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Study of Retro Reflecting Material by Using High Strength Concrete.

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Abstract – *This research presents a study of Retro Reflecting material by using high strength concrete. In this we study various material properties and select one material and test related to concrete are taken. i.e. compression and heat resistant. By this research we illustrate that the internal walls and external walls are made by Retro Reflecting paint can reduce the internal room temperature. We use Retro Reflecting glass beads to increase Retro Reflection and to maximize reflection at any incidence angle, Retro Reflecting material can reduce indoor temperature in tents.*

Key Words: Retro Reflection, Luminous, Reflective Index.

1. INTRODUCTION

In Retro Reflecting material reflecting is mainly depend on the concept of Retro reflection. Retro reflections is the phenomenon of light ray striking a surface and bring redirected back to the surface. Retro reflection is caused by use of Retro Reflecting paint and glass beads into a concrete mix. The matrix composes a high strength concrete. As we know the concept of retro reflection of the surface is activated by rays from sender and receiver. At any given moment the reflection effect become activated and concrete become in active state. In the concept of retro reflection, the rays reflected towards same direction. i.e. 180 Degree.

1.1 SCOPE OF PROJECT:

We know that at night time there are some problems of visibility and chances of accidents so to reduce accidents there are benefits of retro reflecting material, it is very effective in ghat section, black spots, work zone, highly accident prone area, kerbs, sharp curves, heavy earth movers, worthy replacement of tree guards, median markers, blinkers etc. Retro reflecting materials are very economical and easy to apply and it is translucent without considerably affecting its original color.

Retro reflecting material have high design possibilities in architecture, interior design, product design and traffic safety related areas, permanent marking of dangerous areas like stairs, curbs, platform, edges, tunnel passages etc.

Retro reflecting material is an ecofriendly green innovation and could be effectively used to improve aesthetics without compromising the solidity of the structure. It is definitely a technology that would embrace the future of architecture and engineering.

To control or to reduce temperature inside the room. There are two methods i.e. thin film coating on roof and cavity wall construction but the production rate of thin film coating is low and also cost of manufacturing is high and difficult to apply and for cavity wall construction skill labour require and it is not economical. So by adopting retro reflective material we can overcome all the disadvantages of thin film coating and cavity wall.

1.2 OBJECTIVES OF STUDY

The objective regarding projects are:

1) To study various properties of material.
2) To check compressive strength between normal concrete and light reflecting concrete.
3) To check heat resisting property by using heat resistance test.
4) To make demo model by using retro reflecting material and to check their suitability.

2. STUDY OF MATERIALS

2.1 iTraff™ PRO Water Based Paint for Roads & Kerbs

Itraff is a premium waterborne acrylic and solvent based traffic paint formulated for Indian condition. The composition of iTraff traffic paints makes it environmentally friendly and easy to apply with conventional and airless spray techniques.

ITraff is a fast drying, durable and ready mixed product recommended for stripping on airports, Roads or other traffic surfaces including parking lots, driveways and temporary markings. It can be applied over asphalt, Portland cement and concrete pavements.

- Volume solids =Approx. 61%
- Recommended WFT/COAT = 300-375 micron
- Theoretical coverage = 2.1 sq.mt. /kg
- Drying time at 30 degree Celsius= 20 min
- Recommended drop on glass beads = 500 micron for 300 WFT
- Color = White / Golden yellow
- Composition=
  a) Binder = min 18%
  b) Glass beads = min 30%
  C) Tio2 (white) = Min 10%
  D) Fillers (white) = Max 42%
  E) Softening point = 102.5 +/- 9.5 de. Celsius
  F) Glass beads = Type I MORT & H/BS 6088A
  G) Drying time = Max 15 min.
  H) Luminous =

White = Min 70%
Yellow = Min 50%
Flow resistance = Not more than 25%

Features:

1) An acrylic waterborne, fast drying, durable paint
2) Complying with IS-164 specifications
3) Good wear & weathering resistance

Certifications:

- Airports Authority of India | New Delhi
- National Test House | Mumbai
- Chemical & Metallurgical Services | Chennai
- VJTI | Mumbai

2.2 TECHNICAL DATA (GLASS BEADS):

TYPE I BS 6088A GLASS BEADS:

This are high index glass beads designed especially for airport marking with reflective index of +1.5 for drop on application with size gradation ranging from 300-850 micron. The application also extends to drop on beads as they offer high reflectivity and enhance night time vision and better visibility under wet condition at airport runways.

