



STATIC SHEAR TESTER
MODEL SS-RT-10, SS-HT-8 & SS-HT-30
OPERATING INSTRUCTIONS

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PRODUCT DESCRIPTION

Congratulations on the purchase of your new ChemInstruments Static Shear Tester. This versatile, user-friendly, carefully designed instrument allows you to determine shear values of adhesive laminates.

Shear testers are used to measure the length of time it takes for adhesive samples to fail in shear mode. Shear testers consist of a Shear Bank to hold the samples in place and a Timer Box to record the time interval, in minutes, of the specific test.

All units are designed to meet or exceed the requirements of specific test methods for shear testing, including but not limited to the following: PSTC-107 Procedure A, ASTM D 3654 Procedure A, FINAT – FTM 5 & 8, and AFERA 4012 P2.

Units designed for use in ovens and designated by the term “High Temperature” in their description, (models SS-HT-8 & SS-HT-30) are designed to meet or exceed the requirements of specific test methods, including but not limited to the following: PSTC -7 Procedure C, ASTM D 3654 Procedure C, FINAT FTM-5, and AFERA 4019 P2 & 4020 P2.

SPECIFICATIONS

Electrical	120/240 VAC, 50/60 Hz, 1 amp
Timer Box/SS-RT-10 Operating Temperature	32 – 150 degrees Fahrenheit (0 – 70 degrees Celsius)
Humidity	0 – 55% relative humidity
Time Measurement Tolerance	+/- 1 minute over 24 hours
Physical Dimensions (SS-HT-30)	Width: 38 inches (96 centimeters) Depth: 13 inches (33 centimeters) Height: 22 inches (56 centimeters) Weight: 90 pounds (41 kilograms)
Physical Dimensions (SS-HT-8)	Width: 16 inches (41 centimeters) Depth: 9 inches (23 centimeters) Height: 16 inches (41 centimeters) Weight: 28 pounds (13 kilograms)
Physical Dimensions (Timer Box)	Width: 11 inches (28 centimeters) Depth: 8 inches (20 centimeters) Height: 3 inches (8 centimeters) Weight: 3 pounds (1.4 kilograms)
Physical Dimensions (SS-RT-10)	Width: 39 inches (99 centimeters) Depth: 7 inches (18 centimeters) Height: 18 inches (46 centimeters) Weight: 43 pounds (19 kilograms)

UNPACKING

ChemInstruments has made every effort to ensure that the Shear Tester arrives at your location without damage. Carefully unpack the instrument and check for any damage that may have occurred during shipment. If any damage did occur during transit, notify the **carrier** immediately.

The ChemInstruments Static Shear Tester consists of the following parts:

- Shear Bank (8, 10, or 30)
- Timer Box (10 bank is self-contained)
- Envelope with manual

Make sure all of these components are present before discarding the packaging material.



ASSEMBLY

Carefully remove the Shear Bank and Timer Box from the packaging and set them on a sturdy bench top. Check the physical dimensions listed previously for the space required for the instrument. As with any precision piece of laboratory equipment, it is preferable to locate the Timer Box in an area where temperature and humidity are controlled to standard conditions of $72 \pm 2^{\circ}\text{F}$ and $50 \pm 5\%$ relative humidity.

High Temperature Shear Testers are designed to place only the Shear Bank in an oven. The matching Timer Box is to be connected to the Shear Bank by the provided cable. Make sure the appropriate cable is connected to the matching connector on the Shear Bank.

The ChemInstruments Shear Tester is now ready for calibration and use. Before proceeding with calibrating the Shear Tester, it is advisable to become familiar with the Key Components of the Shear Tester. These Key Components and a brief description of their function follow in the next section.

Connect the power cord to its receptacle on the backside of the Timer Box. Complete the connection by inserting the male end of the power cord into a convenient AC outlet. Notice that the on/off power switch is located directly next to the power cord receptacle.



