Proceedings of Conference On Insights in mechanical Engineering (IME-19)
In Association with Novateur Publications IJIERT-ISSN No: 2394-3696
ISBN. No. 978-93-87901-04-9
March, 1st March 2019

Paper ID OT 05

STUDY OF A PHYSICAL PROPERTY OF EPOXY GRANITE

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Abstract – Epoxy granite is a topic of discussion due to its versatility and functionality; it possesses all the required properties in adequate range, such as mechanical, thermal and vibrational. It needs certain judgement and surety of the mixture of granite and resin. Also, granite particle size, their different size combinations even their mixture with epoxy which also has an appropriate amount of quantity to be taken. Combination of variable i.e. Granite particle size, their percentage in mixture, epoxy percentage, vibrational frequency during casting and their effect on all the properties have been experimented. Altogether, its importance as a structural material and its application have made epoxy granite as one of the most valuable material.
Keywords: Granite, Mechanical properties, Density, Epoxy granite.

I. Introduction

The world is continuously shifting towards the new and advance materials which possess required properties in a better way. Structural materials like iron, aluminium, steel is getting replaced either by their alloys or other advance materials and one of those is epoxy granite. [1][2] Epoxy granite can be used as a structural material because of its good properties like damping, strength, thermal, density, absorptivity, surface finish etc. which are appropriate for practical and application point of view. [2][3][4]

Structural materials must withstand during vibrations below predefined frequency[7], they should have ability to withstand the force directly or indirectly coming upon them[3], thermal expansion must be as minimum as possible because it leads to accuracy or dimension error altogether[5], also they must be dense enough which gives a surety about manufacturability, absorptivity plays important role at the working place and increases its versatility, good surface finish achievement at ease is also important in many ways as it reduces all the input resources. In short epoxy granite with its result can be used in many applications as a structural material. [1]

This paper is put forward to give a brief and a guideline to get the results in best possible way. Density of various combination have been taken and conclusions have been drawn out.

During the experimentation various combination had been considered to make the different specimen of the epoxy granite. [6][8] Aim of this experimentation is to easily pick out the combination with respect to required properties or the combination of required properties.

II. Specimen Preparation

Considering all the properties to be tested and their standards, specimen size has been finalised, which is 300x50x50 mm. Vibration table is specially manufactured to make the specimens i.e. mineral casting. Variables under considerations are different aggregate sizes of granite and their percent aggregate combination by weight, different epoxy percentages by weight and different vibrating frequencies.

4 different aggregate sizes of granite = 0.1-0.3 mm, 1-3 mm, 4-8 mm, 8-11mm

and percent aggregate combination by weight = 40-30-20-10%, 30-25-25-20%, 20-20-30-30%, 10-15-35-40%.

4 different epoxy percentages by weight = 8%, 12%, 16%, 20%.

2 Different vibrating frequencies = 45 Hz and 60 Hz.

Total 32 specimens will be prepared by considering all types of combinations.

Select specimen to be prepared. Take selected granular size by its weight percentage and mix it properly. Make a mixture of epoxy resin and hardener by weight consideration and add it to granite granular mixture. Continue mixing at least for 15-20 minutes. Clean the moulds and apply oil for easy removal. Clamp the mould box on the vibration table and start the vibration table at selected frequency. Then pour a mixture of epoxy and granite granular in a mould box and make sure mould box gets completely filled. After completion of pouring, keep the vibrations for 10-20 minutes and then stop the vibrations, unmount the mould box. Keep mould box at normal temp for 24 hrs, after 24 hrs dissemble the mould box and check the epoxy granite specimen.

III. Experimentation

Measure the Length, height and width of the specimen thrice and average it because of surface irregularity. Calculate volume of the specimen then take the weight on calibrated and precise weighing machine. Calculate density of specimen by formula,

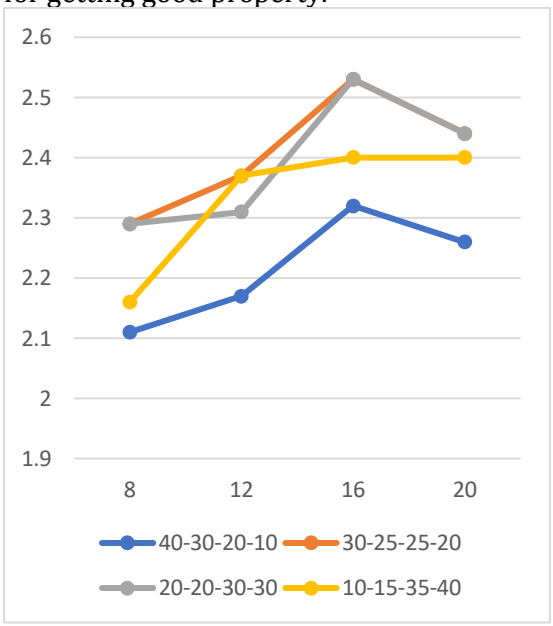
$Density = \frac{W}{V}$ gm/cm^3

w= weight of the specimen, gm

v= volume of the specimen, cm^3

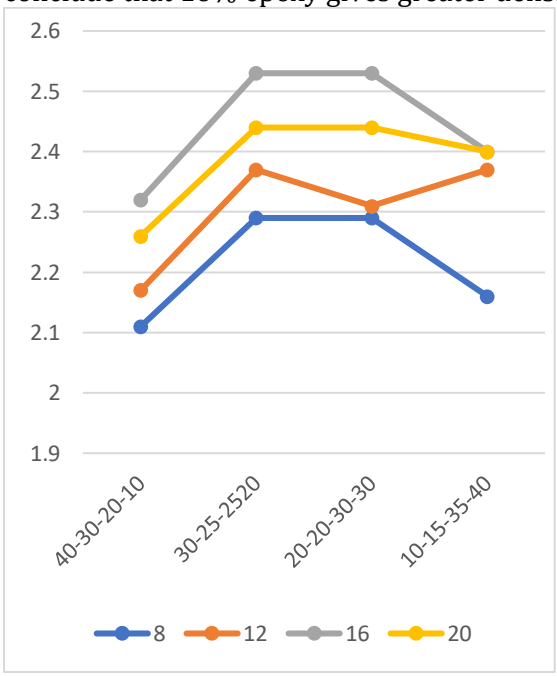
IV. Results and Conclusion

These results now put into a graphical form, result is compared with their variables to find out the best variable for getting good property.



Graph I

Graph I is plotted as density vs epoxy percentage and 4 lines are representing aggregate size combination, graph clearly indicating that for all the combinations, at 16% specimens are showing greater density, we can conclude that 16% epoxy gives greater density than any other epoxy percentage in combination.



Graph II

Graph II is plotted as density vs aggregate size combination and 4 lines representing epoxy percentages, graph is showing that 30-25-25-20 and 20-20-30-30 combinations are giving more denser specimen but particularly in case of 12 % epoxy at 20-20-30-30 combination it is going downward which makes 30-25-25-20 combination superior so we can conclude that to get the denser specimen we can select 30-25-25-20 combination.

Altogether, specimen of 16% epoxy with 30-25-25-10 combination gives the best density among all the specimens.

In application point of view, if density is playing vital role and is responsible for many other parameters, this reference or experimentation is enough as well as this is providing guideline to how to find best epoxy granite for particular application.

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