

A Study of Light Weight Roofing

Parikshit S. Mahale, Prof. Ankush Khandare Sir

P. R. Patil college of architecture, Amravati

Submitted: 05-05-2022

Revised: 10-05-2022

Accepted: 13-05-2022

ABSTRACT

The following report discusses the many benefits provided by the lightweight roofing structures. The report also tells about the various lightweight products that are available in the market. Along with this, the various advantages and the disadvantages are also discussed in this report. The main products included in this report are the polymer materials, PVC materials and the fiber glass materials. Along with the advantages and the disadvantages of the said materials, the report also includes the various specifications of the products that accounts for such specifications in the market.

I. INTRODUCTION

The materials used in the formation of lightweight roofing are used to provide features for roofing applications. The materials used for the lightweight roofing applications are termed as lightweight based on the specifications and the weight of them. The specifications of the materials are in the ranges of 20 kg per meter. The weight of the materials used for the roofing is only considered when fitted on the roof. The materials with the specifications of the heavy weight exceed the defined limit. Due to the various situational benefits provided by the lightweight roofing materials, they are used in various other ways too. The report discusses the many benefits provided by the lightweight roofing structures. The report also tells about the various lightweight products that are available in the market. Along with this, the various advantages and the disadvantages are also discussed in this report.

The lightweight materials used are listed below-

- Polymer
- PVC
- Fiber glass

A) AIM & OBJECTIVES

AIM-

- To Study the Importance of different types of lightweight roofing.

OBJECTIVE-

- Describe the importance of Lightweight roof
- Explain the various types of Lightweight roofs

- Explain the precautions to be taken in construction of Lightweight roof

- Describe the construction activities in different types of Lightweight roof.

C) HYPOTHESIS-

- Construction of railway roofing as per respective location climate by considering different factors like wind load.
- The solar plates is more effective, eco-friendly and Reduce consumption of electricity by replacement of solar plates

D) RESEARCH QUESTION-

- How many types of method are used for constructing Lightweight roofs?

E) SCOPE AND LIMITATIONS

- It can help to design proper railway station roofing by considering span and different types of loads.
- It also helps for planning and designing a good railway station as per density of population.
- For achieving easy vertical & horizontal communication.
- For making a Structure barrier free.
- For giving a proper service to people.

POLYMER AS ROOFING MATERIAL

POLYMER

- **What is polymer roofing?**

Polymers are made up of many molecules strung together to form really long chains. They occur naturally, and can also be man-made. A perfect example of a man-made Polymer is plastic. A natural polymer is rubber from the caoutchouc or Indian rubber tree. When used in single-ply roofing, a polymer can provide both a rubber like absorption to impact, combined with a tough underlying structure to resist damage.

- **Energy Efficiency**

Polymer is not a good insulator. This means that you may have to rely more heavily on your central heating and cooling system to regulate your indoor temperature.

- **Cost**

Although the polymer shingles themselves may cost around the same as other comparable roofing materials, it is important to remember that this is a relatively new technology that goes with high research and development costs. The underlying infrastructure of plastic polymer shingles may also cost more compared to other options. It is also great when it needs a shed roof repair.

- **Advantages of Polymer Roofing:**

- It is lighter and easier to handle, so installation is easy – much easier than clay or slate.
- It can closely mimic the look of almost any product out there (clay, slate, asphalt shingles, shake).
- It requires less maintenance.
- It can last twice as long as some other products (especially materials like cedar shake).
- It produces no granules (like asphalt shingles) to wear off into gutters or into yards.
- It is well suited for water collection.
- It is extremely fire resistant.
- It makes for easy ice and snow removal, with less wear and tear.
- Its lighter weight reduces transportation costs (less fossil fuels used)

- **A Few Disadvantages:**

- Currently, polymer roofing is a bit cost prohibitive. Can be 2 or 3 times the cost of other materials.
- It has less insulation capabilities than other products.
- It doesn't perfectly mimic other natural products (although improvements are happening all the time).



