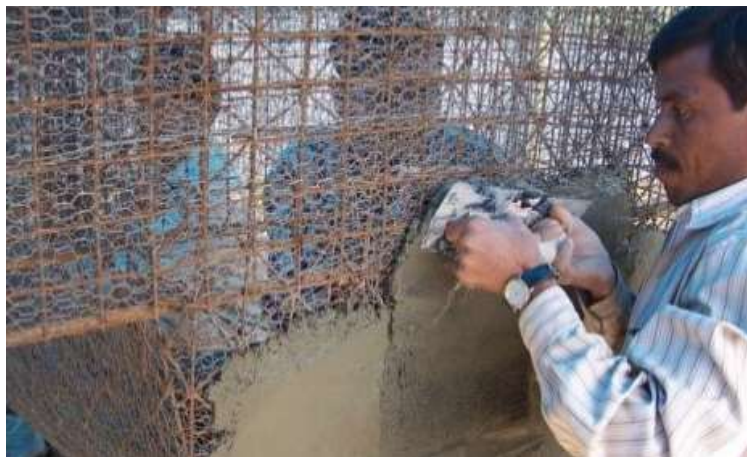


1.0 FERRO-CEMENT

Ferro Cement (also called Ferro-concrete) is a rich or composite mortar plaster applied to both sides of a thin and well distributed reinforcement layer (usually a layer metal mesh and closely spaced thin steel rods). Normally plaster of 1:2 cement mortar should be applied to a matrix structure made of weld mesh would round the chicken mesh. Ferro cement components have high strength as the cement content is very high (i.e, in the orders of 700 kg/m³). Since the steel is spread over the area, the ferro-cement components are usually a homogeneous in composition. Ferro cement is applied with pressure over the weld chicken mesh matrix. The mortar holds in position because of the mechanical interlocking. So No shuttering is required to cast ferro-cement components.



Since Ferro-cement are made of mortar with higher cement content, the chances of shrinkage cracks are high. Ferro-cement components are to be cured for a minimum period of 7 days without interruption to avoid any shrinkage cracks.

Applications of Ferro cement:

1. Used in making boats
2. Used as planks for shelves in housing projects replacing costly wooden planks

3. Used in construction of boxes for water and electrical meters
4. Used in construction of sewage manhole covers
5. Ferro-cement components are Used in Rural areas for low cost housing
6. Recently Ferro-cements are used in some residential and industrial buildings also



Dome Constructed out of Ferro-cement

Advantages:

1. Raw materials required for Ferrocement construction are easily available
2. The fabrication of the mesh can be done in many shapes that suits the requirements
3. Ferrocements are more durable and are cheaper than steel and wood
4. Application of Ferro-cement doesn't require any heavy machinery
5. Ferro cement roofs are engineering and design marvels as they provide an opportunity to construct seamless and free flowing monolithic structures.
6. Due to monolithic design, the roofs are leak proof.
7. A structural steel component within ensures toughness, high tensile strength and superb integrity.
8. Ferro cement roofs are free-form it can be shaped into complex double curved surfaces, large open spans, single hemispheres, elliptical or groups of domes on different levels.
9. Ferro cement construction eliminates/minimizes use of form work resulting in reduced construction costs.
10. It also reduces maintenance cost as damages (if any) are localized and easily repairable.
11. Free- form structures, can be constructed in any design imagined.
12. Domes, Arch, Hemisphere, Spherical shapes possible 100% Leak proof -Monolithic structure
13. High structural strength

14. Eco-friendly design blends with the surrounding
15. Light weight permanent structure
16. Very superior finishing

Disadvantages:

1. Excessive shrinkage due to higher cement content. Needs constant curing for a period of 7 days to avoid any shrinkage cracks
2. Prone to corrosion of MS rods and GI mesh due to incomplete coverage of materials by mortar
3. Ferro-cement is labour intensive. So it might not be economical to use ferro-cement in places where the labour costs are high
4. As ferro-cement components are usually thin structures, Buckling is another factor that needs to be taken into consideration.

