

III-2. METHOD OF TESTS FOR STEEL FIBER REINFORCED
CONCRETE

JSCE-SFI METHOD OF MAKING STEEL FIBER REINFORCED
CONCRETE IN THE LABORATORY

1. SCOPE

This standard specifies the method of making steel fiber reinforced concrete by mixing in the laboratory for the purpose of conducting various tests.

2. PREPARATION OF MATERIALS

2.1 Prior to mixing, materials shall be maintained at a temperature of $20\pm 3^{\circ}\text{C}$.

2.2 Cement shall be kept sealed in a moisture proof container.

2.3 Aggregates shall be prepared in a manner that gradation will not vary from batch to batch. Aggregates shall be controlled to have an uniform moisture content.

3. BATCHING OF MATERIALS

3.1 Materials shall be batched separately by weight. However, water and admixtures in liquid form, or admixture made into aqueous solutions, may be batched by volume.

3.2 Batching shall be performed accurately using batching equipment accurate within 0.5% of a single batch.

3.3 Batched aggregates shall be prevented from drying until mixing is performed.

4. MIXING OF CONCRETE

4.1 Mixing of concrete shall be performed in the laboratory, which is maintained to have a temperature of $20\pm 3^{\circ}\text{C}$ and relative humidity not less than 60%.

4.2 Concrete shall be mixed using a mixer. Steel fiber shall be dispensed to the mixer after the concrete matrix is thoroughly mixed.

4.3 The quantity of concrete mixed at one time shall be 5 liters or more in excess of the quantity required for testing, and shall not be less than one half of and not more than the nominal capacity of the mixer.

Remarks: Steel fiber reinforced concrete exerts a large load on the mixer at the time of mixing, and it is therefore advisable for the quantity to be mixed to be less than about 80% of the nominal capacity of the mixer.

4.4 Prior to the mixing of test batch, a small quantity of concrete of identical mix proportions to the test batch is mixed so as to give a coating of mortar on the mixer. It should be noted that individual materials shall be introduced in a sequence so that they will adhere to the mixer as little as possible and shall be mixed until uniform mix is obtained¹⁾.

Note 1) Mixing time will differ depending on the capacity of the mixer, type of the mixer, the mix proportions of the concrete, etc., but generally, it is advisable for it to be at least 3 minutes for a tilting type mixer and at least 2 minutes for a pan type mixer.

4.5 Introduction of steel fibers shall be done while mixer is rotating, and in a manner that the steel fibers will be distributed uniformly in the concrete as much as possible²⁾. Mixing shall be continued even after the entire quantity of the steel fibers has been introduced³⁾.

Note 2) The duration for introduction of steel fibers, which differs according to the volume being mixed and the quantity of steel fibers introduced, is normally about 1 to 2 minutes.

Note 3) It is advisable for the mixing time to be about 1 minute.

Remarks: Steel fibers shall be thoroughly unravelled when introducing, and for example, shall be passed through a vibrating chute or screen, or shall be introduced by means of a special dispenser (fiber dispensing plant).

4.6 Concrete which has been mixed shall be discharged into a mixing pan and remixed by shovel until uniform mix is attained.

Remarks: In this case, it is advisable to do shovelling in a way that the front edge of the shovel is always in contact with the mixing pan.

4.7 The mixing pan used under section 4.6 shall be watertight, and shall be coated in advance with mortar of concrete of identical mix proportions as the test concrete.

5. REPORT

The report shall include necessary items from the following:

- 1) Objective of test,
- 2) Number of batches,
- 3) Date and time of sample preparation,
- 4) Temperature and humidity of laboratory,
- 5) Names, types, manufactures or sources of materials,
- 6) Temperatures of materials,
- 7) Configurations and dimensions of steel fibers,
- 8) Maximum size, gradation, specific gravity, absorption and moisture content of aggregates,
- 9) Mix proportions of concrete,

- 10) Type and capacity of mixer, and quantity and mixing time of one batch of concrete,
- 11) Sequence of introduction of materials to the mixer,
- 12) Temperature, slump, and air content of concrete,
- 13) Others.