iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 10 **Issue:** VI **Month of publication:** June 2022

DOI: https://doi.org/10.22214/ijraset.2022.43536

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 10 Issue VI June 2022- Available at www.ijraset.com

Nylon Reinforced Cement Sheets

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***Abstract*—The purpose of this paper was to investigate a comparative study between nylon-reinforced cement sheeting and conventional asbestos sheeting. Because it possesses such a diverse range of unusual properties, nylon is an excellent additive for cement mortar. A material made of nylon has a high melting point, is not reactive to chemicals, and is stable in the alkaline environment of mortar. It also has a low price. In this process, nylon-reinforced cement sheets are cast, then subjected to a variety of tests, the results of which are compared to those obtained using conventional asbestos sheets.**

***Keywords*—Nylon Net, the construction procedure of NRC, and Nylon Reinforced Cement Sheet**

I. INTRODUCTION

Corrugated galvanised iron sheets and asbestos cement sheets are used extensively in residential and commercial buildings. When struck, asbestos cement sheets are prone to failure. Asbestos is a carcinogen that is found in many common household products, including sheets. It is possible to get asbestosis and lung cancer while working with sheets. As a result, it has been banned in many countries, including the United States, Russia, France and Canada. For this reason, we came up with the idea of making a healthier alternative to asbestos sheets that would fit within the budgets of our people in India, despite the fact that asbestos is illegal here as well.

Using galvanized iron-coated steel sheets is time consuming and costly. Corrosion is the biggest problem for G.I. sheets. In the summer, these roofs are unbearably hot. Repairing these sheets is difficult due to their proneness to breakage.

This process is no longer feasible due to the importation of asbestos material required to make A.C sheets. The entire community is harmed because the water that falls on the asbestos sheets can be used to make drinking water.

Consider the following drawbacks of galvanized and asbestos sheets, as well as the current situation, before making a final decision. Nylon cement corrugated sheet, made from nylon nets and cement mortar, has taken the place of asbestos and galvanized roofing.

Next time, we'll talk about nylon sheets, their production, and whether or not they're cost-effective.

II. PROBLEM STATEMENT

A. The material asbestos is used for the manufacturing of sheets and it is hazardous to human health.
B. It causes diseases like asbestosis and lung cancer to the people who are working for the manufacturing of the sheets.
C. In India also, asbestos sheets are banned but due to economy most of our citizens prefer it taking risk of health so, we thought of given our people a better alternative within their limits.

III. OBJECTIVES

A. To provide the best and most cost-effective alternative to the AC sheet.
B. To make effective use of the fishing net in the production of a Nylon reinforced sheets.
C. To assess the suitability of casted Nylon Reinforced Cement Sheets in various tests.

IV. RESEARCH METHODOLOGY

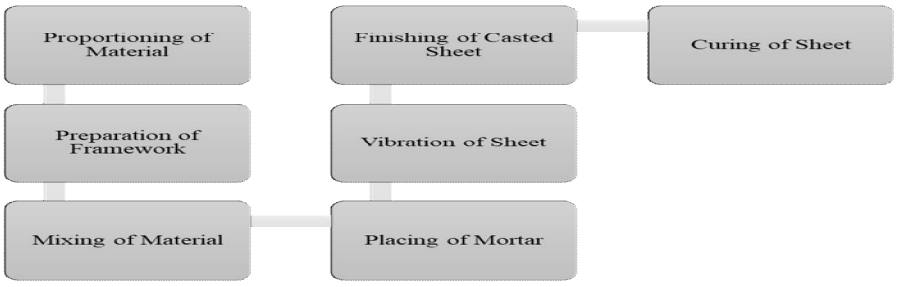


Fig. Flow Process Chart for N.R.C Sheet Casting.

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A. Proportioning of Material

We began by determining the material to be used in the casting of the sheet and, as a result, the ratio. The sand-cement mortar ratio was determined to be 1:3, and the water-cement ratio was determined to be 0.35. The size of Nylon was then determined based on the size of the member. Nylon cut to size weighed 110 gm for 1.5 m². on weighing scales.

B. Preparation of Framework

We used a fibre mould of 1 x 1.25 m in size to cast the corrugated sheet. In order to keep the mortar from adhering to the fiber mould, a layer of oil was applied to the mould. As a result of the polythene paper, the cast sheet was easily removed and had a high-quality finish.

C. Mixing of Material

We transported all of the material to the mixing area after it had been meticulously weighed and batched. The mixture of sand and cement was thoroughly dried before being poured into the moulds. Slowly, the water was poured into the mortar as the mixture was being kneaded. A shovel is used to mix the mortar.

