

## Littleton Softening Point

**Automatic Softening Points in < 10 minutes !!  
Eliminate Operator Errors !!  
Improved Accuracy & Reproducibility !!**

### It's simple:

Load the fiber, start the test, and return in less than 10 minutes to read the Littleton Softening Point Temperature. *It's that easy!!*



### Orton Model SP-1000

(required computer system not shown)

The softening point of a glass is the most widely used production control parameter. Changes in the softening point temperature are indications of chemistry changes. According to ASTM C-338 the softening point temperature is the temperature at which a uniform fiber of glass (0.65 mm in diameter by 23.5 cm long) elongates under its own weight at a rate of 1.0 millimeters per minute when the upper 10 cm of its length is heated in a specified furnace at the rate of 5°C per minute. The Orton Model SP-1000 has been designed to automatically monitor the elongation of the sample fiber and calculate the Littleton softening point according to the ASTM C-338 method. In addition, the operator can modify the thermal cycle to suit other testing procedures such as rapid sample testing to meet high volume production QC demands.

**EASY:** The operator requires little training. After the test fiber is pulled to meet the ASTM specified dimensions, the operator simply places the fiber into the furnace, aligns the laser, clicks the START button on the computer monitor, and walks away. The operator is free to perform other tasks.

**FAST:** In less than ten minutes the Littleton Softening Point Temperature is displayed on the computer monitor. It is possible for one operator to test 50 fibers during a single 8-hour shift.

**ACCURATE, RELIABLE, and REPRODUCIBLE:** The laser system automatically monitors the elongation, the computer calculates the rate of elongation, and the computer determines the softening point temperature. **Operator differences, errors, and biases are eliminated.** With good fibers,  $\pm 1^\circ\text{C}$  is routine.

**FLEXIBLE:** The user can select the ASTM C-338 procedure, or modify the thermal cycle for individual testing requirements, such as high volume QC testing.

**POWERFUL:** The data acquisition software displays the test and conditions while the test is underway. The data review software shows the test results, and generates a report that automatically calculates the average temperature for a series of fibers.

**Description:** The Model SP-1000 Series System is comprised of a special furnace to heat the glass fiber; a thermocouple to monitor the glass fiber temperature, a laser system to monitor the elongation of the fiber, the Orton SP Control Console, and Orton SP Software. The system requires a personal computer system that is provided by the purchaser.

The heart of the Model SP-1000 Series is the special Orton SP Software. The software prompts the operator to select the mode of operation, and to insert the desired thermal cycle parameters.

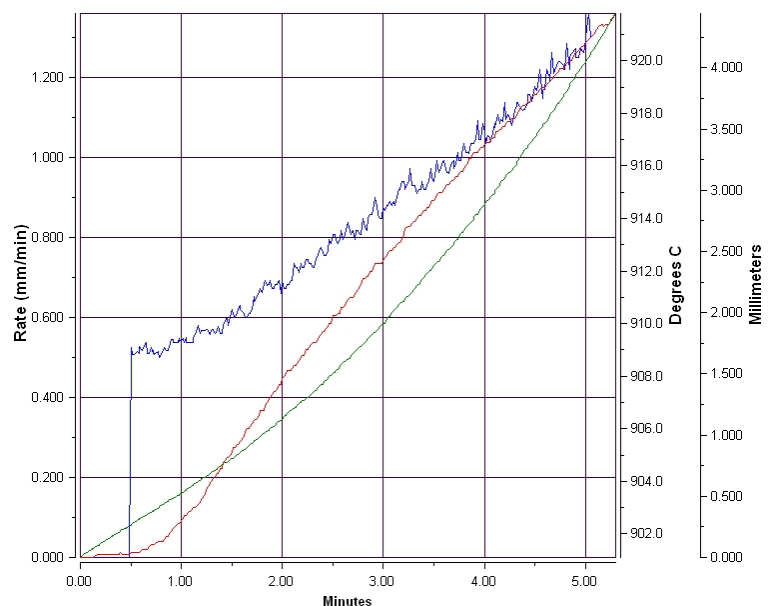
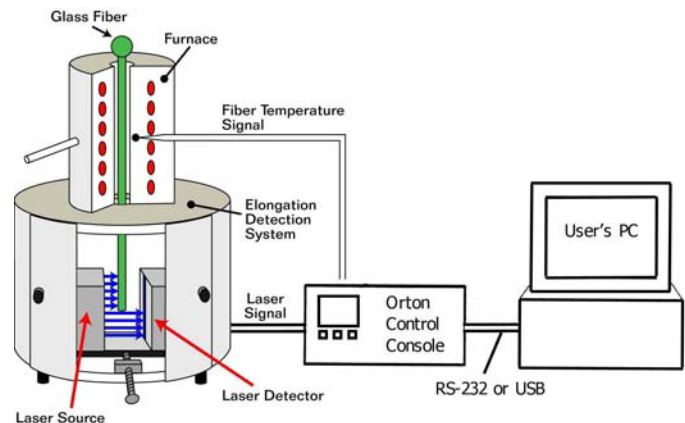
The software directs the PID controller to follow the thermal cycle, collects the data signals from the sample thermocouple and laser, displays the data on the computer monitor in real time, performs the appropriate calculations on the data, stores the data and calculations in a text file on the hard drive, and waits for the operator to begin the next test. The software also opens past data files for post testing review, analysis, and report generation.

