Refractory Products

for the Aluminium Industry
Ladies and Gentlemen,

The PCO ‘Zarow’ S. A. is one of the most modern companies in Europe specialized in production of aluminosilicate refractories dedicated to aluminium and other non-ferrous metallurgy, cement plants, coke-making plants and other industries consuming refractories.

Our goal is improvement of product quality through consistently continuous implemented, unusually fast modernization of all production processes that has included all production divisions, from the automation of the batch preparation division to the purchase of new tunnel kilns with a full control of firing conditions.

Last investments in the production department are: a complete technological line for precast shapes manufacturing and a new division for manufacturing of special ceramics including NBSiC products.

Whole management process is supported by Microsoft Dynamic AX software – comprehensive enterprise resource planning (ERP) solution, which covers all areas of our activity.

Company team members work with passion, appreciating and being concerned for direct contacts with customers to find the best solutions. Together we are able to compete effectively in the nowadays global market.

We invite you to cooperation!
We offer:
- technical and technological consulting
- engineering and designing support
- supervision and installation services
- research and development advice
- quality control system certified by ISO 9001

Exemplary qualities and their application area:
- NORMATON AX28 – pot-line, cryolite resistant BRO bricks
- SUPERTON AX33 – pot-line, cryolite resistant BRO bricks
- SUPERTON AX40 – pot-line, cryolite resistant BRO bricks
- SUPERTON AL40 – pot-line bricks with increased corrosion resistant
- PCOCAST BOS 100A – leveling course
- PERLITEX LPN6 – insulating bricks
- BRO bricks air-setting mortars (e.g. MORTALEX ZSz2)

### Fired bricks

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHEMICAL COMPOSITION</th>
<th>BULK DENSITY</th>
<th>APPARENT POROSITY</th>
<th>COLD CRUSHING STRENGTH</th>
<th>REFRACTORINESS UNDER LOAD (T_{x,0})</th>
<th>THERMAL CONDUCTIVITY AT 800°C</th>
<th>LINEAR AFTER CONTRACTION OR EXPANSION AT 1350°C / 2H [%]</th>
<th>THERMAL SHOCK RESISTANCE AT 950°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>NORMATON AX28</td>
<td>Al(_2)O(_3) 28%</td>
<td>2.2</td>
<td>2.00</td>
<td>20</td>
<td>1380</td>
<td>1.30</td>
<td>±0.2</td>
<td>&gt;10</td>
</tr>
<tr>
<td>EXTRATON AX33</td>
<td>Al(_2)O(_3) 33%</td>
<td>2.2</td>
<td>2.08</td>
<td>18</td>
<td>1430</td>
<td>1.30</td>
<td>±0.2</td>
<td>&gt;10</td>
</tr>
<tr>
<td>EXTRATON AX40</td>
<td>Al(_2)O(_3) 40%</td>
<td>2.4</td>
<td>2.10</td>
<td>18</td>
<td>1430</td>
<td>1.30</td>
<td>±0.2</td>
<td>&gt;10</td>
</tr>
<tr>
<td>SUPERTON AL40</td>
<td>Al(_2)O(_3) 40%</td>
<td>1.5</td>
<td>2.18</td>
<td>16</td>
<td>1480</td>
<td>1.35</td>
<td>±0.2</td>
<td>&gt;18</td>
</tr>
</tbody>
</table>

### Refractory castables

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHEMICAL COMPOSITION</th>
<th>BULK DENSITY</th>
<th>MAXIMUM SERVICE TEMPERATURE</th>
<th>COLD CRUSHING STRENGTH</th>
<th>LINEAR EXPANSION 1000°C</th>
<th>APPR. WATER ADDITION</th>
<th>MATERIAL REQUIRED</th>
<th>SHELF TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCOCAST BOS 100A</td>
<td>Al(_2)O(_3) 26%</td>
<td>10</td>
<td>4.5</td>
<td>1.9</td>
<td>1000</td>
<td>15</td>
<td>0.45</td>
<td>13-17</td>
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### Insulation bricks