PVC AS ROOFING MATERIAL

PVC

- **What is PVC roofing?**

Made from polyvinyl chloride (or in layman's terms, plastic), PVC is a great single-ply

roofing solution. It's made from a lower percentage of oil and petroleum than thermoplastic polyolefin (TPO) or ethylene propylene diene terpolymer (EPDM). As a cool roof membrane, it carries both Energy Star and Cool Roof ratings.

PVC is so strong and stable, it can be installed by heat welding the seams, as opposed to other membranes that require adhesive or utilize a taped seam. This installation method allows a PVC roof to expand and contract with a building. PVC can also be sealed with solvent welding and attached to metal flashing and other components with adhesives.

This robust material also offers protection against chemicals, water leaks, UV rays and fire. Thanks to its cool reflective properties, PVC is resistant to damage and discoloration from the sun's radiation.

- **ADVANTAGES OF PVC ROOFING**

The greatest advantage of PVC roofing is its strength; these roofs will typically last over 20 years due to their ability to handle a fair amount of weight. The American Society of Testing and Materials (ASTM) requires a roofing membrane to have a minimum weight limit of 200 lbs per square inch. But you shouldn't have to worry about this material as it can surpass holding the weight of 350 lbs.

- **Durability**

One of the features that makes PVC roofing so strong and resistant to moisture is the hot air welded seams; they form a watertight bond that is actually stronger than the material itself.

This feature actually makes PVC roofing one of the most durable materials; others will require adhesives, tapes, and caulks to seal the material together, alternatives that are considerably weaker than the welded seams.

- **Long Service Life**

Due to its strength and durability, PVC roofing will typically have a long service life. One that is installed properly installed and with a few maintenance checks, you can expect it to last around 20 years.

While this material will be costly upfront, you can save thousands of dollars in repairs, maintenance, and even replacement costs in the long run.

- **Resistance to Chemicals**

Some commercial buildings, like warehouses and manufacturing facilities, will have a significant amount of exposure to chemicals. But another advantage of PVC roofing is that it is highly resistant to this kind of damage.

With other materials, such as asphalt and singly-ply roofing membranes, harsh chemicals and toxins can cause considerable damage. So if your building

falls into this category, it would be a good idea to invest in PVC roofing.

○ **Resistance to Fire**

In addition to chemicals, PVC roofing is also fire-resistant. In fact, they do not support combustion, burn slowly, are difficult to ignite, and even extinguish the fire as long as the source is removed. This has been proven after being tested with FM and UL fires.

○ **Resistance to Wind**

Thanks to the hot air welded seams and durability, PVC roofing is also resistant to strong winds. It has also been proven that they have survived Category 3 hurricanes. So regardless if you have a low or high-rise building, they will be able to withstand high wind speeds.

○ **Water-Resistant**

With the hot air welded seams, PVC membranes are designed to be watertight, especially during storms and hurricanes. They can also withstand ponding, the condition of water puddling on the roof, as well as high and low alkaline conditions.

They are also resistant to mold, bacteria, and plant roots.

○ **Eco-Friendly**

If you're looking to stay eco-friendly, PVC roofing has a number of benefits. It's highly efficient with heating and cooling, reflects the sun, and mitigates the heat island effect in cities. Finally, PVC roofing is also recyclable, even after years of service life.

• **DIS-ADVANTAGES OF PVC ROOFING**

○ **Cost**

Despite the benefits of PVC roofing, these features come at a higher cost.



FIBERGLASS ROOFING MATERIAL
FIBER GLASS

• **What is Fiberglass roofing?**

are an extremely popular choice for roofing. They come in many styles and colors to

choose from and are very easy to install. Although not as common as regular asphalt shingles, fiberglass roofs have become more and more popular with certain types of home designs.