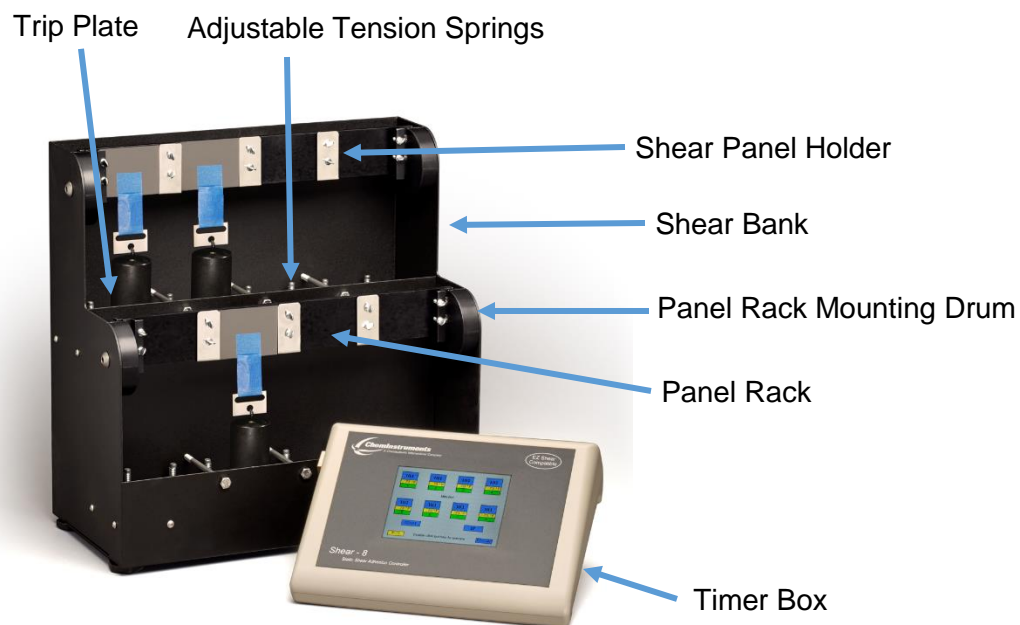
SS-HT-8



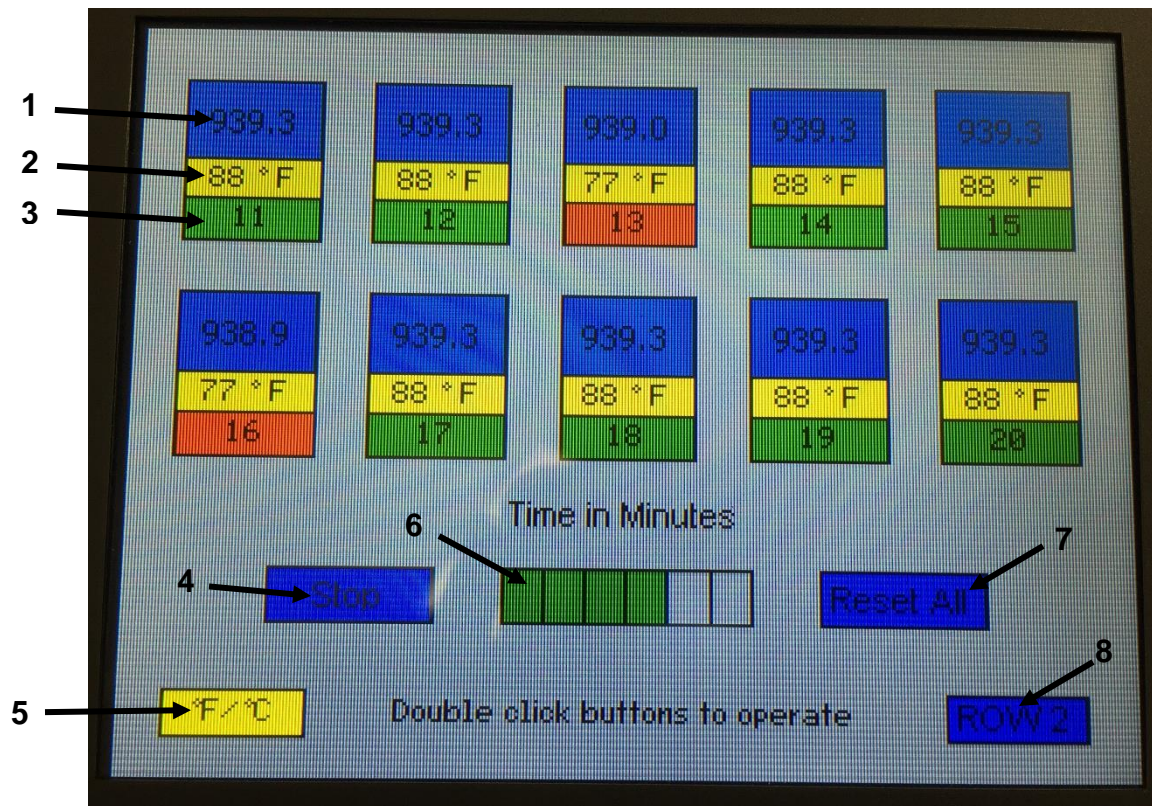
SS-HT-30

KEY COMPONENTS

- **SHEAR BANK** consisting of 8, 10, or 30 shear test stands including panel holder, trip plate, panel rack, and mounting drum.
- **TIMER BOX** displays test bank position, time. Temperature is only displayed with the optional Thermocouple accessory.
- **SHEAR PANEL HOLDER** mounted chrome clips providing a bracket to hold shear panels in place for testing purposes.
- **PANEL RACK** consisting of horizontal flat bar providing mounting points for the Shear Panel Holders.
- **PANEL RACK MOUNTING DRUM** consisting of cylinder shaped mounting points for the Panel Rack.
- **TRIP PLATE** steel plate mounted below shear station to provide switch action when the test weight (not included) drops.
- **ADJUSTABLE TENSION SPRINGS** consisting of two coil type springs providing tension for the movement of Trip Plate.