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHEMICAL COMPOSITION</th>
<th>BULK DENSITY</th>
<th>TOTAL POROSITY</th>
<th>COLD CRUSHING STRENGTH</th>
<th>CLASSIFICATION TEMPERATURE</th>
<th>THERMAL CONDUCTIVITY AT 300°C</th>
<th>THERMAL CONDUCTIVITY AT 600°C</th>
<th>THERMAL CONDUCTIVITY AT 800°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERLITEX LPN6</td>
<td>Al(_2)O(_3) 13%</td>
<td>51</td>
<td>21</td>
<td>2.4</td>
<td>71-74</td>
<td>1.5</td>
<td>0.38</td>
<td>0.21</td>
</tr>
</tbody>
</table>

These tables are for information purposes only. For a detailed technical advice, please contact PCO Żarów S.A.
We offer:
- complete linings concept
- engineering and designing support
- technical and technological consulting
- supervision and installation services
- research and development advice
- quality control system certified by ISO 9001

Exemplary qualities and theirs application area:
- SUPERTON AL42 – pit floor tiles
- SUPERTON AL44-2 – head walls
- MULITEX AL46 – flue-walls
- MULITEX AL49HF – flue-walls
- ANDALUX A60H – binders
- MORTALEX ZAL42 – air & heat setting mortar
- MORTALEX ZAL50 – air & heat setting mortar
- PCOCAST 135SK – top blocks fireclay-cordierite castable
- PCOCAST 135SK/W – top blocks fireclay-cordierite castable
- PCOCAST BOS 145N – top blocks fireclay-mulite castable
- insulating castables

Fired bricks

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHEMICAL COMPOSITION</th>
<th>BULK DENSITY</th>
<th>APPARENT POROSITY</th>
<th>COLD CRUSHING STRENGTH</th>
<th>Refractoriness under load [TN]</th>
<th>Thermal conductivity at 800°C [W/mK]</th>
<th>Thermal shock resistance at 950°C [n/hO]</th>
<th>Linear after contraction or expansion at 1500°C / 2h [%]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUPERTON AL42</td>
<td>42</td>
<td>1,5</td>
<td>2,20</td>
<td>16</td>
<td>1480</td>
<td>1,35</td>
<td>±0,2</td>
<td>&gt;18</td>
</tr>
<tr>
<td>SUPERTON AL44-2</td>
<td>44</td>
<td>1,8</td>
<td>2,25</td>
<td>16</td>
<td>1480</td>
<td>1,30</td>
<td>±0,2</td>
<td>&gt;20</td>
</tr>
<tr>
<td>MULITEX AL46</td>
<td>45</td>
<td>1,2</td>
<td>2,28</td>
<td>16</td>
<td>1480</td>
<td>1,50</td>
<td>±0,2</td>
<td>&gt;20</td>
</tr>
<tr>
<td>MULITEX AL49HF</td>
<td>48</td>
<td>1,0</td>
<td>2,30</td>
<td>15</td>
<td>1500</td>
<td>1,55</td>
<td>±0,2</td>
<td>&gt;25</td>
</tr>
<tr>
<td>ANDALUX A60H</td>
<td>60</td>
<td>1,1</td>
<td>2,55</td>
<td>15</td>
<td>1620</td>
<td>1,70</td>
<td>-0,1</td>
<td>&gt;30</td>
</tr>
</tbody>
</table>

This table is for information purposes only. For a detailed technical advice, please contact PCO Żarów S.A.
Refractory Linings
of Carbon Bake Furnaces

