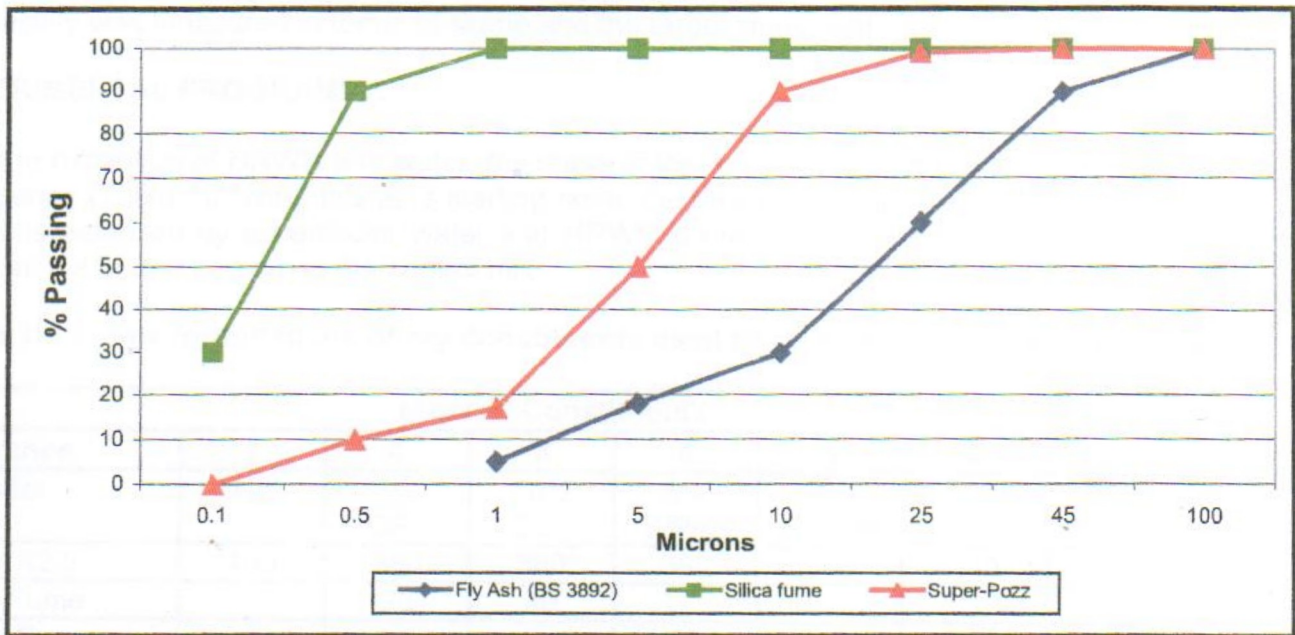


Figure 1: Particle Size Distribution



CONCRETE QUALITY AND MIX DESIGN

The quality and impermeability of high-performance concrete are, inter alia, determined by the amount of water utilized in the mix design i.e. the water/binder ratio. High range water reducers (HRWR) are extensively used to ensure placement with low water contents. Ultra-fine pozzolanic materials such as silica fume, is often utilized in HPC. The presence of the extremely fine particles decreases the permeability and improves durability.

In order to measure the effect of the Super-Pozz® on the workability, water requirement and HRWR dosage, three series of concrete mixes were prepared, based on the following mix design methodology:

- A. **Workability:** Keeping the w/b ratio (binder= cement + extender) and HRWR content constant and measuring the variation of the slump
- B. **Water Demand:** Keeping HRWR dosage the same and varying the amount of water required to achieve the same slump
- C. **Admixture Requirement:** Keeping the w/b ratio the same and varying the amount of HRWR required to maintain similar slump measurements.

In all 3 series, Super-Pozz was used at replacement levels of 5%, 10%, 15% and 20% of the total binder content. For silica fume mixes, replacement levels of 5% and 10% were used. The total binder content was kept constant at 400kg/m^3 . Crushed dolerite with a specific gravity of 2.92 served as the coarse aggregate. The sand content was a blend of dolerite crusher sand and filler sand with a specific gravity of 2.82. Prior to their use, the materials were completely dried. The cement used was CEM I 42.5. The HRWR was a naphthalene-based admixture.