**Operation:** The furnace is initially heated to an equilibrium soak temperature, and waits for the test fiber. After the fiber is inserted and aligned, the test is begun. The Orton software sends information to the SP Control Console, and the furnace is heated according to the predetermined thermal cycle. As the temperature increases and the fiber elongates, the laser system follows the tip of the elongating fiber and continuously sends its signal to the computer. The software calculates the elongation rate as a function of time, and concludes the test once the elongation rate exceeds a predetermined rate. The software selects the temperature at the target elongation rate (1.00 millimeters per minute for the ASTM C-338 mode) and displays that softening point temperature until the system is reset. The furnace cools to the next beginning temperature, and the system waits for the next test fiber.

**Data Acquisition:** The graph at the right is the real time display of the test procedure. The computer continuously monitors and displays the laser and thermocouple outputs, and calculates and displays the rate of elongation:

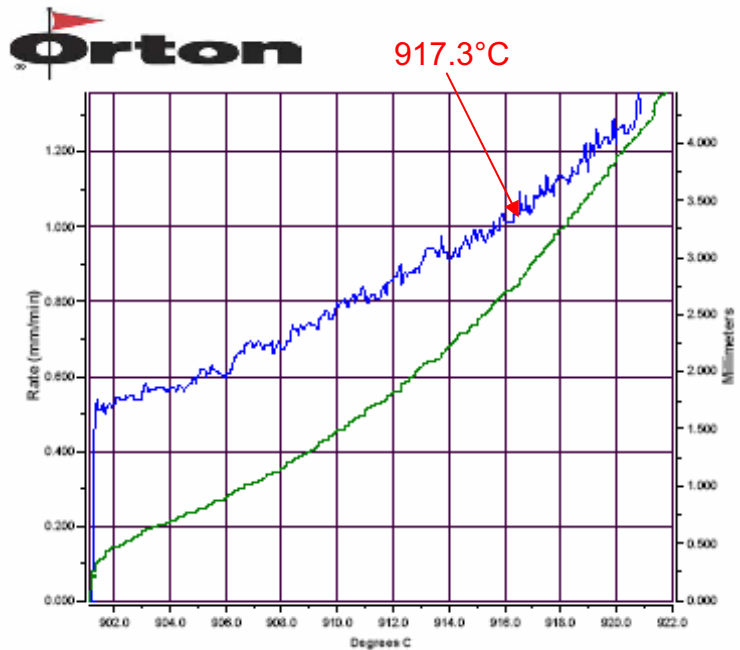
- Fiber elongation (green curve)
- Temperature (red curve)
- Rate of elongation (blue curve)

This process is performed **WITHOUT** the operator, so **OPERATOR ERRORS** in data acquisition are **ELIMINATED !!**



(continued on the next page)

**Data Analysis:** At the end of the test, the computer software plots the elongation rate data versus temperature, and determines the temperature at which the rate of fiber elongation is 1.0 mm/minute. This analysis is performed **WITHOUT** the operator, so **OPERATOR ERRORS** in data analysis are **ELIMINATED !!**



Softening Point	File Name
917.3	TestFiber.txt
917.8	Average

**Operating Modes:** The Orton SP Software prompts the operator to select one of two modes of operation: the ASTM C-338 Mode, or the User Defined Mode. The User Defined Mode follows the guidelines of the ASTM C-338 Mode, but allows the operator to change the test parameters (the starting temperature for each test, the heating rate for the data collection period, and the target elongation rate) to suit individual testing requirements.

**Data Review:** The Orton software will display and store the fiber elongation, elongation rate, time, and temperature. The data is saved in a text file on the hard drive, and is available for post testing review, analysis, and permanent storage. The user can select a series of test files and generate a report that automatically averages the softening point temperatures for that series of tests.

#### Standard Model SP-1000 Series Specifications

	Model SP-1000	Model SP-1100
Maximum Testing Temperature	900°C	1,000°C
Heating Element	AerOcoax Heater Cable on SS core	Kanthal A1 wire on ceramic tube with Inconel core
Thermocouple	Type "S"	Type "S"
Temperature Control System	PID – Automatic	PID – Automatic
Elongation Tracking System	Laser – Automatic	Laser – Automatic
Data Acquisition & Display	Automatic	Automatic
Power Requirements	120 VAC, 5 amp, 50/60 Hz (240 VAC available as an option)	
Computer Requirements	Provided by the Purchaser - PC system with English language version of Windows 2000/XP, with available RS-232 or USB port (must specify)	
Measuring Unit Dimensions	10" Wide x 10" Deep x 15" Tall (250 x 250 x 380 mm)	
SP Control Console Dimensions	18" Wide x 12" Deep x 5" Tall (460 x 305 x 130 mm)	

Models SP-1000 and Model-1100 Systems are designed to test glass fibers according to the dimensions specified in ASTM C338 (235 millimeters long by 0.65 millimeters diameter).