

Introduction:

- In the construction industry, concrete plays a major role due to its availability and easy maintenance.
- It has excellent durability and Mechanical properties but it is a poor conductor of electricity.
- Concrete which has both excellent Mechanical properties and conductive properties will play a major role in the world.
- The study aims to explore different ways of increasing the strength of concrete, as well as to understand the properties of conducting materials at different dosages.

Literature:

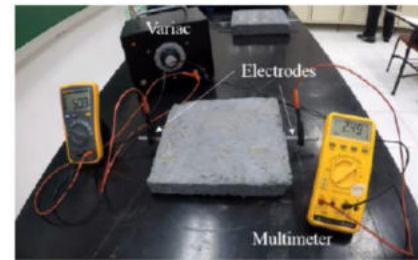
- Conducting concrete is a mixture of regular concrete and a mixture of conducting materials like Steel shavings, steel fibers, and carbon particles.
- The research on conducting concrete was going on from the early 1970s.
- The first mixture of conductive concrete was developed in the year 1998 by prof Yehia and Y.Tuan 1998.
- He constructed a bridge using reinforced concrete after which conductive concrete was laid over the concrete slab
- The steel fibers and shavings which made up the conducting concrete mixture help achieve the required electrical resistance for heating purpose.
- When two electrodes were embedded in the precast segment of the conductive concrete and we could see the flow of electricity through the conductive concrete.



Mixing Procedure:

- The mixing procedure of conducting concrete is the same as that of conventional concrete. At the end of the mix, conducting materials are to be added.
- The concrete mix used in the experimental study consists of a single mix with different dosage levels of conducting materials.
- The cement dosage and water-cement ratio of 400 kg/m³ and 0.5 are kept constant respectively.

Standard Tests:



Percolation transition zone test:

- The percolation transition zone test is done by varying amounts of conducting materials, w.r.t the relative volume of total concrete. By this test, we can say that the optimal value of fiber content is found in the mix.
- The plates used a percolation test was made with two electrodes inserted in them. This test doesn't have any standardized reference. Here the setup works by connecting the electrodes to the AC power supply and voltage variac.
- The electrical resistivity of the material was known, by measuring the current and voltage through the multimeter.
- Electrical conductivity tests tell about the amount of conducting materials that are needed to be added to the concrete mix.
- Other standard tests for concrete such as compressive test, slump cone test, air content, and temperature tests, etc, are done to ensure the values are in an acceptable range.

Characteristics and Applications:

- Conductive concrete can be used cathodic protection of reinforcement in concrete structures.
- It can also be used for electrical grounding
- Conductive concrete can also be used for protecting structures against static electricity and lightning.
- It can be used for de-icing roads, bridges, and pavements.



Conclusion and Current Developments:

- Conductive concrete can last for about 15-20 years, as it saves time, money, and human life.
- Further researches are on improving the mechanical strength of conductive concrete so that it can be effectively used as a sole member in withstanding load and not as an overlay.

Important References:

- https://www.scielo.br/scielo.php?pid=S0366-69132020000100088&script=sci_arttext
- https://www.researchgate.net/publication/339603209_Development_of_electrically_conductive_concrete
- https://csce.ca/elf/apps/CONFERENCEVIEWER/conferences/2018/pdfs/Paper_MA9_0610035034.pdf
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