

CONSTRUCTION

TIPS



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**Fiber Reinforced
Concrete (FRC)
Important Items
for Construction
and Inspection**

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Materials

- Ensure that the fibers proposed for use are listed on the Department's Material Producer List.
 - Verify that the correct dosage and fiber is used.

Trial batch and mix design suggestions

- Make trial batches, even for a currently approved mixture. This process will ensure a workable mixture after the addition of fibers. Any modifications needed can be made prior to placing the concrete.
- Modify the mix design to increase the sand content by using a maximum coarse aggregate factor of 0.55 (as recommended by ACI 544.3).
- Use superplasticizers or mid-range water reducers in place of water to increase the workability.

Construction recommendations

- Add fibers at the ready mix plant, whenever possible.
- Consult with the fiber producer prior to adding the fibers; each fiber supplier will recommend when to add the fibers (e.g., an upfront addition before any materials are added to the truck or at the very end once all other materials have been added to the truck).
- Use a minimum of 200 revolutions when mixing; adequate mixing is the key to avoid balling (add 30 revolutions at charge speed prior to discharge).
- If adding the fiber at the jobsite is the only option, a minimum of 100 revolutions at charge speed should be achieved after the fiber addition and before discharge.

Placing and finishing fiber reinforced concrete

- The concrete should be vibrated to ensure adequate consolidation is achieved.
- The concrete will appear to be less workable than it actually is. Adding additional water to the concrete will not increase the workability in the same manner as traditional concrete and should be avoided when possible.
- Some fibers will be visible after finishing; however, this is expected. Adding finish water will not increase the tendency for the fibers to lay flush with the surface.
- Overworking the surface should be avoided; this may cause crazing of the surface. Steel and/or magnesium floats and trowels are recommended; wood tends to tear the surface. Jitterbugs have been successfully used to help push the fibers below the surface.
- If a broom finish is required, a stiff bristle broom is recommended. The end of the broom should be held as close as possible to the concrete surface. Only one pass in one direction is recommended.

Job control testing

- The material testing is required to conform to the Department's [Guide Schedule](#) for Class A and B concrete.
- Strength cylinders are made in accordance with ASTM C 31 and made in the same fashion as concrete without fibers.
- Although ASTM C 1229 is difficult to perform in the field, this test method, if required, is acceptable to determine if the correct amount of fibers are present in the concrete.
- An alternative test, if required, is described as follows:
 - 1) Fill a known volume container (e.g., the bucket of the pressure meter or a unit weight bucket with a volume of at least 0.25 ft³).
 - 2) Vibrate each lift with an external or internal vibrator.
 - 3) For the final lift, care should be taken to ensure the bucket is not significantly overfilled and is as close to level as possible before striking off the surface.
 - 4) Pour the concrete in the bucket over a No. 8 (2.38 mm) sieve.
 - 5) Extract the fibers, allow them to dry, and weigh. A scale having an accuracy of 0.1 g should be used to measure the mass of the dried fibers. The amount of fibers is calculated as follows:

$$\text{Amount of Fibers (lb/yd}^3\text{)} = \frac{F}{B} (0.059525)$$

Where:

F = Weight of fiber in grams

B = Volume of container in ft³

Note, the typical amount of fibers obtained from a 4 lb/yd³ concrete batch and a 0.25 ft³ bucket should equate to about 16.8 grams.

Contact Information

For more information, reference the Fiber Reinforced Concrete Tip Sheet and/or contact the Rigid Pavements and Concrete Materials Branch at 512/506-5856.