

## Use of plasma treated basalt fiber as a concrete additive

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### Abstract

The paper investigates the effect of plasma treatment of basalt fiber on its hydrophilic behavior, which was estimated by contact angle. The pre-chopped basalt fiber was put in a soft polyethylene container to prevent fiber particles from being carried away by a flow of plasma gas, and to protect outlet gas ducts against clogging. It was evaluated what effect the plasma modification had on the strength properties of BST V40 P2 concrete.

As the treatment time increases the contact angle becomes higher until treatment time reaches 10 minutes. The contact angle-treatment power dependence passes through a maximum. The highest value has been observed at a treatment power of 0.6 kW both on the day of treatment and after a 5-day rest period. The wettability of basalt fiber after 5 days of exposure after the first wetting leads to lower results, but remains at a fairly high level.

The retreatment after a 5-day curing period yields lower results, but the level remains sufficiently high.

The highest contact angle has been observed at a treatment power of 0.6 kW, gas flow rate (G) of 0.04 g/s, chamber pressure (P) of 20 Pa, with air/argon mixture (1:1) as plasma gas.

Were tested samples of concrete BST V 40 P 2 with the addition of plasma-treated basalt fiber in the amount of 0.5 and 3% of the mass. on the strength index under two modes of basalt fiber processing: in mode 1 the treatment time was 10 minutes, the treatment power was 1.5 kW; and in mode 2 the treatment time was 5 minutes, the treatment power was 0.6 kW, with the addition of plasma treated basalt fiber (0.5 and 3 mass percent).

It was found that the plasma treatment of basalt fiber before chopping gave concrete a higher strength than plasma treatment followed by chopping. Concrete has the highest strength when basalt fiber (3 mass percent) is subjected to plasma treatment in mode 2. Furthermore, the strength increased by 23 mass percent in comparison with the reference sample.

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