Now most fiberglass shingles are made of a fiberglass base mat, which is then coated with asphalt. Ceramic bits are then placed on the top of all that.

They're comparable to organic mat shingles, which are made in the same way but use paper and/or wood matter as their base. However, fiberglass shingles offer a lighter, more environmentally friendly option than their organic mat counterparts.

• **Are they Energy Efficient?**

Yes! Fiberglass shingles use less asphalt than their competitors. Thus, in using less material, they are lighter than organic mat-based roofing. The effects of this are quite far reaching. Due to their lighter weight, it requires less fuel and energy to transport. In addition to all of this, manufacturers have begun implementing new technologies to reduce the heat absorbed by the roof, thereby reducing the cost of using your A/C. If you are interested in choosing a roofing option that is proven energy efficient, look for options with an Energy Star label.

• **Advantages:**

1. The main phenomenon behind using fiberglass roofing is its versatile structures and different colors and styles. Simple fiberglass roofing sheets are also available but homeowners like to install it because of its upgraded look which consists of fascinating colors and designs on it which gives a different look to your roof.
2. Fiberglass roofing is fire resistant in nature. It helps in protecting the house from wind, rainfall, storm, etc. There are less possibility water drainage and leakage if maintained in a proper manner.
3. Fiberglass roofing is light in weight as compared to other roofing methods. As metal roof and wood roof are weighted but fiberglass roof is light in nature and with different and fascinating styles on it.
4. It has longer life period in cool weathers so it is preferable to install it in the cooler region places.
5. The materials which are used in preparing the fiberglass roof are less expensive and are easily available in the market so its installation cost is less as compared to other roofing method, it is easy to fix it and saves time of the roofing contractor installing it.

- **Disadvantages:**

1. While installing fiberglass roofing the roofing contractor must nail is properly with proper negligence so that it does not gets damaged because it is not metal or wood, it is made of glass, so proper installation of fiberglass roofing is important because if not installed properly than it can damage the home.
2. Maintenance of fiberglass roofing is not easy because it will need proper guidance and appropriate materials to fill in the cracks which had occurred due to any unwanted weather. The life of fiberglass roofing is not more than thirty years because they are made up of glass elements.
3. Air exchange issues are noticed after installing fiberglass roofing in your home because ventilation is important for every home and due to its glass structure it is not easily possible of ventile region to exchange the spoiled air to the pure air.
4. As this roof comes in cutted and shaped sheets so manual cutting is also required for more better and enhanced look of the roof where it is been installed.



II. CONCLUSION

- Roofing elements of natural fibre concrete have been in use since 1977. The experiences so far include both success and failures. To secure a good quality roofing material made of concrete or mortar with natural fibres one has to keep the following in mind:
- Glassfibers are a very versatile class of materials. They are used extensively as a reinforcement fiber for polymeric resins such as epoxy and unsaturated polyester.
- From the study of PVC roofs we concluded that PVC roofs are single membrane roofing systems made from a plastic polymer called polyvinyl chloride. PVC roofs are heat-welded

during installation, creating a single structural sheet with waterproof seams that eliminate any risk of leakage or damage from multiple seam failures. This type of roofing material is typically used on low-slope roofs as well as it is fire resistant, leak and moisture resistant, UV rays resistant, high wind resistant also it is easy for installation.

- From the study of polymer roofing it is concluded that a polymer roofing is a man-made polymer roofing material that is mostly made from recycled plastic. If you are considering using plastic polymer for the roof, keep reading to learn more about the different advantage and problems that can expect like environmental issue, cost, asthetical issue, energy efficiency, longevity etc.

REFERENCE

- [1]. [Global Roofing Group - Polymer Roofing](#)
- [2]. [Advantages of PVC Roofing Membranes - RoofSlope](#)
- [3]. [Advantages of Composite or Fiberglass Shingles \(stormmasterinc.com\)](#)
- [4]. [Lightweight Roofing Structures- PDF \(desklib.com\)](#)