

MSA1 Film/Fiber Tension/Compression Testing Operating Procedure

TA Instruments RSAIII Micro-Strain Analyzer

See RSA3 User Manual (pdf file located on computer desktop)

Start-Up

1. Log in usage using the SMIF web site
 - a. You may need to log into Windows on the MSA1 computer. If this is the case, choose the SMIF user and use SMIF as the password
2. Turn on air supply
3. Turn on the power switch located on the back left side of the tool
4. Open the TA Orchestrator software on the computer
5. Turn the transducer motor on and set oven temperature (if desired)
 - a. Select **Instrument Control Panel** from the **Control** pull-down menu
 - b. Click Motor Power On button
 - c. If you want to use the oven for the measurement:
 - i. Set temperature control to Oven
 - ii. Type in the desired temperature(25C – 600C)
 - d. Click OK

Tool and Sample Mounting (see pages 93-96 in RSA3 User Manual)

6. Select **Gap Control Panel** from the **Control** pull-down menu and click on **Send to Top** to raise the motor to the tool loading position.
7. Click on **Offset Force to Zero**
8. Mount the upper and lower Fiber/Film tools on the actuator shafts. The longer piece is mounted on the top and the shorter piece is mounted on the bottom.
9. Verify that the Force in the Gap/Instrument Control panel reads about -97.0gm with the longer Fiber/Film tool mounted on top. *If the force value is different than this, contact SMIF to perform a tool mass calibration.*
10. Click on **Offset Force to Zero** to zero the normal force on the motor with no sample present
11. Using the stepper control buttons on the ride side of the instrument, lower the stage to a point where the upper and lower tools are close but not touching.
12. Click on **Zero Fixture** button to determine the zero point for the Fiber/Film tools.
Note: The fixture should be zeroed at the temperature you will run the experiment.
13. Enter the desired **Commanded Gap** and **Max allowed Force** based on your sample geometry. Commanded gap is the desired approximate sample length for the measurement. Typical values for tensile testing are 10mm for the gap and 500g for the force.
14. Click on **Set Gap** to move the stage to the approximate desired sample length.
15. Mount the sample
 - a. Loosen the screws and place the sample between the jaws of the upper and lower Fiber/Film tools
 - b. Use the hex torque wrench to tighten the screws and hold the sample in place. A torque setting of 15-20 is a good starting point.

- c. Adjust the screw tightness (if needed) to get the measured force back close to zero. Too tight and additional torque forces will be placed on the sample. Too loose and the sample might slip during the measurement.
 - d. Examine the sample to ensure that it does not have wrinkles or kinks.
16. Click on the **Move Stage** buttons slightly increase the gap distance to provide a very slight tension (less than -1gm) as indicated by the Force meter
17. Click **Exit** in the Gap/Instrument Control Panel

Test Set-Up and Measurement (See Chapter 3 in the RSA3 User Manual)

18. Click the green **START** button to enter the **Edit/Start Instrument Test** panel.
19. Enter an Experiment Title (filename to store the data) and click on **Save As** to select your directory. You should save your data in your own folder located in the “User Data” folder on the desktop.
20. Enter Operator and Test Notes if desired
21. Under **Sample Geometry**:
- a. Select the **Predefined Geometries** button (*Note: you can also save geometry settings and recall them by selecting the Stored Geometries button*)
 - b. In the **Geometry** pull down menu select:
 - i. Rectangular Tension/Compression Geometry for film samples or
 - ii. Cylindrical Tension/Compression Geometry for fiber samples
 - c. Click on **Edit Geometry** and enter the sample dimensions. Check “Read Test Fixture Gap” to have the system automatically measure the sample length at the start of the test.
22. Under **Test Set-Up**:
- a. Select the **Predefined Test Setups** button (*Note: you can also save test setup settings and recall them by selecting the Stored Test Setups button*)
 - b. Select the desired **Measurement Type** button (Dynamic or Transient) and select the desired Test Setup from the pull-down menu. See Chapter 3 in the RSA3 User Manual for a description of the various Test Setups. A typical test setup would be to select the Transient button and the Multiple Extension Mode Test from the pull down menu.
 - c. Click **Edit Test** to edit the test parameters. Click on **Help** button for an explanation of the test parameter settings
23. Click **Begin Test** to start the test
24. The data will be plotted in real time
- a. Graphing options can be modified by right clicking on the graph. Click on **Help** under each of the page tabs to read a description of the various graphing options.
 - b. You can toggle between graph display and spreadsheet display by clicking on the “Toggle Plot/Spreadsheet” icon
25. See Help files for descriptions of various data analysis functions

Saving Data

Please save all data in your directory in the User Data folder on the desktop

26. To save the data in the Orchestrator format

- Choose Save As from the File pull down menu and type in filename and select your directory in the User Data folder.
27. To save a picture of a graph:
Choose Copy from the Edit pull down menu (or press Ctrl+C). Open up the Paint application and choose Paste. You can then save the graph in a number of different picture formats (e.g., tiff, jpeg, etc).
28. To save the data list spreadsheet
a. Select the desired columns of data and choose Copy from the Edit pull down menu (or press Ctrl+C). Open up the Excel application and paste the data. You can then save the data in Excel format.

Shut Down

29. Select **Gap Control Panel** from the **Control** pull-down menu and click on **Set Gap** to move the motor to the original sample load position
30. Unload your sample
31. Click on **Send to Top** to raise the motor to the tool loading position
32. Remove the upper and lower Fiber/Film tools and place the tools and hex torque wrench in the black storage box
33. Click **Exit** in the Gap/Instrument Control Panel
34. Turn off the transducer motor and oven (if used)
a. Select **Instrument Control Panel** from the **Control** pull-down menu
b. Click Motor Power Off button and Environmental Controller Off button
c. Click OK
35. Exit the TA Orchestrator software
36. Turn off the power switch located on the back left side of the tool
37. Turn off the air supply
38. Log out usage using the SMIF web site