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COIMBATORE

DEPARTMENT OF CIVIL ENGINEERING

19CEB204 – CONSTRUCTION MATERIALS

II YEAR / III SEMESTER

Unit 5 : Modern Materials

Topic 7 : Clay Products



Clay Products



- **Structural clay products**, ceramic products intended for use in building construction.
- Typical structural clay products are building brick, paving brick, terra-cotta facing tile, roofing tile, and drainage pipe.
- These objects are made from commonly occurring natural materials, which are mixed with water, formed into the desired shape, and fired in a kiln in order to give the clay mixture a permanent bond.
- Finished structural clay products display such essential properties as load-bearing strength, resistance to wear, resistance to chemical attack, attractive appearance, and an ability to take a decorative finish.



Clay Products



- Clay products are one of the most important classes of structural materials.
- The raw materials used in their manufacture are clay blended with quartz, sand, chamatte (refractory clay burned at 1000-1400 o C and crushed), slag, sawdust and pulverized coal.
- Structural clay products or building ceramics* are basically fabricated by moulding, drying and burning a clay mass.
- Higher the bulk specific gravity, the stronger is the clay product.



Benefits of Clay Building Material



- Clay building materials are simply more convincing.
- Clay retains the inherent strength, durability and economy that made it the building material of choice over centuries.
- Versatile
- Durable
- Aesthetic
- Economic



Types of Clay Products



In routine construction work, we come across many clay products used in Masonry work, roof coverings, sanitary & drainage works, etc.

Let us enlist and briefly discuss these clay products used in building construction.

- **Bricks**
- **Tiles**
 - **Roofing Tiles**
 - **Flooring Tiles**
- **Earthen Ware.**
- **Sanitary Wares.**
- **Stone Wares.**
- **Refractories.**
- **Porcelain etc.**



Bricks

- It is an artificial material of construction in the form of clay blocks of uniform size and shape.
- Clay is mixed with a desirable quantity of water and other ingredients, molded-in required form, dried & then burnt in, a kiln.
- The clay used for manufacturing bricks should constitute of following ingredients
 - Alumina or Clay 20 to 30% by weight.
 - Silica or Sand 35 to 50% by weight.
 - Silt 20 to 35% by weight.
 - Lime, oxide of iron 1 to 2% by weight Magnesia
 - Manganese.
 - Sodium, etc.





Bricks



Compared to Stones.

- Brick is lighter in weight, easily available uniform shapes and size, and cheaper in cost of manufacturing.
- Bricks are classified according to their engineering properties as under
 - **1st Class Brick**
 - **2nd Class Brick**
 - **3rd Class Brick**
 - **Over Burnt Bricks**



Tiles



Roofing Tiles

Being a clay product, they are used to serve as covering for pitched roof. The various roof tiles available in the market are.

- **Allahabad Tiles.**
- **Flemish Tiles.**
- **Mangalore Tiles.**
- **Corrugated or Flat Tiles.**
- **Guna Tiles.**
- **Pot/Pan Tiles.**



Tiles





Tiles



They are manufactured in various shapes and sizes. Normal the tiles are available in dimensions ranging as under.

Length	Width	Thickness
25 to 15 cm	20 to 10 cm	2.5 to 5.0 cm



Tiles



Flooring Tiles

- ✓ Tiles used to construct the pavement are called flooring tiles.
- ✓ They are available in a rectangular or square shape, but depending upon its application, various sizes and geometrical shapes (in any desirable colors) are adopted.
- ✓ These are flat tiles available in varying thicknesses from 1.5 cm. to 2.5 cm. They are available in the following sizes:

- • 15 cm x 15 cm x 1.80 to 2.50 cm.
- • 20 cm x 20 cm x 1.80 to 2.50 cm.
- • 25 cm x 25 cm x 1.80 to 2.50 cm.
- • 30 cm x 30 cm x 1.80 to 2.50 cm.





Earthenware

- Earthenware articles are prepared from clay, which is burnt at low temperatures and cooled slowly.
- It is soft and porous, but after Glazing, it is it becomes impervious to water.
- It is manufacture by adding required quantity of sand, crushed pottery, etc. to clay,





Sanitary Wares



- Water closets, lavatory & wash-basins. Urinals, sewer & Pipes, Glazed Tiles, etc. are used for sanitation purposes.
- These items are known as Sanitary Wares.
- They are manufactured by burning Refractory clay, kaolin, Quartz, Felspar, stone, and crushed pottery at high temperature and cooled slowly.





Stone Wares



- Stoneware articles are more compact and dense than Earthenware.
- On applying Glazing to Stoneware articles, they become impervious to water and are not affected by acids, etc.
- They are strong, durable, and resistant to corrosive fluids.





Refractories



- Refractories indicates those substances which are able to resist high temperature.

It normally possesses the following properties.

- It should have good resistance to rapid changes in temperature, having a high melting point.
- Its dimensional stability should not change due to high and rapid changes in temperature.
- It should be strong enough to resist compressive, crushing, and tensile forces in hot or cold conditions.
- Its thermal conductivity should be suitable for the purpose it is used for.
- They are used in the manufacture of fire and refractory bricks, crucibles, lining materials for furnaces hollow tiles, silica bricks, magnesia bricks, etc.



Refractories





Porcelain



- Sanitary ware, electric insulators, storage, vessels, reactor, chamber, crucibles, etc. Are but some of the porcelain articles available in the market.
- Porcelain indicates a fine earthenware, which is white in colour, thin & semi-transparent.
- It is manufacture by using clay of high purity, possessing a high degree of tensility and plasticity, felspar, quartz & minerals.
- Porcelain is hard, brittle, and nonporous.
- It is used for making articles like an electronic furnace as an electrical insulator for high-intensity electric current- in the manufacture of spark plugs, etc.



Porcelain





Thank You!!