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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**



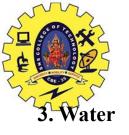
The main ingredients used in design of self compacting concrete are:

#### 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**



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!!

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