2.0 SLATES

Slate is one of the longest-lasting roof materials, sometimes lasting more than 100 years. It is a natural rock that is mined and cut to become a form of 'shingle' (a thin, tapered piece of material used as a roof and wall covering). Slate has been used for hundreds of years as a roof covering but only after the industrial revolution and the construction of the railway network did they become common outside of the slate mining areas.

Roof slates are often mistakenly referred to as 'tiles' and vice versa. Roof tiles are made from materials such as clay or concrete rather than slate. Slate is strong and has very good weather resistance as well as low water absorption, meaning that it withstands freezing temperatures well. However, the initial cost of slate shingles can be higher than other types of roof covering, as can repairs and maintenance. Slate roofs are also relatively heavy.

There are a wide variety of slate sizes, although a common large size is 600 x 300 mm. The quality (but also the weight) is determined by the thickness:

Best: 4 mm thick.

Medium strong: 5 mm.

Heavy: 6 mm.

Extra heavy: 9 mm.

Slates are a suitable covering for roofs in at a pitch of more than 20 degrees. They are laid to the same double lap principles as plain tiles, but unlike plain tiles, every slate course is fixed to the battens by head or centre nailing.

Generally, the larger the slate, the lower the roof may be pitched. Also, the lower the roof pitch, the greater the head lap required. The top of the slate is referred to as the 'head'. Overlap is when one slate overlaps another, whereas 'head lap' is when the head of a slate is overlapped by the slate two courses above it. On a slate roof this is the critical overlap and is necessary to prevent water penetration and leakage. Slate roofing lasts more than 100 years. It won't burn, is waterproof and resists mold and fungus. Slate is effective in wet climates but is expensive, heavy and may be easily broken when stepped on. Keep this in mind if you live in an area that experiences hail. Slate roof tiles are made of metamorphic rocks which are derived from sedimentary rock of volcanic ash and clay.

Slate is a long lasting product depending on the quarry. Known as the hundred year old roof, slate roof tiles are durable, fireproof, water proof and no two pieces are alike because it's a natural product. The longevity of slate is key to its value in the eyes of homeowners. After all, roofing can be expensive.

Slate is one of the few roofing options that doesn't need to be replaced within the span of a lifetime. In most environments, slate shingles will last at least 125 years and sometimes as long as 200 years. Regular maintenance should include cleaning gutters at least twice during the fall and once in early spring, and replacing damaged slates promptly.

Every five to seven years inspections should be conducted by professionals experienced in working with slate and steep slopes. Fibre-reinforced plastic (FRP) (also called fiber-reinforced polymer, or fiber-reinforced plastic) is a composite material made of a polymer matrix reinforced with fibres. The fibres are usually glass (in fibreglass), carbon (in carbon fiber reinforced polymer), aramid, or basalt.



PAN TILES

A **pantile** is a type of fired **roof** tile, normally made from clay. It is S-shaped in appearance and is single lap, meaning that the end of the tile laps only the course immediately below. Flat tiles normally lap two courses. A pantile-covered roof is considerably lighter than a flat-tiled equivalent and can be laid to a lower pitch.

The roof pitch typically relates to the required head lap as follows:

- 20 degrees: 115 mm minimum head lap.
- 25 degrees: 85 mm.
- 35 degrees: 75 mm.
- 45 degrees: 65 mm.



4.0 MANGALORE TILES

Mangalore tiles (also Mangalorean tiles) are a type of tile native to the city of Mangalore, India. Typically considered to be a part of Spanish and Italian architectural styles, the tiles were first introduced to India in 1860 by a German missionary. Since that time, the industry has flourished in India with these red tiles, prepared from hard laterite clay, in great demand throughout the country. They are exported to Myanmar, Sri Lanka, and the Far East and even as far as East Africa, the Middle East, Europe, and Australia. These were the only tiles recommended for government buildings in India under the British Raj.



These tiles still define Mangalore's skyline and characterize its urban setting. They are a popular form of roofing and are preferred over concrete due to their good quality.

