



## Flexural Toughness of Fiber-Reinforced Concrete (ASTM C 1550)

### Standard Test Method for Flexural Toughness of Fiber-Reinforced Concrete (Using Centrally Loaded Round Panel)

#### What is FRC Flexural Toughness Testing?

Flexural toughness testing is used to measure the post-crack energy absorption characteristics of a FRC mixture.

#### How is the Flexural Toughness of FRC Evaluated?

An 800-mm (32-in.) diameter by 75-mm (3-in.) thick molded or shotcrete round panel is supported on three symmetrically arranged pivots and subjected to a central point load under displacement control using a closed-loop, servo-controlled testing system. The load and net deflection are monitored and recorded up to a specified central deflection, most commonly, 40 mm. The energy absorbed is calculated as the area under the load-deflection curve.

#### Why is this test method important?

This method characterizes the flexural toughness for a given FRC mixture, enabling the determination of fiber dosage for use in sprayed concrete (shotcrete) applications.

#### How is this standard used in the industry?

Performance specifications for shotcrete used in mining and tunnel construction often require a minimum energy absorption value (Joules) for acceptance of fiber-reinforced concrete. As noted in ASTM C 1550, the energy absorbed up to 5 mm central deflection is applicable to situations in which the material is required to hold cracks tightly closed at low levels of deformation. Examples include final lining in underground civil structures such as railway tunnels. The energy absorbed up to 40 mm is more applicable to situations where the concrete may be subjected to severe deformations in situ, for example, shotcrete linings in mine tunnels and temporary linings in swelling ground. Fiber suppliers use this test method to develop the flexural toughness versus fiber dosage relationship needed to facilitate the initial estimation of a fiber dosage to meet a specified minimum absorption value prior to field trials using project materials.

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