



CHANDLER ENGINEERING

Model 5600

Shear History Simulator

The Chandler Engineering Shear History Simulator (SHS) is a system designed to prepare and load water-based fracturing fluids dynamically into rotational viscometers. The fluid is pumped through a series of capillaries at various rates and durations in order to simulate pumping conditions experienced during fracture stimulation treatments.

The Chandler Engineering SHS consists of a pressurized fluid reservoir, two injection pumps and three capillaries. Each capillary is 120 ft long with 0.085 inch ID. A valve panel with a graphical representation of flow paths allows the user to configure the instrument to simulate a broad range of conditions.

A gel base fluid is placed into a pressurized supply reservoir to deliver fluid to the suction of the injection pump. Quick couplings and flexible hoses make this a quick and easy connection. Pressure is applied to the reservoir via an air regulator mounted on the front panel.

The base gel injection pump is a high pressure triplex pump. It has stainless steel construction for corrosion resistance. The pump is driven by a gear motor and is controlled by a frequency drive controller and can deliver 0-100 ml/min. The crosslinker additive pump is a stainless steel HPLC pump capable of delivering 0-9.99 ml/minute.

The two fluids are first combined in a micro-volume mixing tee, which flows directly into a multi-element kinetic mixer for thorough homogenization.

Pressure transducers are located at the entrance and exit of each capillary to accurately monitor fluid behavior. Digital indicators display each pressure on the front panel.

The system can be operated manually as a stand-alone unit, or can be run from the Chandler Engineering SHS software. The software monitors and records all measured parameters such as pump rate and pressure. The software displays the time required to propagate through the system and load the proper sample volume into the cup.



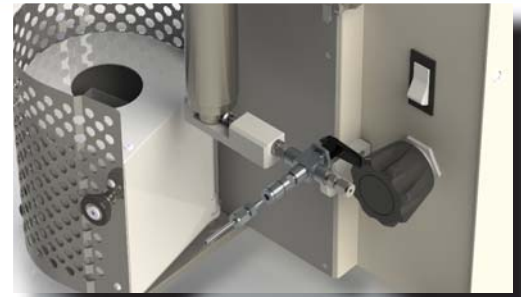
FEATURES

BENEFITS

- * 2,500 psi operating pressure (17.2 mPa)
 - Pressurized environment
- * 360 ft capillary tubing
 - Maximum shear length
- * 0-100 ml/min circulation pump
 - High shear rates 1680 sec⁻¹
- * 0-9.99 ml/min injection pump
 - Precise control of cross linker injection
- * Transfer Shuffle Valve
 - Transfer under pressure to Chandler 5550 Viscometer
- * Kinetic Mixer
 - Thorough homogenization of gel and cross linker

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The connection to a rotating viscometer cup is made via a shuttle valve as pictured. This valve arrangement allows the viscometer sample cup to load dynamically.



Shear History Simulator System Worksheet

Shear Rate	<input type="text" value="1688"/>	1/sec	Pump A	<input type="text" value="99.96"/>	mL/min	Tubing ID	<input type="text" value="0.2159"/>	cm
X-linker % (B/A)	<input type="text" value="0.1"/>	%	Pump B	<input type="text" value="0.10"/>	mL/min	Volume	<input type="text" value="0.0388096"/>	mL/cm
Sample Volume	<input type="text" value="42"/>	mL				Total Rate	<input type="text" value="100.06"/>	mL/min
Time At Shear	<input type="text" value="00:04:00.8"/>	hh:mm:ss	Load Time	<input type="text" value="25.2"/>	s	Capillary Length	<input type="text" value="10972.8"/>	cm

Directions:

1. Enter values in green boxes
2. Program pumps to rate value shown in blue
3. "Loading Duration" is exact time required for proper fill level

Specifications

Operating Conditions:	Ambient room temp
Maximum Operating Pressure:	2,500 psi (17.2 mPa)
Pressure Relief Settings:	2,500 psi
Reservoir:	110 psi
Capillaries (3):	0.085 ID (2.16mm)
	120' long each
Gel pump:	0-100 ml/min
Additive pump:	0-9.99 ml/min
Max shear rate:	1,680 sec-1
Wetted Materials:	316 Stainless Steel
Dimensions:	33'(84 cm) WX 22"(56 cm) H X 24" (61 cm) D
Net Weight:	135 lbs (61kg)
Shipping Weight:	200 lbs (91kg) approximate

Utilities

Input Voltage:	200- 240 VAC; 50/60 Hz Single Phase
Input Air:	up to 250 psi



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