

Utilization of Ceramic Waste in Grout

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Abstract - Repair and reinforcing of existing stone work structures by injection grouting is a practical intends to give functional, sturdy, and safe structures without physically modifying outside aesthetics. A trial and analytical program examining the effect of grout injection on the basic conduct of old, unreinforced stone work is currently in progress. A few distinct definitions of cementitious grouts were observed to be helpful for injection of old brick work. These grouts are utilized for injection into cracks in harmed brick work to reestablish basic capacity and can likewise be utilized to fill existing voids to reinforce lacking stone work. A method for infusion of grouting of stone work is described, including specific portrayals of divider arrangement, infusion port area, grout mixing, and the infusion procedure.

Key Words: grout, injection grout, w/c ratio, compressive strength, tensile strength, etc

1. INTRODUCTION

Grout is a particularly fluid form of concrete used to fill gaps. Grout is generally a mixture of water, cement, and sand, and is employed in pressure. grouting embedding rebar in masonry walls, connecting sections of pre-cast concrete, filling voids, and sealing joints such as those between tiles.

2. TYPES OF GROUTING:

Grouts are classified into different types. They are listed below. Cement-based, furan resin and epoxy **grouts** are most popular and widely used **grouts**.

2.1 Cement-Based Grouts: Cement based grouts can be found in both sanded and un sanded form. This type of grout is easy to work and clean. The cement-based grouts are used in making craft projects.

2.2 Furan Resin Grouts: Furan resin grouts are found in sanded and unsounded varieties too. The name furan came from the ingredient furfural alcohol which is used in this grout.

2.3 Epoxy Grouts: Epoxy grouts are made up of a resin and a hardener. It is resistant to most chemicals and stains. . Among all the grouts, epoxy grout is more expensive and water resistant.

Latex-Modified Sanded Cement Grout: Latex-modified grout is similar to cement grout but has added features of water resistance and bonding characteristics. So they are ideal for bathrooms, countertops and backsplashes.

Caulking Grout : Caulking grouts are used for filling joints because they are available in tube form. They are squeezed by hand or from a caulking gun.

3. Types of cracks

3.1. Depend on broad classification

Depend upon this criterion cracks are classified in to following type

a) Structural cracks:

These are more harmful cracks. These are mostly formed because of the excess loading and due to improper designing of the building.

b) Nonstructural cracks:

Nonstructural cracks are mostly due to internally induced stresses in building material and these generally do not directly result in structural weakening.

4. METHODOLOGY

- Selection & Design of grouting Material.
Study is based on utilization of ceramic wastes. Then we find the material which are waste from various industries like marble industry, granite industry, crush sand etc. from that we took material Granite Dust, Marble Dust, Crushing Sand



Fig.No.1

- Selection of Sieve Size:**

For the selection preparation of materials the sieve size is important factor for strength of grout material. For selection of sieve size for project the following test sample are carried out

2) Pores are not seen after grouting so its good for filler.

3) No permeability after grouting.



Figure No. 2

A) Sample test No. 1

Table No.1: Material Proportion For Sample Test 1

Sieve size	Material	Weight [gm]
90 micro.	Marble dust	500
	Granite dust	500
	Crushed sand	500
	Cement	500

Conclusion: From this test following conclusion are made by observation

1. Flowability was not good
2. Small crack are developed after grouting.

B) Test sample No. 2

Table No. 1: Material Proportion For Sample Test 2

Sieve size	Material	Weight [gm]
125 micro.	Marble dust	500
	Granite dust	500
	Crushed sand	500
	Cement	500

Conclusion: From this test following conclusion are made by observation

- 1) Good flowability.

- Selection of Water Ratio:**

In our project we decided water ratio by trial and error. For that we studied different water ratios for each material. Different water ratios as per follows

- 1) 0.40 % by weight of material – mixture not mixed properly.
- 2) 0.45 % by weight of material –
 1. shows good flowability
 2. mixing properly done

- Casting of blocks**

The size of cubes used for this investigation was 150 x 150x 150 mm.



Fig.No. 3

Concrete cylinders of size 100 mm dia and 200mm using sand.



Fig.No.4

- Laboratory tests
 - compressive strength



Fig. No. 5

Compressive Strength For Mix Proportion

Sr.no	Size(mm)	Weight(gm)	Load(KN)	Avg strength (N/mm ²)
1	150 x 150 x 150	1493.9	171	
2	150 x 150 x 150	1477.9	167	11.37
3	150 x 150 x 150	1489.4	174	

- Tensile strength



Fig.No. 6

Table No.10: Split Tensile Test For Mix Proportion

Trial No.	Size (mm)	Weight (kg)	Load (KN)	strength (N/mm ²)	Avg. strength (N/mm ²)
1	D= 100 L= 200	i)13	i) 72	i)2.29	2.13
		ii) 12.8	ii)73.7	ii)2.34	
2	D= 100 L= 200	i)13.3	i)78	i)2.48	2.54
		ii)13.8	ii)82	ii)2.61	
3	D= 100 L= 200	i)13.7	i)112	i)3.56	3.65
		ii)13.4	ii)118	ii)3.75	

5. Result:

Mixing of material- 45% of marble dust

45%granite dust

10%crushed sand

6. CONCLUSION:

- As per study the rate of grouting in market is about 300 to 350 RS per hole. We reduces the cost of grout upto 105 RS per hole. Which is 70% to 75% less than market cost.
- Strength of prepared Grout mixture is equivalent to market grout material.

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