D. Placing of Mortar

To begin, we placed a 0.75 mm Nylon net on an Asbestos sheet. The net was placed very loosely on the sheet to avoid tensioning the net after the concrete was placed. The mortar was then placed on a corrugated sheet with an 8mm uniform thickness. It was made sure that the net beneath the mortar did not fall out.

E. Vibration of Sheet

The sheet was kept on the table vibrator, and the polythene paper was laid on the mortar, followed by another sheet. The vibrations then began and lasted for one minute. The top sheet was then removed, and the thickness was measured with a gauge marker, as well as the finishing. The thickness was almost 8 millimetres. The sheet was laid again, and the vibration was continued for another 2 minutes.
The sheet was removed again, and the thickness was checked; it was 8 mm, which was satisfactory.

F. Finishing of Casted Sheet

The surface was smoothed out with a table vibrator and polythene paper, but voids were visible in some areas of the sheet, so we filled them in with a trowel. When the mortar was green, the sheet was cut to size with a trowel.

G. Curing of Sheet

After casting the sheet for 24 hours, we performed sheet curing. Gunny bags are spread across the sheets. Curing was accomplished with less water, and the soil remained moist for an extended period of time.

V. TEST RESULTS AND DISCUSSIONS

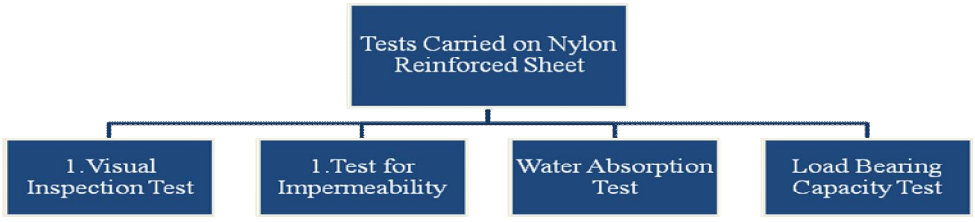


Fig 3.5 Tests on N.R.C Sheet (Reference Code- IS 5913:1970)

A. Visual Inspection Test

The cast sheets are visually inspected for the following:

1) *Texture uniformity:* The texture on both sides of the formwork was uniform.
2) *Trimmed Edges' Neatness and Straightness:* After some cutting in fresh condition, the trimmed edges were uniform and straight.
3) *Corners must be Square:* The cutting sheet in green condition squared the corners.
4) *Rectangularity:* The rectangular form was preserved.

B. Test for Impermeability



Specimen: A 1 x 1.25 m piece of nylon sheet was cut.

C. Water Absorption Test



Specimen : From each of the sheets cast following the sampling, a specimen of 175mm x 175mm was taken.

D. Load Bearing Capacity Test



Specimen: The specimen for the test shall consist of full sheets or 1.25m long cut from a full sheet and was selected following the method of sampling given in the relevant specification.

TABLE I: Experimental Analysis

Sr. No.	Test	IS Requirement	Result
1	Load Bearing Capacity.	Not less than 5N/mm	11.34 N/mm
2	Impermeability	No drops inside after 24hrs. by ponding.	No drops.
3	Frost Cracks	Nil	Nil
4	Water Absorption	Nil	3.73 %

TABLE II: Rate Analysis Of N.R.C Sheet

Standard A.C Sheet	**Nylon Reinforced Cement Sheet**	
For Size 1 X 1.25 m as per C.M 1:6		
Full-Size 1 X 2.25m A.C. Sheet is available At Rs 630/- in the market. Consequently, the half-size AC sheet costs about Rs 315/-	Cement- 15Kg	Rs. 102/-
	Sand- 30Kg	Rs. 128/-
	Polypropylene fibres- 20gm	Rs. 8/-
	Nylon Net Size- 1 X 1.25 m	Rs. 68/-
	Total Cost- Rs. 306/-	