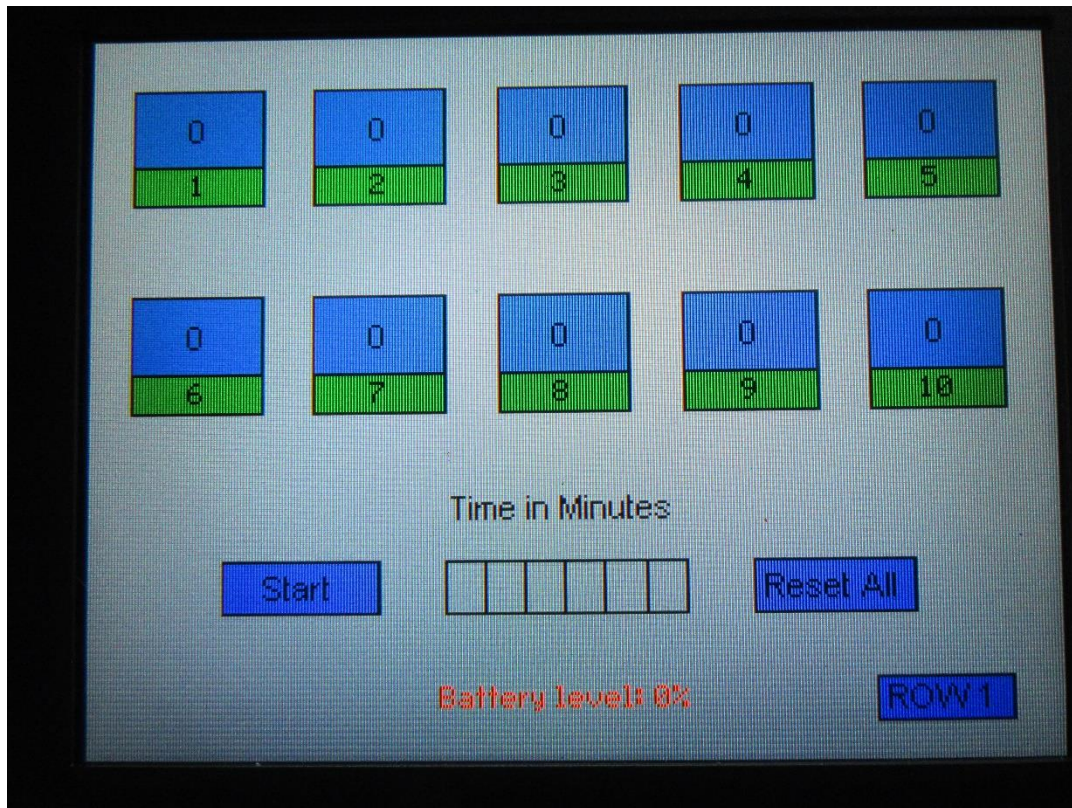


TIMER BOX SCREEN



1. **TIME DISPLAY:** Displays time in minutes. Double clicking a Test Bank's Time Display will reset the time to zero for that Test Bank. Maximum time value is 99,999 minutes.
2. **TEMPERATURE DISPLAY:** *ONLY IF OPTIONAL THERMOCOUPLE IS PURCHASED.* Displays the current temperature during testing. Once a test has ended, the temperature recorded at the end of the test will be displayed.
3. **TEST BANK POSITION:** Indicates the Test Bank position. The field is green during testing to show a test is in progress. Once a test is completed, the field will turn red to show the test is over.
4. **START/STOP:** Starts or Stops a test.
5. **TEMPERATURE CONVERSION:** Only displays if using the *OPTIONAL THERMOCOUPLE*. Converts temperature display from Fahrenheit to Celsius.
6. **TIME IN MINUTES:** Cells light up every second, in succession, to indicate the timer is counting.
7. **RESET ALL:** Resets all Time Displays to zero.
8. **ROW:** Button only appears on the SS-HT-30 model. Scrolls between rows 1, 2 & 3 of the Shear Bank.

