Type 6 Liquid Aerosol and Type 5 Dry Particulate:

<table>
<thead>
<tr>
<th>Physical Property</th>
<th>Test Method</th>
<th>DuPont Tyvek**</th>
<th>Lakeland MicroMax® NS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength / Durability Test</td>
<td></td>
<td>Performance Class Range 1-6, 6 being the highest performing</td>
<td></td>
</tr>
<tr>
<td>Abrasion Resistance</td>
<td>EN 530 (method 2)</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Puncture Resistance</td>
<td>EN 863</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Flex Cracking</td>
<td>ISO 7854/B</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Trapezoidal Tear MD</td>
<td>ISO 9073-4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Trapezoidal Tear XD</td>
<td>ISO 9073-4</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tensile Strength (max. MD/XD)</td>
<td>ISO 13934-1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Burst Strength</td>
<td>ISO 2960</td>
<td>Not Disclosed</td>
<td>1</td>
</tr>
<tr>
<td>Antistat</td>
<td>EN 1149-5</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>Seam Strength</td>
<td>EN/ISO 13935-2</td>
<td>&gt; 75 N</td>
<td>88.8 N</td>
</tr>
</tbody>
</table>

**Advantage: MicroMax® NS**

MicroMax® NS outperforms Tyvek® in five of the nine tests in this category. Tyvek outperforms MicroMax® NS in three, and one is a tie.
Resistance to Liquid Penetration Tests

MicroMax® NS outperforms Tyvek® against two of the four common chemicals for which DuPont publishes data under ISO 16602, and two are a tie.

**Data taken from DuPont User Instructions for CAH5, document L-2984, January 2009/15.

Protection Against Infectious Agents EN14126

In all four tests against blood and other biological contaminants, Lakeland MicroMax® NS is significantly more effective, performing at the highest possible class in each test. Tyvek® does not meet the minimum performance threshold in protection against blood and body fluids, and only meets the minimum classification in the other tests.

**Advantage: MicroMax® NS

Comfort and Breathability

MicroMax® NS is similar in breathability to Tyvek®, with an MVTR (Moisture Vapor Transfer Rate) that is a little better at 119 vs. 111, and Air Permeability that is a little lower at 0.5 vs 3.3 cfm.

However, considering that a typical cotton T-shirt has a cfm of 180, the difference between 0.5 and 3.3 cfm is almost meaningless in terms of breathability- like wearing 59 T-shirts instead of 60.

**The reality is, neither fabric has noticeable breathability.

In Summary...

The data shows that MicroMax® NS provides better overall protection than Tyvek® and is essentially identical in terms of breathability. It would be the better choice in most situations even if it cost as much as Tyvek®.
Lakeland Solutions Selection Guide

**Flash Fire/Chemical Hazards**
- In addition to Flash Fire, do you need chemical protection from liquid spray?
  - No
  - Yes

**Liquid Hazards**
- Is the exposure level low or high?
  - Low
  - High

**Hazardous Dry Particles**
- Is the particle size greater or less than 1.0 micron?
  - > 1 micron
  - < 1 micron

**Infectious Agents**
- Is the hazard a blood-borne pathogen, biologically contaminated aerosol, dry microbial or body fluid?

**Gas/Vapor Hazards**
- Does your application require an air-tight positive pressure suit?
  - Yes
  - No

*For details on Type 4 and Type 3 solutions, contact your Lakeland Sales Representative or call Customer Service at 800-645-9291.

**Must be worn over thermally protective clothing, such as fire resistant cottons, aramids or modacrylics.

***Refer to permeation data on next page for which ChemMax® is indicated for a given hazard.

This is a general guide to selecting garments only, and should not be used as the definitive or only tool in garment selection. It is the responsibility of the user to select garments or products which are appropriate for each intended use and which meet all specified government and industry standards.
Lakeland’s ChemMax® Range vs. DuPont’s TyChem® Range

Selecting the appropriate chemical suit is a critical and challenging task: the health and well being of a company’s employees hangs in the balance. So does productivity and morale… as well as potential liability in the event of an accident.

So how do you make the best and most cost-effective choice for a given work environment?

The accepted industry standard ASTM F1001 list can be helpful for comparing the relative barrier capabilities of various suppliers’ products.

Additional considerations are strength and durability, and the types of seam construction, since the seam often presents the path of least resistance into a garment. A sealed seam is always best, but may not necessary in certain light-duty situations.

The chart below summarizes published strength test results, and then performance test data against the ASTM F1001 list for the range of Chemical suit fabrics Lakeland offers, shown next to the comparable suit from DuPont. A red or green cell represents a permeation time for a chemical in excess of 480 minutes, the maximum exposure time that is tested for. Lack of color means less than 480.