Refractory castables

<table>
<thead>
<tr>
<th>GRADE</th>
<th>CHEMICAL COMPOSITION</th>
<th>BULK DENSITY</th>
<th>MAXIMUM SERVICE TEMPERATURE</th>
<th>COLD CRUSHING STRENGTH</th>
<th>THERMAL CONDUCTIVITY AT 800°C</th>
<th>LINEAR EXPANSION (1000°C)</th>
<th>APPROX. WATER ADDITION</th>
<th>MATERIAL REQUIRED</th>
<th>SHELF TIME</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Al2O3</td>
<td>CaO</td>
<td>Fe2O3</td>
<td>MgO</td>
<td>[%]</td>
<td>[g/cm³]</td>
<td>[°C]</td>
<td>[MPa]</td>
<td>[W/mK]</td>
</tr>
<tr>
<td>PCCAST 135SK</td>
<td>42</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>1,85</td>
<td>1350</td>
<td>35</td>
<td>35</td>
<td>1,10</td>
</tr>
<tr>
<td>PCCAST 135 SK/W</td>
<td>42</td>
<td>7</td>
<td>2</td>
<td>3</td>
<td>1,85</td>
<td>1350</td>
<td>35</td>
<td>40</td>
<td>1,20</td>
</tr>
<tr>
<td>PCCAST BOS 145N</td>
<td>50</td>
<td>6,5</td>
<td>1,8</td>
<td>-</td>
<td>2,15</td>
<td>1450</td>
<td>50</td>
<td>55</td>
<td>1,25</td>
</tr>
</tbody>
</table>

Mortars (heat-setting)

| MORTALEX ZAL42 | 42   | 1,5 | -    | -   | 1500 | -    | -   | -   | -    | -    | 1,95  | no limit |
| MORTALEX ZAL50 | 50   | 1,5 | -    | -   | 1500 | -    | -   | -   | -    | -    | 1,95  | no limit |

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TOP BLOCKS:

What are the advantages of our top blocks:
- manufactured in precisely controlled conditions at our new workshop – equipped with hoppers, mixers, vibrating tables and a dryer;
- extensive experience in manufacturing of such blocks – proven recipe and application of first class raw materials;
- long service life due to excellent thermal shock resistance;
- ability to engineer the blocks which meet customers wishes and requirements;
- in-house mould shop;
- special care for top blocks packing system;
- very short delivery time;
- lower total manufacturing cost.
We offer:
- complete linings concept
- engineering and designing support
- technical and technological consulting
- supervision and installation services
- research and development advice
- quality control system certified by ISO 9001

Exemplary qualities and theirs application area:
- SUPERTON AL42 – working lining – walls above metal line and anchor bricks
- MULITEX AL46 - working lining – walls above metal line and anchor bricks
- ANDALUX A60 – anchor bricks
- BAUXITEX B80AHc – aluminium bath
- PCOCAST SKB – safety barrier, back lining
- PCOCAST 135SK – gunning castable for cast house furnaces
- PCOCAST BOS 145M, PCOCAST BA150, PCOCAST BNB, PCOCAST BBO – castable for cast house furnaces
- MORTALEX ZAL42C, MORTALEX ZAL50C – bricks joining mortars
- MORTALEX ZAL42 – anchor mortars
- wide range of insulating bricks, e.g. ISOLUX LA6, ISOLUX LA8

Fired bricks

<table>
<thead>
<tr>
<th>Properties</th>
<th>Chemical Composition</th>
<th>Bulk Density</th>
<th>Cold Crushing Strength</th>
<th>Refractoriness Under Load</th>
<th>Thermal Conductivity at 800°C</th>
<th>Linear After - CONTRACTION OR EXPANSION AT 1500°C / 2H</th>
<th>Thermal Shock Resistance at 950°C</th>
</tr>
</thead>
</table>
| GRADE      | Al₂O₃ | Fe₂O₃ | g/cm³ | [%] | [MPa] | [ºC] | [W/mK] | [%] | [l/100kg] | [mg/m³] | [month] | [

