



# **SNS COLLEGE OF TECHNOLOGY**



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**COIMBATORE**

## **DEPARTMENT OF CIVIL ENGINEERING**

**19CEB201 – CONSTRUCTION MATERIALS**

**II YEAR / III SEMESTER**

**Unit 3 : Concrete**

**Topic 12 : Self-Compacting Concrete**



# Self Compacting Concrete



- Self compacting concrete (SCC) can be defined as fresh concrete that flows under its own weight and does not require external vibration to undergo compaction.
- It is used in the construction where it is hard to use vibrators for consolidation of concrete.
- Filling and passing ability, segregation resistance are the properties of self compacting concrete.
- SCC possess superior flow ability in its fresh state that performs self compaction and material consolidation without segregation issues.
- The materials, tests and properties of self compacting concrete are explained in the below sections.



# Materials used for SCC



The main ingredients used in design of self compacting concrete are:

## 1. Cement

- Ordinary Portland cement either 43 or 53 grade cement can be used.

## 2. Aggregates

- The size of the aggregates used for SCC design is limited to 20mm.
- If the reinforcement employed for the structure is congested, the aggregate size used can be in the range 10 to 12mm.
- Well graded aggregates either round or cubical shape are a best choice.
- The fine aggregates used in SCC can be either natural aggregates or manufactured aggregates (M- Sand) with a uniform grade.
- The fine aggregates with particle size less than 0.125mm are generally employed.



# Materials used for SCC



## 3. Water

- The quality of water used is same that followed for reinforced concrete and prestressed concrete construction.

## 4. Mineral Admixtures

- The mineral admixtures used can vary based on the mix design and properties required.
- Mentioned below are the different mineral admixtures that can be used and their respective properties they provide.
- Ground Granulated Blast Furnace Slag (GGBS): The use of GGBS helps to improve the rheological properties of the self compacting concrete.
- Fly ash: The fine fly ash particles help to improve the filling of the internal concrete matrix with fewer pores. This improves the quality and durability of the SCC structures.
- Silica Fumes: The use of silica fumes helps to increase the mechanical properties of the self compacting concrete structure. Stone Powder: The use of stone powder in SCC is used to improve the powder content of the mix.



# Materials used for SCC



## 5. Chemical Admixtures

- New generation superplasticizers are commonly used in SCC mix design.
- In order to improve the freeze and thaw resistance of the concrete structure, air entraining agents are used.
- To control the setting time, retarders are employed.



# Tests and Properties of SCC



The requirements of the self compacting concrete are achieved by the properties in its fresh state. The three main properties of SCC are:

1. **Filling Ability:** This property of the concrete is the ability to flow under its own weight without any vibration provided intentionally.
2. **Passing Ability:** This property is the ability of the concrete to maintain its homogeneity.
3. **Segregation resistance:** This is the resistance of the concrete not to undergo segregation when it flows during the self compaction process.



# Tests and Properties of SCC



Different tests are conducted to determine the above mentioned properties of Self compacting concrete. The tests conducted for Self compacting concrete can be categorized into three categories:

1. Filling Ability Tests
2. Passing Ability Tests
3. Segregation Resistance Test



# Advantages of SCC



The main advantages of self compacting concrete are:

- The permeability of the concrete structure is decreased
- SCC enables freedom in designing concrete structures
- The SCC construction is faster
- The problems associated with vibration is eliminated
- The concrete is placed with ease, which results in large cost saving
- The quality of the construction is increase
- The durability and reliability of the concrete structure is high compared to normal concrete structures
- Noise from vibration is reduced. This also reduce the hand arm vibration syndrome issues





# Disadvantages of SCC

SCC construction face the following limitations:

- There is no globally accepted test standard to undergo SCC mix design
- The cost of construction is costlier than the conventional concrete construction
- The use of designed mix will require more trial batches and lab tests
- The measurement and monitoring must be more precise.
- The material selection for SCC is more stringent



# Applications of SCC



The major applications of self compacting concrete are:

- Construction of structures with complicated reinforcement
- SCC is used for repairs, restoration and renewal construction
- Highly stable and durable retaining walls are constructed with the help of SCC
- SCC is employed in the construction of raft and pile foundations



***Thank You!!***