BATTERY FUNCTION



The Shear testers contain a 9 volt battery that is used to allow a test to continue in case of a power outage. The display on the Shear tester will be black while running on battery. A new battery can continue testing for 2-3 hours after loss of power.

The battery voltage is monitored by the control board in the Shear tester. When the voltage becomes low, there will be a warning message that the battery level is 20%. This is the time that you should replace the battery. When the battery level is such that it will not continue testing after a loss of power then a message will be displayed that the battery level is 0%.

The battery tray is located on the back of both the SS-RT-10 and the Timer boxes.

THEORY OF OPERATION

All shear testers are used to measure the time for adhesive samples to fail in shear mode. In accordance with a test method, samples are prepared, applied to a standard test surface, and subjected to a constant gravity force. The time it takes for the sample to fail by falling off the test surface is measured and recorded for determination of performance of the adhesive in a shear position.

SHEAR BANK CALIBRATION

It is important to calibrate the Shear Bank before testing. The majority of shear test methods require a 2 degree back angle to vertical for proper position to conduct a shear test. The following procedure provides information and method for setting your Shear Bank correctly to perform a shear test.

CALIBRATION PROCEDURE

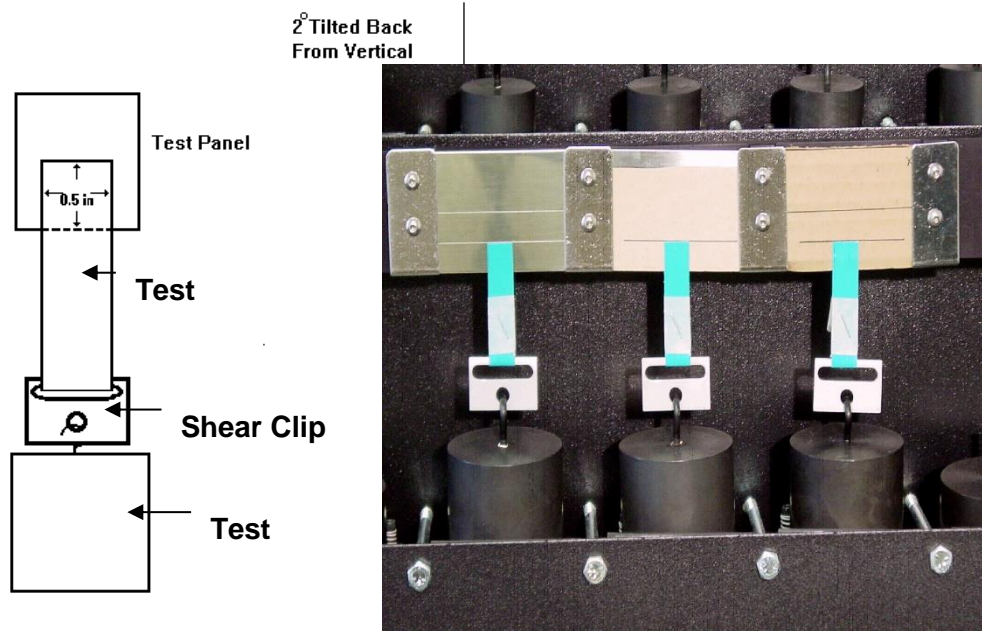
1. With the aid of a level, use the adjustable feet at the four corners of the Shear Bank to position the Shear Bank level in both the front to back and left to right directions.
2. Using an Angle/Level adjust the Panel Rack so that there is a 2 degree backward angle from vertical. There are score marks on the Panel Rack Mounting Drum indicating the proper angle. These marks were set in the factory for a two degree angle with the Shear Bank level.
3. The Adjustable Tension Springs are tighten completely down for shipping. These springs provide the tension to hold the Trip Plate in the up or off position when a test weight is not present. With an allen wrench the socket head bolt holding each spring can be adjusted to allow the Trip Plate to close with as little as a 100 gram test weight. Turn the bolt counter clockwise to loosen the spring tension and enable lower weights to cause the Trip Plate to close.

Your shear bank is now positioned correctly for use in doing shear testing.

RUNNING A TEST

There are numerous test methods for conduction shear test published by many agencies. The most common of these require preparing either a ½ inch or 1 inch wide sample.

1. Cut the sample approximately 2.5 inches long and apply the sample according to test method to the shear panel (part # TP-23, not included).
2. Typically methods call for a 4.5 pound roller (part # HR-100, not included) to be used in applying the sample to the shear panel.
3. The sample's opposite end is then looped through a Shear Test Clip (part # STC-100, not included) and stapled or taped back on itself without disturbing the affixed portion of the sample.
4. The test panel, sample and shear clip are then loaded into the Panel Holder on the Shear Bank.
5. Hook the test weight onto the Shear Test Clip.
6. Double click the Reset All button on the Timer Box.
7. Double click the Start button on the Timer Box.



