

Gel Spinning Fiber Machine Specifications

Gel spinning is a process used to create high-performance fibers from polymer solutions that are gelled to form fibers with enhanced strength, stiffness, and other desirable properties. The gel spinning process is typically used for high-performance fibers like high density polyethylene (HDPE) and ultra-high molecular weight polyethylene (UHMWPE).

The gel spinning fiber machine is designed for the production of ultra-high-performance fibers from polymer gels with different conc. (1-10% by weight). The machine provides precise control over the polymer solution, gel formation, and fiber extrusion, ensuring the production of high-strength fibers with excellent mechanical properties.

Main Components and Parameters:

1. **Extruder-** The extruder is used to feed the polymer solution into the gelation bath. It provides accurate control over the extrusion rate and temperature.
Temperature: Ambient to 350°C
2. **Multiple Draw Zones:** Different zones for gradual drawing to enhance fiber properties.
3. **Spinneret:** Single hole spinneret (0.5-2mm) and we can also use Multi-hole spinneret. Spinneret is made up of material SS316 or Brass.
4. **Temperature Bath chamber** - Maintains optimal temperature for gel formation typically below room temperature.
5. **Winding Unit:** The fiber is wound onto spools after being drawn to its final dimensions.
6. **Take-Up Tension Control:** To prevent breakage and maintain consistent fiber diameter.
7. There is touch software panel to control the temperature, winder speed and take up speed.
8. **Stretching Unit:** The stretching unit in a gel spinning fiber machine is designed to elongate and align polymer chains, crucial for producing high-performance fibers.
Temperature: Ambient to 250°C
9. **Stretch ratio-** It can range from 2x to 6x, depending on the desired final properties. Multiple stages (2-4) with increasing tension for fiber elongation.
10. **Production Rate:** 1-100 kg/hr depending on fiber type or material.