They provide excellent ventilation especially during summer and are aesthetically pleasing as well. Some of them are especially made to be used for roofing kitchens (for the smoke to escape) and bathrooms. Over a period of time, these tiles become dark to black from constant exposure to soot and smoke. Clay tiles offer natural insulation, thereby reducing the expense on electricity for heating or cooling as the case may be. Since these clay tiles are moulded under extreme heat, they are resistant to damage or destruction from fire.

These red colored clay tiles, unique in shape and size, are quite famous and are exported to all the corners of world. They are unique and are made and available in different shapes and sizes depending on the users' need. Clay tiles are often white, yellow, orange or brown in color. However, they can be coloured or styled according to one's preference by spraying enamel over the tile once it has been coloured before baking it in the kiln.

These tiles are not only eco-friendly but also cheap, durable and costs only one third of that of cement. Some of the buildings which are over 100 years old still have tile roofing.

Clay tiles are most apt for roofing solutions in coastal areas, and in regions that experience heavy rainfall. Clay tiles for a sloping roof offer excellent water proofing in regions where it rains quite often. It is corrosion resistant, and has superior longevity compared to other materials. The Mangalore tiles are generally placed inclined at forty five degrees. The tiles get their robust red colour due to the high proportion of iron compound found in the laterite clay. A tile weighs about 2 kilograms (4.4 lb) to 3 kilograms (6.6 lb). These kinds of tiles are most popularly used in Canara, Goa, Kerala, and the Konkan.

5.0 FIBRE SHEETS

Fibre sheets are made up of Fibre-reinforced plastic (FRP) (also called fiber-reinforced polymer, or fiber-reinforced plastic) is a composite material made of a polymer matrix reinforced with fibres. The fibres are usually glass (in fibreglass), carbon (in carbon fiber reinforced polymer), aramid, or basalt.



Fiber Roof Sheets can be used along with asbestos cement, Galvanized or industrial corrugated roof sheets to allow uniform diffused light. Fiber Tech roof provide option of sizes, colours, opacity, and corrugations.

Application of FRP Roof Sheet

These sheets are used in following areas and building types:

1. Factories
2. Ware houses
3. Cold storages
4. Swimming Pools
5. Garden
6. Open to sky areas Terraces
7. PEB & semi-PEB structures
8. Patios
9. Garages
10. Green houses
11. Balconies
12. Cooling towers

Advantages

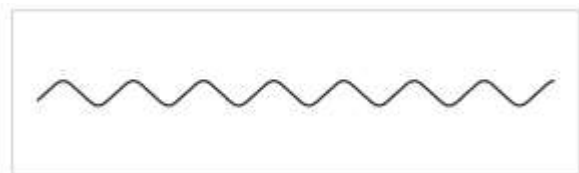
1. Chemical and Corrosion Resistance.
2. Life of Aeron FRP/GRP sheet would be more than 25 years

3. It has good thermal Resistance / Insulation.
4. Machine made sheet ensure uniform quality.
5. Zero maintenance
6. Quick Installation.
7. Using high quality of basic raw material.
8. Protecting against U.V.Rays by using imported U.V Stabilized Resin.
9. Specially formulated top layer to retards the effect of abrasion, erosion and enhances its increases product life.
10. Consistency of uniform thickness throughout the Sheet ensures good quality and high mechanical strength.
11. A unique embossed / crinkles finishing gives scattered natural daylight distribution under the roof.
12. Available in various Colours, Clear, Translucent & Opaque.

