

A REVIEW PAPER ON EVOLUTION OF SAND IN CONSTRUCTION

UDAYSANKAR GUPTA, DEPARTMENT OF CIVIL ENGINEERING D.Y.P.T.C, AMBI, PUNE, HEMANSHU AHIRE, DEPARTMENT OF CIVIL ENGINEERING D.Y.P.T.C, AMBI, PUNE

Cement, sand and aggregate are basic needs for any construction industry. Sand is a prime material used for preparation of mortar and concrete and which plays a major role in mix design. Now a day's erosion of rivers and considering environmental issues, there is a scarcity of river sand. The non-availability or shortage of river sand will affect the construction industry, hence there is a need to find the new alternative material to replace the river sand, such that excess river erosion and harm to environment is prevented. Many researchers are finding different materials to replace sand and one of the major materials is quarry stone dust. Using different proportion of these quarry dust along with sand the required concrete mix can be obtained. This paper presents a review of the different alternatives to natural sand in preparation of mortar and concrete. The paper emphasize on the physical and mechanical properties and strength aspect on mortar and concrete. Keywords- Sand, Quarry Stone Dust, Alternative Material, Physical Properties, Mechanical Properties.

INTRODUCTION

SAND is a natural source of fine aggregate which are formed by weathering of rock by air and weathering for millions of years. Hence the sand is basically found in around the river and are finally granule and course a soil contained partial by mass more than 85 percentage. The composition of the sand depend on the locally available rock source termed as silica (silicon dioxide or SiO_2) in the form of quartz, also the second type of most common type of sand is calcium carbonate, example- aragonite. Which is created mostly over past billion of years by various form of life like coral and shellfish. The same is the most suitable source of fine aggregate for concrete and plaster work in all construction every year.

I NATURAL SAND

The study of individual grains can reveal much historical information as to the origin and kind of transport of the grain. Quartz sand that is recently weathered from granite or gneiss quartz crystals will be angular. It is called grus in geology or sharp sand in the building trade where it is preferred for concrete, and in gardening where it is used as a soil amendment to loosen clay soils. Sand that is transported long distances by water or wind will be rounded, with characteristic abrasion patterns on the grain surface. Desert sand is typically rounded. Only some sands are suitable for the construction industry, for example for making concrete. Because of the growth of population and of cities and the consequent construction activity there is a huge

ADVANTAGES

1. Smoother texture with better shape. Demands less water.
2. Moisture is trapped in between the particles which is good for concrete purposes.
3. Lesser concrete compared to Manufactured Sand
4. Recommended for RCC, plastering and brick/ block work.
5. Particle passing 75 micron - Up to 3% (IS:383 - 1970).

DISADVANTAGES

Minimum permissible silt content is 3%. Anything more than 3% is harmful to the concrete durability. We can expect 5 - 20% silt content in medium quality river sand

Harmful to environment. Eco imbalances, reduce ground water level and rivers water gets dried up.

River sand price ranges from Rs 60 - 80 per cubic feet.

High probability of adulteration since filtered sand (a type of pre-washed sand which contains high silt contents) are mixed together. As a rule, supply shortage always brings adulterated products to the market.

No control over quality since it is naturally occurring. Same river bed sand can have differences in silt contents.

INTERPRETATION:-

Natural sand has its limitations of availability hence to overcome this manufactured sand comes into existence.

II MANUFACTURED SAND

Manufactured sand (M sand) is sand made from rock by artificial processes, usually for construction purposes in cement or concrete. It differs from river sand by being more angular, and has somewhat different properties. The crushed sand is of cubical shape with rounded edges, washed and graded to as a construction material.

ADVANTAGE

Manufactured in factory.

Higher concrete strength compared to river sand used for concreting.

Zero percent of silt is observed

Over Sized Materials is 0%. Since it is artificially manufactured.

Though M Sand uses natural coarse aggregates to form, it causes less damage to environment as compared to river sand.

M Sand price ranges from Rs.35 - Rs.45 per cubic feet in Bangalore.

Probability of adulteration is less

Better quality control since manufactured in a controlled environment.

Particle passing 75 micron - Up to 15% (IS: 383 - 1970).

DISADVANTAGE

Angular and has rougher texture. Angular aggregates demands more water. Water demand can be

Compensated with cement content

Moisture is available only in water washed M Sand.

Cracks developed at surface of concrete or cement mortar if proper curing is not done.

Have lesser properties for water seepage (permeation of water is more)

To achieve required strength different grade of aggregate is to be used.

INTERPRITATION:-

Manufactured sand has angular shape and end results for concreting is ok but for plaster mortar deformative observed to overcome this silpoz sand comes into existence.

III SILPOZ SAND

Silpoz is enhanced & engineered artificial plaster sand where river sand is not used. Better workability, excellent strength due to rich materials, cost-effective & availability round the year are some of the advantages of Silpoz.

ADVANTAGE

Better workability is guaranteed

Rich material imports ease to masons to mix and use without rebound losses.

Thinner plaster guarantees much better coverage and crack free surface .

No cracks are generated as additives reduce the hydration heat of cement.

Excellent for internal & external plastering,

Excellent strength due to cubical shape of the particles.

Available round the year.

