

# Buying GRP Roofing Sheets

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## GRP For Roofing

Glass fibre reinforced plastic sheets (GRP) can be used for roofing in three ways;

**Translucent roofing sheets:** When lighting is required inside the buildings, atriums, factories, etc., GRP translucent sheets can be used along with other roofing sheets. Achieving full transparency in GRP, as in glass or polycarbonate, is difficult. For such full transparency, glass plates or polycarbonates must be used. The sheets with 60-70 % light transmission can be made. A normal building in India needs only about 35% light transmission. So, if the sheet with 60-70% transparency fades to 35 %, it can still be useful. GRP sheets cannot shatter like glass, acrylic or polycarbonate sheets. Well made GRP sheets can be cheaper than polycarbonate sheets. A well made GRP sheet can have at least 15 years of service life.

**Opaque roofing sheets and simulated tiles:** GRP sheets can be lighter and more durable than anodized aluminium and galvanized steel sheets. However, at the present market rates, GRP sheets can be costlier than other roofing sheets and tiles. Hence, opaque sheets have no specific advantage over other sheets.

**Designer roofs:** Architects and civil engineers can design and create aesthetically appealing roofing systems like domes, pyramids, pavilions, geodesic domes, folded plates, doubly curved shells etc. If the roof is large in

*GRP transparent roofing sheet is a product that comes to the market with wide ranging property variations. This article outlines how the buyers can help themselves to a large extent to look for quality while buying. It is purely a voluntary service to help the buyers and the buyers have the freedom to accept it. No liability is implied to the author in giving these suggestions.*

*Users can send their experiences with roofing sheets and their suggestions on how the quality can be improved. Those industries who are willing to follow the procedure can inform the author in writing by Email and their names can be published along with this helpline in a suitable publication. This will help the buyers to identify the sources of supply.*

size and span, it has to be structurally designed to make them safe under wind, live and incidental loads.

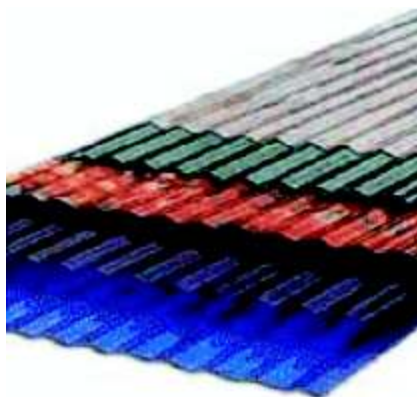
This article concentrates on the translucent roofing sheets only.

## Features of the sheets

GRP translucent sheets are made using glass fibre reinforcements in randomly distributed mat form embedded in a matching polyester resin. The resin impregnated fibre is cast within two polyester films. To create corrugated

profile, the assembly is placed between two corrugated sheets and the resin is cured. Sheets can be made in hand moulding with minimum tools or by mechanized continuous production process. The hand moulded sheets can be made with very little capital investment. In India, only hand moulded sheets are available. Some of the features of these sheets are given below;

- For good uniform translucency, the refractive indices of glass fibre and the resin must match closely.
- The resin must cure well into a hard sheet. Well cured sheet will have metallic sound when tapped with a coin. To check the cure, a small piece of sheet can be cut and put into acetone. After five minutes, it can be taken out and examined. If the cure is not good, the sheet will be tacky and very flexible. It is also possible to check cure by smearing acetone on the surface of sheet and then look for tackiness.
- The two surfaces of the sheet must be non tacky and smooth. Rough



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uneven surfaces and degraded surfaces can scatter light affecting light transmission.

- Since fillers affect light transmission fillers are not used in the sheet. All internal defects like presence of dirt, air bubbles, dry fibre patches created due to lack of fibre wetting, discolorations, fibre overlap etc. will all be shown up when held against light. The sheets in a way can not hide its own defects and in this sense also, they are truly transparent.
- ⊗ Durability of the sheet can vary depending upon the quality of fibre and resin used. The cost of sheet also can vary correspondingly. Hence, purchases shall not entirely be made based in cost.

### How to supply the sheet

The supplier/manufacturer must supply the sheet with an identification marking embedded in it at a corner not affecting the light transmission. This marking shall include;

- (i) A product identification number which can be in several digits consisting of batch No followed by the serial number of the sheet and the day, month and year of manufacture.
- (ii) The company name of manufacturer

Product certificate: They must also present a hard copy certificate for each sheet supplied as given in Table.1 signed by the manufacturer and supplier. The certificate shall include the following;

- Product identification no as embedded in the sheet.
- The name of manufacturer which will help to identify them and approach them in case of problem later.
- IS Standard No IS12866.1989 according to which the sheet is made. It may be noted that this standard takes care of only the load bearing quality and resistance to bolt pull out. It does not say

anything about the quality of materials to be used and the steps to be taken to ensure durability.

