### KS-4® PLUS

#### Product Data

**Description:** Dense, Strong, General-Purpose Castable Refractory for Temperatures up to 2550°F

**Features:**
- Good strength.

**Uses:**
- Complete furnace linings.
- Pouring special shapes.
- Ideal general-purpose castable.

### Chemical Analysis: Approximate (Calcined Basis)

<table>
<thead>
<tr>
<th>Component</th>
<th>Approximate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica (SiO₂)</td>
<td>42.6%</td>
</tr>
<tr>
<td>Alumina (Al₂O₃)</td>
<td>44.9%</td>
</tr>
<tr>
<td>Iron Oxide (Fe₂O₃)</td>
<td>2.3%</td>
</tr>
<tr>
<td>Titania (TiO₂)</td>
<td>2.3%</td>
</tr>
<tr>
<td>Lime (CaO)</td>
<td>6.7%</td>
</tr>
<tr>
<td>Magnesia (MgO)</td>
<td>0.3%</td>
</tr>
<tr>
<td>Alkalies (Na₂O+K₂O)</td>
<td>0.9%</td>
</tr>
</tbody>
</table>

### Physical Data (Typical)

- **Material Required:** 122 lb/ft³ (1.96 g/cm³)
- **Maximum Service Temperature:** 2550°F (1400°C)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Poured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk Density</td>
<td>lb/ft³ (g/cm³)</td>
</tr>
<tr>
<td>After 220°F (105°C)</td>
<td>127 (2.04)</td>
</tr>
<tr>
<td>After 1500°F (815°C)</td>
<td>122 (1.96)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>lb/in.² (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Modulus of Rupture</td>
<td></td>
</tr>
<tr>
<td>After 220°F (105°C)</td>
<td>900 (6.3)</td>
</tr>
<tr>
<td>After 1000°F (540°C)</td>
<td>600 (4.2)</td>
</tr>
<tr>
<td>After 1500°F (815°C)</td>
<td>600 (4.2)</td>
</tr>
<tr>
<td>After 2000°F (1095°C)</td>
<td>450 (3.1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>lb/in.² (MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Crushing Strength</td>
<td></td>
</tr>
<tr>
<td>After 220°F (105°C)</td>
<td>4,150 (28.5)</td>
</tr>
<tr>
<td>After 1000°F (540°C)</td>
<td>2,650 (18.4)</td>
</tr>
<tr>
<td>After 1500°F (815°C)</td>
<td>2,600 (17.9)</td>
</tr>
<tr>
<td>After 2000°F (1095°C)</td>
<td>1,700 (11.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permanent Linear Change</td>
<td></td>
</tr>
<tr>
<td>After 220°F (105°C)</td>
<td>None</td>
</tr>
<tr>
<td>After 1000°F (540°C)</td>
<td>-0.2%</td>
</tr>
<tr>
<td>After 1500°F (815°C)</td>
<td>-0.2%</td>
</tr>
<tr>
<td>After 2000°F (1095°C)</td>
<td>-0.3%</td>
</tr>
<tr>
<td>After 2300°F (1260°C)</td>
<td>-0.4%</td>
</tr>
<tr>
<td>After 2500°F (1370°C)</td>
<td>-0.1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specification</th>
<th>Btu·in/hr·ft²·°F (W/m·°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Conductivity</td>
<td></td>
</tr>
<tr>
<td>At 400°F (205°C)</td>
<td>5.99 (0.86)</td>
</tr>
<tr>
<td>At 800°F (425°C)</td>
<td>6.02 (0.87)</td>
</tr>
<tr>
<td>At 1200°F (650°C)</td>
<td>6.09 (0.88)</td>
</tr>
<tr>
<td>At 1600°F (870°C)</td>
<td>6.20 (0.89)</td>
</tr>
<tr>
<td>At 2000°F (1095°C)</td>
<td>6.35 (0.92)</td>
</tr>
</tbody>
</table>
Product Data

Particle Size

<table>
<thead>
<tr>
<th></th>
<th>Maximum Grain Size 5 Mesh (Tyler)</th>
<th>Less than 3%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Note:</td>
<td>The test data shown are based on average results on production samples and are subject to normal variation on individual tests. The test data cannot be taken as minimum or maximum values for specification purposes. ASTM test procedures used when applicable.</td>
<td></td>
</tr>
</tbody>
</table>

Mixing and Using Information (Water calculated at 8.337 lb/gallon)

<table>
<thead>
<tr>
<th></th>
<th>55 lb bag</th>
<th>1000 lb bag</th>
<th>1500 lb bag</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Required—Vibration Casting (Weight 12.7%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pounds</td>
<td>7.0</td>
<td>127.0</td>
<td>190.5</td>
</tr>
<tr>
<td>Gallons</td>
<td>0.8</td>
<td>15.2</td>
<td>22.8</td>
</tr>
<tr>
<td>Liters</td>
<td>3.2</td>
<td>57.6</td>
<td>83.3</td>
</tr>
<tr>
<td>Water Required—Hand Casting/Pouring (Weight 13.5%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pounds</td>
<td>7.4</td>
<td>135.0</td>
<td>202.5</td>
</tr>
<tr>
<td>Gallons</td>
<td>0.9</td>
<td>16.2</td>
<td>24.3</td>
</tr>
<tr>
<td>Liters</td>
<td>3.4</td>
<td>61.2</td>
<td>91.8</td>
</tr>
</tbody>
</table>

For detailed mixing and using instructions, contact your HWI representative or visit www.thinkHWI.com.

Working Time

20 minutes

Heatup/Dryout Schedule

See HWI Dryout Schedule 2—PLUS Rated Castables and Gunning Castables.

Installation Guidelines

See HWI Installation Guidelines CC-1—Conventional Castables—Standard.

Shelf Life (Under Proper Storage Conditions)

365 days