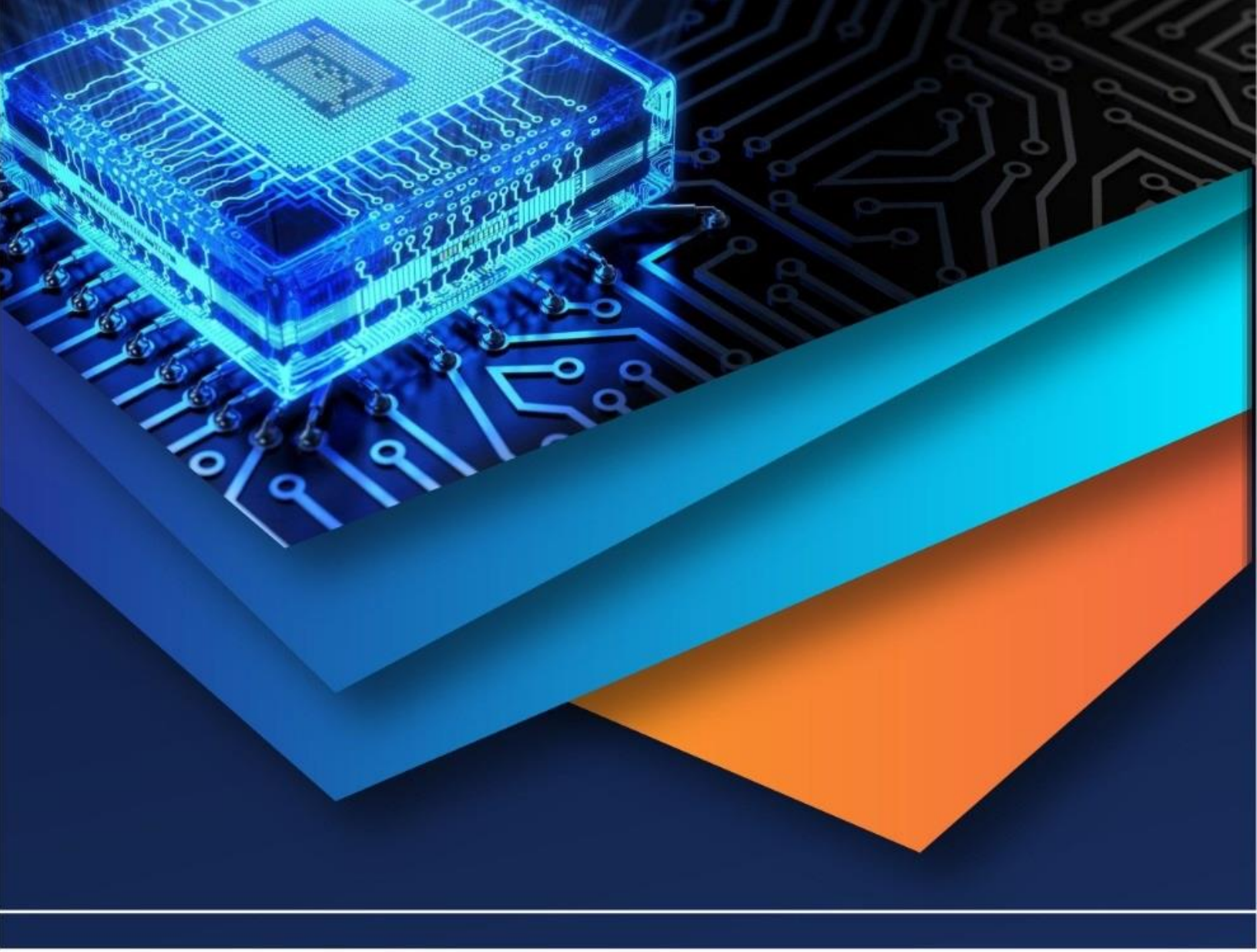
VI. CONCLUSIONS

As a result of the fact that nylon nets are utilized for a variety of applications, our project has enabled us to implement and experiment with the utilization of nylon nets in casting sheets to investigate the utilization of nylon nets. In addition to using cement mortar, we have also been using nylon netting. It was our effort to find a replacement for the traditional asbestos cement sheets, and we came to the following conclusion –

A. Load bearing capacity of Nylon Reinforced Cement Sheet 11.34 N/mm2 is more than IS requirement
B. It is feasible to use nylon cement sheets in place of AC sheets.
C. Nylon Cement Sheets are capable of being produced locally on-site and can be utilized for low-cost applications.
D. Housing, small cattle shades, industrial shades, go downs, storage houses, and so on are all included in the cost.
E. The maximum recommended distance between the purlins when placing the sheets is 1.4 m.
F. The cost of one m^2 of nylon sheet is Rs.306/- while the cost of one m^2 of A.C sheet is Rs.315/-
G. Nylon cement sheet is economical than other roofing Substitutes.
H. It is non-hazardous for human health as well as for environment.
I. Material available in local market can be used for manufacturing of sheet.
J. It fulfils the IS requirement.
K. When it obsolete it can be recycled.
L. It creates employment opportunity.

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