Characteristics of Urethane, Rubbers and Sponges
Features of High Performance Urethane and Rubber

**Urethane Properties**

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>General Urethane</th>
<th>Ceramic Urethane</th>
<th>Polyether Urethane</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>1.05</td>
<td>1.00</td>
<td>1.05</td>
</tr>
<tr>
<td>Modulus</td>
<td>MPa</td>
<td>200</td>
<td>150</td>
<td>250</td>
</tr>
<tr>
<td>Tear Strength</td>
<td>kN/m</td>
<td>40</td>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>MPa</td>
<td>30</td>
<td>20</td>
<td>30</td>
</tr>
<tr>
<td>Shore A</td>
<td>90</td>
<td>90</td>
<td>90</td>
<td></td>
</tr>
</tbody>
</table>

Taber Abrasion Test Results

<table>
<thead>
<tr>
<th>Test Condition</th>
<th>Abraded Loss (mg)</th>
<th>Abraded Loss (mg)</th>
<th>Abraded Loss (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1000 cycles</td>
<td>50</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>2000 cycles</td>
<td>70</td>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>3000 cycles</td>
<td>90</td>
<td>60</td>
<td>90</td>
</tr>
</tbody>
</table>

**Features of Urethane**

- **Discoloration of Urethane**
  - Urethane turns yellow with aging but physical property or characteristics remain unchanged.
  - Acid resistance: ○
  - Sensitivity to water: ○
  - Impact strength: ○
  - Abrasion resistance: ○
  - Oil resistance: ○
  - Strength: ○
  - Durability: ○
  - Non-foaming: ○

**Features of Ceramic Urethane**

- **Deflection Comparison of General Urethane and Ceramic Urethane**
  - Ceramic urethane deflection is lower than general urethane under the same load and pressure.
  - Cylindrical deflection is higher than general urethane at the same load and pressure.

**Properties of Shock Absorbing Gel**

- **Elasticity of Shock Absorbing Gel**
  - P390, 415
  - Shock Absorbing Gel
  - Urethane Shore A50

**Features of Special Urethane Foam SOFIRA® P.425**

- **Steel Ball Collision Noise Level Test**
  - Compression Data of PNCV Steel Ball Collision Noise

**Impact Resilience**

**Heat Resistance**

- **Tear Strength**

**Taber Abrasion Test Results**

- **Temperature Resistance**

**Shock Absorption Comparison of Low Elasticity Rubber, Low Rebound Urethane**

**Features of Low Rebound Urethane, Low Elasticity Rubber (Hanenaito®)**

- **Drop Comparison of Rubber Ball and Hanenaito® Ball**

**Features of Low Rebound Urethane, Low Elasticity Rubber (Hanenaito®)**

- **Low Rebound Urethane**
  - It has the same properties as, synthetic, and inca in shock absorption. With more resistance to compression than general urethane, it is hard to deform. Furthermore, it is suitable for absorbing large impact energy because its tensile strength and elongation resistance are weaker than that of urethane of the same hardness.
  - Low Elasticity Rubber (Hanenaito®), “Hanenaito®” is a registered trademark of Nippon Rubber Industry Co., Ltd.

**References: Compression Set of Low Rebound Urethane**

- **Urethane (Shore A50)**
  -% 1%

**Correlation of Hardness and Rebound Force of Shock Absorbing Materials**

- **Elastomer**
  - Extra Low (F Hardness)
  - High (A Hardness)

**Elasticity of Shock Absorbing Gel**

- P390, 415
- Shock Absorbing Gel
- Urethane Shore A50

**Features of Special Urethane Foam SOFIRA® P.425**

- **Steel Ball Collision Noise Level Test**
  - Compression Data of PNCV Steel Ball Collision Noise

**Properties of Shock Absorbing Gel**

- **Unit**
  - Shock Absorbing Gel
- **Specific Gravity**
  - 1.0
- **Tensile Strength**
  - 80 MPa
- **Elongation at Breaking**
  - 300%