1) Appearance = Round, Clean & free of bubbles & foreign matters.
2) Spherical beads = Greater than 70
3) Reflective index = Greater than 1.5
4) Specific gravity = 2.4-2.6
5) Coating = Waterproof and floating

These are high index glass beads designed specifically for airport marking with a reflective index of +1.9 for drop on application with size gradation ranging from 300-850 microns. The application also extends to drop on beads as they offer high retro reflectivity and enhance night time vision and better visibility under wet condition at airport runways.

2.3 MIX DESIGN

Mix Design for M30

Design of M30 grade concrete mix according to IS 10262:2009 and IS 456:2000

3. RESULT AND DISCUSSION

3.1 Compression Testing

A) Normal Concrete- Average compressive strength for normal concrete is 35.56 N/Sq.mm

B) By applying retro reflective paint only-Average compressive strength by applying retro reflecting paint is 34.96 N/Sq.mm

C) By applying retro reflective paint + glass beads-Average compressive strength by applying retro reflective paint + glass beads is 35.36 N/Sq.mm

3.2 Heat resistant testing

We have conducted heat resistant test by applying retro reflective paint only and by applying retro reflective paint + glass beads for 100 degree Celsius and for 200 degree Celsius and after that we kept cube for 24 hour at room temperature and as per procedure we take compressive strength on it and their results are as follows.

3.2.1 for 100 degree Celsius-

a) For Normal concrete average compressive strength is 31.6 N/Sq.mm

b) By applying retro reflective paint average compressive strength is 32.8 N/Sq.mm

c) By applying retro reflective paint + glass beads average compressive strength is 33.5 N/Sq.mm

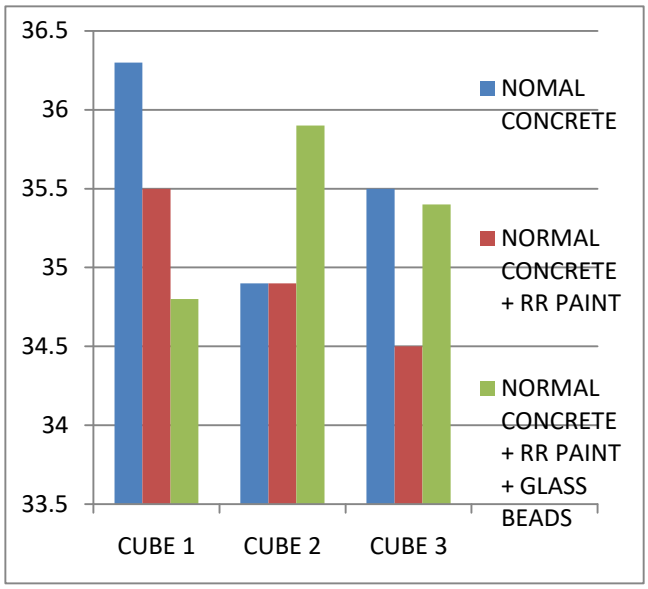
3.2.2 For 200 degree Celsius-

a) For Normal concrete average compressive strength is 28.6 N/Sq.mm

b) By applying retro reflective paint average compressive strength is 29.5 N/Sq.mm

c) By applying retro reflective paint + glass beads average compressive strength is 31.5 N/Sq.mm

Chart -1 Compression testing result



Above bar chart shows that retro reflective paint and glass beads not much affected on compressive strength of concrete so it is suitable for application regarding concrete like concrete road, concrete block regarding architectural aesthetic purposes etc.

Heat resistant strength by applying retro reflective paint + glass beads for 100 degree Celsius is 33.5 N/Sq.mm and for 200 degree Celsius is 31.5 N/Sq.mm. and by comparing with normal concrete it is more heat resistant so it is suitable for road marking, runway marking and other safety purposes.

Fig -1: Demo model

Above figure shows final demo model made by using retro reflective paint and glass beads. In this figure two models are there one with normal concrete by applying white color and other with by applying retro reflecting paint and glass beads.

By eye observation we easily define that the surface of first model is activated by rays from sender and concept of retro reflection is work on and it is suitable for traffic safety purposes like traffic signs, curb, tunnel inside areas etc.

3. CONCLUSIONS

3.1We have conclude that, Glass beads TYPE I BS 6088 A and Itraff water borne paint is applicable for retro reflection and it is easily applicable on concrete and their glass beads retention is and also drying period is fast.

3.2 By taking compressive testing, Retro reflecting paint + glass beads is applicable on concrete and it is not affected on compression strength of concrete.

3.3 By taking heat resistant test on cube, we conclude that heat resistant capacity of glass beads + applying retro reflecting paint on concrete is more as compare to normal concrete so that retro reflecting material and glass beads is applicable where heat and temperature is high.

3.4 By eye observation we say that light reflection is good after applying retro reflective material so it is widely application for tunnel inside areas, road marking, airport runways, parking marking on roads, traffic signs eth

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