Refractory castables

<table>
<thead>
<tr>
<th>Properties</th>
<th>Chemical Analysis</th>
<th>Bulk Density</th>
<th>Maximum Service Temperature</th>
<th>Cold Crushing Strength at 110ºC</th>
<th>Cold Crushing Strength at 1000ºC</th>
<th>Thermal Conductivity at 800ºC</th>
<th>Linear Expansion (1000ºC)</th>
<th>Approx. Water Addition</th>
<th>Material Required</th>
<th>Shelf Life</th>
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<tbody>
<tr>
<td>GRADE</td>
<td>Al₂O₃</td>
<td>Fe₂O₃</td>
<td>CaO</td>
<td>BaO</td>
<td>MgO</td>
<td>[g/cm³]</td>
<td>[ºC]</td>
<td>[mPa]</td>
<td>[ºC]</td>
<td>[mPa]</td>
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<tr>
<td>PCCCAST SKB</td>
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<td>8,5</td>
<td>5,0</td>
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<td>1,95</td>
<td>1,95</td>
<td>3500</td>
<td>28</td>
<td>20</td>
<td>1,05</td>
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<td>6,5</td>
<td>-</td>
<td>-</td>
<td>2,25</td>
<td>1450</td>
<td>50</td>
<td>55</td>
<td>1,10</td>
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<td>1,5</td>
<td>3,6</td>
<td>-</td>
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<td>2,25</td>
<td>1450</td>
<td>80</td>
<td>85</td>
<td>1,12</td>
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<td>1450</td>
<td>45</td>
<td>55</td>
<td>1,12</td>
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<td>6,0</td>
<td>-</td>
<td>-</td>
<td>2,25</td>
<td>1450</td>
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<td>45</td>
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<td>-</td>
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<td>1500</td>
<td>80</td>
<td>85</td>
<td>1,20</td>
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<tr>
<td>MULCAST BN50M</td>
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<td>1,8</td>
<td>-</td>
<td>-</td>
<td>2,30</td>
<td>1520</td>
<td>65</td>
<td>80</td>
<td>1,22</td>
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<td>1,5</td>
<td>6,0</td>
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<td>-</td>
<td>2,30</td>
<td>1420</td>
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<td>60</td>
<td>1,37</td>
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<td>70</td>
<td>80</td>
<td>1,55</td>
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<td>2,60</td>
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<tr>
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<td>2,80</td>
<td>1550</td>
<td>65</td>
<td>95</td>
<td>2,10</td>
</tr>
</tbody>
</table>

Mortars (air-setting)

<table>
<thead>
<tr>
<th>Properties</th>
<th>Chemical Composition</th>
<th>Bulk Density</th>
<th>Cold Crushing Strength</th>
<th>Classification Temperature</th>
<th>Moulds Rupture</th>
<th>Permanent Linear Change (Class. Temp/[12H])</th>
<th>Thermal Conductivity at 300ºC</th>
<th>600ºC</th>
<th>800ºC</th>
<th>1000ºC</th>
<th>1200ºC</th>
</tr>
</thead>
<tbody>
<tr>
<td>GRADE</td>
<td>Al₂O₃</td>
<td>SiO₂</td>
<td>CaO</td>
<td>Fe₂O₃</td>
<td>[g/cm³]</td>
<td>[mPa]</td>
<td>[ºC]</td>
<td>[MPa]</td>
<td>[%]</td>
<td>[ºC]</td>
<td>[%]</td>
</tr>
<tr>
<td>ISOlux LA6</td>
<td>40</td>
<td>54,5</td>
<td>0,6</td>
<td>1,5</td>
<td>0,65</td>
<td>70-75</td>
<td>2,0</td>
<td>1350</td>
<td>1,2</td>
<td>-1,0</td>
<td>0,22</td>
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<td>ISOlux LA8</td>
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<td>3,5</td>
<td>1400</td>
<td>1,8</td>
<td>-1,0</td>
<td>0,28</td>
</tr>
</tbody>
</table>

These tables are for information purposes only. For a detailed technical advice, please contact PCO Żarów S.A.
Due to development in aluminium production technology, the requirements for refractory materials used in this branch of industry has changed. Research & development programs enable us to offer a very diverse range of refractory materials dedicated to this specific branch of metallurgy.

In our production process only the best raw materials are used. Modern fabrication methods and proper selection of raw materials make possible to provide the products with the highest resistance not only to thermal stresses, but also to the aggressive abrasives and chemicals.

The Research and Development Department possesses well-equipped Laboratory which provides continuous improvement of manufactured refractories. Furthermore, the properties of products are frequently verified in a leading research institute.

Searching for products of longer durability leads to the development of modern research methods that make possible to precisely predict the behavior of the materials in the operation conditions. Developed testing methods involve the analysis of corrosion mechanism and influence of service conditions in thermal units used in aluminium industry.