



## APPLICATION

CERAMICS	SANITARYWARE	TABLEWARE	TILES
<p>Fine Fire Clay</p> <p>Fine fireclay was specifically, developed to allow large basins and counter tops. Kitchen sinks and shower stays to be made in a ceramic body.</p> <p>Unlike vitreous china it has a water absorption of greater than 5% and hence is not normally used for the manufacture of toilets. The body is produced using mixture of clay, kaolin, flux and fillers.</p> <p>A combination of these minerals gives the fine fireclay the following major properties:</p> <ul style="list-style-type: none"> <li>• Dimensional stability – greatly improved by using a fine fire clay body because the body does not flux.</li> <li>• Strength – an essential property of both the unfired and fired body.               <ul style="list-style-type: none"> <li>○ Unfired strength (clays)</li> <li>○ Fired strength is produced by the formation of a glassy matric during the firing process (fluxes).</li> </ul> </li> <li>• Rheology (clays, kaolin).</li> <li>• Particle packing – working with our minerals to provide the optimum packing to give a good cast rate and firing rate (all).</li> </ul>	<p>Vitreous China</p> <p>Vitreous china is the main production body for producing ceramic sanitaryware and has been in general use since the 1950s.</p> <p>As its name suggests it is vitreous and has a water absorption of less than 0.5%.</p> <p>The body is produced using a mixture of clay, kaolin, fluxes and fillers. A combination of these minerals gives the vitreous china the following major properties:</p> <ul style="list-style-type: none"> <li>• Vitrification – fluxing the materials into a vitreous homogeneous mass (fluxes: feldspar, nepheline syenite, petalite).</li> <li>• Strength – an essential property of both the unfired and fired body.</li> <li>• Unfired strength (clays)</li> <li>• Fired strength is produced by the formation of a glassy matric during the firing process (fluxes: feldspar, nepheline syenite, petalite)</li> <li>• Rheology – (clays).</li> <li>• Particle packing – working with our minerals to provide the optimum packing to give a good cast rate and firing rate. This is provided by controlling the particle sizes</li> </ul>	<p>Stoneware</p> <p>The stoneware bodies are formed of several raw materials as clay, kaolin, feldspar, wollastonite and sand.</p> <p>The quality and consistency of the raw materials used for stoneware influence the main properties of the stoneware body as:</p> <ul style="list-style-type: none"> <li>• Plasticity (clay)</li> <li>• Fired shrinkage (clay kaolin, feldspar)</li> <li>• Fired colour (clay, kaolin, feldspar)</li> <li>• Porosity (clay, kaolin, sand, feldspar)</li> </ul> <hr/> <p>Bone China</p> <p>The bone china body is produced by using a mixture of Kaolin, clay, feldspar, quartz and calcium phosphate – bone ashes!</p> <p>Most of the time the raw materials are milled in a wet style and the ceramic slip then spray dried, pressed and fired.</p> <p>Bone china is the strongest porcelain body with a very high mechanical strength and well known for its high levels of whiteness and translucency.</p> <p>Due of his high strength allows to produce thinner cross – section than other porcelain types.</p> <p>Usually, first firing 1280°C and second firing 1080 °C.</p> <p>Key functionalities for Bone China app (all minerals):</p> <ul style="list-style-type: none"> <li>• Long term Sustainable reserves</li> <li>• High Alumina Content Provides superior shaping abilities</li> <li>• Low level colourant oxides leading to excellent dried whiteness</li> </ul>	<p>Non-porcelain Tiles</p> <p>Based on the current normative ISO 10545-3 that rules the ceramic tile classification on their porosity the Non-Porcelain Tiles can be divided in 3 main clusters as:</p> <ul style="list-style-type: none"> <li>• B1la water absorption (w.a%) 3 to 6%</li> <li>• B1la water absorption (w.a%) 6 to 10%</li> <li>• B1la water absorption (w.a%) &gt;10%</li> </ul> <p>Unfortunately, within the market place we could find other “market” classification as: monoporosa and/or wall tiles.</p> <p>The quality and the consistency of the raw materials used for non-porcelain tiles production influence the main properties of the ceramic body as:</p> <ul style="list-style-type: none"> <li>• Strength (clay)</li> <li>• Fired shrinkage (clay, kaolin)</li> <li>• Fired colour (clay, kaolin, sand)</li> <li>• Porosity (clays, feldspars)</li> </ul>