NOTES:

- An alternate method to start testing is as follows:
 1. Set test weights on trip plates. Verify that the TEST BANK POSITION on the Timer Box is red indicating that the test weight has tripped the switch.
 2. Prepare test samples and load into panel holder as described above.
 3. Double click the Reset All button on the Timer Box.
 4. Double click the Start button on the Timer Box. Counting will begin. However, if a TEST BANK POSITION is red, the TIME DISPLAY will not be incremented every one tenth of a minute.

5. Hook the test weight onto the Shear Test Clip. The TEST BANK POSITION will become green and the TIME DISPLAY for that bank will start counting.
- Once a test weight falls onto the trip plate, the TEST BANK POSITION becomes red. The TIME DISPLAY will remain at the time that the trip occurred even if the test weight is removed.
 - To clear the TIME DISPLAY, double click the bank's TIME DISPLAY.

MAINTENANCE

TROUBLESHOOTING

The troubleshooting chart describes some problems that may occur over time. After determining the problem, follow one of the following maintenance procedures.

Table 1 – Troubleshooting Chart

Problem	Possible Cause	Procedure
Timer not counting	Switch is defective.	Replace with new switch. (See item A below)
Timer does not stop	Landing platform spring tension too tight.	Adjust spring tension on landing platform. (See item B below)
	Switch lever bent down.	Bend switch lever back into place. (See item C below)

MAINTENANCE PROCEDURES

After determining the problem, the cause must be determined and the proper procedure followed. Following are the proper maintenance procedures:

A. To replace a switch:

1. Eight bank units: Lay the unit on its back. Remove the base of the unit. This allows access to the switches. Loosen the screws holding the wires, and then remove the screws holding the switches in place using a $\frac{5}{64}$ " Allen key. After bending the lever on the new switch (See Below - "D"), install the new switch. Make sure the wires are connected to the proper terminals, then replace the base and tighten all the screws.
2. Ten bank units: Remove eight (8) screws holding the face panel in place and carefully lower the face panel. Do not pull any wires loose from their connections! Lay the unit on its back to allow easier access to the switches. Loosen the screws holding the wires, and then remove the screws holding the switches in place using a $\frac{5}{64}$ " Allen key. After bending the lever on the new switch (See Below - "D"), install the new switch. Make sure the wires are connected to the proper terminals, and then replace the face panel.

3. Thirty bank oven units: Lay the switch bank on its back. Remove the base of the unit. This allows access to the switches. Loosen the screws holding the wires, and then remove the screws holding the switches in place using a $\frac{5}{64}$ " Allen key. After bending the lever on the new switch (See Below - "D"), install the new switch. Make sure the wires are connected to the proper terminals, and then replace the base.

B. To adjust spring tension: Using a $\frac{9}{64}$ " Allen key, turn screw clockwise to increase tension. Turn screw counter-clockwise to decrease tension. [NOTE: Increasing tension will raise the Trip Plate from the switch lever, making it necessary to use heavier weights to trip the switch. Decreasing the tension will have the opposite effect.] (See Figure A – Trip Plate)

C. To bend switch lever: Using a $\frac{9}{64}$ " Allen key, remove both screws with springs and lift off landing platform. Press down near the rear of the lever while bending up the front end. To test if it has been bent correctly, install the landing platform and screws, and then set a weight on the panel. If the weight trips the switch, the lever has been bent correctly. This procedure may have to be repeated until the lever is adjusted properly. (See Figure B – Lever Adjustment)

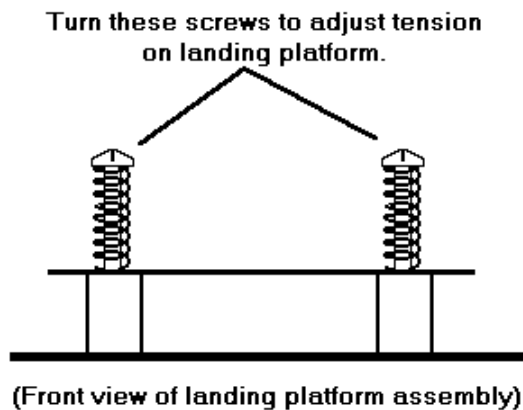


Figure A – Trip

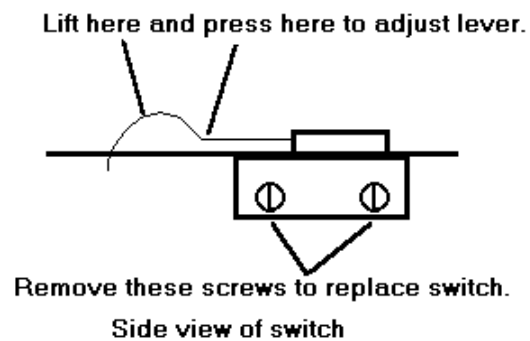


Figure B – Switch Lever Adjustment

CLEANING THE TOUCH SCREEN

It's important to realize the touch panel is sensitive to chemicals.

