

SOP: Production of Pyrolyzed Hemp-Derived Short Carbon Fiber

Document ID: SOP-HCF-001

Version: 1.0

Effective Date: 2026-06-25

1. Objective

To provide a standardized procedure for the conversion of industrial hemp bast fiber into short, pyrolyzed carbon fibers suitable for use as reinforcing fillers in structural composites.

2. Materials and Equipment

- Pre-processed industrial hemp bast fibers (decorticated, cleaned).
- High-temperature tube furnace with inert gas capability (Argon or Nitrogen).
- Mechanical chopping mill (or industrial shredder).
- Precision scale.
- Quartz or Alumina furnace boats.

3. Procedure

3.1 Feedstock Preparation

Mechanical chop the raw hemp bast fibers to the desired length (e.g., 3-10mm). Ensure fibers are dried in an oven at 105°C for 24 hours to remove residual moisture before pyrolysis.

3.2 Loading

Distribute the chopped fiber uniformly in the furnace boat. Avoid overloading; a thin, even layer promotes uniform heat distribution and volatiles removal.

3.3 Pyrolysis Process

Load the boat into the furnace. Purge the furnace with Argon for 30 minutes to establish an oxygen-free environment.

Stage	Temperature	Ramp Rate	Dwell Time
Heating	Room Temp to 600°C	5°C/min	N/A
Carbonization	600°C - 900°C	2°C/min	120 min
Cooling	900°C to Room Temp	Controlled	Until < 50°C

3.4 Post-Processing

Remove the pyrolyzed carbon fiber from the furnace. Store in a desiccator to prevent environmental moisture uptake before integration into the resin matrix.

CAUTION: Pyrolysis produces flammable volatiles. Ensure the furnace exhaust is properly vented to an external scrubbing system. Do not open the furnace until the temperature is below 50°C to prevent oxidation of the carbon fiber.