<ul style="list-style-type: none"> <li>• Chemistry – the basic building block from which our development of bodies begins (all).</li> <li>• Cast rate – directly related to productivity in the manufacturing process (kaolin, chamotte).</li> <li>• Consistency – an essential property of our minerals and improved by our tight process control (all).</li> </ul>	<p>of all materials used in the body (all).</p> <ul style="list-style-type: none"> <li>• Dimensional stability – one of the most difficult properties to control but our range of materials allows us to do this, assisted by control of the alumina to silica ratio.</li> <li>• Chemistry – the basic building block from which our development of bodies begins. Provides by the correct mix of mineral (all).</li> <li>• Cast rate – is directly related to productivity in the manufacturing process (clays and kaolin).</li> <li>• Consistency – an essential property of our minerals (all)</li> </ul>	<p>Main raw material in bone china bodies is bone ash, nearly 50 to 60% of the body</p>	
		<p>Porcelain</p> <p>Porcelain bodies are produced using a mixture of clays, kaolins, fluxes and quartz.</p> <p>Porcelain is classified in 3 categories:</p> <ul style="list-style-type: none"> <li>• Hard porcelain: Firing temperature: 1400°C</li> <li>• Soft porcelain: firing temperature 1250°C</li> <li>• Bone china: Firing temperature: 1280°C</li> </ul> <p>The quality and consistency of the raw materials used for porcelain production influence the main properties of the ceramic body such as:</p> <ul style="list-style-type: none"> <li>• Vitrification (Nepheline, Clay, Kaolin, Feldspar, Wollastonite)</li> <li>• Strength – fired and unfired (clay, Kaolin)</li> <li>• Fired Shrinkage (Feldspar, all)</li> <li>• Dimensional stability (feldspar, kaolin)</li> <li>• Fired color: Low level colourant oxides leading to excellent fired whiteness (kaolin)</li> <li>• Chemistry (all)</li> <li>• Plasticity (clay)</li> <li>• Low permeability</li> <li>• Hardness</li> <li>• Toughness</li> <li>• Translucency and resonance combined with high resistance to chemical attack.</li> <li>• Consistency (all)</li> </ul>	<p>Porcelain Tiles</p> <p>Based on the current normative ISO 10545-3 that rules the ceramic tile classification, the porcelain tile follows under B1A group with a water absorption (porosity) below 0.5%.</p> <p>The porcelain tiles are obtained stating with several natural raw materials such as clay, kaolin, feldspar and sand. Most of the time, these raw materials are milled in a wet style and the ceramic slip is then spray dried, pressed and fired.</p> <p>Within the porcelain tiles group we also have glazed porcelain tiles that are decorated with glaze, influencing the aesthetic effect of the tile surface.</p>



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		<ul style="list-style-type: none"><li>• Particle size</li></ul> <p>Porcelain is decorated with glaze influencing the aesthetic effect of the porcelain surface.</p>	<p>The quality and consistency of the raw materials used for porcelain tiles production influence the main properties of the ceramic body, such as:</p> <ul style="list-style-type: none"><li>• Plasticity (clay)</li><li>• Fired shrinkage (clay, kaolin, feldspars)</li><li>• Fired colour (clay, kaolin, feldspar, alumina)</li><li>• Porosity (feldspar, glass waste, petalite, nepheline)</li></ul>
		<p>Earthenware</p> <p>Earthenware is mainly used for versatile colouring and handmade tableware. Mostly fired by lower temperature and consequential higher water absorption, the articles are easy to paint and coloured.</p> <p>The quality and consistency of raw materials used for Earthenware influence the main properties of the Earthenware Body as:</p> <ul style="list-style-type: none"><li>• Plasticity (clay)</li><li>• Fired Shrinkage (clay, kaolin, limestone, dolomite, feldspar)</li><li>• Fired colour (clay, kaolin)</li><li>• Porosity (clay, kaolin, dolomite, limestone, feldspar, wollastonite)</li><li>• Chemical strength (clay)</li></ul>	