Specific Cleaning Information: Use a soft, lint-free cloth. The 3M Microfiber Lens Cleaning Cloth is especially recommended for cleaning touch panels without requiring liquid cleaner. The cloth may be used dry or lightly dampened with a mild cleaner or Ethanol. Be sure the cloth is only lightly dampened, not wet. Never apply cleaner directly to the touch panel surface; if cleaner is spilled onto touch panel, soak it up immediately with absorbent cloth. Cleaner must be neither acid nor alkali (neutral pH). When using cleaner, avoid contact with the edges of the film or glass, and with the flex tail. Wipe the surface gently; if there is a directional surface texture, wipe in the same direction as the texture. Never use acidic or alkaline cleaners, or organic chemicals such as: paint thinner, acetone, toluene, xylene, propyl or isopropyl alcohol, or kerosene. Suitable cleaning products are commercially available pre-packaged for use; one example of such a product is **Klear Screen™** or commercially available off-the shelf retail brands such as **Glass Plus® Glass and Surface Cleaner** made by Reckitt-Benckiser. Use of incorrect cleaners can result in optical impairment of touch panel and/or damage to functionality.

Note: Most products contain 1-3% Isopropyl Alcohol by volume, which is within acceptable limits for Resistive Touch Panel cleaning use.

Caution: Many products contain Ammonia, Phosphates, and/or Ethylene Glycol, which are NOT ACCEPTABLE; check product content label carefully.

EZ SHEAR SOFTWARE

OVERVIEW

Congratulations on the purchase of your new ChemInstruments EZ Shear Software. The EZ Shear Software works with ChemInstruments SS-HT-8, SS-RT-10, and SS-HT-30 Shear Testers. The software will allow you to:

- Store test data
- Recall data from previously saved tests
- Graph test data
- Generate reports

ChemInstruments - EZ Shear

File Tools Admin Help

ChemInstruments EZ Shear

Test Information

Sample Description Test Area

Test Method Weight

Operator Name Panel Type

Load Data

Calculate

Graph

<input type="checkbox"/>	Position	Time (minutes)	Temp	Status	Failure Mode	Comments
<input type="checkbox"/>	1					
<input type="checkbox"/>	2					
<input type="checkbox"/>	3					
<input type="checkbox"/>	4					
<input type="checkbox"/>	5					
<input type="checkbox"/>	6					
<input type="checkbox"/>	7					
<input type="checkbox"/>	8					
<input type="checkbox"/>	9					
<input type="checkbox"/>	10					

Test Results

Avg Max Min Std Dev

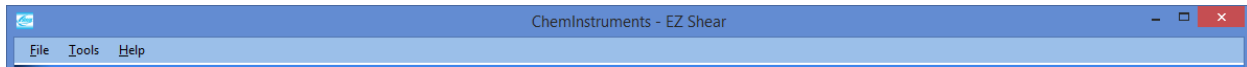
Filename Date/Time

Notes

SPECIFICATIONS

System Requirements	Personal computer operating Microsoft Windows 7, Windows 8, or Windows 10. Pentium processor, 1 GHz or higher. Minimum screen resolution: 1280 x 768 1 available USB port. 4 GB of RAM. 50MB of hard drive space.
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TOOL BAR



FILE

- **NEW** – Clears any data from the screen.
- **OPEN** – Opens a previously saved test.
- **SAVE** – Saves the test displayed on the screen.
- **PRINT** – Prints either the Table or Graph or both.
- **EXIT** – Exits the program.