- The plan size of the sheet and the thickness in mm
- Reinforcement mat used. Only E or ECR glass of first quality must be selected. The mat used can be CSM 450 or CSM 600 giving thicknesses 1.11 and 1.5 respectively. Sheet with CSM 600 gsm mat is preferable.
- The resin grade used must be indicated. Isophthalic roof light grade resin is preferable. Slight tinting may be seen when Iso resin is used. The choice of orthophthalic is not advisable and it is entirely up to the buyer.
- The weight for a given sheet size is a better record to make sure that the right amount of materials are used than to measure thickness. The buyer can easily check the weight accuracy during inspection by a procedure described later in this article.
- The warranty. GRP roofing sheets can definitely supplied with five years warranty. If such a warranty is not given, the buyer shall not accept the sheet.

### How to buy the sheet

The buyer must take certain basic action to get things clear before the sheets are ordered.

- Action 1: Search for a good supplier/ manufacturer. Always buy from reputed manufacturers who have good standing in the field with several years of selling history. Avoid buying through middlemen or dealers.
- Action2: The buyers must first decide the type of corrugation they want. They must also decide the size and colour. Colours like, blue

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and yellow can be much more durable than colours like red.

- Action 3: Those who buy in bulk through open tender can prepare a good specification based on the information given below so that the sheet manufacturers will take proper care to comply with what is presented.
- Action 4: The buyer must ask for the product certificate as in Table 1. If such a certificate is not issued, the buyer has the option not to buy. Since each sheet in a lot can be made with different fibre density and resins, such certificate is necessary for each sheet. If the manufacturer uses same resins and fibres, the sheet can very well be printed and only weight and sheet identification number need to be entered.

### Visual Inspection

Once the conditions mentioned above are satisfied, the buyer must inspect the sheet carrying out the following steps. The manufacturer must provide every facility to carry out the inspection of sheets.

- Step 1: Look for any visible defects by keeping the sheet against light. Sheets with white patches, non-uniform colour, too many air bubbles etc. shall not be accepted. Surface smoothness is very important for getting and retaining good translucency.
- Measure the dimensions and ensure that they agree with the data in product certificate.
- The weight given in the certificate can be examined whether the

weight corresponds to that of a sheet of required material structure

First, the developed width of the corrugated sheet must be found out in m. Take a paper in tape form and place it along the contours of the corrugation. The paper can then be straitened and the developed length measured. A measuring tape can also be used for this measurement. The length measured indicates the developed width of sheet. Multiply this with the length of sheet and find the area of sheet A in square metre. If the sheet is made of CSM 450 gsm fibre mat and with a resin to fibre ratio of 2.5, it will have a weight of  $1.575 \cdot A$  kg. The corresponding weight for a sheet with CSM 600 gsm mat is  $2.1 \cdot A$  kg. If the weight matches with what is recorded in Table 1 within + or 10 %, the sheet can be accepted.

The general formula for weight calculation is s

$$\text{Weight of sheet in Kg} = 0.001 \cdot A \cdot W \cdot (1 + R)$$

Where,

A = Area of expanded sheet surface in Sq.m.

W is the fibre mat density in gsm

R = Resin to fibre ratio by weight.

- The buyer whether the sheet is fully cured. The acetone smear test or immersion of cut sample in acetone can be used for finding the cure.

In case the sheet discolours, surface is degraded, or the sheet totally fractured, the manufacturer can replace the sheet. If the warranty is not honoured, the buyer can exercise his consumer right with the support of the documents in hand and the number marked in the sheet.

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Table 1	
Format for preparing the product certificate	
Trade name of product and the name of manufacturer	
Product identification no. including date of manufacture	Xxxx xxxxxxxx <i>It shall contain the batch no followed by the individual sheet number and six digits indicating date, month and year of manufacture.</i>
Standard adopted	IS
Product specification	
Length, width and thickness in mm	xxxx      xxx      xx Length in m    Width in m    Thickness in mm
Weight of the full sheet in kg	
Glass fibre and glass fibre manufacturer	First quality E/ECR glass CSM 450 / CSM 600
Resin and resin manufacturer	Isophthalic / Orthophthalic roof light grade resins
Resin to fibre ratio by weight	<i>For good sheet it must be 2.5</i>
Whether UV Stabiliser of required quality and quantity is added	<i>Answer here must be yes.</i>
Colour of sheet	
Name of customer	
Date of sale	
Warranty offered in years	<i>Must be five years</i>
Signature of manufacturer	Signature of supplier