One can see that at every level the Lakeland chemical suit performs at least as well or better than the comparable DuPont offering. But in every case, Lakeland suits costs less. Now that is truly cost-effective!

Comparative Chemical Fabric Performance Data

<table>
<thead>
<tr>
<th>Test Method</th>
<th>ChemMax® 1</th>
<th>Tychem® QC</th>
<th>ChemMax® 2</th>
<th>Tychem® SL</th>
<th>ChemMax® 3</th>
<th>Tychem® CPF3</th>
<th>ChemMax® 4 Plus</th>
<th>Tychem® BR/LV</th>
<th>Interceptor® Plus</th>
<th>Tychem® TK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basis Weight</td>
<td>ASTM D3776-90 &amp; D751</td>
<td>2.29 oz/y²</td>
<td>2.5 oz/y²</td>
<td>4.3 oz/y²</td>
<td>3.5 oz/y²</td>
<td>4.5 oz/y²</td>
<td>4.4 oz/y²</td>
<td>7.5 oz/y²</td>
<td>7.4 oz/y²</td>
<td>11.0 oz/y²</td>
</tr>
<tr>
<td>Thickness</td>
<td>D1777-75</td>
<td>15 mil</td>
<td>10 mil</td>
<td>11 mil</td>
<td>13 mil</td>
<td>16 mil</td>
<td>17.5 mil</td>
<td>19 mil</td>
<td>21 mil</td>
<td>33 mil</td>
</tr>
<tr>
<td>Ball Burst</td>
<td>ASTM D751</td>
<td>25 lbf</td>
<td>Not Available</td>
<td>48 lbf</td>
<td>Not Available</td>
<td>55 lbf</td>
<td>68 lbf</td>
<td>79 lbf</td>
<td>83 lbf</td>
<td>250 lbf</td>
</tr>
<tr>
<td>Grab Tensile MD</td>
<td>ASTM D5034-90</td>
<td>35 lbf</td>
<td>41 lbf</td>
<td>47 lbf</td>
<td>41 lbf</td>
<td>59 lbf</td>
<td>Not Available</td>
<td>93 lbf</td>
<td>84 lbf</td>
<td>219 lbf</td>
</tr>
<tr>
<td>Grab Tensile XD</td>
<td>ASTM D5034-90</td>
<td>27 lbf</td>
<td>47 lbf</td>
<td>34 lbf</td>
<td>50 lbf</td>
<td>42 lbf</td>
<td>Not Available</td>
<td>80 lbf</td>
<td>83 lbf</td>
<td>170 lbf</td>
</tr>
<tr>
<td>Trapezoidal Tear MD</td>
<td>ASTM D5733</td>
<td>14 lbf</td>
<td>7 lbf</td>
<td>30 lbf</td>
<td>9 lbf</td>
<td>26 lbf</td>
<td>21 lbf</td>
<td>25 lbf</td>
<td>26 lbf</td>
<td>35 lbf</td>
</tr>
<tr>
<td>Trapezoidal Tear XD</td>
<td>ASTM D5733</td>
<td>14 lbf</td>
<td>5 lbf</td>
<td>13 lbf</td>
<td>8 lbf</td>
<td>20 lbf</td>
<td>30 lbf</td>
<td>19 lbf</td>
<td>22 lbf</td>
<td>39 lbf</td>
</tr>
</tbody>
</table>

Acetone | Acetonitrile | Anhydrous Ammonia | 1,3 Butadiene | Carbon Disulfide | Chlorine | Dichloromethane | Diethylamine | Dimethyl Formamide | Ethyl Acetate | Ethylene Oxide | n-Hexane | Hydrogen Chloride | Methanol | Methyl Chloride | Nitrobenzene | Sodium Hydroxide | Sulfuric Acid | Tetrachloroethylene | Tetrahydrofuran | Toluene |

Lakeland’s ChemMax®, ChemMax® 4 Plus and Interceptor® Plus give you the added bonus of PermaSURE®. PermaSURE® is a free, mobile-friendly online tool that models permeation rates and calculates safe-use times by incorporating environmental, temperature and chemical exposure factors. It is a state-of-the-art technology developed initially by leading Polymer chemists for defense forces to quickly determine which suits are needed for various chemical warfare agents and dual use chemicals. It is based on the known molecular characteristics and behavior of 4000+ chemicals interacting with Lakeland’s specific chemical fabrics.

Please contact Lakeland or your local Lakeland distributor, who will be pleased to help you analyze the hazards of your work environment and select the most appropriate and cost-effective solution.

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