TOOLS

- **EXPORT TO EXCEL** – Allows test data to be saved to Excel. See Figure C – Sample Excel Output Format.
- **ENTER AUTHORIZATION CODE** – Each Shear Tester must be authorized to work with the EZ Shear Software. The software allows for the user to use the software as a trial for 5 tests prior to authorization. Enter the authorization code and click OK or hit the Enter key.
- **READ CURRENT SYSTEM TEMPERATURE – ONLY IF OPTIONAL THERMOCOUPLE IS PURCHASED.** Displays the current temperature measured by the thermocouple (the thermocouple must be connected to the Shear Tester).
- **READ BATTERY VOLTAGE** – Displays the current voltage level of the battery backup.
- **CALIBRATE THERMOCOUPLE – ONLY IF OPTIONAL THERMOCOUPLE IS PURCHASED.** Calibrates the thermocouple (thermocouple must be connected to the Shear Tester). Enter the password and click OK or hit the Enter key.
- **CALIBRATE TOUCHSCREEN** – Calibrates the touchscreen display on the SS-RT-10, SS-HT-8, SS-HT-30, or SS-OSI-8. After the calibration is complete, the display will go blank and the power to the touch screen will need to be recycled.
- **DISCONNECT SHEAR STAND** – Shutdown the communication between the shear equipment and the EZ Shear program.
- **RESET SHEAR STAND CONNECTION** – This will attempt to re-connect the connection to the SS-RT-10, SS-HT-8, SS-HT-30, or SS-OSI-8.

ADMIN

- **COMPANY NAME** – The reports for the Data Table and Graph printouts display a name in the upper left corner. The name is set to default as ChemInstruments. Type in the desired name and click OK or hit the Enter key.

- **STANDARD DEVIATION OPTIONS** – Allows the user to select which type of standard deviation formula to use, either sample or population based. Past versions of EZ Shear strictly used the population based formula.

HELP

- **MANUAL** – Opens a digital copy of the manual for Shear Testers and EZ Shear Software.
- **ABOUT** – Displays the model number of machine connected (if applicable) and version number of the software.

test-001.xlsx - Excel

Sample Description:

1	Sample Description:	Testing				
2	Test Method:	PSTC 107				
3	Operator Name:	Angle				
4	Test Area:	1/2 in x 1/2 in				
5	Weight:	300 grams				
6	Panel Type:	Stainless Steel				
7						
8						
9	Position	Time(min)	Temp	Status	Failure Mode	Comments
10	1	5.9	75 °F	Running		
11	2	5.9	75 °F	Running		
12	3	5.9	75 °F	Running		
13	4	1.4	86 °F	Complete	Cohesive	failure right away
14	5	5.9	75 °F	Running		
15	6	5.9	75 °F	Running		
16	7	5.9	75 °F	Running		
17	8	5.9	75 °F	Running		
18	9	5.9	75 °F	Running		
19	10	5.9	75 °F	Running		
20	11	5.9	75 °F	Running		
21	12	5.9	75 °F	Running		
22	13	5.9	75 °F	Running		
23	14	5.9	75 °F	Running		
24	15	5.9	75 °F	Running		
25	16	1.7	84 °F	Complete	Cohesive	failed right away
26	17	5.9	75 °F	Running		
27	18	5.9	75 °F	Running		
28	19	5.9	75 °F	Running		
29	20	5.9	75 °F	Running		

test-001.xlsx - Excel

Sample Description:

30	21	5.9	75 °F	Running		
31	22	5.9	75 °F	Running		
32	23	5.9	75 °F	Running		
33	24	2	81 °F	Complete	Cohesive	failure
34	25	5.9	75 °F	Running		
35	26	5.9	75 °F	Running		
36	27	5.9	75 °F	Running		
37	28	5.9	75 °F	Running		
38	29	5.9	75 °F	Running		
39	30	5.9	75 °F	Running		
40						
41						
42	Average:	5.48				
43	Max:	5.9				
44	Min:	1.4				
45	Std Dev:	1.26				
46						
47	Notes:					
48	Test looks good.					
49						
50	Date/Time:	5/10/2016 12:51				
51	Filename:	C:\EZ Shear\TestData\test051016-001.dat				
52						
53						
54						
55						
56						
57						
58						

Figure C – Sample Excel Output Format

TEST INFORMATION

Test Information			
Sample Description	<input type="text"/>	Test Area	<input type="text"/>
Test Method	<input type="text"/>	Weight	<input type="text"/>
Operator Name	<input type="text"/>	Panel Type	<input type="text"/>

- **SAMPLE DESCRIPTION** – Enter a description of the sample and click OK or hit the Enter key.
- **TEST METHOD** – Enter your own test method or choose from the preselected list and click OK or hit the Enter key.
- **OPERATOR NAME** – Enter a description of the sample and click ok or hit the Enter key.
- **TEST AREA** – Enter your own test area or choose from the preselected list and click OK or hit the Enter key.
- **WEIGHT** – Enter your own weight or choose from the preselected list and click OK or hit the Enter key.
- **PANEL TYPE** – Enter your own test method or choose from the preselected list and click OK or hit the Enter key.