DISADVANTAGE

Cannot give good results in non humid area.

Can lead to more water and cement requirement to achieve the expected workability.

INTERPRITATION:-

Silpoz sand are not suitable at all weather condition to overcome that sand free plaster comes into existence.

IV SAND FREE PLASTER

Sandfree Plaster is a premix material supplied in bags. Apply Sandfree Plaster on walls, ceilings, RCC work by just mixing with water. Sandfree Plaster is a better alternative to gypsum plaster as it is damp proof, cement based and gives a crack free plaster surface, with quicker application

ADVANTAGES

Ready mix contains self-curing compound gives curing free product.

Crack free surface achieved after application.

Less material waste

Durability of sand free is more.

Efflorescence free

Dust free and clean

Light weight

Save time and cost

Save manpower

Smart construction.

DISADVANTAGES

Workability issues: Manufactured sand can be of a coarser and angular texture than natural sand, which is smooth and rounded due to natural gradation.

Technical Specifications

Dry density: 1150 kg/cum (+/- 5 %)

Initial setting time: 90 – 120 mins

Final setting time: 200 – 260 mins

Pot life: 3 hrs

Coating thickness: 10 – 18 mm

Coverage*: 125 kg/100 sq.ft. (10 mm thick plaster)

Shelf life**: 6 months

Ideal for use at 27oC - 30oC

* When applied under controlled environment by skilled applicator and with proper tools

** When stored in proper location with reasonable care. Under packed conditions.

How to Apply



Fill a clean pot with potable water measuring 18% (+/- 5%) the weight of Sandfree Plaster (1 kg Sandfree Plaster : 0.18 litres water).

Now pour Sandfree Plaster into the pot. Mix and knead slowly to form a homogeneous paste. Let the mixture stand for 10 minutes. Mix the green mortar again without adding more water.

Evenly apply a coat of Sandfree Plaster with a mason's trowel or with aluminum level patty.

Apply aluminum level patty from bottom to top direction followed by left to right & right to left direction without leaving stroke marks to level the plaster.

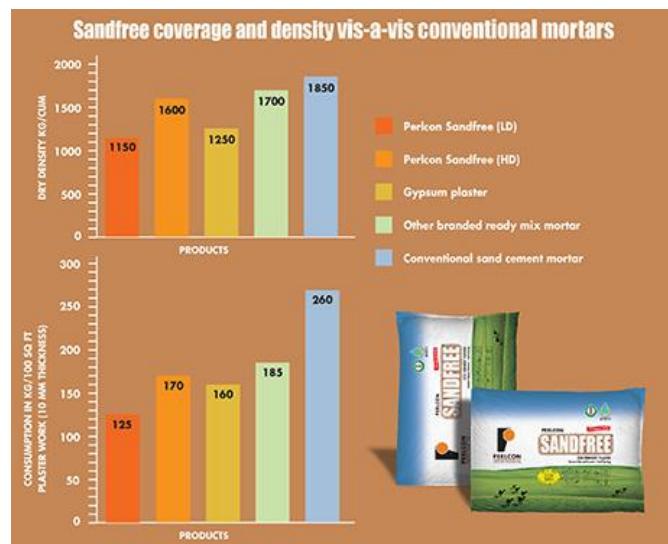


After initial setting apply aluminium scrapping patty to achieve true level and create a rough texture for subsequent coat.

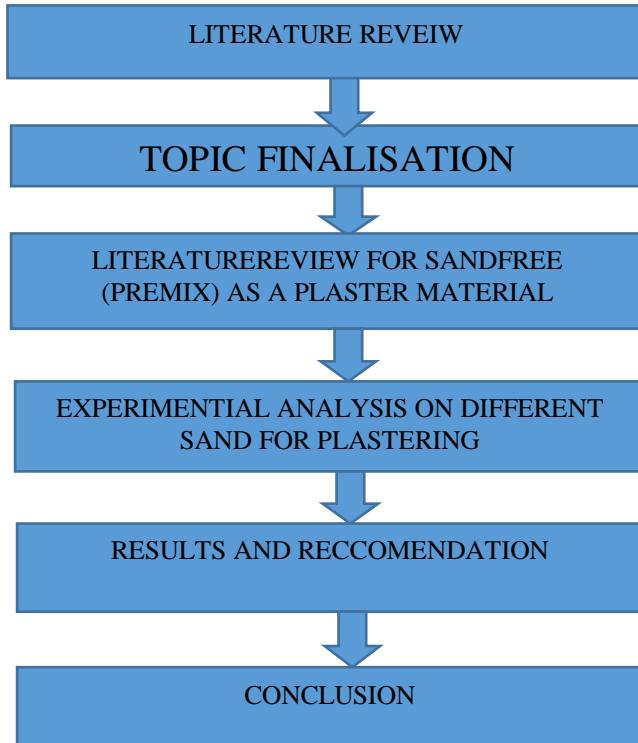
Over smaller area and in corners, apply grilled float to open out plaster surface. Remove loose particles.

After 45 min apply steel/float/muster, if necessary with little sprinkling of water to achieve perfectly leveled plaster surface.

Smooth, leveled, Sandfree Plaster wall is now ready. No curing is required.



METHODOLOGY



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