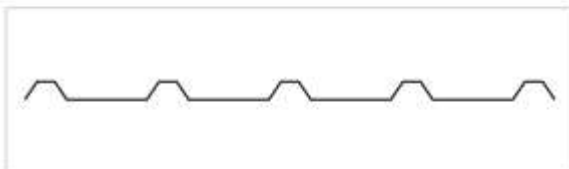
Type of Roofing Sheet



A-1 Flat Sheet



A-2 Corrugated Sheet



A-3 Trapezoidal Sheet



A-4 Trapezoidal Rib Sheet

Colors



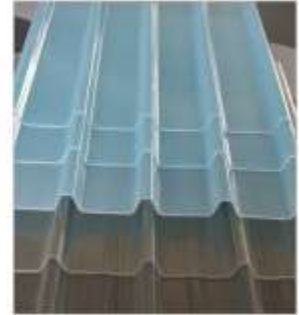
Clear



Translucent



Opaque



For more information and practical information please see the following links:

<https://www.aeroncomposite.com/frp-grp-roofing-sheet.html>

<https://www.indiamart.com/proddetail/fiberglass-roofing-sheets-4039218048.html>

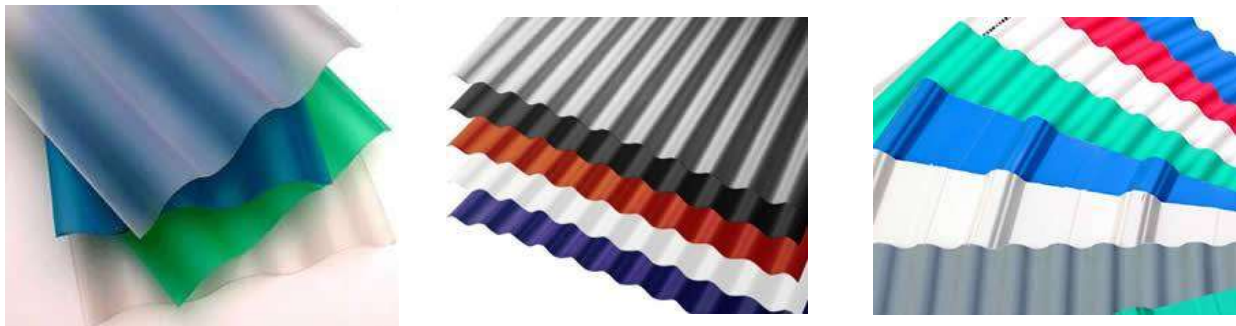
6.0 PVC SHEETS

PVC roofing or polyvinyl chloride is a single-ply roofing solution used on commercial or industrial roofs that are flat or low sloped. PVC or polyvinyl chloride, is the third-most widely produced synthetic plastic polymer. PVC corrugated sheet is mainly made from polyvinyl chloride resin (PVC) mixing with red soil, anti-UV agent and other chemical materials under scientific proportion. It is fire retardant, anticorrosive, weather resistant, colorful and environment protective.

PVC semi-transparent corrugated sheet can be bright color, no-easy color fading, high intensity, fire-proof performance, weather resistance, resistance to acid and alkali as well as organic solvent and low cost.

Application:

1. Roofing for workshop, warehouse, market;
2. Roofing for parking lot, corridor, passage, balcony;
3. Clapboard of the road and etc.



Benefits of PVC roofing

1. Flexible membranes for commercial roofs
2. A flexible roof membrane is beneficial for building owners because it can be prefabricated in the manufacturing phase which leaves less scrap and waste at the job site.
3. High flame resistance
4. Vinyl membranes are flame resistant, which allows pvc roofing systems more likely to qualify for class-a ratings than other roofing systems. A class rating fire test consists of evaluating the following criteria:
5. Flame penetration through the roof membrane
6. Flame extension across the roof membrane
7. The tendency of the roof membrane to collapse or be dislodged
8. Lightweight roofing membranes

9. When re-roofing a commercial building, pvc roofing membranes are a lightweight solution and a worthwhile investment. Pvc roofs can go directly over the existing roof membranes, which saves money by avoiding costly roof tear-offs and requires less time on the roof.
10. Environmentally friendly roofing membranes
11. Installing a pvc roof will keep your business building temperature cooler, reducing energy demand, which in turn helps alleviate the urban heat island effect. Pvc roofs are also generally unaffected by most chemicals, which allows your pvc roof to withstand harsh environments for a long period of time.