Test Method

- ASTM D4498
- PSTC 107
- PSTC 14
- PSTC 17
- AFERA 5012
- FINAT FTM 8
- EN 1943
- Other

OK Cancel

Test Area

All parameters are listed as Width x Height

- 12 mm x 12 mm
- 24 mm x 24 mm
- 12 mm x 24 mm
- 1/2 in x 1/2 in
- 1 in x 1 in
- 1/2 in x 1 in
- Other

OK Cancel

Weight

- 2000 grams
- 1000 grams
- 500 grams
- 300 grams
- 250 grams
- 200 grams
- 100 grams
- Other

OK Cancel

Panel Type

- Stainless Steel
- Glass
- PP
- PC
- HDPE
- ABS
- Other

OK Cancel

TEST DATA

<input type="checkbox"/>	Position	Time (minutes)	Temp	Status	Failure Mode	Comments
<input type="checkbox"/>	1					
<input type="checkbox"/>	2					
<input type="checkbox"/>	3					
<input type="checkbox"/>	4					
<input type="checkbox"/>	5					
<input type="checkbox"/>	6					
<input type="checkbox"/>	7					
<input type="checkbox"/>	8					
<input type="checkbox"/>	9					
<input type="checkbox"/>	10					

- **LOAD DATA** – Click to load the test data from the Shear Tester.
- **CALCULATE** – Click to calculate the selected positions desired for statistics and graph.
- **GRAPH** – Displays a graph of the selected positions.
- **DATA TABLE** – Changes the screen back to the Data Table from the graph.
- **ZOOM** – Displays an enlarged version of the graph.
- – Click to select/unselect all positions. Click the box next to an individual position to select/unselect individual positions. Selected positions will be used in calculations and graph.
- **POSITION** – Displays the position of the test on the Shear Bank.
- **TIME (MINUTES)** – Displays the duration of the test in minutes.
- **TEMP** – ONLY IF OPTIONAL THERMOCOUPLE IS PURCHASED. Displays the temperature recorded at the completion of the test. If no thermocouple is being used for testing, the field will display NA.
- **STATUS** – Indicates if a test is COMPLETED or RUNNING.
- **FAILURE MODE** – Enter your own failure mode or choose from the preselected list and click OK or hit the Enter key.
- **COMMENTS** – Enter a comment and click OK or hit the Enter key.

Failure Mode

Cohesive
 Adhesive
 Transfer
 Other

OK Cancel

Comments

OK Cancel

TEST RESULTS

Test Results

Avg Max Min Std Dev

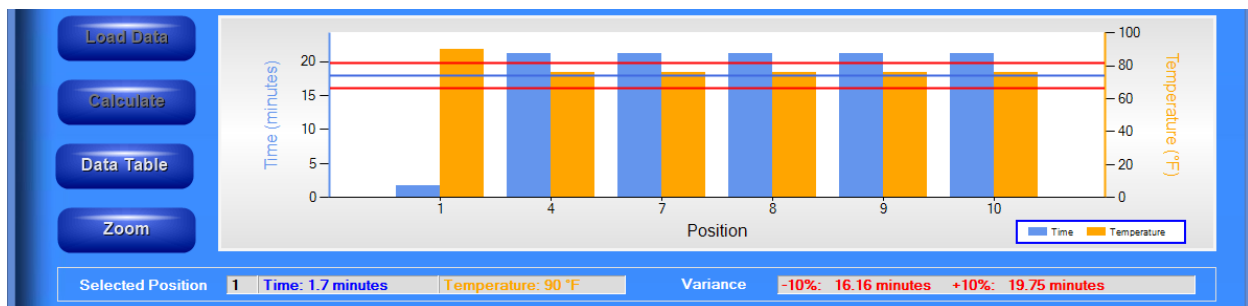
Filename Date/Time

Notes

To display the test results, select one or more positions and click the Calculate button.

- **AVG** – Displays the average from all of the selected test positions.
- **MAX** – Displays the maximum from all of the selected test positions.
- **MIN** – Displays the minimum from all of the selected test positions.
- **STD DEV** – Displays the standard deviation of all of the selected positions.
- **FILENAME** – Displays the file name if the file has been saved.
- **DATE/TIME** – Records the date and time the test data was saved.
- **NOTES** – Enter any desired notes and click OK or hit the Enter key.

GRAPH SCREEN



- **SELECTED POSITION** – Click on any of the positions on the graph and the position, time, and failure temperature will be displayed in the field.
- **VARIANCE** – Enter your own variance or choose from the preselected list and click OK or hit the Enter key. Entries must be whole numbers between 5-30%.
- **DATA TABLE** – Changes the screen back to the Data Table from the graph.
- **ZOOM** – Opens a larger version of the graph.

% Variance

+/- 10%
 +/- 20%
 +/- 30%
 Other

Range is 5% - 30%
Incremented by 1
No decimal points

OK Cancel

View of the enlarged graph using the ZOOM button.

